The role and impact of labour taxation policies

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Summary

Key points

This report focuses on the analysis of the role and impact of labour taxation policies. It provides a catalogue of tax reforms implemented through the personal income tax, social security contributions paid by the employer, by the employee and by the self-employed and it uses the catalogue in order to assess the impact that labour taxation policies have had on employment, unemployment, participation rates, hours of work, poverty and income inequality. The time span covered is 1990-2008 and the study encompasses the 27 EU Member States plus Croatia, Macedonia, Iceland, Japan, Serbia and United States. We also provide detailed information on reforms in Norway.

The template for data collection develops from the original European Commission LABREF database.

The reforms are classified according to one or more criteria: reforms which have **increased/decreased** Personal Income Taxation or Social Security Contributions; reforms of the Social Security Contributions which have introduced a **tax amnesty; temporary and permanent** reforms; reforms which put in place **enforcement and monitoring procedures; targeted** and **untargeted** reforms; **marginal** reforms; r**eforms which involved social partners.**

Beyond providing a descriptive analysis of the reforms implemented, the regression analysis conducted reveals that:

The **impact of the included policies on** the **unemployment** rate, the **employment** rate, the **inactivity** rate and weekly **hours** of work **is very weak, if any**. Even when they are significant, policy-related coefficients have very limited economic meaning. O**ne or two years are needed** in order to be able to detect any policy impact on countries' macroeconomic situation. When **time-varying control variables** such as the rate of highly educated people or the GDP are introduced, the policy impact is even weaker. Stronger and more significant effects are found when the analysis is conducted on the female workforce subsample. **PIT reforms targeted to women have increased female employment rates and average hours of work**, **while they have reduced inactivity rates**. There is no evidence that European reforms targeting the **young workforce** had an impact on any of the relevant outcomes.

When the focus is on poverty, the impact of the reforms is quantitatively **very limited** and statistically not significant. Inequality as measured by the Gini index does not seem to be influenced by any reforms in labour

income taxation. The only exception is when we study inequality separately by age subgroups.

The main recommendations to be derived from this study are the following.

Tax policy can play only a minor role in determining the outcomes of the labour market, compared to more effective policy measures such as wage bargaining arrangements, monetary and in-kind transfers, job placement services, training programmes, support to geographical mobility.

When using tax policies to improve labour market performance, it is better to target them on specific groups of workers (married woman, lone mothers, low-educated individuals).

It is more effective to use tax policies to affect the number of hours worked rather than the participation decision.

It is important to foresee procedures of ex-post evaluation in order to improve our knowledge of the actual impact of these measures.

The tax shift from labour income to consumption taxes can be part of a strategy aimed at increasing employment and reducing the efficiency cost of taxation; the possible adverse distributive effects of a tax shift to VAT for beneficiaries of transfers should be carefully taken into account.

Reforms should be based on more thorough considerations of the specific features of tax/benefit systems and institutional settings at the national level, moving from a cross-country analysis to one conducted at a more disaggregate level.

Executive summary

This report focuses on the analysis of the role and impact of labour taxation policies. It provides a catalogue of tax reforms implemented through the personal income tax, social security contributions paid by the employer, by the employee and by the self-employed and it uses the catalogue in order to assess the impact that labour taxation policies have on employment, unemployment, participation rates, hours of work, poverty and income inequality. The time span covered is 1990-2008 and the study encompasses **33 countries**: the 27 EU Member States plus Croatia, Macedonia, Iceland, Japan, Serbia and United States. We also provide detailed information on reforms in Norway. The exercise is performed on the general sample of a country labour force and on selected subsamples of the population, in particular, females and young workers.

Preliminary to the development of the catalogue, the report performs an analysis of the theoretical and empirical literature on the effects of taxation on the labour market and illustrates the broad statistical trends in labour taxation over the relevant period.

The literature

From the vast literature on the effects of taxes on labour market performance, we derive valuable insights on four key questions.

Which taxes have a significant impact on labour market performance?

Personal income taxes, employers' and employees' social security contributions, payroll taxes all affect the labour market equilibrium by contributing to the "*tax wedge*". Taxes on capital income may also affect the labour market outcome when capital markets are internationally integrated.

Which are the most relevant aspects of a tax structure in assessing the distortionary effects of taxes?

When the labour market is imperfectly competitive the composition of the tax wedge and the side that is legally taxed are relevant for assessing the economic effects of taxes. The degree of progressivity may affect both employment levels and human capital accumulation. The effects of single taxes cannot be correctly evaluated without taking into account how the

government disposes of the tax receipts and the overall structure of the tax system.

What can we say on the distortionary effects of taxes?

The empirical evidence shows that men's hours of work and the decision to participate do not respond very strongly to tax changes, while married women's, lone mothers' and low-skilled men's hours of work and participation decisions are more responsive to taxation.

The empirical literature has documented a positive relationship between unemployment rates and average labour taxes, even though changes in tax policies seems to explain only a very small share of employment differentials across countries.

What kinds of tax reforms may enhance social welfare?

The normative theory of optimal taxation suggests that the lowest-paid workers should face rather low marginal tax rates in order for their participation not to be discouraged. Efficiency-gains can be obtained by introducing elements of age-dependency in the labour income tax schedule and by a revenue-neutral tax reform that lowers the tax burden on secondary earners.

The case for a declining time profile of unemployment benefits appears reasonably well established in the literature.

Broad statistical trends

Macroeconomic trends

The analysis of the main trends in international taxation over the last four decades shows that Europe is a high tax area within the OECD. Despite the measures taken by EU countries to reduce the tax burden on labour during the last years, EU as a whole is still characterized by high labour taxation.

The stability of the average EU implicit tax rate on labour is the result of opposite trends within EU. Some countries (Southern Europe) have increased labour taxation, others (mainly in North and Eastern Europe) have reduced it, while the remaining (continental Europe) did not substantially modify their tax burden.

Trends in tax structure

Since the Mid-Eighties OECD countries and Europe have reduced the number of brackets and the top marginal tax rate. Despite the general reduction of top marginal tax rates of the personal income tax, progressivity measured by the total tax wedge has increased between 2000 and 2009.

In the period 2000-2009 the total tax wedge has been declining in most EU countries. The greatest decline occurred in Northern European countries where the tax wedge decreased by more than 5 percentage points. In most EU countries there has been a partial shift from employers to employees of the wedge component due to social security contributions.

The catalogue

The template for data collection is structured on the thirteen descriptive features of the original European Commission LABREF database, plus **seventeen additional categorical variables**, which aim at simplifying the use of the database for empirical analysis. Possible answers to some existing questions are also categorized, in order to facilitate the use of the information for statistical and descriptive purposes.

Identification of typologies of reforms

The reforms are classified according to one or more criteria. The main ones are the following:

Reforms which have **increased/decreased** Personal Income Taxation or Social Security Contributions; reforms of the Social Security Contributions which have introduced a **tax amnesty; temporary and permanent** reforms; reforms which put in place **enforcement and monitoring procedures; targeted** and **untargeted** reforms; **marginal** reforms; r**eforms which involved social partners.**

The taxonomies are used for descriptive purposes and for econometric analysis.

Descriptive analysis

The report provides three complementary descriptions of the database: the **general description** of the reforms for each of the countries considered**; the description of the main features** of the reforms for each country and each area of intervention **by making use of the categorical variables**; **the**

information on each features of the reforms cross-country and over-time for each field of intervention**.**

From 1990 to 2008 there have been 1,331 reforms in personal income taxation, with an average of about 40 reforms per country and about 70 per year. 99 reforms have decreased the tax base and 96 have increased it. 157 have modified the tax brackets. 102 have decreased the tax rate; 38 have increased the tax rate. 121 have decreased deductions; 105 have increased them. 62 have decreased tax credits; 110 have increased tax credits. The vast majority of reforms (1,209) apply to the entire labour force, with no distinction between incumbents and new entrants.

There have been 474 reforms on social security contributions paid by the **employees**. 18 are tax amnesties, 95 have decreased the tax rate; 137 have increased the tax rate.

There have been 767 reforms on social security contributions paid by the **employers**. 86 are tax amnesties, 293 have decreased the tax rate; 174 have increased the tax rate.

There have been 417 reforms on social security contributions paid by the **self-employed**. 23 are tax amnesties, 83 have decreased the tax rate; 84 have increased the tax rate.

Regression analysis

The report focuses on reforms that **lower** Personal Income Taxation or Social Security Contributions.

The individual incentives to work depend on both the tax wedge (and therefore on personal income tax and on social security contributions) and on net social benefits. The report only focuses on the tax wedge. This is an important thing to bear in mind in the interpretation of the results.

The main results of the analysis are:

- The **impact of all the included policies on** the **unemployment** rate, the **employment** rate, the **inactivity** rate and weekly **hours** of work **is very weak, if any**. Even when they are significant, policy-related coefficients have very limited economic meaning.
- O**ne or two years are needed** in order to be able to detect any policy impact on countries' macroeconomic situation.
  - When **time-varying control variables** such as the rate of highly educated people or the GDP are introduced, the policy impact is even weaker.
- When the analysis is conducted on the female workforce subsample,

we find that **PIT reforms targeted to women have increased female employment rates and average hours of work, while they have reduced inactivity rates**.

- There is no evidence that European reforms targeting the **young workforce** had an impact on any of the relevant outcomes.
- When the focus is on poverty, the impact of the reforms is quantitatively **very limited** and statistically not significant.
- The effect of reforms lowering the income tax targeted for young individuals differs across age subgroups: for the youngest group (16-30), it is positively correlated with the percentage of poor individuals; for the age group (31-55), it is negatively correlated with the percentage of poor individuals and with the average poverty gap.
- Inequality as measured by the Gini index does not seem to be influenced by any reforms in labour income taxation. The only exception is when we study inequality separately by age subgroups. In that case, there is some evidence that reforms regarding income tax and reforms of social security contributions have an impact in reducing poverty for the youngest cohort.

The basic analysis is subject to several robustness checks. In particular, it is extended to include also tax increasing reforms and to focus on more important reforms. The results generally confirm the previous conclusions. Remarkably, the involvement of social partners seems to be correlated with better labour market outcomes and lower poverty.

Using the OECD tax-benefit model the report finds that, consistently with the Lisbon employment targets for low employment countries, with few exceptions (e.g. lone mothers in Hungary) the changes in tax-benefit systems generally went in the direction of augmenting incentives. It is however hard to detect a relationship between the magnitude of the change in incentives and the size of the initial employment gap.

Thematic analysis of reforms

The analysis of past tax measures adopted in time of recession reveals that they are all characterized by a shift away from progressivity and a reduction of marginal tax rates on labour income, especially at higher income levels. Moreover, they all contain measures aiming at restoring neutrality of capital income taxation and at reducing the favour for debt-financed investment. All of the reforms tended to reduce revenue losses, or even to be revenue-neutral, by closing loopholes and reducing distortion of the tax systems. The analysis also shows that there is no tax

reform which is able to help economic recovery *and* to reduce inequalities, while being also financially sustainable. Tax reforms can help economic recovery, can work to reduce or to put a limit on inequality and also contribute to fiscal consolidation. However, due to inherent limits of tax policies, these objectives cannot be all satisfied simultaneously. The choice of priorities by each country depends on the relative strength of the economy, the potential benefits of a tax stimulus and the sustainability of public finances.

Making taxes less distortionary by shifting taxation from more mobile to less mobile tax bases and by broadening the tax base while reducing rates is a way to improve economic performance. Consumption taxes are the main candidate to implement a tax shift from labour taxation. Due to the broad base of the VAT, an increase in its tax rate is usually considered as a crucial ingredient of such a tax reform.

The move from labour income to consumption taxes can be proposed as part of strategy aimed increasing employment and reducing the efficiency cost of taxation. However, the possible adverse distributive effects of such a reform for beneficiaries of transfers should be carefully taken into account.

Fiscal packages promoted to alleviate the negative employment and social implications of the 2008-2009 included both revenue and expenditure measures and were often consistent with the guidelines of European Economic Recovery Plan (EERP), but were highly diversified across countries.

As for labour market and employment support, expenditure side measures were the most widely implemented, together with the revision of labour market institutions. Employment support came also from attempts to reduce the tax wedge on labour, tax disincentives to work and unemployment traps, through, for instance, cuts to personal income taxes and to social security contributions. The implemented expansionary tax reforms contributed to sustain household purchasing power and aggregate demand. Reforms of indirect taxation were mostly restrictive and encompassed tax increases (in particular, of VAT and excise duties), primarily to finance expansionary policies, but also reflecting a trend already detectable before the crisis.

Future challenges are: fiscal consolidation, to revert the trend of increasing public debt, and continuing support to economic growth, to mitigate the potential output losses and to guarantee that growth returns close to its pre-crisis path. Some of the tax reforms introduced during the crisis may be consistent also with these long term objectives.

Policy recommendations

The main recommendations to be derived from this study are the following.

Tax policy can play only a minor role in determining the outcomes of the labour market, compared to more effective policy measures such as wage bargaining arrangements, monetary and in-kind transfers, job placement services, training programmes, support to geographical mobility.

When using tax policies to improve labour market performance, it is better to target them on specific groups of workers (married woman, lone mothers, low-educated individuals) and economic sectors.

It is more effective to use tax policies to affect the number of hours worked rather than the participation choice.

It is important to foresee procedures of ex-post evaluation in order to improve our knowledge of the actual impact of these measures.

The tax shift from labour income to consumption taxes can be part of a strategy aimed at increasing employment and reducing the efficiency cost of taxation; the possible adverse distributive effects of a tax shift to VAT for beneficiaries of transfers should be carefully taken into account.

Reforms should be based on more thorough considerations of the specific features of tax/benefit systems and institutional settings at the national level, moving from a cross-country analysis to one conducted at a more disaggregate level.

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Chapter 1: setting the scene on labour taxation

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Executive Summary

Aim of this task is twofold: to provide a solid theoretical base about the influence of taxation on the economic performance, by supplying a critical and complete review of the recent literature and identifying some broad statistical trends in labour taxation.

Labour taxation and labour market performance: a review of the literature

Labour literature on the effects of taxes on labour market performance is vast. The number of issues that have been investigated is huge as there are several relevant dimensions that should be taken into account. Despite the complexity of the issue, the literature provides valuable insights on four key questions: 1) which taxes have a significant impact on labour market performance? 2) Which aspects of a tax structure are most relevant in assessing the distortionary effects of taxes? 3) What can we say on the distortionary effect of taxes? 4) What kinds of tax reforms may be welfare-enhancing?

Which taxes have a significant impact on labour market performance?

Payroll taxes and personal income taxes are not the only taxes that affect the labour market equilibrium. The concept on which most of the literature focuses is the so called "tax wedge", defined as the difference between the real product wage (or real labour cost) paid by firms and the real consumption wage of a worker. The tax wedge should take into account personal income taxes, employers' and employees' social security contributions, payroll taxes.

Taxes on capital income may also affect the labour market outcome when capital market are internationally integrated. When a small open economy levies a tax on income from domestically located capital, it drives some capital offshore lowering the productivity of the domestic labour force and, as a consequence, the equilibrium real wage rate. Thus, if labour is internationally immobile, levying a tax on the income of domestically located capital will ultimately make workers worse off.

Which aspects of a tax structure are most relevant in assessing the distortionary effects of taxes?

In a perfectly competitive labour market with flexible wages, only the total tax wedge matters: different components of the tax wedge exert identical effects on employment. Furthermore, the side that is legally taxed is irrelevant for assessing the economic effects of taxes.

When the labour market is imperfectly competitive the composition of the tax wedge becomes relevant. A switch from payroll to income taxes, given average rates, could affect wage pressure and unemployment. For instance, since non-labour income is not subject to payroll taxes, payroll taxes may not be equivalent to either income- or consumption taxes. The presence of a minimum wage represents another possible explanation why a switch from income taxes to payroll taxes reduces employment for those at- or near the wage floor. The reason is that a minimum wage implies that firms cannot entirely shift onto workers in the form of lower wages the increase in payroll taxes.

Another feature of the tax system which is important when the labour market is imperfectly competitive is the degree of progressivity.

When the workers cannot freely choose the number of working hours, an increase in the degree of tax progressivity may have employment-enhancing effects. However, assuming that workers can freely choose the number of working hours, an increased tax progressivity has ambiguous effects on pre-tax wages. The impact of higher tax progressivity on pre-tax wages (and unemployment) varies with the degree of centralization of the wage bargain and is stronger with industrial bargaining and weaker with central and local bargaining; less favorable employment outcomes occur at intermediate level of centralization (bargaining at the industrial level).

A key message of the literature is that it is crucial, albeit not always an easy task, to jointly consider the two sides of the public budget. Analyses of the incentive effects of taxation can be very misleading if they fail to take into account how the government disposes of the tax receipts and the overall structure of the tax system. For example, theoretical models predict that, when the tax system is proportional, a tax cut may increase employment if unemployment benefits are not taxed. In contrast, when unemployment benefit are fully taxed, proportional taxes on labor earnings are neutral.

What can we say on the distortionary effects of taxes?

The labour demand elasticity determines how the impact of a tax reform is distributed over employment- and wage responses. If the labour-demand elasticity is large, employment moves substantially while wages do not change much.

The empirical evidence shows that, for men, hours of work do not respond particularly strongly to the financial incentives created by tax changes. On the other hand, hours of work are a little more responsive for married women and lone mothers.

The participation decision is quite sensitive to taxation and benefits for married women and lone mothers in particular. Among men, it is responsive for low-educated individuals.

The empirical literature has documented a positive relationship between unemployment rates and average labour taxes, even though changes in tax policies seems to explain only a very small share of employment differentials across countries. A 10% rise in the tax wedge reduces employment by about 2%. The negative impact of higher (average) labour taxes on employment is stronger at intermediate degree of centralization of the wage bargaining process.

The impact of higher tax progressivity on pre-tax wages (and unemployment) varies with the degree of centralization of the wage bargain and is stronger with industrial bargaining and weaker with central and local bargaining; less favorable employment outcomes occur at intermediate level of centralization (bargaining at the industrial level). Further, the effect of increased progressivity on pre-tax wages is income-dependent. In particular, empirical work on Danish data has shown that an increase in progressivity reduces the pre-tax wages of blue-collar workers and moderate-wage-earners among white-collar workers but it has the opposite effect for high-wage earners among white-collar workers.

Even if hours of work and the decision whether to participate or not in the labour market are key dimensions that are affected by taxes, at least two other important choices are be influenced by taxes. One is human capital accumulation and the other is the extent to which agents engage in tax avoidance or tax evasion activities.

Human capital accumulation

In a simple setting with exogenous labour supply, no uncertainty and no other form of investment, a proportional wage tax is neutral with respect to the incentives to invest in human capital if all investment costs are represented by foregone earnings, or if all monetary costs of education/training are deductible against the proportional tax rate.

With an endogenous hours-of-work decision, a proportional wage tax may change the benefits of the investment without an offsetting movement in the costs, and neutrality no longer holds. Recent simulations have shown that the distortions generated by labour taxation are substantially larger when one takes into account the interactions between labour supply, education and retirement decisions.

The incentive/disincentive effects of labour income taxes on human capital investment also depends on the tax treatment of alternative forms of investment, such as investments in physical/financial capital.

If the return from investing in human capital is uncertain, taxes may stimulate the incentives to invest in human capital by reducing the riskiness of the investment, i.e. by providing an implicit insurance device.

Tax avoidance and evasion

The empirical literature has shown that the total income elasticity (which also takes into account tax avoidance activities) is quite high for high earning/high skill men.

When the scope for tax evasion varies across occupations, taxes may affect the occupational choices of agents by providing an incentive to choose those occupations where the possibility to engage in tax evasion (or tax avoidance) are greater.

The possibility of tax evasion (or tax avoidance) implies that the statutory incidence of taxes matters. Who is responsible for remitting the tax becomes an important aspect of implementing a tax system. The way that taxes are collected matters both for the incidence of the tax and for the government's tax revenue. In particular tax withholding and information reporting on the income of employees by employers dramatically improves tax compliance.

What kinds of tax reforms may enhance social welfare?

The normative theory of optimal taxation provides some useful insights on the structure of labour taxation.

Negative marginal income tax rates are never optimal in a model where agents only adjust along the "intensive" margin (number of hours of work). In such a setting, high marginal tax rates, along with a sizeable grant, tend to be optimal at the bottom of the income distribution.

The incorporation of "extensive" labour supply responses (whether to participate or not in the labor market) in the standard optimal taxation model changes the shape of the optimal tax schedule in important ways. Realistic participation elasticities require that the lowest-paid workers face rather low marginal tax rates in order not to discourage their participation. Negative marginal tax rates might in some cases become desirable.

Efficiency-gains can be obtained by introducing elements of age-dependency in the labour income tax schedule. Since the elasticity of labour supply varies over the life-cycle, an age-related labour income tax would allow targeting lower marginal tax rates on agents whose labour supply is more elastic, as for instance young workers and workers close to the retirement age.

With respect to the issue of the choice of the unit of account for tax purposes, the conventional wisdom among economists is that, from an

efficiency standpoint alone (and in the presence of graduated marginal tax rates), individual taxation should be preferred to joint taxation since the former imposes lower marginal tax rates on individuals whose labour supply is more elastic.

Substantial welfare (and employment) gains could be achieved by a revenue-neutral tax reform that lowers the tax burden on secondary earners. Such a reform would strongly target married women with low earnings, or weak labour market attachment, without formally discriminating based on gender. Alternatively, welfare (and employment) gains could be achieved by publicly providing private goods that are complements with the supply of labour services in the market and that are substitutes for household chores that tend to be performed by women within the family (for instance child-care services and elderly-care services). Such a policy measure, financed by adjusting the income tax schedule, can be viewed as an indirect way to target the reduction in the tax burden on the segment of the female population characterized by larger labour supply elasticities.

Labour income taxes tend to make home production profitable even if the marginal productivity of labour in home production is below its marginal product in the official consumer service sector. For this reason, it might be welfare-improving to levy a relatively low tax rate on the purchase of consumer services (defined as goods/services that can be both purchased in the market and produced at home). Once the possibility of involuntary unemployment is accounted for, the case for a relatively low net fiscal burden on consumer services seems to be strengthened.

The case for a declining time profile of unemployment benefits appears reasonably well established in the literature.

Optimal layoff taxes should be set equal to the sum of the unemployment benefits and payroll taxes whose revenue is lost once the workers are laid off and become unemployed.

Broad statistical trends

Macroeconomic trends

The analysis of the main trends in international taxation over the last four decades shows that Europe is a high tax area within the OECD.

The tax to GDP ratio rose during the 1970s and the 1980s, when the European welfare states reached their maturity. However, within Europe single countries show different trends. In particular, while in Northern and Continental Europe overall taxation ratios leveled off by the mid-

1990s, they are still raising in Southern Europe. Since the former countries were characterized in the '70s and '80s by the highest taxation ratios and the latter by the lowest, a catch-up trend seems to be occurring in Europe.

As to the composition of the tax burden, European countries rely more on consumption taxes – due to a more developed VAT system - and on social security contributions – due to a more developed social benefit system - than other developed economies. Notwithstanding marked differences in taxation structures, a convergence process in terms of direct and indirect tax revenue to GDP ratios seems to be ongoing in Europe, mainly among old EU-members. On the contrary, with regards to social security contributions, two main taxation models emerge as Southern and Continental Europe countries are on average characterized by persistently higher ratios than Northern Europe.

In the last fifty years the structure of taxation has been relatively stable in four countries: Ireland, Luxembourg, Denmark and Austria. Southern European countries, with the exception of Italy, moved from a very low taxation pattern towards a higher taxation pattern, especially Portugal which in 2005 recorded higher than average SSC and indirect tax rates. Finally, the three big European countries, namely France, Germany and UK, have moved towards lower relative taxation ratios with a greater SSC cut effort in France and Germany and greater direct tax cut effort in UK. Italy steadily stays among countries with the higher relative taxation with a shift of fiscal burden to direct taxation.

The analysis of implicit tax rates over the period 1995-2008 shows that, among old EU members, only two countries, the Netherlands and UK, remain at a low relative level of taxation over the whole period, while Austria, , Italy, Sweden, and to a greater extent Finland exhibit stable high taxation patterns. All new EU members, with the exception of Czech Republic, have since 1995 (or shift towards) low taxation modes. Finally four countries, Belgium, Cyprus, Germany Portugal have been moving towards higher relative taxation structures.

Despite the measures taken by EU countries to reduce the tax burden on labour during the last years, EU as a whole is still characterized by high labour taxation. However, the stability of the average EU implicit tax rate on labour turns out to be the result of opposite trends within EU. Some countries (Southern Europe) have been increasing labour taxation, others (mainly in North and Eastern Europe) have been reducing it, while the remaining (continental Europe) did not substantially modify their tax burden. Finally, capital tax competition did not entail any decline of the corresponding tax burden in EU.

The implicit tax rate (ITR) on labour can be decomposed in three main components: the ratio of taxes on labour to total taxation, the level of the total tax burden with respect to the GDP and the share of compensation of employees on GDP. The analysis of the changes in the three components reveals that, between 1999 and 2008, the decrease in the ITR was generally achieved through a reduction of the share of taxes on labour and a decrease in the total tax burden. It is more difficult to find a general pattern in the case of an increase of the ITR. Cyprus, Malta and Spain have experienced an increase in total tax burden and a reduction in the share of taxes levied on labour. Portugal and the United Kingdom have recorded an increase in both total taxation and taxes on labour. Austria and Netherlands registered an increase in ITR despite a reduction in both total taxation and the share of taxes on labour.

Trends in tax structure

In OECD countries and Europe there is a clear downward trend since the mid '80s both in the number of brackets and in the top marginal tax rate. Top rates started decreasing at a stronger pace after the turn of the century.

The trend towards flatter income taxes (with a smaller number of tax brackets and lower top rates) was certainly driven, at least in the 80s, by the growing concern about the negative effect of highly progressive rates on labour supply. The further decline in top marginal rates experienced in the last decade may be the result of the growing international integration of goods and capital markets.

Since the 80s there is, among OECD countries, a clear convergence of statutory tax rates of the corporate income tax and a reduction in their mean value. The convergence in statutory rates is consistent with the theoretical prediction that increased economic integration of capital stimulates strategic interaction, forcing high tax countries to reduce their rates in order to avoid profit shifting towards low tax countries and to attract new multinational firms. If the corporate tax is a backstop to the income tax, personal tax rates on labour and capital income are linked to corporate tax rates. This implies that trends in personal tax rates can be driven by changes in corporate taxation. It is therefore possible that higher mobility of profits and firms forced a convergence in corporate statutory tax rates and this caused a similar convergence in personal tax rates.

Surprisingly, despite the general trend among OECD countries towards a reduction of top marginal tax rates of the personal income tax, progressivity measured on the total tax wedge has increased between 2000 and 2009. The raise in progressivity is quite general in the EU: only three out of nineteen countries (Austria, Hungary and Ireland) have slightly

reduced progressivity. The average value shows a slight decline between 2008 and 2009 which may be the result of the policy measures implemented to counteract the economic crisis.

It is much more difficult to describe the evolution of the tax schedule at the bottom of the income scale. A relevant feature for the potential impact on labour decisions is the tax threshold, e.g. the level of earnings at which the income tax is first paid. Between 2001 and 2009 there is a general trend towards a reduction in the tax threshold and in the marginal effective tax rate at the threshold.

In the period 2000-2009 the total tax wedge has been declining in most EU countries. The greatest decline occurred in Northern European countries where the tax wedge decreased by more than 5 percentage points. In most EU countries there has been a partial shift from employers to employees of the wedge component due to social security contributions.

1. Labour taxation and labour market performance: a review of the literature

In this chapter we provide a review of the theoretical and empirical literature on the effects of taxes on labour market outcomes. The plan of the chapter is the following. Section 1.1 deals with the effects of taxes in perfectly competitive labour markets. The analysis of the effects of taxes in imperfectly competitive labour markets is carried out in Section 1.2, where we consider separately the two cases of proportional versus progressive taxes. Section 1.3 extends the analysis contained in the previous sections by looking at the effect of taxes on the incentives to engage in tax avoidance/evasion activities and to invest in human capital. Section 1.4 reviews some specific issues that arise when analyzing the effects of taxes in an open-economy setting. Finally, section 1.5 offers a review of the main insights that can be drawn from the normative theory of optimal taxation.

1.1 The effect of taxes in competitive labour markets

The impact of taxes differs substantially whether one assumes that labour markets are perfectly competitive or not. The analysis is simpler in competitive labour markets since the flexibility of wage rates implies that there cannot be any involuntary unemployment. To examine the effects of taxes, it is useful to start with the labour supply channel and consider the effect of an increase in a proportional tax on labour income, taking the hourly wage rate as given.

Because the substitution and income effects on labour supply pull in opposite directions, one cannot predict unambiguously whether labour supply rises or falls in response to an increase in the proportional tax rate. On the one hand, since a higher tax rate lowers the after-tax wage rate, the price (opportunity cost) of leisure goes down and this induces a substitution effect toward more leisure and less work.[1] On the other hand, the decrease in the returns to work also means that the worker is poorer at any given level of labour supply. This reduction in income implies an income effect that causes him/her to work more.[2] **However, since income**

[1] The strength of this substitution effect is measured by the so called "compensated (wage) elasticity of labour supply" (the higher the compensated elasticity and the higher the reduction in the individual's labour supply).

[2] The strength of this income effect is measured by the so called "income elasticity of labour supply" (the higher the income elasticity, the larger the increase in the individual's labour supply).

effects on labour supply are proportional to hours worked before the change in the tax rate, substitution effects are likely to dominate at low levels of working hours, implying a reduction in labour supply.

Box 1: Uncompensated wage elasticity estimates			
Paper	*Country*	*Period*	*Estimate*
Male labour supplì			
Blomquist and Hansson-Brusewitz (1990)	Sweden	1980-1981	0.12
Blomquist and Newey (2002)	Sweden	1973; 1980; 1990	from 0.04 to 0.12
Bourguignon and Magnac (1990)	France	1985	0.1
Ecklof and Sacklen (2000)	US	1976	0.05
Flood and MaCurdy (1992)	Sweden	1984	from -0.25 to 0.21
Heckman and Ashenfelter (1974)	US	1960	0.06
Kaiser et al. (1992)	Germany	1983	- 0.04
MaCurdy et al. (1990)	US	1975	0
Pencavel (2002)	US	1968-1999	from -014 to 0.25
Triest (1990)	US	1983	0.05
Van Soest et al. (1990)	Netherlands	1985	from -0.01 to 0.12
Married women labour supply			
Arellano and Meghir (1992)	UK	1983	0.29 when the youngest child is between age 0 and 2; 0.5 when the youngest child is between age 3 and 5; 0.71 when the youngest child is between age 6 and 10; 0.62 when the youngest child is older than 10
Blomquist and Hansson-Brusewitz (1990)	Sweden	1981	from 0.386 to 0.79
Blundell et al. (1998)	UK	1978-1992	0.14 when there are no children; 0.21 when the youngest child is between age 0 and 2; 0.37 when the youngest child is between age 3 and 5; 0.13 when the youngest child is between age 6 and 10; 0.13 when the youngest child is older than 10
Cogan (1981)	US	1966	0.864
Hausman (1981)	US	1975	from 0.906 to 0.995
Kaiser et. al. (1992)	Germany	1983	1.04
Lone mothers labour supply			
Blundell et. al. (1992)	UK	1978-1992	0.34
Brewer et. al. (2005)	UK	1995-2002	1.02 (participation)
Eissa and Liebman (1996)	US	1985-1987; 1989-1991	1.16 (participation)

The empirical literature suggests that the uncompensated wage elasticity for men and single female without children is positive but close to zero, which implies that hours adjustments to changes in marginal wages is very low (see Box 1). The empirical evidence for

married women and lone mother is rather mixed. The range of estimates of labour elasticity for married women is very wide and depends a lot on whether they have children or not, on the age of the youngest child, and on whether one considers the effect on yearly hours of work or weekly hours of work. The estimated uncompensated wage elasticities are similar to those for men when one considers married women with no children and for married women with a youngest child older than 5. For married women with children younger than 5 and for lone mothers, the uncompensated wage elasticity is larger. **In all cases, the elasticities calculated with respect to yearly hours are for married women and lone mothers significantly larger than those based on weekly hours (see Box 1).** This evidence suggests that for some groups of individuals the relevant margin that is affected by taxes is not that of whether to work more or fewer hours, or whether to put more or less effort, but rather whether to participate or not in the labour market. This margin of choice is often called "extensive" margin to distinguish it from the traditional "intensive" margin represented by the number of hours of work. The extensive margin becomes important if there are for instance fixed costs of work (like travel expenses or, for those who have been acting as carers, usually for children or elderly relatives, child-care or elderly-care expenses) or if employers require employees to work a minimum number of hours per week. **The literature has shown that the importance of the extensive margin of response is highly sensitive to the demographic group that one considers, and that it appears to be especially relevant at the low end of the income distribution. For instance, the highest participation elasticity is found for lone mothers, who tend to be poor and to face very high costs of work. Among men, quite significant participation elasticities have been estimated for unskilled men.**

So far we have assumed that the hourly wage rate was constant. However, a change in the labour income tax rates will in general affect the equilibrium level of employment, the gross wage paid by employers and the net wage received by employees.

To assess the impact of taxes on the market wage, we need to consider the demand side of the labour market. How the impact of the tax reforms is distributed over employment- and wage responses depends on the labour-demand elasticity. If the labour-demand elasticity is large, employment moves substantially while wages do not change much. Taking wages as given, a profit maximizing representative firm hires labour up to the point where the marginal revenue from employing an additional worker exactly equals the producer wage (which includes

payroll taxes and social security contributions paid by the employer[3]). A higher producer wage induces a profit maximizing firm to reduce its labour demand. The strength of this negative effect on labour demand is measured by the so called "wage elasticity of labour demand".[4] Tax reforms that have a positive effect on employment also reduce the producer wage and vice versa.

Payroll taxes and personal income taxes are not the only taxes that affect the labour market equilibrium. The concept on which most of the literature focuses is the so called "tax wedge", defined as the difference between the real product wage (or real labour cost) paid by firms and the real consumption wage of a worker. The tax wedge should take into account personal income taxes, employers' and employees' social security contributions, payroll taxes, and indirect consumption taxes.

As a first approximation, one can claim that in a perfectly competitive labour market with flexible wages, different components of the tax wedge exert identical effects on employment. The reason is that flexible wages ensure that firms can partially shift a higher payroll tax onto workers through lower wages, while higher wages allow workers to shift higher income taxes and consumption taxes onto employers.

The above result leads to the "invariance of incidence proposition" according to which, in perfectly competitive labour markets, the side that is legally taxed is irrelevant for assessing the economic effects. Irrespective of the legal incidence of a tax, its economic burden is shared between the demand- and supply-side of the labour market in a way that depends only on the relative elasticity of the labour demand- and the labour supply curve. As a general rule, the less elastic one of the sides of the market is, the larger will be its share of the economic burden of the tax.

Tax wedges may sometimes be misleading for the purpose of predicting the labour market equilibrium in terms of wages and employment. It is crucial, albeit not always an easy task, to jointly consider the two sides of the public budget. Analyses of the incentive effects of taxation can be very misleading if they fail to take into account how the government disposes of the tax receipts. For instance, when individuals are perfectly

[3] Hereafter, the distinction between social security contributions and payroll taxes will be based on the circumstance that only the former confer an entitlement to social benefits.

[4] The higher the wage elasticity of labour demand and the larger the reduction in the firm's labour demand. The value of this elasticity depends on the time horizon that one considers and also on the aggregation level to which the concept applies. With respect to the former, the long-run wage elasticity of labour demand tends to exceed the short-run elasticity (given that in the long run a firm has the possibility to also adjust the level of production factors other than labour). With respect to the latter, the wage elasticity of labour demand tends to be larger on a macroeconomic level than on a sectoral level.

rational and retirement schemes are actuarially fair, social security contributions should not be included in the tax wedge. Given the tight link between the individuals' social security contributions and their own retirement benefits, the social security contributions are not in itself a tax in this case.[5] Another example is given by the public provision of private goods/services that are complements with the individuals' labour supply on the market (such as, for instance, child care services or elderly care services). When such goods/services are provided free of charge by the public sector (or at a fee that is below the marginal production cost), part of the income tax rate that applies to workers is non-distortionary. In fact, part of the income tax rate is a *corrective* component that offsets the distortion created by the public provision scheme: it replaces the market price in facing the agent with the true social cost of working. To calculate the real tax wedge we should subtract this component from the statutory tax rate.[6]

To summarize:

- **The impact of taxes differs substantially whether one assumes that labour markets are perfectly competitive or not.**
- **In a perfectly competitive labour market with flexible wages, only the total tax wedge matters: different components of the tax wedge exert identical effects on employment.**
- **The labour demand elasticity determines how the impact of a tax reform is distributed over employment- and wage responses. If the labour-demand elasticity is large, employment moves substantially while wages do not change much.**
- **In a perfectly competitive labour market, the side that is legally taxed is irrelevant for assessing the economic effects.**
- **When assessing the incentive effects of taxation it is crucial to take into account also how the government disposes of the tax receipts.**
- **The empirical evidence shows that, for men, hours of work do not respond particularly strongly to the financial incentives created by tax**

[5] Agents' beliefs are important since, when benefits are far into the future, workers may underestimate the marginal benefits that accrue as they work. This implies that the labour supply effect of social security contributions might be greater than it would if benefits were fully appreciated. Since the lag between the payment of the contributions and the timing when retirement benefits start to accrue is larger for younger workers, younger workers are likely to be proner to underestimate the marginal future benefits of currently paid social security contributions. In this case social security contributions would have more adverse labour supply effects when levied on young workers.

[6] See, e.g., Gahvari (1994, 1995) and Blomquist, Christiansen and Micheletto (2010).

changes. On the other hand, hours of work are a little more responsive for married women and lone mothers.

- **The participation decision is quite sensitive to taxation and benefits for married women and lone mothers in particular. Among men, it is responsive for low-educated individuals.**

1.2 The effect of taxes in imperfectly competitive labour markets

In this section we abandon the assumption of perfectly competitive labor markets and we therefore allow for the presence of involuntary unemployment. The section is organized as follows. The first paragraph examines the effect on the labour market of proportional labour taxation while the second paragraph deals with the effects of progressive labour taxation.

1.2.1 Proportional income taxation

If the labour income tax is proportional, a tax cut can generate employment gains only if it changes the replacement ratio (i.e. the relative compensation of unemployed workers). The reason is that, if the labour taxation system is proportional, the pre-tax wages fall if the real after tax income from unemployment and leisure is not affected, or only partially affected, by the reduction in average taxes. For instance, when unemployment benefits are not taxed, lower average labour taxes reduce the replacement ratio, and unions are willing to accept lower pre-tax wages because the net income loss from employment increases.[7]

Thus, a benefit regime involving fixed unemployment compensation in real terms may generate employment gains through lower labour taxes. The tax cut works because it implies a decline in the relative compensation of unemployed workers.[8] Moreover, when further income sources other than wages are considered, since these additional income sources are unresponsive to changes in the real wage and are more prevalent among the unemployed, a higher labour income tax rate increases the effective replacement rate by inducing a proportionally bigger reduction in labour earnings than in total unemployment compensation. This happens irrespective of whether unemployment benefits are indexed to wages or fixed in real terms. In contrast, in conventional models of equilibrium

[7] See Daveri and Tabellini (2000).

[8] The result does not depend either on the assumptions on the individuals' labor supply (whether it is exogenous or endogenous) or on the assumptions about the composition of the workforce (whether workers are homogeneous or heterogeneous).

unemployment where the replacement ratio is held fixed, proportional taxes on labour earnings are neutral with respect to unemployment.[9]

The most recent empirical literature has documented a statistically significant positive relationship between unemployment rates and average labour taxes, even though changes in tax policies explain only a very small share of employment differentials across countries. The effect of labour taxation on unemployment differentials across countries was one of the issues largely discussed in the Mid-Eighties following the Bean, Layard and Nickell (1986) effort to organize a multi-country study. According to them, labour taxation is only partially responsible for the unsatisfactory employment performance of European countries. Their empirical evidence shows a positive but weak relationship between labour taxation and unemployment. More recently, a number of studies, which have been using panel data to exploit the correlation of these variables over time, have found a stronger relationship between unemployment rates and average labour taxes.[10] According to Nickell (2003), a 10% rise in the tax wedge reduces employment by about 2%.

The magnitude of the impact of higher (average) labour taxes on unemployment depends on the degree of centralization of the wage bargaining process. The empirical evidence shows that the relationship between the degree of centralization of the wage bargain and equilibrium unemployment is hump-shaped and highest in countries with an intermediate degree of centralization (bargaining at the industrial level).[11] The negative effect of high average taxes on employment appears to be stronger in countries characterized by intermediate degree of centralization of the wage bargaining process than in countries characterized by low- or high- degree of centralization (bargaining at the firm- or at the national level).[12]

The empirical evidence suggests that in the long-run a higher tax wedge is fully passed on to consumers in the form of lower post-tax real wage. From a theoretical point of view the tax wedge has a larger negative impact on employment the higher the real consumption wage rigidity (i.e. the post-tax real wage accruing to the individual), or the higher the wage elasticity of labour supply. In both cases, since the change in the real after tax wage is small, any change of taxation is passed on employers in the form of higher labour costs. Recent evidence by Arpaia and Carone (2004) on the relationship between the tax wedge (and each of its components)

[9] This holds true in union-bargaining models, search-matching models and in various efficiency wage models (see Pissarides, 1998).

[10] See, for instance, Nickell and Layard (1999) and Daveri and Tabellini (2000).

[11] See Calmfors and Driffill (1988).

[12] See Daveri and Tabellini (2000).

and the labour costs shows that wage resistance is significant only in the short run.

When the labour market is imperfectly competitive the composition of the tax wedge matters and the aforementioned "invariance of incidence proposition" may fail to hold. As we will see below, this result is strengthened when one considers nonlinear taxation schemes but it may also occur under simple proportional tax structures. The presence of a binding minimum wage represents a possible explanation why a switch from income taxes to payroll taxes reduces employment for those at- or near the wage floor. The reason is that a minimum wage implies that firms cannot entirely shift onto workers in the form of lower wages the increase in payroll taxes. But payroll taxes may not be equivalent to either income or consumption taxes also for other reasons. For instance, since non-labour income is not subject to payroll taxes, a switch from payroll to income taxes, given average rates, could affect wage pressure and employment. Finally, recent contributions have highlighted how the statutory tax incidence matters when it induces a shift in the fairness perceptions of the agents transacting in a market. In particular, changes in statutory incidence matter when prices are determined, at least partially, by bargaining (as it is the case for the labour market) and agents' behaviour is motivated by both their pecuniary after-tax payoffs and by social norms, concerning the distribution of payoffs, which prescribe that the legal obligation to pay a tax is regarded as a moral obligation to bear it.[13]

To summarize:

- **If the labour taxation system is proportional, pre-tax wages fall if real after tax income from unemployment and leisure is not affected, or only partially affected, by a reduction in average taxes.**
- **Proportional labour taxes are non-neutral with respect to unemployment irrespective of whether unemployment benefits are indexed to wages or fixed in real terms when income sources other than wages are considered.**
- **The empirical literature has documented a positive relationship between unemployment rates and average labour taxes, even though changes in tax policies seems to explain only a very small share of employment differentials across countries. A 10% rise in the tax wedge reduces employment by about 2%.**
- **The negative impact of higher (average) labour taxes on employment is stronger at intermediate degree of centralization of the wage bargaining process.**

[13] See Kerschbamer and Kirchsteiger (2000).

- **When the labour market is imperfectly competitive the composition of the tax wedge matters and the "invariance of incidence proposition" may not hold. This is true even when one limits attention to simple proportional tax schemes. The result might be due for instance to the presence of binding minimum wages or the possibility that people's behaviour is partly driven by social norms that regard the legal obligation to pay a tax as a moral obligation to bear it.**

1.2.2 Non-linear (progressive) income taxation

When labour taxation is nonlinear, another opportunity to reduce unemployment is to vary the degree of labour tax progressivity.

1.2.3 Progressive income taxation with exogenous labour supply

When the length of the working day is exogenously given (i.e. individual labour supply is exogenous), stronger tax progressivity is employment-enhancing in common models of imperfectly competitive labour markets. Thus, some degree of progressivity can be justified on purely efficiency grounds. Various theoretical contributions on unionized labour markets have shown that, if labour taxation is progressive and the length of the working day is exogenously given, unions reduce pre-tax wages in response to an increase in the marginal tax rate.[14] The intuition is that, increasing the marginal tax rate and holding the average rate constant, the union's marginal benefit of increasing the pre-tax wage is reduced. Thus, a higher degree of tax progressivity (i.e. a larger positive difference between marginal- and average tax rate) lowers for unions the attractiveness of striving for higher wages. A "wage moderation effect" of increased tax progressivity also occurs in standard job search models of the labour market. The reason is that a higher marginal tax rate raises the cost to the employer of providing the worker with some given increase in the after-tax wage, and at the same time it reduces the cost to the worker of conceding more profit to the employer by accepting a lower pre-tax wage.[15] The theoretical prediction of a negative relationship between tax progressivity and wage pressure has also been tested and confirmed in several empirical contributions covering different countries and different time periods.[16] It should be noticed, however, that many of these papers derived the unemployment effects of tax progressivity by estimating a single wage equation and disregarding labour supply effects.

When the income tax is progressive the composition of the tax wedge becomes more important. We have already seen that the composition of

[14] See, e.g., Malcomson and Sartor (1987), Lockwood and Manning (1993), Holm and Koskela (1996) and Koskela and Vilmunen (1996).

[15] See, e.g., Sørensen (1999).

[16] See, for instance, Lockwood and Manning (1993) for the case of UK, Malcomson and Sartor (1987) for the case of Italy, and Holmlund and Kolm (1995) for the case of Sweden.

the tax wedge is likely to be more relevant when labour markets are imperfectly competitive than under perfect competition. When the income tax is progressive this difference is likely to be magnified. For instance, the equivalence between personal income tax rates and payroll taxes is violated in the presence of tax allowances.[17] The reason is that the two taxes have different tax bases; therefore, any revenue-neutral increase in the wage tax must be higher than the associated fall in the payroll tax. This in turn implies an increase in the marginal tax rate (for a given average tax rate) and therefore an effect on employment through the "wage moderation effect" illustrated above.[18] More generally, it has been pointed out that, whenever taxes are nonlinear, a revenue-neutral tax reform that changes the composition of the tax wedge is likely to exert employment effects by affecting the tax progressivity.[19]

To summarize:

- **When the length of the working day is exogenously given, stronger tax progressivity is employment-enhancing in common models of imperfectly competitive labour markets. A certain degree of progressivity can be justified on purely efficiency grounds when labour markets are distorted for non-tax reasons.**
- **Imperfectly competitive labour markets imply that a progressive income tax strengthens the case that the composition of the tax wedge matters. This happens because, when taxes are nonlinear, a revenue-neutral tax reform that changes the composition of the tax wedge is also likely to affect the tax progressivity.**

1.2.4 Progressive income taxation with endogenous labour supply

When the individual labour supply is endogenous, a change in tax progressivity has ambiguous effects on pre-tax wages. We have already seen that an increase in tax progressivity, achieved by raising the marginal tax rate for a given average tax rate, reduces the pre-tax real wage and is therefore employment-enhancing in imperfectly-competitive labour markets where the length of the working day is exogenously fixed. However, when labour supply is endogenous, a higher marginal tax rate also reduces the optimal number of individual work hours, and this labour supply effect tends to raise the pre-tax real wage.[20] When the labour supply effect is sufficiently strong, pre-tax real wages increase in response to an increase in the marginal tax rate. Even if this happens, the

[17] See Koskela and Schöb (1999).

[18] See also Picard and Toulemonde (2003) who show the non-equivalence between taxes levied on workers and those paid by the firms when labour taxes are non-linear.

[19] See Picard and Toulemonde (2003).

[20] See for example Holmlund and Kolm (1995), Calmfors (1995), Hansen (1999), Sørensen (1999), Fuest and Huber (2000), and Hansen, Pedersen and Sløk (2000).

unemployment rate is likely to go down because each employed individual works less. However, total output is reduced too. The labour supply effect that materializes when the individual labour supply is endogenous implies that the optimal degree of progressivity that can be justified on purely efficiency grounds is smaller than under the assumption of exogenous length of the working day.

The empirical literature suggests that the effect of increased progressivity on pre-tax wages is income-dependent.[21] In particular, empirical work on Danish data has shown that an increase in progressivity reduces the pre-tax wages of blue-collar workers and moderate-wage-earners among white-collar workers. However, an increase in progressivity raises the pre-tax wages of high-wage earners. The fact that the sign of the effect is income-dependent is likely to be due to institutional differences among the respective labour submarkets. As suggested by Lockwood, Sløk, and Tranaes (2000), unskilled workers' pre-tax wages are more likely to fall, following an increase in tax progressivity, since these workers are heavily unionized and their hours-supply function is relatively inelastic. The opposite holds true for skilled workers who have more elastic labour supply and are less unionized.

The empirical evidence suggests that the impact of higher tax progressivity on pre-tax wages (and unemployment) varies with the degree of centralization of the wage bargain; less favorable employment outcomes occur at intermediate level of centralization (bargaining at the industrial level). Brunello and Sonedda (2007) have shown that a higher tax progressivity increases wages in countries characterized by industrial wage bargaining (with a consequent higher unemployment rate); however, it reduces wages (and this effect is much smaller in absolute terms) in countries where the wage bargaining is either local (at the firm level) or centralized (at the national level).

So far the individual labour supply has been considered in terms of hours of work. However, the individual labour supply can also be conceived in terms of effort. Under collective wage bargaining, Koskela and Schöb (2007) show that, while a higher tax progression leads to wage moderation, a revenue-neutral increase in tax progressivity has a negative effect on employment when the individual effort is imperfectly observable. Moreover, ambiguous employment effects of changing labour tax progressivity in a model where labour supply is measured by individual's effort can also be found when a different wage setting procedure is considered. Within an efficiency wage framework, Koskela

[21] See Hansen, Pedersen and Sløk (2000) and Lockwood, Sløk and Tranaes (2000).

and Schöb (2009) show that an increase in tax progressivity, generated by a revenue-neutral tax reform, moderates the wages and workers' efforts but has an ambiguous effect on employment that depends on the magnitude of the pre-reform total tax wedge.

When agents can adjust labour supply also along the extensive margin, the composition of the tax wedge becomes more important. With few exceptions, the literature has focused on labour supply effects generated by changes in either effort or the hours of work supply function (i.e. at the intensive margin), but it has generally disregarded changes in labour market participation at an aggregate level. One exception is Heijdra and Ligthart (2009), who endogenize the labour supply along the extensive margin to examine, in a search-theoretic framework, how a tax reform that reduces a payroll tax and increases a progressive wage tax affects the equilibrium unemployment rate. They show that such a reform reduces the equilibrium unemployment rate and it increases tax revenues as long as the bargaining power in the negotiations does not all belong to workers.

To summarize:

- **A change in tax progressivity has ambiguous effect on pre-tax wages and employment when individual labour supply is endogenous.**
- **The empirical evidence shows that the effect of increased progressivity on pre-tax wages is income-dependent.**
- **The impact of higher tax progressivity on pre-tax wages (and unemployment) varies with the degree of centralization of the wage bargain and is stronger with industrial bargaining and weaker with central and local bargaining; less favorable employment outcomes occur at intermediate level of centralization (bargaining at the industrial level).**
- **The composition of the tax wedge becomes more important when agents can adjust labour supply also along the extensive margin.**

1.3 Taxes, educational choices and compliance behaviour

Even if hours of work and the decision whether to participate or not in the labour market are key dimensions that are affected by taxes, at least two other important dimensions of labour supply may be influenced by taxes. One is the level of human capital of the workforce and the other is the extent to which agents engage in tax avoidance or tax evasion activities.

1.3.1 Tax avoidance/evasion

Taxes may affect the compliance behavior of agents, and in particular the incentives to engage in tax avoidance and/or tax evasion activities.[22]

Higher marginal income tax rates may affect the composition of the compensation package offered to a worker. Employers often offer employees a compensation package that includes not only wages but also health benefits, pensions, "perks" such as access to a company car, in-house sport facilities, and so on. Most of the non-monetary component of the compensation package goes untaxed; therefore, their relative attractiveness increases when marginal tax rates increase.

Higher marginal income tax rates may be followed by an increase in the expenditure on deductible items. When deductions are itemized, the net price of a deductible item is equal to 1 minus the marginal income tax rate. When the marginal income tax rate goes up, the net price of a deductible item goes down.

The tax system may provide incentives for restructuring the organizational form of one's business activity (like for instance the incorporation choice[23]) **or provide incentives for "source misreporting"**, namely to disguise, for tax purposes, incomes from a given source into incomes from a different source. For instance, when labour- and capital income are taxed at different rates, agents might try to take advantage of this different tax treatment by disguising labour income as capital income (or, albeit a less likely case, vice versa). The rationale for adopting such practices rather than purely under-reporting total earned income (i.e. engaging in tax evasion) is twofold. First, if the practice is challenged by the tax authority, it may be considered a less serious offense, being subject to a lighter penalty. Second, attempting to enjoy the fruits of under-reporting by consuming in excess of one's declared (net) income might attract the suspicions of the tax authority and, to avoid this risk, costly laundering activities must be undertaken.[24]

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[22] The conceptual distinction between tax avoidance and tax evasion hinges on the legality of the taxpayer's actions. Tax evasion refers to effort to evade taxes by illegal means. Tax avoidance refers to the legal utilization of the tax regime for the purpose of reducing one's tax liability. This conceptual distinction notwithstanding, the distinction between these two type of activities can often be quite blurred.

[23] De Mooij and Nicodème (2008) provide evidence that the tax gap between personal and corporate tax rates exerts a significant effect on the degree of incorporation. Their estimates on incorporation suggest that the impact of income shifting in response to a larger tax gap is sizeable. In particular, a 1 euro ex-ante tax relief in corporate taxes costs only 82 cents in terms of ex-post corporate tax revenue once the shifting of income towards the corporate tax base is taken into account.

[24] See Yaniv (1990).

When the scope for tax evasion varies across occupations, taxes may affect the occupational choices of agents. Suppose for instance, as done by Pestiaeu and Possen (1991), that agents can choose between being wage-earners, who have no opportunities for tax evasion, and entrepreneurs, who do. Then, the stricter the enforcement of the tax law, the smaller the fraction of agents that chooses to become entrepreneurs. Or suppose, as done by Kolm and Larsen (2004), that only manual workers have access to the black labour market. Then, stricter measures against the black labour market will lead more manual workers to get an education.

The empirical literature has shown that the total income elasticity is quite high for high earning/high skill men. Starting with the contributions by Feldtsein (1995, 1999), the recognition that taxes may affect the compliance behaviour of agents has spurred a strand of literature which focuses on the concept of total (or taxable) income elasticity with respect to taxes. It has been argued that, especially for top-income earners, this represents the most relevant concept for the purpose of evaluating the behavioural responses to an increase in marginal tax rates. The most recent results has shown that the total income elasticity is quite high for high earning/high skill men. For instance, for high-income earners in US (defined as taxpayers who have incomes above 100.000 US dollars per year) Gruber and Saez (2002) have found a total income elasticity of 0.17 and a taxable income elasticity of 0.56.

Allowing for the possibility of tax evasion/avoidance implies that who is responsible for remitting the tax becomes an important aspect of implementing a tax system.[25] **The way that taxes are collected matters both for the incidence of the tax and for the government's tax revenue.** In an otherwise competitive setting, it is natural to think about the incidence effects of the hidden economy in the following way. When firms and consumers hire black market labour, it must be because it is cheaper: gross wages must be lower than in the regular economy. Moreover, when agents supply labour to the black economy, it must be because it pays them to do so: net wages must be higher than in the regular economy. Consequently, one should expect the private gains from tax evasion to be splitted between employers and workers just as in the standard theory of tax incidence. A fundamental difference is however that with evasion the risk aspects of the situation becomes crucial in the determination of incidence. For instance, if the probability of detection is different for workers and employers, a change of the formal incidence of the tax may lead to a different balance between regular and black labour markets with implications for gross wages and the level of employment.

[25] See Slemrod (2008).

The empirical literature shows that tax-withholding and information reporting by employers on the income of employees dramatically improves tax compliance. From a theoretical perspective, having both the employer and the employee to report to the tax authority the information on the wage income paid to the employee does not necessarily improve tax compliance since employer and the employees could collude and misreport true wages.[26] In practice, however, such collusion appears to be fragile in modern economies due to a combination of two circumstances. On one hand, as the size of firms becomes larger, the amount of accounting records that are needed to run a complex business expands (and these accounting records need to report true wages in order to be useful for the purpose of running a complex business). On the other hand, a single employee can denounce collusion between employer and employees by showing true records to the government, and this is more likely to happen in large firms.[27] Thus, as the average size of firms becomes larger, the effectiveness of relying on information reporting by employers on the income of employees is going to strengthen.

To summarize:

- **Increases in marginal income tax rates might be followed by an increase in the expenditure on deductible items.**
- **Income taxes may affect the composition of the compensation package offered to a worker.**
- **The tax system can provide incentives for restructuring the organizational form of one's business activity or for "source misreporting".**
- **The empirical evidence shows that the total income elasticity is quite high for high earning/high skill men.**
- **When the scope for tax evasion varies across occupations, taxes may affect the occupational choices of agents.**
- **The possibility of tax evasion (or tax avoidance) implies that the statutory incidence of taxes matters. Who is responsible for remitting the tax becomes an important aspect of implementing a tax system. The way that taxes are collected matters both for the incidence of the tax and for the government's tax revenue.**
- **The empirical literature shows that tax-withholding and information reporting by employers on the income of employees dramatically improve tax compliance. This effect is likely to be stronger the larger the average size of firms.**

[26] See, for instance, Yaniv (1992).

[27] See, for instance, Kleven, Kreiner and Saez (2009).

1.3.2 Human capital

To investigate how taxes interact with the decision to invest in human capital, we need to take a lifetime perspective on the individuals' behaviour.

With exogenous labour supply and no uncertainty, a proportional wage tax has no impact whatsoever on the decision to invest in human capital if all costs of human capital investment are represented by foregone earnings or if all monetary costs of schooling are deductible against the proportional tax rate. The logic of the argument is straightforward. The tax reduces the benefits and costs in the same proportion; therefore, if the net present value of the investment was positive prior to the tax, it stays positive also after the tax is imposed.

Even when hours of work are independent of the net wage, if the returns to human capital are stochastic, proportional wage taxation is in general non-neutral in the human capital decision.[28] **The impact of taxation is ambiguous because of two potentially conflicting effects.** On the one hand a proportional wage tax reduces the riskiness of human capital investment, given that the government becomes a silent partner in the investment, sharing in both gains and losses. With risk-averse individuals, this insurance effect tends to increase human capital accumulation. On the other hand, the proportional wage tax reduces the individual's wealth. If the desire to invest in relatively risky assets decreases (increases) with wealth, this effect tends to decrease (increase) the investment in human capital.

With an endogenous hours-of-work decision, a proportional wage tax may change the benefits of the investment without an offsetting movement in the costs, and neutrality no longer holds. This so called "utilization effect" makes schooling and labour supply complementary activities. This complementarity is further strengthened if one takes also into account how taxes affect the incentives for early retirement. Hours of work can be thought of as the "utilization rate" of human capital: the less the individual works, the lower is the rate of utilization and, therefore, the lower the return on the human capital investment. Education, yearly hours of work and retirement age interact over the life-cycle of an individual. Investments in human capital only pay off if human capital is utilized in the labour market. The utilization rate increases with labour force participation and hours worked, and human capital loses all its value at retirement. Low labour force participation rates of older workers imply that the time-horizons over which investments in human capital are harvested are short, and the incentives to invest in human capital are

[28] See, for instance, Eaton and Rosen (1980), and Anderberg and Andersson (2003).

accordingly weakened. Similarly, incentives to participate in the labour market, to supply labour, and to retire later improve with higher levels of education because better-educated workers forgo higher labour earnings.

One implication of the complementarities emphasized above is that education policy can cushion the distortionary impact of taxes and actuarially unfair retirement schemes. Education subsidies do not only reduce the explicit tax burden on skill formation, but also the implicit tax burden caused by low skill utilization (also resulting from high taxes) and quick skill depreciation (early withdrawal from the labour force).

The empirical literature has shown that the aforementioned complementarities are important. The differences in labour force participation rates between workers with lower secondary education and workers with a tertiary education are of the order of 15-30% points. The mirror image is that unemployment rates fall by 2-6% points when skill levels increase from lower secondary education to tertiary education. Labour force participation rates of older cohorts are also much higher when individual have more initial education. The difference in labour force participation rates between older workers with less than upper-secondary education and those with tertiary education is approximately 20-30% points. Recent estimates have shown that once one takes a broader view on labour supply and considers also the endogeneity of education and retirement choices, the uncompensated labour supply elasticity for men rises by almost 50% (and reaches a value of 0.25), whereas the uncompensated elasticity of the tax base rises by about 150% (and reaches a value of 0.45).[29]

The incentive/disincentive effects of labour income taxes on human capital investment cannot be properly assessed leaving aside the tax treatment of investments in physical/financial capital. Consider for instance the case of a comprehensive income tax levied at the same rate on labour- and capital income. With exogenous labour supply and no uncertainty, a proportional wage tax has no impact on the decision to invest in human capital if all costs of human capital investment are represented by foregone earnings. However, the tax on capital income lowers the private return to financial savings and in this way discourages financial savings. If the same proportional tax rate is levied on investment in non-human capital too, individuals face an incentive to partially substitute financial savings with investment in human capital. Thus, the tax system is no longer neutral since it discriminates in favour of human capital investments and against other forms of investment.

[29] See Jacobs (2009).

To summarize:

- **With exogenous labour supply and no uncertainty, a proportional wage tax has no impact on the decision to invest in human capital if all investment costs are represented by foregone earnings or if all monetary costs of schooling are deductible against the proportional tax rate.**
- **If the returns to human capital are stochastic, proportional wage taxation is in general non-neutral in the human capital decision. From a theoretical point of view, the effect is ambiguous because of two conflicting effects (an insurance effect and a wealth effect).**
- **With an endogenous hours-of-work decision, a proportional wage tax may change the benefits of the investment without an offsetting movement in the costs, and neutrality no longer holds. This so called *utilization effect* makes schooling and labour supply complementary activities. This complementarity is further strengthened if one takes into account how taxes affect the incentives for early retirement.**
- **Education policy can be important to cushion the distortionary impact of taxes and actuarially unfair retirement schemes.**
- **The incentive/disincentive effects of labour income taxes on human capital investment cannot be properly assessed leaving aside the tax treatment of investments in alternative forms of capital such as physical/financial capital.**

1.4 Taxation in an open economy

In this section we address some issues arising in a world of multiple jurisdictions where economies are open to cross-border movements of people, capital and goods. First, we consider capital mobility in isolation and analyze the incidence and desirability of a source-based capital tax. We then consider product market integration and the effects that it has on wage formation. Finally, we look at how international integration affects the risk-absorber role of the government, and how agents' mobility can be viewed as an insurance device against income-risks.

It is never optimal for a small, open economy to levy source-based capital income taxes (i.e., taxes on income deriving from capital located within its borders) if capital is perfectly mobile and labour is immobile. The reason is straightforward. Because capital is mobile and ends up always where the return it can earn (after-taxes) is the highest, a small country can do nothing to reduce the after-tax return earned by its resident (or any) capital owners: since they can move elsewhere, they need not accept an after-tax return lower than the one available in the rest of the

world. The burden of the tax will ultimately be borne by immobile workers.[30]

Given this inescapable fact it is better to directly tax workers by levying taxes on labour income. The reason is that in either case workers bear the burden, but if the small open economy tries to tax the income from domestically located capital, it drives some capital offshore, which, by lowering the productivity of the domestic labour force, lowers the equilibrium real wage rate. Thus, either levying a labour income tax or levying a tax on the income of domestically located capital will ultimately make workers worse off (this is inevitable in a small economy open to capital movements); but the negative economic consequence of capital flight will be avoided by taxing workers directly.[31]

The above result applies to a source-based tax only. If a country can tax on a residence basis (where the base is the worldwide income of its residents), the tax does not cause capital flight. (It might cause individuals to change residence but that is a different question.) Taxing on a residence basis is administratively difficult, however, especially without extensive information sharing or even tax system harmonization among countries.

The result is also critically dependent on the assumption that the workforce is homogeneous, since redistribution is then not an issue. With both high-skilled (high-wage) workers and low-skilled (low-wage) workers, a positive source-based capital tax is desirable if high-skilled labour and capital are complements in the production process, whereas low-skilled labour and capital are substitutes.[32] The desirability of a source-based capital tax hinges in this case on the fact that, by inducing a reduction in the total amount of capital used in the production process, it raises firms' demand for low-skilled labour while reducing the demand for high-skilled labour.[33] This shift in firms' demand for the two types of

[30] See Gordon (1986).

[31] From an empirical perspective, a number of recent contributions have analyzed the incidence of taxes on corporate income in an open economy focusing on the extent to which this kind of taxes are passed on to workers in the form of lower wages. A corporate tax can be regarded as a "specific" (or "selective") capital income tax (as opposed to a "general" capital income tax) since it only applies to a subset of all the demanders of capital. According to the estimates provided by Arulampalam, Devereux and Maffini (2009), a rise of $1 in the corporate tax reduces the wage bill by 75 cents. Additional evidence of very large and significant effects of the corporate income tax on wages can be found in Hassett and Mathur (2006) and Felix (2007).

[32] The first part of the sentence means that the marginal productivity of high-skilled labour increases when, other things being equal, the amount of capital used by firms increases. The second part means that the marginal productivity of low-skilled labour falls when, other things being equal, the amount of capital used by firms increases.

[33] See Huber (1999) and Arachi (2007).

labour narrows the wage rate differential between high- and low-skilled labour, which is socially valuable if the government values redistribution from high-skilled- to low-skilled agents.

Product market integration may affect wage formation since it tends to increase the elasticity of the labour demand schedule faced by workers in each country. This happens since reduction in various barriers to trade implies that a larger share of the productive sectors are exposed to international competition. Accordingly, changes in taxes (and unemployment benefits) are to a lesser extent shifted onto wages, which also means that they affect to a larger extent the employment levels.[34]

Increased international integration is also likely to affect in relevant ways the risk-absorber role of the government. On the one hand, more open economies have greater exposure to the risks emanating from turbulence in world markets and variations in terms-of-trade.[35] This is especially true if one considers that openness to trade generally implies specialization in production through the forces of comparative advantage. On the other hand, an increased international integration is likely to affect the riskiness of investing in human capital. In a world where capital is almost perfectly mobile whereas labour is relatively immobile, increased international integration is likely to magnify the risks associated with investing in specific human capital (i.e. in skills that are highly specific to a certain firm or sector).[36] This effect suggests that an increased international integration might strengthen the role of taxation as a social insurance device in order to prevent individuals from under-investing in specific skills. Some of these conclusions might however be weakened if one abandon the assumption that labour is an immobile factor. Suppose for instance that the mobility of workers, or perhaps of a particular type of worker such as skilled workers, increases. Sector- or region-specific shocks may then result in inflows or outflows of labour, thus reducing the earnings' risk.[37] Also, the possibility to access labour markets of large geographical scope increases the prospect that workers with specialized skills and their potential employers will make successful employment matches, and this tends to make the acquisition of specific skills more attractive.[38] Finally, labour mobility also limits the ability of the government to insure earnings or, in general, to redistribute from high-earners to low-earners. In fact, the mobility of high-income households

[34] See, for instance, Andersen, Haldrup and Rose Sørensen (2000) and Andersen (2003).
[35] See, for instance, Rodrik (1998).
[36] See, for instance, Arachi and D'Antoni (2004).
[37] See, for instance, Wildasin (1995).
[38] See Wildasin (2000).

that are net contributors to the fiscal system undermines the ability of governments to finance redistributive programs.

To summarize:

- **The scope for levying source-based capital income taxes is considerably weakened in a small open economy.**
- **Product market integration may affect wage formation and it tends to make employment more sensitive to variations in taxes.**
- **Whether the risk-absorber role of the government is strengthened or weakened in an open-economy setting depends crucially on the degree of mobility of labour. As labour becomes increasingly mobile, the risk-absorber role of the government tends to weaken.**

1.5 Insights from the normative theory of optimal taxation

In this section we take a normative view on taxation and offer a survey of the main insights that can be derived from the optimal taxation literature.

When agents adjust labour supply only along the "intensive margin" (hours of work), negative marginal tax rates are never optimal. If the marginal tax rate were negative in some income range, then increasing it a little bit in that range would raise revenue (and lower the earnings of taxpayers in that range), but the behavioral response (which would be to work less) would also be to raise revenue, because the marginal tax rate is negative in that range. Therefore, social welfare would unambiguously increase.

High marginal tax rates tend to be optimal at the bottom of the income distribution. A result that emerges from the simulations is that, at an optimum, a nontrivial fraction of the population does not work, and this fraction is larger when social preferences favor greater redistribution and when the labour supply elasticity is higher. Relatedly, little productivity, and thus little tax revenue, is sacrificed when those with very low skills are induced not to work, whereas substantial revenue is raised from the rest of the population, for whom marginal tax rates on low levels of income are "inframarginal".

The incorporation of extensive labour supply responses in optimal taxation models changes the shape of the optimal tax schedule in important ways. In particular, optimal marginal tax rates at the bottom of the income distribution tend to become substantially smaller.[39] When

[39] See, e.g., Saez (2002) and Jacquet, Lehmann and Van der Linden (2010).

agents react also along the extensive margin, subsidizing the working poor, using negative marginal tax rates at the bottom, might become desirable. Simulations performed on a model with responses along both margins have shown that, for plausible values of the intensive labour supply elasticities, it takes fairly high participation elasticities to rationalize negative marginal tax rates at the bottom, especially if the preference for redistribution is strong. However, with realistic participation elasticities, the lowest-paid workers should face rather low marginal tax rates in order not to discourage their participation. Thus, the new focus in optimal tax theory on the importance of the extensive margin of labour supply offers a rationale for the recent trend in many OECD countries towards the introduction of various in-work benefit (such as an EITC) that are intended to "make work pay".

The extension of the optimal taxation model to allow for non-participation has also other applications. Two examples are tax evasion and migration.

Allowing for the possibility of tax evasion may lead the government to place a lower value on the consumption of individuals with no reported earnings than on workers with low reported earnings, thus making subsidies for work even more likely to be optimal. Suppose that low-income earners can decide to either work in the formal sector or in the informal sector. Suppose also that the formal sector is characterized by full compliance with the tax and benefit rules, whereas full non-compliance characterizes the informal sector. In this case, the decision to work or not can be replaced by the decision to work and report earnings, or to work informally and not report earnings. The government might then recognize that some of all individuals reporting no earnings are in reality working informally, and so might be better off than low-income workers in the formal sector.

Allowing for the possibility to migrate may imply that the optimal income tax schedule is regressive over some income ranges.[40] When migration is possible, a migration threat by high-skilled agents implies that the government should design an income tax schedule that does not provide strong incentives for high-skilled agents to leave the country.

Efficiency- (and welfare-) gains can be obtained by introducing elements of age-dependency in the labour income tax schedule.[41] One reason for this result is that the empirical evidence indicates that the elasticity of labour supply varies over the life-cycle. Thus, an age-related income tax allows targeting lower marginal tax rates on those agents

[40] See, e.g., Simula and Trannoy (2009).

[41] See, e.g., Blomquist and Micheletto (2008), Weinzierl (2008), and Bastani, Blomquist, Lindvall and Micheletto (2010).

whose labour supply is more elastic, such as for instance young workers or workers close to retirement age.[42]

From an efficiency standpoint alone and in the presence of graduated marginal tax rates, individual taxation should be preferred to joint taxation. With few relevant exception, the theory of optimal taxation has neglected the family dimension, taking as decision unit a single individual dividing his endowment of time between market work and leisure.[43] However, given that a majority of adults live in couples, and can be assumed to share income to some extent, the choice of the unit of account for tax purposes is an important issue. On one extreme, there is pure joint taxation if the tax function depends only on the sum of the incomes of the two partners. As a result, the marginal tax rate is the same for both spouses of the same couple. On the other extreme, under a system of individual taxation the tax paid by the family is given by the sum of two tax liabilities calculated by applying the same tax function separately on each spouse's income. The reason why individual taxation should be preferred to joint taxation is related to the fact that the empirical literature shows that married women tend to have a much more elastic labour supply than their husbands. To minimize the efficiency costs of taxation, a lower marginal tax rates should be applied on agents whose compensated labour supply is more elastic. Judging the joint taxation scheme and the individual taxation scheme on this ground, it is apparent that the latter is more efficient. In fact, while a joint return, on its face, applies a single income tax rate schedule to all of a couple's income, this may not be how the couple itself looks at it if the man is certain to work while the woman faces a genuine choice. Under this circumstance, the woman may view her first euro of earnings as facing the marginal tax rate into which the man's work was already expected to place the couple. A progressive individual-based income tax, on the other hand, satisfies the efficiency principle of letting more elastic agents face lower marginal tax rates since married women tend to be the secondary earner in the couple and therefore earn a lower income than husbands.

Efficiency gains can be obtained by revenue-neutral tax reforms that lower the tax burden on secondary earners in the household and raise the tax burden on primary earners in the household. Alternatively, the same effect can be achieved by publicly providing private goods which are complements with labour supply and which are substitutes for household chores that tend to be performed by women within the

[42] Another virtue of an age-dependent scheme is that the efficiency gain can be achieved without violating horizontal equity. The reason is that everyone, by ageing, is subject sooner or later to the various tax schedules that apply to agents of different age.

[43] The relevant literature is presented in Apps and Rees (2009).

family. A more coherent approach to minimize efficiency losses from taxation would require that the income earned by married women should not only be taxed on a separate tax schedule, as required by individual taxation, but on a different (and lower) rate schedule.[44] Even if a gender based tax is likely to face strong political opposition,[45] it is possible to envisage other instruments that mimic the beneficial effects of a gender based tax while at the same time avoiding some of its weaknesses, and also being more palatable from a political point of view. One such alternative is a revenue-neutral tax reform that changes the taxation of primary- versus secondary earners.[46] The difference with a gender based tax is that primary and secondary earners are defined not in terms of gender but in terms of relative earnings within the family – a concept that is highly correlated with gender given that in almost all countries more than 80% of secondary earners are women. Such a reform would strongly target married women with low earnings or weak labour market attachment without formally discriminating based on gender. Another possibility is to publicly provide services such as child-care- and elderly-care services. The public provision of these goods can be seen as an indirect way to target the reduction in the tax burden on the segment of the female population characterized by larger labour supply elasticities.[47]

Differentiated commodity taxation can be efficiency-enhancing. In particular, a low tax rate on the purchase of consumer services can both strengthen the incentive for agents to supply labour in the market and reduce the unemployment rate among low-skilled workers. Let's call "consumer services" those goods/services that can be both purchased in the market and produced at home. The tax on labour income and the taxation of the market purchase of consumer services both tend to imply a distortion in favor of home production at the expense of market-based service production. Thus, taxes tend to make home production profitable even if the marginal productivity of labour in home production is below its marginal product in the official consumer service sector. A low tax on consumer services can therefore be efficient to alleviate this distortion created by the tax system. The practical importance of this result is that it is easy to think of commodities that would be candidates for reduced taxation under this principle. For example, housing repair and repair of other consumer durables, child care, cleaning, cooking etc. are all consumer services that can either be produced at home or be delivered

[44] See, e.g., Alesina, Ichino and Karabarbounis (2010).

[45] Real-world applications of a gender-based tax are however unknown. A possible explanation is that it would discriminate between single men and single women earning the same level of income and this might be regarded as violating horizontal equity.

[46] See Immervoll, Kleven, Kreiner and Verdelin (2009).

[47] This argument is developed in Blomquist, Bastani and Micheletto (2010).

from the market. According to the reasoning above such services should be taxed more lightly than, say, manufactured goods that cannot realistically be produced within the household. Once the possibility of involuntary unemployment is accounted for, the case for a relatively low net fiscal burden on consumer services seems to be strengthened. The reason is that, since consumer services are often intensive in the use of low-skilled labour, a stimulus to the demand for these services might reduce overall equilibrium unemployment by increasing the relative demand for unskilled workers, who suffer from a particularly high incidence of unemployment.

The time profile of unemployment benefits should be declining. Moreover, wage taxes after reemployment may be used as complementary instruments to the unemployment benefit payments. Involuntary unemployment raises the issue of the optimal design of unemployment insurance schemes. A declining unemployment insurance schedule serves the purpose of mitigating moral hazard problems associated with the inability to perfectly monitor the job search effort of individuals.[48] A wage tax after reemployment with the characteristic of being increasing with the length of the unemployment spell can further improve the intertemporal incentives by imposing a large penalty on long spells of unemployment.[49]

An optimal layoff tax amounts to the sum of the unemployment benefits and payroll taxes whose revenue is lost once the workers are laid off and becomes unemployed.[50] Another factor that can affect the labour market outcome is given by the presence of legal and administrative restrictions on layoff. From a theoretical perspective, even though higher firing restrictions lead to higher unemployment duration and lower average productivity, they do not necessarily imply a higher unemployment rate. This is because the flows of workers decrease and, due to this "participation effect", it is not clear what the overall impact on the rate of unemployment is. An optimal layoff tax rate, characterized as above, internalizes the difference between the social and the private values of jobs. When a job is destroyed, workers will cost more to public finance: unemployment assistance has to be paid to them and revenue from their

[48] See for instance the early analyses by Baily (1978), Flemming (1978), and Shavell and Weiss (1979). An exception to the general finding that unemployment benefits should be decreasing over time is provided by Wang and Williamson (1996). They show that it may be optimal to provide low benefit during the first week(s) of unemployment. This sort of tax on entry to unemployment aims at discouraging the use of temporary layoffs subsidized by unemployment benefits.

[49] See, e.g., Hopenhayn and Nicolini (1997).

[50] See Cahuc and Zylberberg (2008).

payroll taxes is lost. For this reason, according to the authors, layoff taxes should be conceived as instruments used to finance public expenditures.

To summarize:

- **Negative marginal income tax rates are never optimal in a model where agents only adjust along the "intensive" margin. In such a setting, high marginal tax rates tend to be optimal at the bottom of the income distribution. Moreover, neither strong egalitarian preferences nor a very low labour supply response produces increasing marginal rates at high income levels.**
- **The incorporation of extensive labour supply responses changes the shape of the optimal tax schedule in important ways. Realistic participation elasticities require that the lowest-paid workers face rather low marginal tax rates in order not to discourage their participation. Negative marginal tax rates might become desirable.**
- **Age-dependent income taxes are efficiency-enhancing.**
- **Individual taxation should be preferred to joint taxation since the former imposes lower marginal tax rates on individuals whose labour supply is more elastic.**
- **Efficiency gains could be achieved by revenue-neutral tax reforms that lower the tax burden on secondary earners. An indirect way to achieve this result is to publicly provide complementary-to-labour-private-goods such as child care services and elderly care services.**
- **Differentiated commodity taxation can be efficiency-enhancing. In particular, a low tax rate on the purchase of consumer services can both strengthen the incentive for agents to supply labour in the market and reduce the unemployment rate among low-skilled workers.**
- **The case for a declining time profile of unemployment benefits appears reasonably well established in the literature.**
- **Optimal layoff taxes amount to the sum of the unemployment benefits and payroll taxes whose revenue is lost once the workers are laid off and become unemployed.**

2. Broad statistical trends

2.1 Main international trends in the tax system macro-structure

This section presents main international trends in tax system with a focus on European Union countries.

The first three paragraphs (2.1.1-2.1.3) analyze tax revenues in percentage of GDP of the European Union countries belonging to OECD over the period 1965-2007. The adopted perspective is comparative as the corresponding trend for OECD area as a whole as well as US and Japan is reported. Data come from the annual OECD Tax revenue statistics database which presents a unique set of internationally comparable tax data in a common format for all OECD countries (see Box 1). Tax revenue is then split according to the traditional classification among direct taxes, indirect taxes and social security contributions. This breakdown represents a necessary preliminary step for further and more detailed investigations and aims at describing the taxation structure of European countries by means of their different tax burdens. As an additional exercise, due to the marked differences among EU countries in terms of welfare state and statutory tax rates, four different groups of old EU members have been analyzed[51]. The first group is composed by Northern EU countries, i.e. Denmark, Finland and Sweden; the second group is the Continental Europe including Austria, Belgium, France, Germany, Luxembourg and the Netherlands; Southern EU region is composed by Greece, Italy, Spain and Portugal; the last residual group is then represented by UK and Ireland that cannot be included in any of the former groups. Finally, for the period 1991-2007 data are reported distinguishing between old EU members (i.e. the 15 Member States that joined EU before 2004) and new EU members that joined OECD (i.e. Czech Republic, Hungary, Poland and Slovak Republic). The last paragraph of this section (2.1.4) aims at providing a synthetic framework of the data previously illustrated by means of the identification of EU countries' taxation patterns, as well as of their evolution over the last four decades.

[51] Groups of countries are defined according to quite traditional classifications of European welfare models (see for instance Ferrera, 1996; Greve, 2007; Katrugalos, 1996). If it is not differently specified we always take the arithmetic average within group.

Box 2 Data sources

For the first part (par. 2.1.1 – 2.1.4) data come from the annual OECD Tax revenue statistics database which presents a unique set of internationally comparable tax data in a common format for all OECD countries from 1965 to 2007. Tax revenues collected by each OECD country are split according to a standardized classification among direct taxes, indirect taxes, social security contributions, taxes on payroll and workforce, and taxes on property. Data are provided in national currencies, US dollars and as a percentage of GDP and by level of government. In order to carry out cross-sectional and longitudinal comparisons, revenues collected by the government sector are always presented in this report as a percentage of GDP.

For the second part (par. 2.1.5 - 2.1.7) data on ITRs come from Taxation Trends in European Union and cover the period from 1995 to 2007. Data are also available for the period 1980-1994 but the change in classification of Eurostat "European System of Accounts" (from ESA-79 to ESA-95) introduces a statistical break in 1995 and the two time series (before and after 1995) are not comparable. ITRs are defined as the ratio of the tax revenue that can be allocated to each economic function (labour, consumption and capital) and the corresponding potential tax base. Numerators are calculated by Eurostat by supplementing data on tax revenue with the National List of Taxes provided by each Member State. Since taxes can be related to multiple sources of economic income each tax revenue is broken down by economic function on the basis of tax base descriptions supplied by Member States. Denominators are then calculated using the production and income accounts of the National Account data (formerly NewCronos) with some adjustments to calculate the capital tax base. The need of detailed information to allocate tax revenue to economic function does not allow to extend the calculation of ITRs to OECD countries and comparisons are carried out only for EU Member States.

Subject to a few minor exceptions, ESA figures presented in the second part can be reconciled with OECD figures analyzed in the first part, since ESA criteria and definitions have been adopted in the most cases by OECD.

In 2.1.5 a more detailed analysis of EU taxation structure is carried out by providing a breakdown of taxes by economic function, distinguishing among labour, capital and consumption. In this case data are not represented as percentages of GDP, but in terms of implicit tax rates (ITR hereafter). ITRs provide a measure of the effective tax burden levied on different incomes (labour and capital) or economic activities (consumption). Differences among taxation ratios calculated over GDP, indeed, do not necessarily mean that one source is taxed more than another, as those rates reflect also the weight that each base has in a particular economy. Data come from Taxation Trends in European Union (see Box 1) and cover the period from 1995 to 2008. Data are also available for the period 1980-1994 but the change in classification of Eurostat (from

the ESA-79 to the ESA-95) introduces a statistical break in 1995 and the two time series (before and after 1995) are not comparable. To better understanding ITRs evolution over the period of analysis, last paragraphs (2.1.6 and 2.1.7) offer two further exercises. The first, consistently with the exercise proposed in paragraph 2.1.4, aims at identifying EU countries' taxation patterns on the basis of ITRs previously illustrated. The second, by means of a decomposition of the ITRs on labour, aims at assessing to what extent labour taxation is affected by cyclical factors.

2.1.1 Total tax ratios

Looking at the overall tax ratio, i.e. the sum of direct and indirect taxes, social security contributions, payroll and workforce taxes and taxes on property, over the period from 1965 to the mid-1990s EU and OECD as a whole record a clear upward trend (Figure 1). Since then, in both areas ratios remain rather stable respectively at 40% and 35% of GDP. The stability shown by EU area since 1995 can be explained also by considering that the group of EU countries belonging to OECD changed over the relevant period, as in the early 1990s four Eastern Europe countries joined the organization, thus affecting the average EU ratios. Japan and US show a different trend as compared with EU. Japan's taxation peak was reached at the end of 1980s, followed by a slight decline during the 1990s and the early 2000s. US do not exhibit the upward trend ofthe other OECD countries, as their ratios always range between 25% and 30% with a peak in the late 1990s and a decline in the following years. Unlike EU countries, in both US and Japan total tax revenues exhibit a non negligible increase starting from 2004. Notwithstanding this small upward trend in non-EU OECD countries, EU average ratio is 10 percentage points above those of US and Japan in 2007. Taking 1965 as the base year (1991 for the new EU members), it emerges (figure 2) that the area which recorded the most sizeable rise in the last four decades is Japan with an increase of 60%, followed by EU-19 with a 40% increase. Splitting the EU average ratio in the four groups of countries previously described, it turns out that EU is not yet a homogeneous area in terms of taxation, even if the process of convergence since the 1990s is evident (figure 3). As it is well known, the higher taxation area in EU is represented by Northern countries, followed by Continental Europe and by Southern countries. Although all EU macro-regions record a sharp tax burden increase due to the enlargement of their welfare state dating back to the 1970s, trends are not perfectly comparable. While in Continental Europe the upward trend stopped at the beginning of 1980s at a 40% ratio, in Northern countries it went on until the following decade and in Southern Europe it is still ongoing, even though at a lower rate. Finally, UK and Ireland exhibit a steady trend as their average taxation ratio ranges over the whole period between 30 and 36%, with a peak during the 1980s. Taking 1965 as the

base year, Southern Europe clearly turns out to be the area with the greatest tax burden increase as its overall tax ratio doubled in four decades (figure 4). These figures seem to evidence a clear "catch-up" taxation trend, as Southern EU countries recorded at the beginning of the period very low taxation levels with respect to the other EU areas. Looking at each European country (figure 5) the stabilization of tax ratios occurred in the last two decades is particularly evident in Belgium, France, Germany, Sweden and UK while in Ireland and Netherlands tax ratios decreased. All Southern EU countries recorded a continuous increase in overall taxation and Italy, in particular, moved from the lower to the upper tail of the overall tax ratios distribution.

The comparison between old vs. new EU members trends (figure 6) provides evidence that since the mid-1995 to the early 2000 the two groups of countries have been diverging. Afterwards, differences among tax ratios remain rather stable in a range between 6 and 9 percentage points with a small decrease in the last year here recorded.

2.1.2 Three main pillars of taxation: direct income taxes, indirect taxes and social security contributions

Direct income taxes, indirect taxes and social security contributions represent the main pillars of all developed countries' taxation systems. However, their shares on total tax revenue vary a lot among countries depending on the taxation model adopted. In general, European countries rely proportionally more on consumption taxes and on social security contribution than other developed economies. As showed in figures 7, 8 and 9, where countries are ranked according to their total tax revenue ratios (from the highest to the lowest), from 1965 to 2007 most countries exhibit an enlargement of the SSC share which is above 30% in many countries at the end of the period. Due to the enlargement of the SSC share, direct and indirect shares consequently decreased. Looking at 2007, the country with the highest direct taxation share (after Denmark) and also the lowest indirect taxation share is US which shows a structure of the tax system rather different with respect to the other developed countries. Interestingly, the two non-EU countries, Japan and US, exhibit at the same time the lowest overall tax revenue ratios and the lowest indirect taxes shares due to the small (null for the US) weight of the value added tax. On the contrary, Portugal is the country that relies less on direct taxation and more (together with Ireland) on indirect taxation. Denmark's tax revenue distribution is not comparable with the other OECD countries, with a very low share of SSC revenue and a direct taxation share over 60% due to its model of social benefits financing, mainly based on direct tax revenue. Countries which rely more on SSC are mainly in Continental Europe but also Japan shows an above-average SSC share.

Direct taxes

Looking at direct taxes represented by the sum of taxes on income, profits and capital gains, the picture is rather different. While in EU-19 OECD members as well as in OECD as a whole direct taxation has been characterized by a regular trend with an increase up to the end of the 1980s followed by a stabilization in the last two decades (figure 10), in both US and Japan direct taxation ratios show more unstable trends with peaks followed by sharp declines. In particular Japan recorded a first peak in the early 1970s and a second more remarkable raise at the beginning of 1990s. Since then Japanese direct taxation ratios have undertaken a downward trend which stopped in the last five years. US direct taxation has been characterized by a more stable trend with two peaks, the first at the end of the 1960s and the second at the end of the 1990s. Interestingly, in the very last year a rapid increase of US direct taxation ratio has taken US value at the highest level in the OECD areas here considered. As a consequence, in 2007 direct taxation revenue ranged from a minimum of 10% of the GDP in Japan to a maximum of 14% in US. Concerning EU, Northern countries record an average direct taxation ratio which is by far the highest in EU (figure 11), even if in the last years it showed a slight downward trend. Southern EU is, instead, the area with the lowest direct taxation ratios, even if it has been showing the most marked upward trend, especially during the fifteen years from 1975 to 1990, when average ratios more than doubled. The overall picture shows a process of partial convergence among EU areas, even if noticeable differences in fiscal efforts reflecting different welfare state models still persist. The comparison between old and new EU members evidences an average 6 percentage points difference in the last years (14 vs. 8%) as a result of a slight but steady divergence trend starting in the mid-1990s (figure 14). New EU countries represent, together with Turkey and Japan in the 2000s, the OECD area with the lowest average direct taxation ratios. Taking 1965 as the reference year and focusing only on the last decade, European Union has been the most stable area in OECD in terms of direct taxation, with a slight increase up to 2000 followed by a limited decline during the first 2000s (figure 11). This marked an interruption of many years of increasing tax burdens, which would reflect increasing public expenditures. More recently, overall levels of expenditure are being reduced in consequence of efforts needed to consolidate public finances, followed to some extent by some reduction in revenues as percentage of GDP. US and Japan rather show phases of growth and decline and their direct taxation revenue seem to be more sensitive to the business cycle.

Direct taxes can be split into two main parts, on the basis of personal and corporate tax revenue. Personal taxation will be analysed in the following paragraph focusing on labour taxation.

As to corporate taxation it has to be noted that revenue in this field are by far the most affected by the business cycle (figure 15). Among the OECD areas here considered, Japan is by far the country with the highest variability in corporate tax ratio, followed by the United States. EU as well as OECD average levels are less volatile. This may be the effect of asymmetric response to business cycle of each single country in the two areas. However, the corporate tax ratio range is quite limited for the whole period as it moved within a minimum of 1.5% in the early 1980s in US and a maximum of 7% of GDP in Japan few years later, when the distance with OECD average ratio reached its peak. Looking at European Union, it does not emerge a clear rank among areas as the tax corporate ratios cross many times (figure 17). In particular, all EU areas record the sharpest growth during the 1990s followed by a decrease reflecting the economic downturn of the early 2000s. As for other tax ratios, Southern EU countries recorded the most sizeable increases in the last decades (200%) and as a result of a marked convergence in the last years, in 2007 all EU areas, including new EU members, show ratios of around 3%.

Social security contributions

Switching to social security contribution (SSC hereafter), which are, as a rule, directly linked to a right to benefits such as old age pensions or unemployment and health insurance, their trend is affected by the average age of the population as well as by the business cycle. Over the period 1965-1990, all OECD areas showed a clear and steady upward trend in SSC (figure 20). Afterwards, US and EU upward trend stabilized and their ratios slightly leveled off respectively at around 6.5% and 12% of GDP. On the contrary, Japanese as well as OECD ratios have been steadily increasing. As a consequence, in 2007 the percentage of social security contribution over the GDP in Japan was close to the EU level, which still remains the highest in OECD. Looking within EU, trends of the four different macro-regions are not perfectly comparable (figure 22). Continental countries record the highest social security contribution level in the whole period with an upward trend up to 1985, followed by two decades of stability and a slight decrease after 1995. Southern European countries show an upward steady trend during the whole period that brought to halve the four percentage point difference with Continental Europe. Denmark, Finland and Sweden are characterized by lower SSC ratios, as in those countries many social benefits are financed through direct taxation. Also these countries exhibit, like Continental Europe, an upward trend only up to the mid 1980s and a remarkable decline in the last two decades. As in Northern Europe initial ratios were among the lowest in Europe, their increase has been the highest among EU countries, as shown by the figures defined on the 1965 base (figure 23). Finally UK and Ireland present in the whole period the lowest SSC revenue as a

percentage of GDP and a rather stable trend since early 1980s. Unlike direct taxation, new EU members record higher SSC ratios as compared to old EU countries, thus showing the relevant weight that social spending has in those countries.

Social security contributions are formally levied on employees and/or employers.[52] As a further exercise, figures from 25 to 36 present SSC trends separately for the two sides of the labour market. OECD countries, as a whole, show a steady upward trend in SSC on employees' rate up to 1992 when a 3% level was recorded (figure 25); afterwards ratio did not remarkably change and it is slightly above 3% in 2007. Although all OECD areas were characterized by an increase in SSC on employees, Japan is the country that recorded the sharpest upward trend insomuch as in 2007 its ratio is 50% higher than OECD average. EU area, which exhibited the highest ratios over the first three decades, recorded a stop in its upward trend in correspondence of the mid 1990s when the ratio started to decline slowly. Differences among SSC ratios on employees within EU are quite marked and two clusters of countries can be identified (figure 27): Continental Europe countries are characterized by higher ratios with a 6.3% peak in the early 1990s; the other European countries show more similar ratios, especially after the mid-1990s when a process of convergence among EU SSC on employees - due to a sharp increase in Swedish and Finnish ratios - seems to emerge. Moving to SSC on employers a clear rank among OECD areas becomes evident since the mid 1970s. Europe is the area with the highest ratios, followed by Japan and US. EU and Japan show very similar trends with a sharp increase during the 1970s, followed by a period of stability in the 1980s and a slight increase at the early 1990s. For the sake of comparability figure 35 reports the decomposition of total SSC between employees and employers for EU as compared with other OECD areas in five years (1965, 1975, 1985, 1995 and 2005). In all OECD areas SSC paid by employers represent the greater amount of total SSC with the partial exception of Japan and US in 2005 where the two components almost balance. Concerning EU, even if the upward trend in SSC collected from employers stopped after 1995, they still represent almost two thirds of total SSC.

[52] As highlighted in section 1.1, in a perfectly competitive labour market with flexible wages, different components of the tax wedge exert identical effects on employment. It is therefore irrelevant whether social security contributions are formally levied on employees or employers. However when the labour market is imperfectly competitive the composition of the tax wedge matters for several reasons analyzed in section 1.2. In particular, in the short run, when nominal wages are rigid due to existing contracts, a reduction in social security contributions formally levied on the employer reduces firm's labour cost. This point will be further elaborated in chapter 4 dealing with policy recommendations.

Indirect taxes

Concerning indirect taxation, EU average ratio remarkably differs from those recorded in US and Japan (figure 37). The higher EU tax burden on goods and services is mainly due to the fact that Europe has a more developed VAT systems, even if there are substantial differences among countries - especially concerning the extent of VAT exemptions (either in the form of base reductions or of reduced rates). Also their trends are not similar: in EU taxes collected on goods and services as a percentage of GDP rose in the period from the mid 1970s to the mid 1980s up to the current 12% level. In US there was a slight but steady decline which brought the rate from an initial 6% to the 2007 4.5% level. Japan still shows a low rate but is was characterized by a sharp increase in the late 1990s after the introduction of VAT. Focusing on European Union, trends appear irregular in all macro-regions (figure 39). Quite interestingly, however, at the end of the period here considered, in all old EU members , with the exclusion of Northern European countries, indirect taxation revenues are on average around 11% of the GDP. Considering the pronounced difference in their starting points in 1965, there was an indubitable convergence process in the most European countries in terms of indirect taxation. This convergence emerges also by comparing old vs. new EU countries, where average rate is around 12% since the late 1990s on (figure 41).

Focusing on trends of a subgroup of taxes on goods and services, namely VAT, it should be premised that its introduction in the most countries occurred during the 1970s and the 1980s (table 1). US is the only OECD country that does not yet apply a value added tax as it relies on a sale tax whose revenue in 2007 amounted at 2.2% of GDP. The introduction of VAT in an increasingly higher number of countries explain the sharp upward trend of VAT ratios in all OECD areas and, in particular, in Japan where taxes on value added were levied for the first time in 1991 (figure 42). Within Europe, data record a rapid increase in VAT ratios during the 1970s in all areas except for Southern countries where the same growth occurred ten years later when also Greece, Spain and Portugal adopted a VAT system (figure 43). Excluding 1991 and 1992, old and new EU member ratios are very close (figure 44), thus indicating that Eastern Europe countries have rapidly adopted a VAT systems similar to Western Europe.

2.1.3 Labour taxation: a preliminary analysis

A preliminary analysis on labour taxation can be based on the ratio between revenue from tax on labour and GDP. Revenue from tax on labour is the sum of personal income taxes referring to this source of income, social security contribution and taxes on payroll and workforce.

OECD tax revenue data, however, do not allow to allocate personal income taxes to different sources of economic income (labour, capital and rents). As a consequence, the overall indicator, obtained as the sum of PIT, SSC and payroll and workforce taxes ratios, which offers a first clue of the tax burden on labour, overestimates the actual labour taxation mainly in countries where capital is more heavily taxed at personal level. In OECD as a whole the sum of PIT, SSC and payroll and workforce taxes revenue increased from 12.5% of the GDP in 1965 to more than 18% in 2007 (figure 45). This limited increase (slightly above 0.1 percentage point per year on the arithmetic average) is the result of an upward trend until early 1980s followed by stabilization and a slow decrease since the mid 1990s. EU ratio is always above OECD average and follows the same trend. US and Japan record a ratio always below OECD mark. In particular, US show a more irregular trend with a first peak in the early 1980s and a second more pronounced peak in 2001 and 2002, followed by a sharp decrease. In Japan after a sharp increase in the first two decades no remarkable variation is recorded and the current ratio is by now at the same level as twenty five years ago (15% of GDP). Over the whole period Japan exhibits by far the greatest increase (100%) among different OECD areas here considered, which however show a remarkable growth (50%). In European Union there is a clear trend among the four areas (figure 47) for almost the entire period. At the top of labour taxation ratio are Northern countries, followed by Continental area. At a lower taxation level, Southern Europe and UK and Ireland average ratios cross in 1991 when the former shift above the latter due to its steeper upward trend. In fifteen years the distance of Southern countries ratio with Northern and Continental EU decreased respectively by four and three percentage points, thus evidencing a partial convergence trend in European labour tax burdens. As a further evidence of this convergence, (figure 48) Southern Europe is the EU area which recorded by far the most sizeable increase (150%), taking 1965 as the reference year. The comparison between old versus new EU members shows then that the distance between the two EU areas in terms of tax burden on labour more than halved during the last two decades and in 2007 is around two percentage points (figure 49).

2.1.4 An attempt to identify EU taxation patterns based on tax ratios

In order to identify different taxation patterns on the basis of actual tax revenue ratios, EU countries have been classified according to their tax as well as SSC revenue ratios with respect to the corresponding OECD average values. Quite roughly, we define as "high taxation countries (H)" those countries whose tax ratio is above the OECD average and as "low taxation countries (L)" the ones below the OECD average with respect to each type of tax revenue. Accordingly, we create 8 groups of countries ranging from the group characterized by lower than average direct,

indirect and SSC ratios, to the group formed by all higher than average tax and SSC ratios countries. This exercise is carried out for each decade, by ranking countries ratios in 1965, 1975, 1985, 1995 and 2005. Mobility tables from 2 to 6 show whether taxation patterns have been changing over time and, in case, in which direction. By construction, countries on the diagonal of the table (black cells) did not modify their taxation pattern over the corresponding period. Those in the dark grey cells shifted to a higher taxation pattern, as at least one ratio exceeded the OECD average value at the end of the analyzed period. The opposite holds for countries in the light gray cells that shifted to lower taxation patterns. Finally, for countries in the white cells it is not possible to clearly establishing the direction of their taxation pattern as they are characterized by a shift from one type of taxation to another.

In 1965 three EU countries recorded ratios below the OECD averages for all tax revenues, namely Greece, Portugal and Spain. Two countries, UK and Germany, were in all cases above the OECD average. Among the remaining countries, two had higher than average direct taxation and SSC ratios (Luxembourg and Netherland), three showed higher than average direct and indirect tax ratios (Denmark, Finland and Sweden) and finally four were above average as for SSC and indirect tax revenues (Austria, Belgium, France and Italy). Ireland was characterized by a higher than average indirect taxation. The emerging picture shows that during the 1960s there was a cluster of low taxation countries, represented by Southern Europe area (with the exception of Italy) which collected an amount of indirect taxes and SSC over the GDP below the OECD average. Northern EU countries were characterized since 1960s by a higher than average direct taxation, while in Continental Europe indirect taxes and SSC played a major role. Ten years after the picture changed a lot: only Greece remained a totally low taxation country, while both Spanish and Portuguese direct taxation revenues exceeded the OECD average. During the 1970s it is possible to identify a group of high taxation countries represented by Finland, Netherland, Sweden and Belgium which, at least in part, would not change their taxation structure in the following years. On the opposite, both Germany and UK, which ranked above the OECD average for all revenues in 1965, were changing their taxation structures: UK - in a more radical way as in 1975 only its direct taxation revenue exceeded OECD average, Germany - in a smoother way as both its direct taxes and SSC revenues persist above the average. Finally over the years from 1965 to 1975 only four countries out of the fifteen here analyzed, did not change their taxation modes, namely Ireland, Austria, France and Denmark. The decade from 1975 to 1985 was crucial in terms of welfare state reforms as many European Union countries adopted new or wider forms of state intervention, mainly concerning health care, pensions,

unemployment benefits. Raising public expenditures required to raise tax burden and, to some extent, changes in taxation patterns. Such process of progressive enlargement of state boundaries was shared by most developed countries, hence the OECD average tax revenues also rose in those year as illustrated above. Our exercise allows to understand whether some countries changed their taxation patterns more deeply than others or whether there was a sort of "scale" effect which did not modify countries' relative positions. According to our scheme, the "scale" effect in this decade was quite marked as nine countries out of fifteen (Austria, Belgium, Denmark, France, Germany, Finland, Ireland, Spain, Sweden) did not modify their taxation patterns and the others marginally moved towards high taxation patterns, with the exception of Netherlands. The period from 1985 to 1995 confirms taxation patterns of a bulk of countries. In particular there are two countries, Spain and Greece, which kept their low taxation structure and a number of countries, mainly in Northern and Continental Europe, which exhibit steady high taxation patterns with the exception of Germany which was still moving towards a lower taxation structure. During the last decade from 1995 to 2005 new EU countries, namely Czech Republic, Hungary, Poland and Slovak Republic joined OECD, so that it is possible to identify the corresponding taxation pattern also for them. All new EU members have a stable taxation model, which is characterized, as in Austria, Netherlands and Portugal, by higher than average SSC and indirect taxation ratios together with a lower than average direct tax revenues. Finland and Sweden still remain in the top taxation group together with Belgium, the only non Northern country characterized by all higher than average taxation ratios, as a result of its effort to consolidate public finances. Spain, Greece and UK but also Germany and France are in the lower relative taxation group as they have two out of three tax ratios below the OECD average. In particular all these countries, with the exception of UK, record only a SSC ratio higher than OECD average while both direct and indirect taxation revenues as a percentage of GDP stay below.

Looking at a broader perspective, with focus on what occurred in the whole period of analysis, it emerges that four countries out of fifteen have very stable taxation patterns, namely Ireland, Luxembourg, Denmark and Austria as they did not change their relative position over the last four decades. Southern European countries, with the exception of Italy, moved from a very low taxation pattern towards a higher taxation pattern, especially Portugal which in 2005 recorded higher than average SSC and indirect tax rates. Finally, the three big European countries, namely France, Germany and UK, have moved towards lower relative taxation ratios with a greater SSC cut effort in France and Germany and greater

direct tax cut effort in UK. Italy steadily stays among countries with the higher relative taxation with a shift of fiscal burden to direct taxation.

The evolution of tax systems documented in the previous paragraphs has been driven by several factors:

- demographic changes (e.g. population aging) which may have affected both the total tax burden (by changing the overall level of public expenditure) and its composition (e.g. higher expenditure for pensions may have increased the reliance on social security contributions);
- changes in the macroeconomic environment (e.g. higher income per capita, higher international integration of markets for goods and capital) which may have affected both the demand for public services and the marginal cost of public funds (e.g. capital mobility should have increased the efficiency loss produced by source based taxes like the corporate tax);
- changes in market institutions and regulation which may have altered the way in which taxes affect agents choices and market outcome (e.g. the existence of minimum wage regulation may affect the incidence of payroll taxes).

A comprehensive econometric analysis of data to identify such factors and their impact on the tax structure goes beyond the scope of this chapter. However, some useful insights can be gained through some simple regressions. Table 7 reports the results of OLS pooled regression on an unbalanced panel of OECD countries from 1980 to 2008. The dependent variables are different tax to GDP ratios. There are two different sets of explanatory variables. The first one is given by variables which describe the demographic structure of the population (the share of population older than 65 and the share of population younger than 15) and the macroeconomic environment (GDP per capita, the total trade to GDP ratio, the employees to self-employed ratio, the unemployment rate). The debt to GDP ratio and the consumer price index are added to control for alternative methods of financing.

The second set of explanatory variables is given by a series of dummies which are equal to one in the years in which a country is member of a particular economic and political association and zero otherwise. The dummy EU refers to membership in the European Union, EEA to the European Economic Area, EFTA to the European Free Trade Association, Euro to the Euro Area and NAFTA to the North American Free Trade Agreement. The role of the dummies is primarily descriptive: they are used to test whether the tax ratios of countries belonging to a specific group significantly differ from the same ratio in other countries after

controlling for characteristics that may affect the structure of the tax system. They cannot be used as such to infer a causality link, i.e. whether the membership forces to adjust to the group mean or whether countries join a group only if they have a similar tax structure.

The sign of the coefficients of the control variables are usually in line with expectations. The share of population over 65 is in general significant and positive suggesting that a higher share of aged population increases financing needs and exerts an upward pressure on all taxes. The other variable which is usually correlated with tax ratios is the trade-to-GDP ratio. The correlation between the degree of openness of an economy and the level of public expenditure (and total taxation) is consistent with the hypothesis that openness increases the demand of insurance through the public budget (Rodrik 1998). The regression results, which show a stronger effect on VAT, are also consistent with the fact that VAT, levied on a destination basis, is considered an efficient tax in an open economy as it does not discriminate exports. GDP per capita is not correlated with total taxation. However the results suggest that countries with higher GDP per capita rely more on direct taxation and less on indirect taxes and distribute the burden of SSC on employees rather than on employers. Interestingly, the ratio between employees and self employed is strongly correlated with total taxation. This may be related to the relevance of tax withholding (mainly on employed labour income) in reducing the administrative costs of tax audit and collection (Kleven et al. 2009).

The coefficients of the dummy variables show that the European Union is a high tax area, with a tax to GDP ratio on average 5 percentage points higher with respect to other OECD countries. The tax to GDP ratio is even higher in EFTA. In contrast, the average tax burden in the European Economic Area is lower. The dummy for the Euro Area is not significant.

To interpret the coefficients it is worth mentioning that each country may belong to several groups in the same year or it can move from one group to another across years. For example, all countries in the Euro Area belong to the European Union and to the European Economic Area. As a consequence, the Euro dummy captures the effect on tax ratios of entering the Euro Area. The regression suggests that the adoption of the Euro had no impact on the overall level of taxation even if it seems to have resulted in taxes' shift, with a reduction of direct taxes on individuals and corporations.

The EEA dummy captures two effects: the differential development of tax ratio in countries which joined the European Union before 1993 with respect to countries that entered the Union later and the impact of the new member states in 2004. The negative coefficient on total taxation and on

direct taxes is consistent with the structure of new EU members while the negative coefficient on VAT may be driven by the tax decrease in UK, Ireland and France.

Finally the EFTA variable basically captures the structure of some non EU countries (Switzerland, Iceland and Norway) and of the Nordic countries before they joined the EEA. The positive coefficient on total tax revenue and VAT is consistent with the above average tax ratios of the Nordic countries.

2.1.5 Implicit tax rates on labour, consumption and capital

In this second section a more detailed description of EU taxation structure is presented by providing a breakdown of taxes by economic function, distinguishing among labour, capital and consumption through the analysis of the corresponding implicit tax rates (ITR hereafter) calculated over the period 1995-2008.

At the EU-25 level (weighted average) in 1995 ITR on consumption was 20%; capital exhibited a higher ITR at 26.3% level; finally, labour was by far the most highly taxed economic factor with an ITR of 36.9% (figure 50). In 2008 ITRs on consumption and on labour were at the same level as thirteen years before, while ITR on capital increased by about 6 percentage points (figure 52). These results are quite interesting for two main reasons. According to aggregate data, measures taken by EU countries to reduce the tax burden on labour during the last years did not reach the target and labour tax burden remain well above those of consumption and capital Moreover, data provides evidence that, despite common belief, competition on capital taxation within and outside EU did not entail a decline in the corresponding tax burden. Annex II summarizes some reasons that may explain this puzzle with reference to corporate taxation.

It is interesting to understand whether these trends are common or whether there are differences among countries in ITRs dynamics. In 1995 ITR on consumption ranged from a minimum of 12% in Cyprus to a maximum of 30.5% in Denmark; ITR on labour was at its minimum level in Malta (19%) and at its maximum in Sweden (46.8%); the country with the lowest ITR on capital was Lithuania (9.2%) and at the opposite Slovak Republic registered the highest rate (35.1%). Thirteen years later Denmark is still the country with the highest ITR on consumption, while two Southern EU countries, Spain and Greece, recorded again the lowest levels (14.1 and 15.1% respectively). Belgium, Hungary, Italy, and Sweden raised in 2008 the greatest amount of taxes per unit of labour, as their ITRs are above 42%.. Countries with the lowest labour taxation rates (below 30%) were three Southern European countries (Cyprus, Malta and Portugal), two new EU members (Latvia and Romania) and, finally, two

traditionally low-labour tax countries (Ireland, and UK). The country that in 2008 taxed capital by most is UK, followed very closely by Denmark). Quite interestingly, UK is the country with the greatest taxation on capital and, at the same time, the smallest (with the exception of Malta) taxation of labour. The most capital-friendly countries in terms of tax burden are, as expected, the new EU members (Slovak Rep., Latvia, Lithuania, Estonia) together with two small nations, Ireland and the Netherlands, which have adopted in the recent years policies to attract foreign capitals Over the period 1995-2008 an overall process of convergence between labour and capital taxation occurred in many countries and especially in Sweden and France.

Taking 1995 as the reference year, the EU average ITR on consumption showed a slight increase in the late 1990s with a peak in 1999, and a small decline in the following two years, before slightly leveling off during the mid-2000s (figure 53). Finally in the last year a small decrease (-2.5%) has been recorded. . Looking at different EU macro-regions, however, trends are quite different . In particular, Southern European countries recorded a sharp and steady upward trend in the taxation of consumption with a 18% increase up to 2007, followed by a remarkable decline in the last year. New EU members exhibit a declining trend until 2001, which reversed up to 2007. Finally, consumption taxation shows a clear drop in UK and Ireland in the two last years when it decreased by 10%. The EU average ITR on labour shows a quite similar trend to the one of ITR on consumption, but again it is the result of non homogeneous dynamics in the different EU macro-regions.

As for consumption, tax burden on labour evidences a sharp upward trend in Southern Europe, as the corresponding ITR increased by 15% in thirteen years, namely more than 1 percentage point per year (figure 54). The other EU regions, except for Continental Europe, exhibit an opposite trend with an average decline of 7% in Northern Europe and in UK and Ireland and a 11% reduction in new EU members. The stability of the average EU implicit tax rate on labour over the period 1995-2007 turns out to be therefore the result of opposite trends within EU where some countries (Southern Europe) were increasing labour taxation, others (mainly in North and Eastern Europe) were reducing it, while the remaining (Continental Europe) did not substantially modify their tax burden on labour.

Capital taxation - as measured by the corresponding ITR - records in the whole EU-25 an increase by more than 20% in five years from 1995 to 1999 when it reached its first peak (figure 55). After a decline which stopped in 2003, a new rising phase took place until 2007., New EU members

experienced instead a sharp decrease in capital taxation in the first five years, , followed by a slight increase in the last eight years. Notwithstanding this upward trend the ITR on capital in 2008 was lower by 20% than in 1995. UK[53] and, to a greater extent, Northern EU countries exhibit a trend similar to the average EU 25 but with more marked peaks. Finally, in Southern Europe capital taxation has been sharply rising, especially in the last year, with a total increase of more than 40% over the analyzed period.

Previous evidence demonstrates that trends in EU ITRs are only partially common within EU. To better understanding whether a convergence (or a divergence) process occurred in the last year, looking at some convergence indicators gives interesting hints (figure 56). The only ITRs that show a slight convergence are those on labour after 1998. On the opposite, indicators on capital tax burdens within EU seem to diverge over the last twelve years, thus suggesting that each country is following its own strategy in order to tax the most mobile taxation base.

2.1.6 An attempt to identify EU taxation patterns based on implicit tax rates

In line with previous analogous attempt to identify EU taxation patterns on the basis of tax revenue ratios, we have classified European Union countries according to their ITR on labour, consumption and taxation. Quite roughly, we defined as "high taxation countries (H)" with respect to each economic function countries whose ITR is above the EU25 weighted average[54] and as "low taxation countries (L)" those below the average ITR[55]. Accordingly, we create 8 groups of countries ranging from the group characterized by lower than average ITRs on every economic functions, to the group formed by countries with higher than average ITRs. Mobility tables 13-15 show whether a country shifted towards a higher taxation pattern (dark grey cells), a lower taxation pattern (light grey cell) or if no remarkable changes occurred (black cells).

In the first five years from 1995 to 2000 (table 13) ten countries maintained the same taxation structure. In particular, two small Southern European

[53] Here we do not represent the average UK and Ireland value as for Ireland data on capital taxation are available only since 2002.

[54] We adopt the EU25 average as the reference point as the EU27 average is not calculated for the ITR on capital over the whole period.

[55] In 1995 nine countries out of the 27 EU members (Bulgaria, Greece, Spain, Luxembourg, Hungary, Malta, Romania and Slovak Republic) have not been classified due to the non availability of one or more ITRs. In 2000 and 2007 three countries (Bulgaria, Luxembourg and Malta) have not been ranked due to the non availability of the ITR on capital.

countries, Cyprus and Portugal, show both in 1995 and in 2000 lower than average ITRs on all economic functions. On the opposite, Denmark, Finland and France record all higher than average implicit tax rates. Netherland, Germany and UK have only one ITR above the EU average, respectively on consumption, labour and capital. In Austria and Belgium both consumption and labour were taxed more than average in the late 1990s. The only country which moved toward a higher relative taxation position is Sweden whose ITR on capital exceeded the EU average in 2000. On the opposite, six countries moved towards a lower relative taxation group, namely all the new EU Eastern Europe members (Poland, Latvia, Czech Republic, Estonia and Slovak Republic) and Italy that recorded a relative reduction in the ITR on capital. In the following eight years (table 14) only eight countries did not change their taxation structure In particular, Latvia and Romania have been characterized over the whole period by a relative low tax burden on all economic factors, while Finland is the only country which has experienced a relatively high overall taxation. Greece, Latvia and Romania were the countries with the lowest relative fiscal burden in the early 2000s, while Denmark, Finland and Sweden were the most taxed. All Southern European countries moved towards higher relative taxation positions together with Belgium, Czech Republic, Germany and Poland. Denmark, France and Sweden left the group of the most taxed countries because of a reduction - with respect to the average - of their ITRs on labour, capital, and consumption, respectively The last mobility table (table 15) presents the evolution of taxation over the whole period for those countries whose taxation structure can be identified both in 1995 and in 2008. Among old EU members, only two countries, the Netherlands and UK, show a low relative taxation over the whole period, while Austria, , Italy, Sweden, and to a greater extent Finland exhibit stable high taxation patterns. All new EU members, with the exception of Czech Republic, have since 1995 (or shift towards) low taxation modes. Finally four countries, Belgium, Cyprus, Germany Portugal have been moving towards higher relative taxation structures.

2.1.7 The dynamics of the ITR on labour

This section presents some simple decompositions of the ITR on labour. The aim is twofold. First, the dynamics of ITR on labour may conceal important changes in the structure of the tax system. As discussed in the survey of the literature, social contributions are usually considered a component of tax wedge in those countries characterized by Beveridgean pension systems where individual pension benefits are not related to individual contributions. In countries with Bismarckian pensions schemes, characterized by a strict link between benefits and contribution, the inclusion of social security contributions in the tax wedge is more

controversial. It is therefore interesting to analyze the evolution of the two components of the ITR, i.e. taxes and SSC.

Second, the evolution of the ITR on labour is affected both by government intervention (changes in the overall tax burden, shift of the tax burden onto or away from labour) and by changes in the economic environment (e.g. changes in the share of compensation of employees in GDP). A simple decomposition of the ITR on labour may highlight the role played by these two different drivers of the ITR dynamics.

The structure of the IRT on labour

Table 23 reports the value of three components of the ITR on labour (the personal income tax, the SSC paid by employees and the SSC and payroll taxes paid by employers) for the first (1995) and last (2008) year of the period under consideration and for 1999, which is the year that marks a turning point in the dynamics of the average ITR among Member States.

In 2008 , Denmark is the European country with the lowest SSC implicit rate on labour (0,9%), while, on the opposite, Italy exhibits the highest rate (24%). In all countries (but Denmark) SSC represents more than 50% of the total ITR on labour. The share of SSC paid by employees exhibits a great variability within Europe with the lowest levels in Estonia and Latvia (the ITR due to SSC paid by employees is respectively 0.4% and 1.9%).

Figure 65 depicts the changes in ITR on labour and in its components in the period 1995-1999. The figure shows that in this period the three components of the ITR do not generally move in the same directions. It is also difficult to find a stable relationship between the change in the total ITR and one of the three different components.

In the period 1999-2008 a clearer pattern can be detected (figure 66): the evolution of the three components of the total tax wedge is generally in line with the overall ITR trend. However, in some cases the three components move in opposite directions. Notably, Bulgaria, Estonia Lithuania and Slovakia had all reduced the total ITR on labour while increasing the component of ITR due to SSC paid by employees.

The factors driving the ITR on labour

A simple decomposition of the ITR on labour may help to understand the role played by two different drivers of the ITR dynamics: changes in tax systems and changes in the economic environment. The decomposition is described by the following equation:

$$\text{Implicit tax rate on labour} = \frac{\text{Taxes on labour}}{\text{Compensation of employees}} =$$

$$\frac{\text{Taxes on labour}}{\text{Total taxation}} \times \frac{\text{Total taxation}}{\text{GDP}} \times \frac{\text{GDP}}{\text{Compensation of employees}} \quad (1)$$

The left hand side shows whether a high (low) level in the implicit tax rate on labour is due to the structure of the tax system - high (low) reliance on taxes on labour relative to other source of revenues (first term) or to a high (low) level of the total tax burden with respect to the GDP (second term) - or to the structure of the economy - low (high) share of compensation of employees on GDP (the inverse of the last term).

The first term on the left hand side can be further decomposed as follows:

$$\frac{\text{Taxes on labour}}{\text{Total taxation}} = \frac{\text{PIT on labour}}{\text{Total taxation}} + \frac{\text{Employees' SSc}}{\text{Total taxation}} + \frac{\text{Employers' SSc}}{\text{Total taxation}} \quad (2)$$

This may be useful to understand whether there have been changes in the structure of taxation for a given share of taxes on labour in total taxation.

Further, to get insights on the evolution of the macroeconomic framework, the share of compensation of employees in GDP can be further decomposed as follows:

$$\frac{\text{GDP}}{\text{Compensation of employees}} = \frac{\text{GDP}}{\text{Total employment hours}} \times \frac{\text{Total employment hours}}{\text{Total employment persons}} \times \frac{\text{Total employment persons}}{\text{Employees}} \times \frac{\text{Employees}}{\text{Compensation of employees}} \quad (3)$$

The first term on the left hand side of (3) shows that the share of compensation of employees in GDP is higher the lower is the productivity per hour (the first term), the lower is the average number of hours of work per employed person (employees and self-employed), the higher is the share of employees in total employment (the inverse of the third term) and the higher is the average wage (the inverse of the last term).

Tables 8 to 10 reports the values of the different components of the ITR on labour for the first (1995) and last (2008) year of the period under consideration and for 1999, which is the year that marks a turning point in the dynamics of the average ITR among Member States.

In 2008 the data shows that the main driving factor behind the differences in ITR among countries is the share of the total tax burden that is levied on labour: countries that rank high in term of ITR stand usually in a high position when graded according to the share of taxes on labour in total taxation. There is also a clear, albeit weaker, correlation between the ITR and the total tax burden. In contrast, there is no clear link between the ITR

and the share of compensation of employees in GDP. These patterns can be detected more easily in figure 58 where each country is represented on the horizontal axis by the ranking based on the ITR on labour while the vertical axis measures the ranking according to the three components of the ITR. The points that correspond to the ranking based on the share of taxes on labour in total taxation lie usually close to the forty-five degrees line, showing a great similarity with the ranking based on ITR. The distribution of the points which represent the ranking according to total taxation still follows the forty-five degrees line but on a wider range while the points related to the share of compensation of employees in GDP do not display any clear pattern. The same general conclusions can be drawn by the inspection of 1995 data, even if in figure 57 there seems to be a stronger correlation between total taxation and the ITR on labour.

In 2008 there are three groups of countries where the ITR on labour is not in line with the share of taxes on labour in total taxation. The first is Italy with a high ITR on labour and a share of taxes on labour in total taxation close to the median. The high ITR on labour in Italy is due to a high tax burden (Italy ranks 6th) while the share of compensation of employees in GDP is around median values. A second group is given by two countries (Estonia, Latvia and Slovenia) with a high ranking in the share of taxes on labour (respectively 1nd, 6th and 5th) but with a ranking based on the ITR close or below the median (respectively 15th, 23rd and 13th). In all cases, the high share of taxes on labour in total taxation does not translate into a high ITR on labour for the joint effect of a moderate/low total tax burden and a very high share of labour income on GDP. A final group is given by countries with an ITR level around the median but a low share of taxes on labour (Greece, Norway and Poland). As to Greece and Poland the reason is the very low share of labour income in GDP which seems due to the very high number of self-employed (especially for Greece) and to the low per-capita average wage (especially for Poland). In the case of Norway, the departure between ITR and the share of taxes on labour is due to the high level of the tax burden.

By comparing the three components of the ITR across different years it is possible to highlight whether trends in implicit tax rates are mainly driven by policy choices (changes in total tax burden or in the composition of the tax burden) or by the dynamics of underlying macroeconomic variables (the share of compensation of employees).

Table 11 reports the ratios between the values of the ITR and its components in 1999 and the values in 1995. In this period the ITR increased in 10 countries out of 24. The analysis of the changes in the three components reveals that, in general, the increase was not the result of the shift of the tax burden on labour but rather the (usually joint) effect of a

rise in the total tax burden and a reduction of employees' compensation as a share of GDP. This pattern is illustrated by figure 59 which has the percentage increase of the ITR on labour on the horizontal axis and the percentage changes in the three components on the vertical axis.

The graph shows that the ITR on labour and the share of taxes on labour jointly increased only in five countries: Estonia, Italy, Lithuania,Malta and Sweden. In five countries (Austria, France, Germany, Luxemburg and Portugal) the ITR on labour increased due to an increase in total taxation despite a reduction in the share of taxes levied on labour. In contrast, all countries that experienced a reduction in ITR (exept for Slovakia Czech Poland) have shifted the tax burden away from labour. In four countries (Belgium, Cyprus, Spain and United Kingdom) the tax shift more than compensated for an increase of the total tax burden.

Figure 67 shows the changes in the composition of taxes on labour described by equation (3). Most countries have changed the composition of the tax burden on labour but it is difficult to detect a common pattern. Usually the personal income tax and social security contributions move in the same direction, especially when the share of taxes on labour decreases (Cyprus, Germany, Ireland, Portugal, Slovenia, Finland and UK). However in some cases the reduction of the share of taxes on labour has been achieved through a shift among the three different components. The Netherlands have increased the share of SSC paid by employers and France the share of the PIT while Latvia have decreased the share of taxes on labour by compensating an increase in PIT and SSC paid by employees through a significant cut in employers' SSC.

The comparison between 2008 and 1999 shows a similar pattern (table 12 and figure 60). The decrease in the ITR is generally achieved through a reduction of the share of taxes on labour and a decrease in the total tax burden. Two notable exceptions are Bulgaria and Italy. Bulgaria achieved a reduction in ITR, despite an increase in total tax burden and a reduction in the share of GDP paid to employees, by shifting the tax burden from labour to other tax bases. Italy has experience a (marginal) reduction in the ITR despite an increase in both total taxation and in the share of taxes levied on labour. In this case the main driver is the change in the composition of GDP with an increase of the compensation of employees. It is more difficult to find a general pattern in the case of an increase of the ITR. Cyprus, Malta and Spain experienced an increase in total tax burden and a reduction in the share of taxes levied on labour. Portugal and the United Kingdom recorded an increase in both total taxation and taxes on labour. Austria and Netherlands registered an increase in ITR despite a reduction in both total taxation and the share of taxes on labour.

Figure 68 shows that the changes in the share of taxes on labour in total taxation have been usually driven by changes in the share o SSC paid by employers. The only two exceptions are Hungary, where the reduction in SSC paid by the employers have been more than compensated by an increase in the SSC paid by the employee and the PIT and Estonia where the reduction in the PIT was stronger than the increase in SSC

2.2 Main international trends in the tax system micro-structure

The analysis of tax ratios and macro-economic measures of the average tax rate on labour are useful to identify trends in the overall structure of the tax system. However, the impact of taxes on workers' and firms' decisions depends not only on the average tax burden but also on marginal rates. This section describes the main trends in the structure of taxes levied on labour.

The tax burden on labour is essentially composed of personal income taxes and social security contributions. In most countries the structure of the personal income tax rate is very complex. The tax schedule usually comprises several brackets and rates as well as general and specific tax allowances while the tax base is affected by several types of deductions. Furthermore, in many countries income is subject to tax by different level of governments. The structure of social security contributions (SSC) is usually simpler but far from proportional. In most countries SSC rates decline with taxable income and there is a cap on contributions.

For these reasons the comparison of the evolution of the entire structure of the personal income tax and SSC among different countries is almost unfeasible. We will focus on some features which appear particularly relevant for assessing the impact of the taxes on labour market performance. Section 2.1 describes the evolution of top marginal rates, the number of brackets and the income threshold for paying the tax. Section 2.2 describes the evolution of the tax wedge on low wage production worker. Section 2.3 illustrates the impact of changes in the structure of the income tax and SSC on the degree of tax progression.

2.2.1 Evolution in the schedule of the personal income tax

Table 16 reports the top marginal tax rates and number of brackets of the personal income tax in OECD countries since 1981 and top marginal tax rates for non-OECD European countries. There is a clear downward trend over the whole period both in the number of brackets and in top marginal tax rate. A clear turning point is at the end of the eighties (prompted by the '86 reform in US). From 1985 to 1990 the average rate among OECD

countries dropped by more than 10 percentage points and the average number of brackets fell from 11 to 6. Top rates began to decrease at a stronger pace after the turn of the century. Between 2000 and 2009 the average rate declined by around 6 percentage points. Only two countries, Canada and Portugal, slightly increased their rates. In just three cases the rate did not changed (in Austria, Chile and the United Kingdom).

European countries followed the same trends. The EU-19 average went down by 23.8 percentage points since 1985 and 7.08 percentage points since 2000. The reduction since 2000 is most noticeable in the Central and Eastern European countries that joined the union in 2004 and 2007, with the biggest cuts having taken place in two countries that moved to flat rate systems, the Czech Republic (– 17.0) and Slovakia (– 23.0). On average, these countries reduced the top PIT rate by more than 13 percentage points since 2000, whereas the former EU-15 countries reduced the top rate by a mere 5.33 percentage points. Large rate cuts since 2000 have been also experienced in some non OECD European countries such as Bulgaria (-30.0), Lithuania (-17.0) and Romania (-24.0).

The trend towards flatter income taxes (with a smaller number of tax brackets and lower top rates) was certainly driven, at least in the 80s, by the growing concern about the negative effect of highly progressive rates on labour supply. The further decline in top marginal rate experienced in the last decade may be the result of the growing international integration of goods and capital markets.

Table 17 shows that since the 80s there is a clear convergence of statutory tax rates of the corporate income tax and a reduction in their mean value. The convergence in statutory rates is consistent with the theoretical prediction that increased economic integration of capital stimulates strategic interaction forcing high tax countries to reduce their rates in order to avoid profit shifting towards low tax countries and to attract new multinational firms. The similarity in trends in top rates of the PIT and corporate statutory rates may be explained by the view that the corporate tax is a backstop to the income tax (Gordon and MacKie Mason 1995). When the corporate tax rate is lower than the tax rate on personal income the burden of the income tax could be reduced by retaining earnings within a corporation or by reclassifying labour and interest income as business income. The size of the gain from such strategies depends on a number of factors, such as the effective tax rates on capital gains, the degree of integration between corporate and personal income tax, the structure and burden of social security contributions. In any case, there is empirical evidence which confirms that taxpayers do react to differences in rates (see Weichenrieder 2005 for a survey). Further evidence of the link between corporate and individual tax rates is provided by Slemrod (2004)

and Clausing (2007). If the corporate tax is a backstop to the income tax, corporate tax rates are related to personal tax rates on labour and capital income and trends in personal tax rates can be driven by changes in corporate taxation. It is therefore possible that higher mobility of profits and firms forced a convergence in corporate statutory tax rates and this caused a similar convergence in individual rates.

It is much more difficult to describe the evolution of the tax schedule at the bottom of the income scale. A relevant feature for the potential impact on labour decisions is the tax threshold, e.g. the level of earnings at which income tax is first paid. The threshold is one of the determinants of progressivity and may influence the point where the poverty trap becomes operative. However, the threshold depends on several elements of the tax: the rate schedule, the structure of general standard and non-standard tax allowances and, in case of married workers, the tax unit.

Table 18 contains a description of the threshold for OECD countries based on the so called "budget constrain" calculated by the OECD in the annual publication Benefits and Wages. The first column reports whether the tax contains standard allowance or tax credit. The second column reports the threshold for a non-married worker with no children. The level of the threshold is measured as percentage of an average worker wage. The third column contains the Marginal Effective Tax Rate (METR) at the threshold, i.e. the fraction of any additional earnings above the threshold that is taxed away by the combined effect of taxes and benefit withdrawals. The fourth column shows the METR of the personal income tax) at the threshold, i.e. the fraction of any additional earnings that is taxed away by the exclusive effect of the personal income tax. The remaining columns report the tax threshold and the two different METRs in the case of a worker with an inactive spouse and two children aged 4 and 6 and in the case of a worker with employed spouse earning the average worker wage and two children aged 4 and 6.

In 2008 the tax thresholds for a non-married worker with no children varied from a minimum of zero (Japan and New Zealand) to a maximum of 59% of the average worker wage in Greece. European countries showed, on average, a higher threshold. The METR of the PIT at the threshold ranged from a minimum of 1% in Finland, Slovak Republic, United Kingdom and United States to a maximum of 84% in Italy. There is no clear correlation between the threshold and the corresponding METR of the PIT and no difference in average values in Europe and OECD.

The METR which takes into account also the effect of benefit withdrawals is significantly higher on average. In several countries, Belgium, Ireland, Netherlands, Norway, Sweden and Switzerland, it is equal or greater than

one. The effect of benefit withdrawals is larger in Continental Europe and the Nordic countries.

The tax threshold usually increases for the married worker with a dependent spouse and two children. It almost doubles, on average, both in Europe and in OECD countries. In contrast the METR declines while the METR of the PIT increases slightly.

The worker with spouse employed faces usually a lower tax threshold. Not surprisingly, the METR is lower due to the fact that the worker is entitled to a smaller amount of benefit with respect to the single earner. However, the METR of the income tax is usually significantly higher.

The comparison with the year 2001 highlights a general trend toward a reduction in the tax threshold and in the METRs, but for the case of the worker with employed spouse.

2.2.2 Evolution of the tax wedge on low wage workers

An additional tool for analysing the evolution of the tax schedule is given by the tax wedge defined as the difference between labour costs to the employer and the corresponding net take-home pay of the employee. The annual OECD publication Taxing Wages, provides internationally comparable data on total tax wedges. There are two main differences between the tax wedge and the ITR. First , while the ITR gives a picture of the average tax burden on labour across all income classes the tax wedge can be calculated for various household types and different representative wage levels. Second, the tax wedge is not affected by cyclical factors (e.g. changes in factor shares in GDP) which are not filtered out by the ITR on labour as explained in section 2.1.7.

As remarked by the European Commission (Taxation Trends 2010) both indicators (ITR and tax wedge) have pros and cons. The tax wedge is not related to actual tax revenue and may underestimate some elements of the tax system, such as special tax reliefs. In contrast the ITR incorporates all features of the tax system but, by averaging across all types of workers will tend to underestimate the impact of targeted measures. Hence the two approaches are complementary.

In this section we focus on the tax wedge on low wage workers, which is the tax wedge for a single worker without children at two-thirds of average earnings. The reason for this choice is twofold. First, that indicator is also used in the framework of the Lisbon Strategy — together with the ITR on labour — to estimate the potential impact of tax provisions on the labour market. Second, data for non-OECD European countries are calculated in collaboration with the European Commission and published in the annual publication Taxation Trends.

Table 19 reports the data for EU for the years 2000-2008[56]. In 2008 the total tax wedge range a lot within European Union, from 17.9% in Malta to 50.3% in Belgium. In the recent years European Union countries attempted to shift fiscal burden from labour to other tax bases so as to create a more employment-friendly environment. As a result, in all European Union countries, Austria, Greece, Iceland, Malta and United Kingdom excluded, total tax wedge was declining. Excluding Luxembourg which for many aspects is not immediately comparable to the other EU countries, the greatest decline occurred in Northern European countries (in particular Finland and Sweden). Also in Continental Europe countries decreases were recorded, but to a lower extent. Southern regions instead do not show a similar downward trend as their tax wedge in 2008 is almost at the same level as of 2000 or higher (Greece). All Eastern Europe countries, with the exception have cut down their total tax wedge; Bulgaria, Hungary and Slovak Republic showed the greatest reductions. Similar tax wedge downward trends can be recorded also in the most non European OECD countries (see table 20), thus suggesting that the fiscal competition of less developed countries, characterized by lower taxes on labour, lead governments of the richest countries to introduce reforms of their labour taxation models.

As previously discussed for the ITR on labour, an informative exercise consists of decomposing the total wedge into two components, the one associated to social security contributions and the other - to personal income tax. This decomposition is available for OECD countries in the annual publication Taxing wages.

Table 20 reports the total tax wedge together with its SSC component and the share of the SSC wedge levied on employees for OECD countries in years 2000, 2005 and 2009. In 2009 , Denmark is the European country with the lowest SSC wedge (10.3%), while, on the opposite, Hungary exhibits the highest wedge (37.3%). In the most countries SSC wedge represents more than 50% of the total tax wedge. The only country in EU in which SSC are less than half of the tax wedge is Denmark. The share of SSC paid by employees exhibits a great variability with the lowest levels in Sweden and Spain (respectively 18.2% and 17.6%) and total social contributions levied on employees in Denmark.

Figure 61 reports changes of total tax wedge and of its components in the period 2000-2009. The evolution of the two components of the total tax wedge is generally in line with the overall wedge trend. However, in some

[56] Pre-2000 data are not fully comparable due to changes in the definition of the average wage.

cases the two components move in opposite direction. Austria, Hungary and United Kingdom experienced an increased in the SSC wedge along with a decline in the PPT wedge. In Italy, Netherlands and Poland the opposite occurred. Focusing on SSC, figure 62 depicts both the change between year 2000 and 2009 and the variation in the share of social contributions paid by employees. In most EU countries the SSC wedge declined, the only countries not showing this trend being Austria, Ireland, UK and Hungary. In particular, Netherlands record the highest SSC wedge cut with an average yearly reduction of one percentage point. Concerning the breakdown of SSC contributions between the two sides of the labour market, the share paid by employees rose in the most EU countries, especially in Ireland, Hungary and Slovak Republic where the increase was of more than 8 percentage points. On the opposite, Netherlands, together with the strongest SSC wedge cut down, reduced the share of social contributions levied on employees at the same extent.

2.2.3 Changes in progressivity

Changes in the structure of the personal income tax and in the composition of the tax wedge affect the progressivity of the tax system.

One way to evaluate the overall change in progression is to rely on the average personal income tax rates on gross labour income calculated by OECD based on the framework used in the OECD publication "Taxing Wages". The OECD tax database contains data since 2000. The progressivity of the tax system can be measured by the ratio between the difference of the average tax rate of a single earner without children at 167% of average earnings (T167) and at the tax rate of a single earner at 67% of average earnings and the average tax rate at 67% of average wage (T67), using the formula: (T167-T67)/T167. The index is zero if the tax is proportional, positive if the tax is progressive and negative if the tax is regressive.

Table 21 reports the values of such indicator for the period 2000-2009 for OECD countries considering the total tax wedge (PIT and SSC) while table 20 reports the values taking into account the average rate of the personal income tax only.

Surprisingly, despite the general trend among OECD countries towards a reduction of top marginal tax rates of the PIT, progressivity measured on the total tax wedge increased between 2009 and 2000. The rise in progressivity is quite general in EU: only three out of nineteen countries (Austria, Hungary and Ireland) slightly reduced progressivity. The average value showed a slight decline between 2008 and 2009 which may be the result of the policy measures implemented to counteract the economic crisis.

The progressivity of the personal income tax shows a similar pattern. Here the rise in progressivity is most evident up to 2008. Between 2008 and 2009 among European countries the progressivity index on average declined to the 2000 level.

Up to 2008, the standard deviation of countries' values and the difference between the maximum and minimum values both declined providing evidence of a convergence within EU and OECD. The convergence in the degree of progressivity of OECD countries is also illustrated by the figure 63, for the tax wedge, and figure 64 for the personal income tax. Each figure on the horizontal axis has the value of the progressivity index in 2000 and on the vertical axis - the change in value of the same index between 2000 and 2008. It is apparent that changes in progressivity are negatively correlated with initial values in 2000. Countries with high value of tax progression in 2000 have reduced the progressivity, while countries with an initial low value have increased the progressivity of their taxes.

References

Alesina, A. and R. Perotti (1997), "The Welfare State and Competitiveness", *American Economic Review*, 87, 921-939.

Alesina, A., Ichino, A. and L. Karabarbounis (2010), "Gender based taxation and the division of family chores", forthcoming in *American Economic Journal: Economic Policy*.

Anderberg, D. and F. Andersson (2003) "Investments in human capital, wage uncertainty, and public policy", *Journal of Public Economics* 87 (7-8), 1521-1537.

Andersen, T. M. (2003), "Welfare policies, labour taxation and international integration", *International Tax and Public Finance* 10, 43-62.

Andersen, T. M., Haldrup, N. and J. Rose Sorensen (2000), "Labour market implications of EU product market integration", *Economic Policy* 15 (30), 107-133.

Apps, P., and R. Rees (2009), *Public Economics and the Household*, Cambridge University Press.

Arachi, G. and M. D'Antoni (2004), "Redistribution as social insurance and capital market integration", *International Tax and Public Finance* 11, 531-547.

Arachi, G. (2007), "Optimal origin-based commodity taxation in a small open economy", *B.E. Journal of Economic Analysis & Policy* 7 (1).

Arellano, M. and C. Meghir (1992), "Female labour supply and on-the-job-search: an empirical model estimated using complementary datasets", *Review of Economic Studies* 59, 537-559.

Arpaia, A. and G. Carone (2004), "Do labour taxes (and their composition) affect wages in the short and the long run?", European Economy Economic Papers no. 216.

Arulampalam, W., Devereux, M. P. and G. Maffini (2009), "The direct incidence of corporate income tax on wages", Working paper 0917, Oxford University Centre for Business Taxation.

Ashenfelter, O. and J. Heckman (1974), "The estimation of income and substitution effects in a model of family labor supply", *Econometrica* 42, 73-85.

Baily, M. (1978), "Some aspects of optimal unemployment insurance", *Journal of Public Economics* 10, 379-402.

Bastani, S., Blomquist, S. and L. Micheletto (2010), "Public provision of private goods and optimal income taxation with heterogeneity in needs", unpublished manuscript, Uppsala University.

Bastani, S., Blomquist, S., Lindvall, L. and L. Micheletto (2010), "The welfare gains of age related optimal income taxation", unpublished manuscript, Uppsala University.

Bean, C., Layard R. and S. Nickell (1986), "The Rise in Unemployment: A Multi-country Study", *Economica*, 53, S1-S22.

Blomquist, S. and U. Hansson-Brusewitz (1990), "The effect of taxes on male and female labor supply in Sweden", *Journal of Human Resources* 25, 317-357.

Blomquist, S. and W. Newey (2002), "Nonparametric estimation with nonlinear budget constraints", *Econometrica* 70 (6), 2455-2480.

Blomquist, S. and L. Micheletto (2008), "Age-related optimal income taxation", *Scandinavian Journal of Economics* 110 (1), 45-71.

Blomquist, S., Christiansen, V. and L. Micheletto (2010), "Public provision of private goods and nondistortionary marginal tax rates", *American Economic Journal: Economic Policy* 2 (2), 1-27.

Blundell, R., Duncan A. and C. Meghir (1992), "Taxation in empirical labour supply models: lone mothers in the UK", *Economic Journal* 102, 265-278.

Blundell, R., Duncan A. and C. Meghir (1998), "Estimating labor supply responses using tax reforms", *Econometrica* 66 (4), 827-861.

Bourguignon, F. and T. Magnac (1990), "Labor supply and taxation in France", *Journal of Human Resources* 25, 358-389.

Brewer, M., Duncan A., Shephard, A. and M. Suarez (2005), "Did working families' tax credit work? The final evaluation of the impact of in-work support on parents' labour supply and take-up behaviour in the UK", IFS Report.

Brunello G. and D. Sonedda (2007) "Progressive taxation and wage setting when unions strategically interact", *Oxford Economic Papers* 59(1), 127-140.

Cahuc, P. and A. Zylberberg (2008), "Optimum income taxation and layoff taxes", *Journal of Public Economics* 92, 2003-2019.

Calmfors, L. and J. Driffill (1988), "Bargaining Structure, Corporatism and macroeconomic performance", *Economic Policy* 6, 13-62.

Calmfors L. (1995), "Comment on Holmlund B. and Kolm A.: Progressive Taxation, Wage Setting and Unemployment: Theory and Swedish Evidence", *Swedish Economic Policy Review* 2, 461-470.

Cogan, J. (1981), "Fixed costs and labor supply", *Econometrica* 49, 945-963.

Daveri, F. and G. Tabellini (2000), "Unemployment, growth and taxation in industrial countries", *Economic Policy* 30, 49-90.

De Mooij, R. and G. Nicodème (2008), "Corporate tax policy and incorporation in the EU", *International Tax and Public Finance* 15 (4), 478-498.

Eaton, J. and H. S. Rosen (1980), "Taxation, human capital and uncertainty", *American Economic Review* 70, 705-715.

Eissa, N. and J. Liebman (1996), "Labor supply response to the earned income tax credit", *Quarterly Journal of Economics* 111, 605-637.

Eklöf, M. and H. Sacklén (2000), "The Hausman-MaCurdy controversy: why do the results differ across studies?" *Journal of Human Resources* 35, 204-220.

Feldstein, M. (1995), "The effect of marginal tax rates on taxable income: a panel study of the 10986 Tax Reform Act", *Journal of Political Economy* 103 (3), 551-572.

Feldstein, M. (1999), "Tax avoidance and the deadweight loss of the income tax", *Review of Economics and Statistics* 81 (4), 674-680.

Felix, A. R. (2007), "Passing the burden: corporate tax incidence in open economies", Federal Reserve Bank of Kansas City RRWP 07-01.

Flemming, J. (1978), "Aspects of optimal unemployment insurance: search, leisure, savings and capital market imperfections", *Journal of Public Economics* 10, 403-425.

Flood, L. and T. MaCurdy (1992), "Work disincentive effects of taxes: an empirical study of Swedish men", *Carnegie-Rochester Conference Series on Public Policy* 37, 239-278.

Fuest, C. and B. Huber (2000), "Is tax progression really good for employment? A model with endogenous hours of work", *Labour Economics* 7, 79-93.

Gahvari, F. (1994), "In-kind transfers, cash grants and labor supply", *Journal of Public Economics* 55, 495-504.

Gahvari, F. (1995), "In-kind versus cash transfers in the presence of distortionary taxes", *Economic Inquiry* 33, 45-53.

Gordon, R. H. (1986), "Taxation of investment and savings in a world economy", *American Economic Review* 76 (5), 1086-1102.

Gruber, J. and E. Saez (2002), "The elasticity of taxable income: evidence and implications", *Journal of Public Economics* 84 (1), 1-32.

Hansen, C. T. (1999), "Lower tax progression, longer hours and higher wages", *Scandinavian Journal of Economics* 101 (1), 49-65.

Hansen, C., Pedersen, L. and T. Sløk (2000), "Ambiguous effects of tax progressivity: theory and Danish Evidence" *Labour Economics* 7, 335-347.

Hassett, K. A. and A. Mathur (2006), "Taxes and wages", Working Paper No. 128, American Enterprise Institute for Public Policy Research.

Hausman, J. (1981), "Labor supply", in *How Taxes Affect Economic Behavior*, ed. H. Aaron and J. Pechman, Washington DC: Brookings Institution.

Heijdra, B.J., and J. E. Ligthart (2009), "Labour tax reform, unemployment, and search", *International Tax and Public Finance* 16, 82-104.

Holm, P. and E. Koskela (1996), "Tax Progression, structure of labour taxation and employment" *FinanzArchiv* 53, 28-46.

Holmlund B. and A. Kolm (1995), "Progressive Taxation, Wage Setting and Unemployment: Theory and Swedish Evidence" *Swedish Economic Policy Review*, 2, 423-460.

Hopenhayn, H. and J. Nicolini (1997), "Optimal unemployment insurance", *Journal of Political Economy* 105, 412-438.

Huber, B. (1999), "Tax competition and tax coordination in an optimum income tax model", *Journal of Public Economics* 71, 441-458.

Immervoll, H., Kleven, H. J., Kreiner, C. T. and N. Verdelin (2009), "An evaluation of the tax-transfer treatment of married couples in European countries", IZA Discussion Paper 3965.

Jacquet, L. M., Lehmann, E. and B. Van der Linden (2010), "Optimal marginal tax rates with both extensive and intensive responses", IZA Discussion Paper 4837.

Kaiser, H., Spahn, P. and U. van Essen (1992), "Income taxation and the supply of labour in West Germany", *Jahrbucher fur Nationalokonomie und Statistik* 209 (1-2), 87-105.

Kerschbamer, R. and G. Kirchsteiger (2000), "Theoretically robust but empirically invalid? An experimental investigation into tax equivalence", *Economic Theory* 16, 719-734.

Kleven, H. J., Kreiner, C. T. and E. Saez (2009), "Why can governments tax so much? An agency model of firms as fiscal intermediaries", NBER Working Paper No. 15218.

Kolm, A. S. and B. Larsen (2004), "Does tax evasion affect wages, unemployment and educational choice?", IFAU Working Paper 2004:4.

Koskela E. and J. Vilmunen (1996), "Tax Progression is good for employment in popular models of trade union behaviour", *Labour Economics* 3, 65-80.

Koskela E. and R. Schöb (1999), "Does the composition of wage and payroll taxes matter under Nash Bargaining", *Economic Letters* 64, 343-349.

Koskela E. and R. Schöb (2007), "Tax Progression under Collective Wage Bargaining and Individual Effort Determination" CESifo Working Paper No. 2024.

Koskela E. and R. Schöb (2009), "Is Tax Progression Good for Employment? Efficiency Wages and the Role of the Prereform Tax Structure", *FinanzArchiv* 65, 51-72.

Lockwood B. and A. Manning (1993), "Wage setting and the tax system", *Journal of Public Economics* 52, 1-29.

Lockwood, B., Sløk, T., and T. Tranaes (2000), "Progressive Taxation and Wage Setting: Some Evidence for Denmark" *Scandinavian Journal of Economics* 102, 707-723.

MaCurdy, T., Green, D. and H. Paarsch (1990), "Assessing empirical approaches for analyzing taxes and labor supply", *Journal of Human Resources* 25 (3), 415-490.

Malcomson J. and N. Sartor (1987), "Tax push inflation in a unionized labour market", *European Economic Review* 31, 1581-1596.

Nickell, S. and R. Layard (1999), "Labour market Institutions and Economic Performance", in: Ashenfelter, O. and Card, D., (eds.), Handbook of labour Economics, 3, 3029-84.

Nickell, S. (2003), "Employment and taxes", CESIfo Working Paper No. 1109.

Pencavel, J. (2002), "A cohort analysis of the association between work hours and wages among men", *Journal of Human Resources* 37, 251-274.

Pestieau P. and U. Possen (1991) "Tax evasion and occupational choice", *Journal of Public Economics* 45 (1), 107-125.

Picard, P. M. and E. Toulemonde (2003), "Taxation and labor markets", *Journal of Economics* 78, 29-56.

Pissarides, C. A. (1998), "The impact of employment tax cuts on unemployment and wages; the role of unemployment benefits and tax structure", *European Economic Review* 42, 155-183.

Rodrik, D. (1998), "Why more open economies have bigger governments?", *Journal of Political Economy* 106, 997-1032.

Saez, E. (2002), "Optimal income transfer programs: intensive versus extensive labor supply responses", *Quarterly Journal of Economics* 117, 1039-1073.

Shavell, S. and L. Weiss (1979), "The optimal payment of unemployment insurance over time", *Journal of Public Economics* 87, 1347-1362.

Simula, L. and A. Trannoy (2010), "Optimal income tax under the threat of migration by top-income earners", *Journal of Public Economics* 94 (1-2), 163-173.

Slemrod, J. (2008), "Does it matter who writes the check? The economics of tax remittance", *National Tax Journal* 61, 251-275.

Sørensen, P. B. (1997), "Public finance solutions to the European unemployment problem?", *Economic Policy* 25, 223-264.

Sørensen, P. B. (1999), "Optimal tax progressivity in imperfect labor markets", *Labour Economics* 6, 435-452.

Triest, R. (1990), "The effect of income taxation on labor supply in the United States", *Journal of Human Resources* 25, 491-516.

Van Soest, A., Woittiez, I. and A. Kapteyn (1990), "Labour supply, income taxes and hours restrictions in the Netherlands", *Journal of Human Resources* 25, 517-558.

Wang, C. and S. Williamson (1996), "Unemployment insurance with moral hazard in a dynamic economy", *Carnegie-Rochester Conference Series on Public Policy* 44 (1), 1-41.

Weinzierl, M. (2008), "The surprising power of age-dependent taxes", unpublished manuscript, Harvard University.

Wildasin, D. E. (1995), "Factor mobility, risk and redistribution in the welfare state", *Scandinavian Journal of Economics* 97, 527-546.

Wildasin, D. E. (2000), "Labor-market integration, investment in risky human capital and fiscal competition", *American Economic Review* 90, 73-95.

Yaniv, G. (1990), "Tax evasion under differential taxation", *Journal of Public Economics* 43, 327-337.

Yaniv, G. (1992), "Collaborated employee-employer tax evasion", *Public Finance/Finances Publiques* 47 (2), 312-321.

Chapter 2: Identification of labour tax reforms and their overall impact on the labour market

Bocconi

Executive summary

The labour tax reforms' catalogue

We provide a catalogue of reforms carried out since 1990 in the field of labour taxation and social security contributions. The catalogue encompasses **33 countries**: the 27 EU Member States plus Croatia, Macedonia, Iceland, Japan, Serbia and United States. We also provide detailed information on reforms in Norway. The time coverage is **1990-2008**.

The template for data collection stems from the LABREF database of reforms in the field of labour taxation. In agreement with the DG Employment, the existing template has been enriched by adding new items. The new template is therefore structured on the original LABREF thirteen descriptive features, plus **seventeen additional categorical variables**, which aim at simplifying the use of the database for empirical analysis. We also categorized the possible answers to some existing questions, in order to facilitate the use of this information for statistical and descriptive purposes.

The procedure adopted in filling the forms ensures full **comparability across countries and years**.

Identification of typologies of reforms

We classify the reforms according to one or more criteria. The main ones are reported in the list below.

- Reforms which have **increased/decreased** Personal Income Taxation or Social Security Contributions
- Reforms of the Social Security Contributions which have introduced a **tax amnesty.**
- **Temporary and permanent** reforms.
- Reforms which put in place **enforcement and monitoring procedures**.
- **Targeted** and **untargeted** reforms: region, sectors, age groups, gender.
- **Marginal** reforms.
- **Reforms which involved social partners.**

These taxonomies are used for descriptive purposes and for econometric analysis.

Descriptive analysis

We provide three complementary descriptions of the database.

The **general description** of the reforms for each of the countries considered**.**

The description of the main features of the reforms for each country and each area of intervention **by making use of the categorical variables**.

For each field of intervention**, we present information on each features of the reforms cross-country and over-time.**

Personal Income Taxation

The descriptive analysis highlights the following facts:

- From 1990 to 2008 there have been 1,331 reforms, with an average of about 40 reforms per country and about 70 per year.
- While reforms are evenly spread over time, the distribution across countries is much more uneven: Ireland (119) and Italy (121) implemented almost three times more reforms than the general average, while Austria put in practice only 14 reforms.
- 99 reforms have decreased the tax base and 96 have increased it. 157 have modified the tax brackets. 102 have decreased the tax rate; 38 have increased the tax rate. 121 have decreased deductions; 105 have increased them. 62 have decreased tax credits; 110 have increased tax credits.
- 42.3% of the reforms for which the information is available[57] are embedded in a reform package (the information is not available for 189 reforms) and 29.4% involve a tax shift (the information is not available for 580 reforms).
- Sweden implemented only 3% of reforms in the same year of approval, while the Netherlands, Cyprus and Iceland scheduled on average very long phase-in periods: 744, 510 and 357 days respectively.
- 1,051 reforms have no specific targets. 35 reforms reported to have multiple targets. The share of targeted reforms is 65.5% in the Netherlands, 58.8% in Lithuania and 52.8% in Hungary. On the other extreme, in Greece, the United States and Italy the percentage of targeted reforms is, respectively, 0.7%, 0.7% and 0.8%.
- The vast majority of reforms (1,209) apply to the entire labour force, with no distinction between incumbents and new entrants. Italy is the

[57] In this summary all the percentages are calculated using as a denominator the total number of reforms for which information on the specific question is available.

only country where reforms directed to all the three groups have been implemented. Apart from Belgium (5 reforms over 20 affecting only incumbents), in all other countries the share of such reforms is absolutely negligible.

- The share of reforms associated to some monitoring or enforcement procedure is 71.4% in France, 46% in Slovenia and 34.4% in Malta. For all the other countries the share is negligible.
- Less than 5.8% of the reforms implemented foresees an ex-post evaluation procedure (the information is missing for 259 reforms). Moreover, only in Estonia, Latvia, the Netherlands and Slovak Republic ex-post evaluation was ever foreseen.
- About 8% of reforms foresaw some role for social partners (the information is not available for 255 reforms): the only countries with a consistent involvement of social partners are Belgium (35%), Denmark (100%), Iceland (26%), the Netherlands (55%).

Social Security Contributions

As far as social security contributions are concerned, we can summarize the information regarding them as follows

- There have been 474 reforms on social security contributions paid by the **employees**.
- 18 are tax amnesties, 95 have decreased the tax rate; 137 have increased the tax rate.
- 89 reforms are targeted.
- 18.4% are embedded in a reform package (the information is not available for 73 reforms).
- 2.1% involve a tax shift (the information is not available for 345 reforms).
- 65.9% do not involve social partners (the information is not available for 123 reforms).
- 466 apply to all workers (not only to new entrants or incumbents).
- 4.1% foresee monitoring or enforcement rules (the information is not available for 141 reforms). Only Latvia always foresees monitoring or enforcement rules, followed by France (66.7%).

As far as social security contributions paid by the **employers** are concerned:

- There have been 767 reforms.
- 86 are tax amnesties, 293 have decreased the tax rate; 174 have increased the tax rate.
- 253 reforms are targeted.

- 28.6% are embedded in a reform package (the information is not available for 84 reforms) and 8.1% involve a tax shift (the information is not available for 496 reforms).
- 95.8% do not involve social partners and the information on this point is missing for another 17.3% of the reforms.
- 663 apply to all workers (not only to new entrants or incumbents).
- 6.5% foresee monitoring or enforcement rules (the information is not available for 171 reforms).

As far as social security contributions paid by the **self-employed** are concerned:

- There have been 417 reforms.
- 23 are tax amnesties, 83 have decreased the tax rate; 84 have increased the tax rate.
- 79 reforms are targeted.
- 12.3% are embedded in a reform package (the information is not available for 51 reforms) and 6.7% involve a tax shift (the information is not available for 388 reforms).
- 95.6% do not involve social partners, but the information on this point is missing for 101 reforms.
- 412 apply to all workers (not only to new entrants or incumbents).
- 3.1% foresee monitoring or enforcement rules (the information is not available for 118 reforms).

Regression analysis

We address the labour market effects of tax reforms on **employment**, **unemployment** and **participation** rates, **hours worked**, **poverty** and **inequality**. We estimate how these outcome variables are correlated with tax reforms.

We look both at the overall outcomes and at selected subsamples of the population, in particular, females and young workers. This procedure allows us to exploit both between and within country variability across time. Therefore, our regression approach can include both time and country fixed effects, partially coping with the misspecification problems affecting the existing literature. We estimate a dynamic panel data model where reforms are allowed to have an impact on dependent variables up to two years after their introduction.

As to the type of reforms, we focus on those that **lower** Personal Income Taxation **(**through either an increase of deductions and/or tax credits, or a reduction of the tax base) or Social Security Contributions. Reforms are classified according to their typology (PIT or SSC) and to their target (employers or employee- SSC). We also use information on the target of the reform. We perform a number of robustness checks.

A note of caution is needed in the interpretation of the results. In fact, as it is well acknowledged in the literature, the individual incentives to work depend on both the tax wedge (and therefore on personal income tax and on social security contributions) and on net social benefits. We presume that the present results could be altered by supplementing the analysis based on the catalogue of tax reforms with information on other labour market reforms included in the LABREF database, in particular reforms of the system of social benefits. Having said this, the main results of the analysis can be summarized as follows.

Employment, unemployment and participation rates, and hours worked

The outcomes we focus on are: the **unemployment** rate, the **employment** rate, the **inactivity** rate and weekly **hours** of work. Data come from the European Labour Force Survey and are aggregated at country-year level. The same exercise is performed in the general sample of a country workforce and on a sub-sample of both female and young (<30) respondents.

The main results of the analysis are:

- In general, all the analyses performed seem to point to a very **weak**, if any, **impact of all the included policies on the macroeconomic variables considered**. Even when they are significant, policy related coefficients have very limited economic meaning.
- Moreover, results show that **one or two years are needed** in order to be able to detect any policy impact on countries' macroeconomic situation.
- When **time-varying control variables** such as the rate of highly educated people or the GDP are introduced, the policy impact is even weaker, while most of these control variables show a reasonable and intuitive association with the outcomes under analysis.
- In the general sample, results seem robust across different specifications.

- When the general sample is split into different subsamples, some of the previous results change slightly. In particular,
  - when the female workforce is considered, some policies seem to have impacted more on the relevant outcomes. More precisely, **PIT reforms targeted to women have increased female employment rates and average hours of work, while they have reduced inactivity rates**. Female targeting PIT reforms are associated, for example, with an increase of the employment rate of more than 1%.
  - On the other hand, there is no evidence that European reforms targeting the **young workforce** had an impact on any of the relevant outcomes. Hence, it is difficult to draw any strong conclusion about tax policies targeted to the youngsters, although it seems safe to conclude that, if an impact exists, it must be relatively weak.

Poverty and inequality

We investigate whether reforms have an effect on poverty measures and inequality. We use a panel analysis over the 28 countries covered by ECHP and EU-Silc. The definition of poverty used in the analysis is relative poverty: the poverty line is set at the 60% of the median, for each country in each year. As poverty indicator we use the equivalent household income. We compute the **percentage of poor individuals**, the **average poverty gap** and the **square average poverty gap**. As indicator of inequality, we focus on the **Gini** index.

The main results of the analysis for poverty can be summarized as follows:

- In general, the impact of the reforms is quantitatively **very limited** and statistically non significant.
- When the impact of a reform reducing personal taxation or social security contribution is statistically significant, it has the **opposite sign of what we would expect**.
  - Reforms decreasing income taxation or social security contribution in general are positively correlated with the percentage of poor individuals, the average poverty gap or squared poverty gap.
  - We also find a positive correlation between female poverty and decreasing income tax reforms targeted to women, with one year time lag.
- The effect of reforms lowering income tax targeted to young individuals differs across age subgroups:
  - for the youngest group (16-30), it is positively correlated with

the percentage of poor individuals (with a lag).
    - for the age group (31-55), reforms targeted to young have a negative effect on the percentage of poor individuals and on the average poverty gap.
- Reforms lowering social security contribution targeted to young individuals appear to be negatively correlated with the average poverty gap and square average poverty gaps for the second age cohort (31-55), and positively correlated with poverty in the age bracket (55-65).
- Inequality as measured by the Gini index does not seem to be influenced by any reforms in labour income taxation. The only exception is when we study inequality separately by age subgroups. In that case, there is some evidence that reforms regarding income tax and reforms of social security contributions have an impact in lowering poverty for the youngest cohort.
- In general, we find a positive correlation between immigration rate and poverty (both for female and male poverty); while GDP and the extent of public expenditures are negatively correlated with the percentage of poor female and male individuals.

Robustness checks

The basic regression specification is subject to several robustness checks. In particular, we extend the analysis to include also tax increasing and other reforms and to identify more important reforms. We have also replicated all the regressions restricting the sample to the low-employment countries, identified in Section 4. The results generally confirm the previous conclusions. Remarkably, the involvement of social parties seems to be correlated with better labour market outcomes and lower poverty.

Change in tax-benefit systems and employment goals: assessing consistency for low employment countries

The OECD tax-benefit model is used in combination with the EU-SILC data to simulate the change in economic incentives for a selected group of countries over the last decade. The direction and magnitude of this change are taken as indicators of overall consistency (or otherwise) of the reforms of the tax-benefit systems enforced in this period with the goal of approaching the Lisbon employment targets.

With few exceptions (e.g. lone mothers in Hungary) the change in tax-benefit systems generally went in the direction of augmenting incentives.

However, we could not clearly detect a relationship between the magnitude of the change in incentives and the size of the initial employment gap. This is probably due to the reduced sample of countries for which we could conduct the analysis. At the same time it suggests that taxation policy might have played some role in pursuing employment targets in countries at the middle or the bottom of the employment pyramid, but not a central role. One possible reason is that creating incentives via tax-benefit system is a costly alternative, especially in view of the time lag necessary for the employment effect to materialize.

The analysis carried out with this simulation exercise is clearly preliminary. However, the exercise was undertaken also for heuristic purposes and shows how the data base constructed for this project can be used in connection with the OECD tax-benefit model and EU-SILC data to monitor actual incentive effects of fiscal reforms over time.

Introduction

Task 2 has three main objectives: to provide a catalogue of reforms of labour taxation carried out in the EU since 1990; to identify a typology of reforms in the field of labour taxation and the financing of social security and to regroup and categorize the identified reforms; to assess the labour market impact of the different types of tax reforms in a cross-country perspective.

Section 1.1 details the creation of the labour tax reforms' catalogue and it explains how the new catalogue improves upon the existing one. Sections 1.2 and 1.3 provide an overview of the reforms carried out since 1990 and suggest several possible categorizations of the reforms, depending on the specific object of study. Section 2 offers a first appraisal of the effect of tax reforms on some key labour market outcomes, poverty and inequality. Section 3 takes a look at the evolution of tax-benefit systems in a selected group of European countries and it assesses whether their evolution has been consistent with the goal of increasing employment. In order to represent changes in the tax-benefit system Section 3 does not rely on the catalogue but on the use of the Average Effective Tax rate indicator, which has also been employed in the First Report.

1. The labour tax reforms' catalogue

This section describes the methodology used to construct the catalogue of reforms in the field of labour taxation and the financing of social security.

1.1 Data collection

The basis for constructing the catalogue of reforms has been the "European Commission, Directorate General for Economic and Financial Affairs and Economic Policy Committee LABREF database", LABREF thereafter. Currently, LABREF covers the 27 EU countries, for the years 2000-2007. We have extended the period and the number of countries covered. Furthermore, in agreement with the DG Employment, the existing catalogue has been enriched by adding new items to the template used for data collection.

The catalogue now encompasses 33 countries: the 27 EU Members States plus Croatia, Macedonia, Iceland, Japan, Serbia and the United States. Annex 1 provides the country codes used in this report. The time coverage is 1990-2008. To ensure uniformity, we have collected information and built the catalogue also for the period already covered by LABREF.

The structure of our catalogue is concerned was developed as a tool for research analysis, by modifying the original LABREF template. LABREF is structured in thirteen descriptive features, grouped in two broad headings: "Main features of the reform", and "Detailed features of the reform design"[58].

The "Main features" currently include the following items:

1. General description of the measure;
2. Reference (Budget law, decree, law, or other);
3. Information source concretely used to fill the database;
4. Year of adoption;
5. Timing of implementation (i.e. entry in force, phasing-in schedule);

The "Detailed features" are:

6. Direct budgetary costs for general government;
7. Socio-economic groups targeted;
8. Is the measure applied to new entrants only or also to current incumbents?
9. Are enforcement and monitoring procedures put in place?

[58] See European Commission (2005).

10. In order to be implemented does the reform require policy interventions in related areas?
11. Is the measure embedded in a formal long-term policy programme, and is the reform part of a reform package?
12. Is there an involvement of the social partners?
13. Main impact: on Labour demand (Ld), Labour supply (Ls), Wages (w) or Matching of unemployed with vacancies?

We have modified this template by introducing additional requests of information on the one side, and several additional categorical variables, on the other. This greatly simplifies the use of the database for empirical analysis.

In particular, we first supplemented question 1 with two new encodings, which differ between PIT and SSC. These are:

1.1 Kind of measure
- PIT (0 = increase (or broadening); 1 = decrease (or narrowing); 2= other[59]);
- SSC (0 = increase; 1 = decrease; 2 = tax amnesty/ fiscal pardon; 3 = extension of coverage);

1.2 Tool of intervention (if answered 0 or 1 to qn. 1.1)
- PIT (0 = tax base; 1 = income tax brackets; 2 = tax rates; 3 = deductions; 4 = tax credits; 5 = other)
- SSC (0 = SSC tax rate; 1 = lump-sum amount; 2 = tax base)

In order to have more easily accessible information on the timing of implementation, we added two sub questions to question 5,:

5b. How long does the phase-in schedule last?
5c. When is the policy due to expire?

By the same type of reasoning, we tried to better identify the target of the measure, by adding the following 10 sub-questions to question 7:

7.1 Does the measure target a specific region?
7.1b Specify which regions (if answered 1 to qn. 7.1)
7.2 Does the measure target a specific Economic Sector?
7.2b Specify which sectors (if answered 1 to qn. 7.2)
7.3 Is the measure gender specific? (0 = no; 1 = yes, only women targeted; 2 = yes, only men targeted)
7.4 Does the measure target a specific age group? (Young or old)
7.4b Further information about qn. 7.4 (if answered 1 or 2 to qn. 7.4)

[59] These are, for instance, reforms that modify the progressivity of the personal income tax but do not univocally reduce/increase it.

7.5 Is the measure targeted to unemployed workers? (long-term and short-term unemployment)
7.6 Other specific groups (specify which)

We also categorized the possible answers to questions 8 to 11, in order to facilitate the use of this information for statistical and descriptive purposes and we split question 9 as follows:

9.1 Is an ex-post evaluation foreseen? (0 = no; 1 = yes)
9.1.b Is the ex-post evaluation put in place by government or independent organization (if answered 1 to qn. 9.1)? (0 = Government; 1 = Independent Organization)

Always for clarification purposes, we did some minor changes in the last few questions, and we rephrased question 10, which now reads:

10. Is the measure embedded in a reform package?
10.1. Does the measure involve a tax shift (if answer 1 to question 10)?

The templates used to collect the information on the reforms are reported in Annex II. In order to ensure comparability across countries, the local experts were provided with the guidelines for data collection. Moreover, they were also instructed on how the excel files should be completed, including the exact format for reporting dates, durations, regions and sectors.[60] For Norway, the 34th country included in the study, we have a detailed description of the reforms put in place and the information is reported separately from the catalogue (See Annex IV).

The excel files containing the information of the catalogue are attached to this report (see the file **catalogue. zip**). The files' names have the following structure:

Year_Country Code_Field of intervention.xls

The fields of interventions are classified in two main fields: reforms concerning personal income tax and social security contributions. The latter category is in turn divided in three subgroups, depending on the group which is called to pay the contributions: employers, employees and self-employed. Therefore, there are four fields of intervention: Personal Income Taxation (PIT); Employers' Social Security Contribution (EmployerSSC); Employees' Social Security Contribution (EmployeeSSC); Self-Employed Social Security Contribution (Self-EmployedSSC). Within

[60] The process of cleaning and especially importing the data for implementing the empirical analyses was not at all trivial given the large amount of information.

each excel file, there are as many sheets as the number of reforms in the area of intervention.

We also enclose the **XML database of all the reforms** for importing the data in LABREF.

1.2 Identification of the typologies of reforms

We believe that one of the main advantages of the new structure of the catalogue is that it allows a straightforward identification of the typologies of the reforms in the field of labour taxation and the financing of social security. In fact, having supplemented the catalogue with numerous categorical variables, the reforms can be promptly classified according to alternative taxonomies, making use of the different items on which information has been collected.

For instance:

- Questions 1.1 and 1.2 for PIT allow to identify those reforms which have **increased** (or decreased) the
    - tax base
    - income tax brackets
    - tax rates
    - deductions
    - tax credits

  This distinction is relevant, for instance, in order to evaluate whether the direction of the measures, and the tools of interventions, differs along the business cycle or between countries or group of countries or whether a tool is more often used than others. We use this information in Section 3, to identify reforms that have reduced the personal income tax.

- Analogously, for SSC, questions 1.1 and 1.2 identify
    - reforms which have **increased** (or decreased) the SSC tax rate. One possible use of this information is similar to the one discussed above for PIT. Notice also that these reforms affect the tax wedge, modifying both individuals' labour supply and the firms' labour demand. We use this information in Section 3.

- reforms which have introduced a **tax amnesty.** This classification can be relevant for addressing, for instance, issues related to the incentive/disincentive to evading SSCs.

- reforms which have **extended** the **coverage** of SSC. Notice that this information can be interacted with the answer to questions from 7 to 8 on the target of the reforms. This can be relevant for addressing, for instance, the evolution of specific segments of the labour market in terms of coverage.

- In a general economic equilibrium perspective, it is important to know whether a reform is aimed at increasing (decreasing) total tax revenues or whether a tax shift is involved. Questions 10 and 10.1 deal with this issue, allowing to identify those measures embedded in a reform package which involve a **tax shift**.

- In addressing the labour market effect of any reforms, the economic theory has repeatedly stressed that the individual reaction to institutional changes depends on features such as the duration of the reform (in particular, temporary vs. permanent changes), the fact that it was foreseen or unexpected, the existence of enforcement and monitoring procedures. Three categorical variables now can be used to classify the reforms along these lines. In particular,

  - questions 5, 5.b and 5.c allow to distinguish between **temporary and permanent** reforms. Moreover, the catalogue now provides exact information (in months) on the timing of implementation and on the duration, allowing to distinguish, to some extent, between **foreseen and unexpected** reforms.
  - question 9 identifies reforms which put in place **enforcement and monitoring procedures**.

- Questions 7.1-7.7 identify **targeted** and **non-targeted** reforms. The template considers specific possible targets, as: age groups, gender, sectors, regions, unemployed people and long term unemployed people, low income earners. Question 7.7 also asks for other possible targets. Clearly, a single reform can have multiple targets. One advantage of having indicator variables for the targets is that they allow us to look at different labour market outcomes across different segments of the labour market, controlling for country fixed effects (see Section 4).

- Question 8 identifies **marginal** and **radical** reforms, which is a crucial distinction if the focus of the researcher is on the evolution

of segmented labour markets characterized by different rules/behaviors of incumbents and new entrants.

- The political and social climate in which a reform takes place can be relevant for understanding both the reform itself and its effects. A useful distinction can be made between reforms which have involved social partners vs. those which have not (see question 11).
- Questions 9.1, 9.1.b on the arrangement of ex post evaluation procedures can be used to identify reforms which foresee an-ex post assessment and those which do not.

Finally, notice that for specific purposes the grid of the used taxonomy can be sharpened, by intersecting two or more of the above indicator variables. A higher level of sophistication of the taxonomy can be useful in econometric analysis of the labour market effects of the reforms. For instance, one may be interested in the interaction of the target of the reform with its duration and/or the social climate in which the reform has taken place. Notice also that the database allows to classify countries and/or time periods according to the same indicator variables. For instance, it is possible to distinguish countries according to: the number of reforms undertaken; the direction of the measures over time; the prevailing political or social climate, and so on.

Sections 2.3 and 3 illustrate how to use the taxonomies discussed in this section for, respectively, descriptive purposes and econometric analysis.

1.3 Descriptive analysis

Annex III provides the general description of the registered reforms for 33 of the 34 countries listed in the Annex I (for Norway, see **Annex IV**). For each year and country there are four columns, one for each field of intervention: Personal Income Tax, Employers' Social Security Contribution, Employees' Social Security Contribution and Self-Employed Social Security Contribution. For each country, different reforms in a given year are reported in different rows. When a reform targets the Social Security Contribution scheme for Employers, Employees and/or Self-Employed all together, the general description is repeated in each column.

The general description of the reforms of Annexes III and IV is a rich and useful source of information; it clearly does not offer a concise overview of the trends in tax reforms within and across countries and over time. To this end, the taxonomies proposed in Section 2.2 are useful descriptive tools, which allow to summarize the key elements of the reforms. This is what we do in **Annex V**. For each country we provide four tables, one for

each field of intervention, which sum to 132 tables. The first column, **n**, is a progressive number of the reforms implemented in a single year; the second column, **year**, refers to the year of implementation of the reform. All the other heading are self explaining

Annex VI reorganizes the information of the catalogue by looking at single features of the reforms. The aspects considered are: the kind of measure, the tools of intervention, the interaction between the above two features, the timing of implementation, the targets of the reforms, the involvement of social parts, the presence of post evaluation procedures and tax shifts. Annex VI provides 21 tables for PIT, 16 tables for each of the SSCs scheme and one summary table of SSC. Each table provide information for all countries and the whole time period covered. We think that the information provided in Annex VI is particularly useful in order to compare countries and their evolution over time.

In this Report, it would be almost impossible to comment on all the information included in Annexes III-VI. Here we mainly focus on one single field of intervention, Personal Income Taxation, but we will also provide some information on what can be learned from the catalogue on Social Security Contributions. We look at the various features of the reforms over time and across countries. All the tables are in Annex VI.

1.3.1 Personal Income Taxation

The total number of reforms for personal income tax is very high (1331). The aim of the present section is to compare the main characteristics of the reforms concerning Personal Income Tax (PIT) across countries and over time. Since there are several aspects which characterize the reforms and since it is possible to look at them under different perspectives, in this section we describe the trends of every single feature, leaving aside the analysis of possible correlations and co-movements.

Table 1 of Annex VI shows the total number of reforms implemented from 1990 to 2008. Overall, there have been 1331 reforms, with an average of about 40 reforms per country and about 70 per year. While reforms are evenly spread over time, the distribution across countries is much more uneven: Ireland (119) and Italy (121) implemented almost three times as many reforms as the general average, while Austria put in practice only 14 reforms. It should be noticed, however, that the figures for Ireland and Italy do not result from a very large amount of reforms in a single year (the maximum is Cyprus, with 21 reforms in 1991), but from an ever-lasting process of successive reforms.

Tables 2 of Annex VI splits the total number of reforms by direction: increasing, decreasing or "other". Tables 3, 4, 5, 6, 7 and 8 of the Annex are

analogous to the previous one, but they consider every single tool of intervention. The tables just cited are presented to analyze specific countries or years. For instance, in this table the interested reader can find how many of the 107 Irish "decreasing" reforms concerned tax base (0), income tax brackets (17), tax rates (10), deductions (52), tax credits (28) and other aspects (0). Over all countries, we find that 99 reforms have decreased the tax base and 96 have increased it. 157 have modified the tax brackets. 102 have decreased the tax rate; 38 have increased the tax rate. 122 have decreased deductions; 105 have increased them. 62 have decreased tax credits; 110 have increased tax credits In the example of Ireland, for example, we can say that 17 reforms regarded income tax brackets, but none of them the tax base, 10 tax rates and 58 deductions and 34 tax credits.

Table 10 of Annex VI crosses two pieces of information: how many reforms a country implemented every year and which tools have been used. For instance, in 1991 Cyprus carried out 21 reforms, 3 of them concerning tax brackets, 3 deductions and 15 tax base. In 2003, Cyprus implemented 11 further reforms, 9 of them again on the tax base and 1 on tax brackets. There are countries which seem to have a favourite tool of intervention, others where reforms modify the tax scheme as a whole. Going back to the case of Ireland and Italy, for instance, it clearly emerges from this table that Ireland focused on deductions (until 1998) and tax credits (since 1999), while in Italy policy makers used all the fiscal tools together. For instance, in 2000 in Italy 12 reforms were carried out, concerning all the possible categories: tax brackets (1), tax credits (6), deductions (1), tax base (2) and tax rates (2). Something very similar happened also in 2007.

Table 21 contains information on the time of implementation of the reforms. The first column includes the share of reforms implemented in the same year of approval, while the second one shows the average duration (in days) of the phase-in schedule. Combined together, these measurements may represent the efficiency of implementation or – reversing the argument – how forward looking the policy maker is. There are many countries in which all of the reforms were implemented in the same year of approval and a similarly large number of countries that never scheduled a phase-in process. Under the first dimension, Sweden is at one extreme, with only 3% of reforms implemented in the same year of approval, while Cyprus and Iceland scheduled on average very long phase-in periods: 510 and 357 days respectively, followed by France with 199 days.

Tables 15 summarizes possible specific socio-economic groups or sectors or regions targeted by the reforms, by country and year. The amount of

information contained in this table is very large and it can be summarized as follows.

i) how many reforms have been carried out in every country and year, ii) how many of them were targeted to specific groups or subgroups – and which ones –, iii) how many of them were non-targeted. By looking at the total figures by country (last column), it emerges that the average number of targeted reforms is about 10%-20%, excluding those countries in which all the reforms are non-targeted. This share is invariant to the total number of reforms and to the dimension of the country, since it is true for Spain, Germany, France, Italy, Ireland, Luxembourg, United Kingdom and the United States. The Netherlands, where 19 over 29 reforms had a specific target, are the only exception that is worth mentioning.

A second piece of information contained in the table refers to the targets chosen. For instance, Spain and Italy reported some reform targeted to specific regions, low-income and multiple targets. This can be explained by considering that regional disparities and unemployment are two relevant issues in those economies. Almost all of the countries in the dataset carried out reforms targeted to specific sectors or to low-income earners includes almost all of the countries in the dataset.

35 reforms reported to have multiple targets.

Table 16 shows how many reforms applied to incumbents, new entrants or to the entire labour force. The clear result is that the vast majority of reforms affects all individuals, while Italy is the only country in which there have been all three kinds of reforms. Apart from Belgium (5 reforms over 20 affecting only incumbents), in all the other countries the share of such reforms is absolutely negligible.

Tables 17 and 18 are about enforcement and monitoring procedures. The first lists all the countries, and it includes the share of reforms for which some kind of control procedures was foreseen. What emerges is that – apart from France and Slovenia – the share of reforms associated to some monitoring or enforcement procedure is negligible. The second table looks for time trends in implementation of controls, but results are inconsistent to any trend, neither general nor for France, the only country with a significant number of reforms in this category.

Tables 19 and 20 are perfectly analogous to the previous two, the only difference being the topic: ex-post evaluation procedures. Unfortunately, we have little information on this point. 20% of observations are missing and for the countries which provided this information, less than 5.8% of

the reforms[61] foresees an ex-post evaluation procedure. Moreover, only in six countries (Estonia, Latvia, the Netherlands and Slovak Republic) ex-post evaluation was ever foreseen, with no particular time trends.

Tables 11 and 12 are devoted to the embedding of the reform in a wider package of reforms and whether the reform package involved a tax shift.

The last Table 20 investigates the role of social partners in the discussion of the reforms. Every reform is classified according to the level of involvement of social partners: no role, active role (collective agreement), passive role (consultative). Even if the results must be taken very cautiously (overall, about 8% of reforms foresaw some role for social partners), it is possible to find some regularity: the only countries with a consistent involvement of social partners are Belgium (35%), Denmark (100%), Iceland (26%), Latvia (92%) and the Netherlands (55%).

1.3.2 Social Security Contributions

In the present section the main characteristics of the reforms concerning social security contribution are compared across countries and over time. The section is divided in three sub-sections according to the target of the SSC reforms.

Employers

Table 1 (SSC section in Annex VI) shows the total number of reforms implemented from 1990 to 2008. The total number of reforms is high (767), with an average of about 24 per country and 40 per year. Reforms are evenly spread over time. However, their distribution across countries is much more uneven. Notably, Italy and Spain represent two outliers, with 108 and 88 reforms respectively, while Cyprus and Netherlands implemented only 1 reform in the nineteen years of observation.

Tables 2-4 split the total number of reforms by direction considering single tools of intervention, while Table 5 shows how many reforms a country implemented every year and which tools have been used. Again, across country variation is high. For example, Italy implemented mainly tax rate kind of reforms, while Belgium relied mostly on lump-sum measures.

Table 6-9 are devoted to the embedding of the reform in a wider package and to whether the reform package involved a tax shift. For example, we note that for Ireland, the Netherlands and Portugal 100% of the reforms

[61] Percentages in this section are computed over the total number of reforms.

are included in a wider package of systematic reforms, while for Slovakia and Macedonia only respectively 7% and 6 % of them are accompanied by a larger set of regulatory innovations.

Table 10 analyses if the reforms have specific targets. It emerges that the average number of targeted reforms is about 25%. Spain is the country with highest variety of targets (sectors, women, young, old, all unemployed, long-term unemployed, short term unemployed). Table 11 shows how many reforms applied to incumbent, new entrants or to the entire labour force. By looking at this table, it emerges that a vast majority of reforms affect all individuals, except for Spain, where 77% of them applies only to new entrants.

Table 12 and 13 are about the enforcement and the monitoring procedures. In general, we find that these procedures are not often introduced (i.e. only 6.5% of the reforms are accompanied by either enforcement or monitoring activities). Similarly, Table 14 and 15 show that ex post evaluation procedure are introduced only in 8% of the reforms analysed

Table 15 investigates the role of social partners. Here, we find that about 4% of reforms foresaw some role for social partner, but distribution is uneven. The last table (16) contains information on the time of implementation of the reform. The first column includes the share of reforms implemented in the same year of approval, while the second shows the average duration (in days) of the phase. In all country the percentage of the implemented reforms by year is high, except for Sweden (only 10 %). In France and Japan average durations are particularly high (401 and 248 days respectively), while eastern European countries seem to be significantly faster, with Slovakia and Check Republic taking less than 10 days per phase.

Employees

Table 17 shows the total number of reforms implemented from 1990 to 2008, by country and year. Overall, there have been 474 reforms, with an average of about 15 reforms per country, and 25 reforms per year. As for countries, Bulgaria (55) implemented the highest number of reforms, immediately followed by Germany (48) and Romania(48). Within each country, reforms are on average evenly distributed across time. The countries which, instead, experienced the lowest number of reforms are Denmark, Estonia, Spain, France, and the Netherlands, with an overall amount of 3 each.

Tables 22 shows if a reform is embedded in a wider package of reforms, and the percentage of measures embedded in a reform package. Again, results vary widely across countries and no strong trend emerges. Table 24 tells if a measure involves a tax shift and shows which percentage of the reforms has this property.

Table 26 investigates the role of social partners in the discussion of the reforms. Each reform is classified according to the level of involvement of social partners: no role, active role (collective agreement), passive role (consultative). Even if the results must be taken very cautiously (overall, about 34.1% of reforms foresaw some role for social partners), it is possible to find some regularity: the only countries with a consistent involvement of social partners are France (33%), Lithuania (29%), Latvia (62%), Luxembourg (82%)and the Netherlands (100%).

Table 27 gives information on the time of implementation of the reforms. The first column includes the share of reforms implemented in the same year of approval, while the second shows the average duration (in days) of the phase-in schedule. Combined together, these measurements may represent the efficiency of implementation or – reversing the argument – how forward looking is the policy maker. The reader should be warned, however, that there is a high number of missing values in these two variables.

Table 28 summarizes possible specific targets of reforms, by country and year. The amount of information contained in this table is impressive, and there you can find:

i) how many reforms have been carried out in every country and year, ii) how many of them were targeted to specific classes or categories – and in case which ones –, iii) how many of them were "untargeted". By looking at the total figures by country (last column), it emerges that the average amount of targeted reforms is about 30%, excluding those countries in which all the reforms are untargeted.

Table 28 also contains detailed information about the nature of the target. In particular, the list of countries that carried out reforms targeted to low-income earners includes almost all of the countries in the dataset.

Table 29 shows how many of the reforms applied to incumbents, new entrants or the entire population. It is clear that the vast majority of the reforms affects all the individuals. Apart from Greece and the Netherlands (2 reforms over 6, and 2 reforms over 3,respectively, affecting entrants) ,in all other countries the share of such reforms is absolutely negligible.

Table 30-32 report whether the original reforms were accompanied by enforcement/ monitoring or evaluation procedures respectively. It emerges clearly that– with the notable exception of France (66.67%) and Spain (33.33%) – the share of reforms associated to any further procedure is negligible.

Self-employed

The total number of reforms for self-employed social security contribution is not particularly high (417). The aim of this section is to analyze the reforms across countries and over time.

Table 33 shows the overall number of reforms implemented from 1990 to 2008. There have been 417 reforms, with an average of about 22 reforms per year and about 14 per country. The interesting data is that on average there has been less than one reform per year per country, although the country distribution is uneven. The number of reforms over time varies from only two in France and the USA to fifty in Bulgaria and Hungary.

Table 34-36 analyze respectively tax rates and lump sum reforms by direction: amnesty, increasing, decreasing and other. Given the low number of total reforms, it is difficult to draw generic comments or identify specific trends, although most countries have passed more reforms that reduce imposition. Table 37 crosses two pieces of information: the number of reforms and which tools have been used. it clearly emerges that most countries preferred to reform tax base rather than tax rates. The most notable exception is Ireland, which has reformed more the tax rates of social contributions than any other country.

Table 38 and 39 are devoted to the embedding of the reform in a wider package of reforms, firstly considering the whole period and then analyzing the year by year distribution. Tables 40 and 41 are analogous to the previous ones, but focus on the presence of a tax shift. Again the distribution of this specific characteristic is very uneven across countries. For example, in France both the implemented reforms involved some form of tax shift, while in Ireland there has been 28 interventions, but no one included a tax shift.

Table 42 investigate the role of social partners in the discussion of the reforms. Every reform is classified according to the level of involvement of social partners: no role, active role, passive role. Even though only 4% of the reforms have seen some role for the social partners, there is an evenly distribution between an active and a passive role.

Table 43 contains information on the time of implementation of the reform. The first column indicates the share of reforms implemented in the same year of approval and the second shows the average duration in days of the phase-in schedule. These data may give an idea on how efficient is the implementation procedure; however there is a high number of missing values in the phase-in duration column. Most countries managed to implement all of their reforms in the same year of approval, with the most notable exception for Croatia (only 38%) and Sweden (13%).

Tables 44 and 45 focus on the target of the reform: the first table takes in consideration if the reform is for every self-employed or is specific for some category. The second, instead, shows how many reforms applied to incumbents, new entrants or to the entire labour force. The clear result is that few countries have passed target-specific reforms, while all of them were directed to the entire workforce.

Tables 46 and 47 are about enforcement and monitoring procedures. The first table lists the number of reforms with or without control procedures for the whole period, while the second splits the percentage data of reforms with enforcement by country and by year. Even though the high number of unavailable data (about thirty percent), the number of reforms associated to some monitoring or enforcement procedures is negligible.

The last table (48) is similar to the previous one, the only difference being the topic: ex-post evaluation procedures. Results as well are similar to the previous analysis: the data involve a high percentage of unavailable data and only 3% of the reforms foresee some kind of ex-post evaluation.

2. The labour market impact of tax reforms: A first appraisal

This section aims at addressing the labour market effects of the reforms in the field of labour taxation and of the financing of social security. The analysis begins with a note of caution: it must be acknowledged that it is problematic to assess the causal effect of different types of tax reforms on labour market outcomes in a cross-country perspective. Actually, the identification of robust correlations between labour market conditions and labour taxation policies is problematic too, because of missing controls and because of the possible endogeneity of policies and institutions. According to Nickell et al. (2005), "their [payroll taxes, income taxes and consumption taxes] combined impact on unemployment remains a subject of some debate despite the large number of empirical investigations"[62]. Notice also that as discussed in Carone et al. (2009)[63], the individual incentives to work depend on the tax wedge (and therefore on personal income tax and on social security contributions) and on the net benefit. In this perspective, the analysis based on the catalogue of tax reforms should eventually be complemented with information on other labour market reforms included in the LABREF database, in particular reforms of the system of social benefits. Moreover, real consumption wage also depends on indirect taxation. We here stress the role of social expenditures, which is particularly important for a correct interpretation of the results and for assessing the scope of the present contribution. Indeed, anticipating the results of the analysis that follows, in general we find a very weak, if any, impact of tax reforms on the outcome variables considered. This finding might be driven by the dual role of taxes and social security contributions: on the one side they generate a tax wedge which, ceteris paribus, is expected to be detrimental for the labour market outcomes; on the other side, they contribute to the financing of specific types of public expenditures which could complement the labour supply (think, for instance, to child care services and their potential impact on female labour market participation).

Having said this, it is worth stressing that, to the best of our knowledge, this is the first attempt to establish a direct link between labour taxation reforms and labour market outcomes. The reason being that this is the first catalogue of reforms that allows a straightforward quantitative analysis.

[62] Nickell S., Nunziata L., Ochel W. (2005), pp. 8-9.

[63] Carone, G., K. Stovicek, F. Pierini and E. Sail (2009).

In order to address the impact of reforms in the field of labour taxation and the financing of social security we estimate different regression models of the form:

$$y_{t,i,j} = \alpha_i + \gamma_t + \beta RE_{t,i,j} + \delta X_{t,i} + \varepsilon_{t,i,j} \quad (0.1)$$

where y is the labour market outcome under consideration and t, i and j denote, respectively, time, country and (possibly) a specific subsample of the population. RE is an indicator variable equal to one if a reform has been implemented in year t, country i and subsample j. α_i and γ_t are, respectively, a time invariant country fixed effect and a time dummy, which accounts for time effects common to all countries. $X_{t,i}$ includes time varying additional controls, still to be specified.

Several points in the empirical model are worth noticing. First, it is a dynamic panel data model. By construction, the unobserved panel-level effects are correlated with the lagged dependent variables, making standard estimators inconsistent. To overcame this problem we therefore chose to use Arellano and Bond (1991) technique, which allows obtaining consistent generalized-of-moments (GMM) estimator for the parameters of this model, which combines moment conditions in first differences with moment conditions in levels[64]. Second, the policy variable RE is assumed to have an impact up to two years after the reform. This allows for more flexibility in the detection of the impact, which can realistically be expected to be delayed in many cases. Note, however, that there is a limit to the number of lags that can be used, since an eventual causality link between reforms and market outcomes inevitably fades away with time. Third, besides country fixed effects, year fixed effects are also introduced. This way, market cycles affecting all European countries in the same period are controlled for. Also, all the remaining explanatory variables must be country-specific and time-varying.

The analysis focuses on some key outcome variables y, including: employment, unemployment and participation rates, hours worked, inequality, poverty rates. We first look at the overall outcomes (which corresponds to suppressing the index j). The same type of model is then estimated for selected subsamples j of the population, by taking advantage of the different types of tax reforms identified in the catalogue. In this case, RE denotes reforms implemented at time t in country i and targeted to a particular subsample j of the population. In particular, we look at

[64] Green (2003), Section 13.6, provides a simple introduction to the Arellano-Bond technique. See also Cameron and Trivedi (2010), pages 295-300, for the implementation of the estimator in Stata and the interpretation of the regression output.

females and young workers. Further directions which could be explored include a focus on low-skilled workers[65] and people working in specific sectors or regions. Notice that by exploiting both between and within country variability across time, our regression model can include both time and country fixed effects, partially coping with the misspecification problems discussed above. The analysis allows estimating how the outcome variables are correlated with the main reforms identified in the catalogue.

We here describe in more detail the variables used for the analysis. In the following, the unit of observation is one country in a specific year.

Four dependent variables are considered. First, unemployment rates, defined as the ratio between the number of unemployed and the sum of unemployed and employed. Second, the employment rate, i.e. the number of employed over the total number of respondents. Third, the inactivity rate, which is the percentage of people who are outside of the labour force over the population (ILO definition). Finally, we include the average hours worked by employed people (HOURS).

Explanatory variables other than year-dummies are described in Table 1.

The dummies related to the introduction of the reform are the important ones for our purposes. In this section we focus exclusively on tax-reducing reforms[66]. In this case, the control group comprises cells *t, i, j*, that have experienced either no reforms or other types reforms. The identification of this reference group is convenient for expositional purposes, although, by including the tax-increasing policies, it could bias our results by making it more likely that we find a significant effect of tax reforms. Annex VIII addresses this issue by using three different dummies: tax-increasing, tax-reducing and other reforms, the reference group being triplet cells *t, i, j*, that experienced no reform. Appendix IX performs an additional robustness check, interacting the dummy for a tax-reducing reform with

[65] One possible line of investigation is to address the effect of reducing the tax burden on the low-paid. Although we acknowledge that this issue is a fundamental one, the definition of the outcome variables for the analysis and the interpretation of the results would is somehow tricky. For instance, a reform that is associated to an increase in the share of low-paid employed workers cannot be unambiguously interpreted as a successful policy, and the effect on total employment should be addressed too. We leave this task for future research.

[66] For PIT, a tax-reducing reform is a reform which either decreases the tax base or the tax rate or it increases deductions or tax credits. Analogously, for SSCs a tax-reducing reform identifies reforms that decrease the tax rate, the payroll tax rate or reduce SSCs by a lump-sum amount.

the indicator for the involvement of social partners, which should help to identify more important reforms[67].

The other socio-demographic characteristics of the population are used as time-varying control variables. Note that, since we are able to tell whether the policy has young workers or females as a specific target, in the following we will focus also on a subsample of women and youngsters.

Table 1: Explanatory variables used in the analysis

Explanatory Variable	Description
dreform_tax	=1 if a tax-reduction reform has been introduced in country j and year t
dreform_ssceyer	=1 if a SSC-employer reduction reform has been introduced in country j and year t
dreform_ssceyee	=1 if a SSC-employee reduction reform has been introduced in country j and year t
dreform_ssc	=1 if a SSC (employer+employee) reduction reform has been introduced in country j and year t
dwomen_tax	=1 if tax-reduction specifically targeting female employment has been introduced in country j and year t
dwomen_ssc	=1 if a SSC (employer+employee) reduction reform targeting female employment has been introduced in country j and year t
dyoung_tax	=1 if tax-reduction specifically targeting youth employment has been introduced in country j and year t
dyoung_ssc	=1 if a SSC (employer+employee) reduction reform targeting youth employment has been introduced in country j and year t
Age	Average age in country j and year t
high-ed	Proportion of people with high education in country j and year t
Tenure	Proportion of employed with a permanent position, in country j and year t
Immigr	Proportion of immigrants, in country j and year t
GDP	Real Gross Domestic Product per capita, in country j at year t, Euro per inhabitant, 2002 prices
Pubblic	Total general Government expenditure as a percentage of GDP, in country j at year t

[67] It is worth reminding that there is a large share of reforms for which the information on the involvement of social parties is missing. In order not to lose too many reforms, missing observations have been coded in an additional category.

Industry	Industry production index, in country j at year t, 2005=100. It measures real production output (including manufacturing, mining, and utilities) as a percentage of real GDP

As already specified, all the variables related to the reforms are lagged up to two years in order to detect delayed effects on the relevant outcomes. Obviously, this set of variables is from an elaborations on the information collected in the first part of the report. All the other variables are taken from either aggregating survey data from the European Labour Survey (age, sex, high-ed, tenure, immigr) or downloading the Eurostat official statistics (GDP, Public and Industry)[68].

Notice that in principle the analysis covers the EU-27 countries for the period 1990-2008. However, data for the outcomes variables and the country time varying controls are not always available for all the years and for each country. The unavailability of information explains the number of observations in the regressions which follow. Sections 3.1-3.3 and the related appendices explain in detail the data source.

Section 3.1 presents the analysis for the employment, unemployment and participation rates, and for hours worked; Sections 3.2 and 3.3 look at poverty and inequality.

2.1 Employment, unemployment, and participation rates

Annex VII reports figures about the trend of the main variables of interest. The data are constructed using the micro-data of the European Labour Force Survey, provided by Eurostat.

2.1.1 The impact of tax reforms: results

The results of the analysis are discussed distinguishing general reforms from those reforms targeted to either women or young people.

[68] http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/.

The general sample

Results are reported in Table 2 through Table 13. For each outcome variable, two tables are presented. The first report results when only time dummies and the lagged dependent variable are used as controls. This basically captures all the confounding effects that are not related to time varying country specific variables. In the second we add the above specified time-varying controls. Despite the general approach taken and the variety of countries represented in the sample, results seem robust across different specifications. Here we sum up the main findings.

In general, the impact of the reforms is quantitatively very limited and statistically non significant. Even when they are significant, policy related coefficients have very limited economic meaning. For example, Table 2 shows that SSC policies are associated to a significant (although with a relatively low t-statistics) reductions of the unemployment rate two years after their introduction. Quantitatively, however, this effect is marginal. Precisely, on average the unemployment rate decreased by 0.3% where these types of reforms were applied. Similar results are obtained for other reforms and other outcomes (e.g. SSC on the employment rate and in the average number of hours worked).

When time-varying controls are introduced, most of the SSC reform coefficients keep their magnitude but loose statistical significance. At the same time, in some cases (i.e. employment and unemployment rates) lagged PIT reforms show lower t-statistics and become marginally significant. However, the magnitude of the coefficients is still particularly low.

Since the number of observations is limited (around 330 for 26 countries), slight changes in the coefficients from one specification to another is expected. At the same time, all the analyses performed seem to point to a very weak, if any, impact of all the included policies on the macroeconomic variables considered. Moreover, in no case reforms seem to have played a role in the same year they were introduced. Independently from the interpretation, thus, results show that one or two years are needed in order to be able to detect any policy impact on countries' macroeconomic situation.

Looking at the control variables, the first striking evidence is that the lagged dependent variable has always a relevant and significant role. This is certainly to be expected in a macro dataset, where a great part of the variation remains inevitably unexplained. In any case, adding this further control seems to benefit substantially the reliability of the results. Regarding other control variables, it is difficult to find regularities, since

coefficients vary according to the specification used. The best way to comment in this sense is to consider the four outcomes separately.

Unemployment rates are negatively correlated to the proportion of people with high education, as expected. The proportion of people with permanent contracts is always positively correlated with unemployment, although the relation is statistically non significant (except in some specifications, but with a t-statistic which is particularly close to the threshold value of 1.96). Interestingly, while the coefficient on the variable "industry" is always negative, as should be expected, and significant, the coefficient on "public" is positive and sometimes significant. It is not the object of the present analysis to disentangle the relation between public spending and economic cycle, however this simple result is consistent with the hypothesis of a countercyclical government spending, i.e. increasing in moments of economic downturn.

Looking at employment rates, similar results are obtained. The most important difference here is that public spending is not significant anymore. The fact that GDP is now negatively correlated with the employment rate should not be a source of concern. First, the coefficient is so low to be basically negligible. Second, the increase in the GDP might push more people in the market, thus increasing the denominator of the dependent variable. Finally, note that once again the average education of a country affects positively its economic performance.

Inactivity rates (Table 6 and Table 7) are not significantly correlated with any time-varying control variable. On the contrary, the average number of hours worked shows a negative relation with the immigration rate. This finding merits future investigation.

Table 2: Unemployment rate

	(1) urate	(2) urate	(3) urate	(4) urate	(5) urate
urate t-1	0.852	0.848	0.856	0.859	0.859
	(20.12)**	(20.96)**	(20.94)**	(19.86)**	(20.63)**
dreform_ssceyer	-0.001				
	(0.48)				
L.	-0.001				
	(1.07)				
L2.	-0.004				
	(3.18)**				
dreform_ssceyee		-0.003			
		(1.71)			
L.		-0.001			
		(0.75)			
L2		-0.004			
		(3.01)**			
dreform_ssc			-0.001		-0.001
			(0.65)		(0.76)
L.			-0.001		-0.001
			(0.96)		(1.11)
L2			-0.003		-0.003
			(3.57)**		(3.35)**
dreform_tax				-0.000	-0.000

				(0.36)	(0.36)
L.				0.001	0.001
				(1.05)	(1.17)
L2.				-0.003	-0.002
				(1.90)	(1.70)
Constant	0.017	0.014	0.015	-0.014	0.010
	(0.24)	(0.17)	(0.21)	(0.18)	(0.14)
Observations	336	336	336	336	336

Robust z-statistics in parentheses
* significant at 5% level; ** significant at 1% level

Table 3: Unemployment rate with time varying controls

	(1) urate	(2) urate	(3) urate	(4) urate	(5) urate
urate t-1	0.811	0.814	0.814	0.812	0.810
	(13.58)**	(14.22)**	(13.40)**	(13.08)**	(13.03)**
dreform_ssceyer	0.001				
	(0.24)				
L.	0.000				
	(0.11)				
L2.	-0.002				
	(1.14)				
dreform_ssceyee		-0.002			
		(1.15)			
L.		-0.001			
		(0.65)			
L2.		-0.002			
		(1.27)			
dreform_ssc			0.000		0.000
			(0.06)		(0.01)
L.			-0.000		-0.001
			(0.20)		(0.40)
L2.			-0.002		-0.001
			(1.31)		(1.02)
dreform_tax				-0.001	-0.001
				(0.41)	(0.57)
L.				0.003	0.002
				(1.84)	(1.84)
L2.				-0.001	-0.001
				(0.84)	(0.76)
age	-0.002	-0.002	-0.002	-0.002	-0.002
	(1.31)	(1.37)	(1.29)	(1.38)	(1.35)
SEX	0.039	0.064	0.048	0.046	0.068
	(0.27)	(0.41)	(0.33)	(0.33)	(0.48)
highedrate	-0.066	-0.060	-0.063	-0.070	-0.065
	(2.20)*	(1.84)	(2.15)*	(2.19)*	(2.41)*
tenurerate	0.122	0.120	0.121	0.121	0.116
	(1.95)	(2.00)*	(1.94)	(1.92)	(1.87)
immrate	-0.017	-0.022	-0.018	-0.027	-0.030
	(0.40)	(0.54)	(0.42)	(0.63)	(0.73)
GDP	0.000	0.000	0.000	0.000	0.000
	(1.38)	(1.08)	(1.30)	(1.43)	(1.27)
Public	0.001	0.001	0.001	0.001	0.001
	(2.19)*	(1.81)	(2.09)*	(1.99)*	(1.78)
industry	-0.000	-0.000	-0.000	-0.000	-0.000
	(2.77)**	(2.80)**	(2.75)**	(2.53)*	(2.53)*
Constant	-0.032	-0.028	-0.035	-0.036	-0.036
	(0.49)	(0.39)	(0.49)	(0.48)	(0.47)
Observations	247	247	247	247	247

Robust z-statistics in parentheses
* significant at 5% level; ** significant at 1% level

Table 4: Employment rate

	(1) Erate	(2) erate	(3) erate	(4) erate	(5) erate
dreform_ssceyer	-0.000				
	(0.28)				
L.	-0.001				
	(0.51)				
L2.	0.004				
	(3.11)**				
dreform_ssceyee		0.003			

		(1.62)			
L.		0.002			
		(1.02)			
L2.		0.001			
		(0.61)			
dreform_ssc			0.001		0.002
			(0.84)		(1.14)
L.			0.000		0.000
			(0.04)		(0.18)
L2.			0.003		0.002
			(2.75)**		(2.03)*
dreform_tax				-0.002	-0.002
				(1.34)	(1.39)
L.				-0.002	-0.002
				(1.12)	(1.10)
L2.				0.003	0.002
				(1.75)	(1.74)
Constant	0.213	0.204	0.214	0.208	0.205
	(2.73)**	(2.66)**	(2.67)**	(2.73)**	(2.67)**
Observations	336	336	336	336	336

Robust z-statistics in parentheses
* significant at 5% level; ** significant at 1% level

Table 5: Employment rate with time varying controls

	(1) erate	(2) erate	(3) erate	(4) erate	(5) erate
erate t-1	0.751	0.722	0.740	0.746	0.741
	(10.48)**	(9.57)**	(9.94)**	(10.27)**	(10.14)**
dreform_ssceyer	-0.001				
	(0.49)				
L.	-0.002				
	(0.77)				
L2.	0.003				
	(1.53)				
dreform_ssceyee		0.001			
		(0.65)			
L.		0.001			
		(0.59)			
L2.		-0.001			
		(0.34)			
dreform_ssc			0.000		0.000
			(0.15)		(0.39)
L.			-0.001		-0.000
			(0.33)		(0.24)
L2.			0.002		0.001
			(1.31)		(0.83)
dreform_tax				-0.001	-0.001
				(0.95)	(0.72)
L.				-0.003	-0.003
				(2.18)*	(1.99)*
L2.				0.003	0.003
				(1.88)	(1.93)
age	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.58)	(0.59)	(0.48)	(0.61)	(0.73)
SEX	-0.128	-0.117	-0.140	-0.114	-0.156
	(0.91)	(0.79)	(1.00)	(0.72)	(1.07)
highedrate	0.052	0.049	0.050	0.065	0.060
	(2.13)*	(1.99)*	(1.95)	(2.74)**	(2.41)*
tenurerate	0.022	0.028	0.021	-0.011	0.013
	(0.39)	(0.51)	(0.36)	(0.21)	(0.23)
immrate	-0.026	-0.010	-0.017	0.008	-0.011
	(0.69)	(0.26)	(0.44)	(0.18)	(0.30)
GDP	-0.000	-0.000	-0.000	-0.000	-0.000
	(3.68)**	(2.44)*	(3.35)**	(3.05)**	(3.11)**
Public	-0.000	-0.001	-0.000	-0.001	-0.000
	(1.11)	(1.25)	(1.23)	(1.31)	(1.05)
industry	0.000	0.000	0.000	0.000	0.000
	(3.26)**	(3.08)**	(3.17)**	(2.83)**	(2.91)**
Constant	0.234	0.250	0.245	0.262	0.266
	(2.63)**	(2.56)*	(2.78)**	(2.72)**	(2.84)**
Observations	247	247	247	247	247

Robust z-statistics in parentheses
* significant at 5% level; ** significant at 1% level

Table 6: Inactivity rate

	(1) inrate	(2) inrate	(3) inrate	(4) inrate	(5) inrate
inrate t-1	0.811	0.816	0.814	0.813	0.808
	(16.33)**	(16.97)**	(16.89)**	(16.75)**	(16.30)**
dreform_ssceyer	0.002				
	(1.43)				
L.	0.002				
	(1.58)				
L2.	-0.001				
	(1.05)				
dreform_ssceyee		-0.000			
		(0.19)			
L.		-0.000			
		(0.21)			
L2.		0.002			
		(1.08)			
dreform_ssc			0.000		-0.000
			(0.17)		(0.05)
L.			0.001		0.001
			(0.85)		(0.48)
L2.			-0.000		-0.000
			(0.35)		(0.03)
dreform_tax				0.001	0.001
				(1.01)	(1.10)
L.				0.001	0.001
				(0.54)	(0.91)
L2.				-0.001	-0.001
				(1.18)	(1.04)
Constant	-0.135	-0.136	-0.131	-0.130	-0.134
	(2.24)*	(2.18)*	(2.17)*	(2.16)*	(2.19)*
Observations	336	336	336	336	336

Robust z-statistics in parentheses
* significant at 5% level; ** significant at 1% level

Table 7: Inactivity rate with time varying controls

	(1) inrate	(2) inrate	(3) inrate	(4) inrate	(5) inrate
inrate t-1	0.739	0.732	0.737	0.724	0.724
	(12.65)**	(13.49)**	(13.04)**	(12.42)**	(12.24)**
dreform_ssceyer	0.001				
	(0.72)				
L.	0.003				
	(1.68)				
L2.	-0.000				
	(0.29)				
dreform_ssceyee		0.001			
		(0.31)			
L.		0.000			
		(0.02)			
L2.		0.003			
		(1.20)			
dreform_ssc			0.000		-0.000
			(0.07)		(0.04)
L.			0.002		0.002
			(1.12)		(1.16)
L2.			0.000		0.000
			(0.16)		(0.49)
dreform_tax				0.001	0.002
				(0.95)	(0.99)
L.				0.002	0.002
				(1.47)	(1.42)
L2.				-0.002	-0.002
				(1.54)	(1.46)
age	0.003	0.003	0.003	0.003	0.003
	(1.64)	(1.80)	(1.64)	(1.80)	(1.79)
SEX	0.047	0.026	0.036	0.053	0.046
	(0.37)	(0.20)	(0.30)	(0.36)	(0.35)
highedrate	-0.020	-0.015	-0.018	-0.026	-0.028
	(0.74)	(0.58)	(0.66)	(0.94)	(0.98)
tenurerate	-0.068	-0.083	-0.073	-0.068	-0.068
	(1.43)	(1.84)	(1.53)	(1.44)	(1.42)
immrate	0.027	0.033	0.026	0.021	0.020

	(0.62)	(0.75)	(0.59)	(0.47)	(0.45)
GDP	0.000	0.000	0.000	0.000	0.000
	(1.22)	(1.18)	(1.18)	(0.75)	(0.76)
Public	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.71)	(0.47)	(0.65)	(0.72)	(0.74)
industry	-0.000	-0.000	-0.000	-0.000	-0.000
	(1.07)	(1.28)	(1.17)	(1.14)	(1.19)
Constant	0.017	0.024	0.025	0.012	0.016
	(0.20)	(0.28)	(0.30)	(0.13)	(0.18)
Observations	247	247	247	247	247

Robust z-statistics in parentheses
* significant at 5% level; ** significant at 1% level

Table 8: Hours worked

	(1) HOURS	(2) HOURS	(3) HOURS	(4) HOURS	(5) HOURS
HOURS t-1	0.751	0.756	0.759	0.747	0.744
	(12.41)**	(11.25)**	(11.95)**	(12.87)**	(12.39)**
dreform_ssceyer	0.082				
	(1.56)				
L.	0.057				
	(0.89)				
L2.	-0.028				
	(0.58)				
dreform_ssceyee	0.032				
		(0.43)			
L.		0.132			
		(2.15)*			
L2.		-0.015			
		(0.19)			
dreform_ssc			0.054		0.048
			(1.31)		(1.16)
L.			0.071		0.072
			(1.30)		(1.27)
L2.			-0.041		-0.033
			(0.79)		(0.67)
dreform_tax				0.069	0.062
				(1.52)	(1.39)
L.				0.041	0.032
				(1.20)	(0.84)
L2.				-0.003	0.009
				(0.07)	(0.22)
Constant	3.167	2.907	3.077	3.774	3.559
	(0.76)	(0.71)	(0.75)	(0.91)	(0.85)
Observations	336	336	336	336	336

Robust z-statistics in parentheses
* significant at 5% level; ** significant at 1% level

Table 9: Hours worked with time varying controls

	(1) HOURS	(2) HOURS	(3) HOURS	(4) HOURS	(5) HOURS
HOURS t-1	0.501	0.479	0.502	0.497	0.493
	(8.07)**	(8.35)**	(8.23)**	(8.13)**	(8.24)**
dreform_ssceyer	0.067				
	(1.15)				
L.	0.015				
	(0.24)				
L2.	-0.012				
	(0.21)				
dreform_ssceyee		0.029			
		(0.38)			
L.		0.139			
		(2.36)*			
L2.		0.108			
		(2.37)*			
dreform_ssc			0.054		0.057
			(1.17)		(1.19)
L.			0.034		0.042
			(0.71)		(0.88)
L2.			-0.018		-0.011
			(0.37)		(0.22)

dreform_tax				0.035	0.033
				(0.62)	(0.56)
L.				0.011	0.009
				(0.31)	(0.25)
L2.				-0.024	-0.018
				(0.58)	(0.40)
age	0.072	0.104	0.075	0.083	0.087
	(1.75)	(2.54)*	(1.89)	(2.18)*	(2.25)*
SEX	12.689	11.383	11.989	12.241	11.872
	(4.56)**	(3.54)**	(4.39)**	(4.29)**	(4.77)**
highedrate	0.315	0.175	0.216	0.380	0.125
	(0.39)	(0.21)	(0.27)	(0.44)	(0.16)
tenurerate	-0.054	-0.125	0.025	0.025	0.310
	(0.02)	(0.06)	(0.01)	(0.01)	(0.14)
immrate	-4.161	-3.733	-4.202	-4.450	-4.137
	(2.45)*	(2.20)*	(2.50)*	(2.70)**	(2.41)*
GDP	-0.000	-0.000	-0.000	-0.000	-0.000
	(1.16)	(0.64)	(1.17)	(1.29)	(1.12)
Public	-0.016	-0.007	-0.015	-0.018	-0.017
	(1.40)	(0.57)	(1.34)	(1.40)	(1.47)
industry	-0.004	-0.004	-0.004	-0.005	-0.004
	(1.39)	(1.27)	(1.41)	(1.46)	(1.35)
Constant	12.330	12.256	12.443	12.370	12.280
	(4.76)**	(4.61)**	(4.96)**	(5.02)**	(5.16)**
Observations	247	247	247	247	247

Robust z-statistics in parentheses
* significant at 5% level; ** significant at 1% level

Female workforce

Results for the analysis of the subsample of female workforce are shown in tables Table 10 and Table 11.

When female workforce is considered, some policies seem to have impacted more on the relevant outcomes. The significant impact is limited to the PIT reforms with one year lag; the signs and the magnitude of the coefficients are in the right direction. More precisely, PIT reforms targeted to women have increased female employment rates and average hours of work, while they have reduced inactivity rates. No impact on unemployment rates has been detected. The economic meaning of these findings will be considered later in this report. Here it should be noted that the magnitude of these coefficients is still low, but it is about ten times larger than the one found for the general sample. Female targeting PIT reforms are associated, for example, with an increase of the employment rate of more than 1%. Finally, regarding SSC reforms, some coefficients are significant, but the magnitude is limited and results do not seem as robust as for the PIT.

Female employment and unemployment rates are strongly and significantly correlated to the education of the workforce. This result was found in the general sample, but here the relation is clearer. Obviously, this correlation should not be interpreted as a causal link from education to female work. It is also likely that countries that increased their education rates in the last 20 years are the ones where women play a more important role, for reasons that can go beyond economic factors (e.g. culture). Other control variables show the same results as in the general sample.

Table 10: Women, PIT

	(1) urate	(2) urate	(3) erate	(4) erate	(5) inrate	(6) inrate	(7) HOURS	(8) HOURS
dep t-1	0.811	0.768	0.762	0.600	0.808	0.678	0.785	0.644
	(19.38)**	(13.16)**	(10.23)**	(6.30)**	(15.78)**	(7.59)**	(12.79)**	(7.75)**
dwomen_tax	-0.007	-0.002	0.010	0.007	-0.008	-0.004	0.089	-0.140
	(1.82)	(0.66)	(1.19)	(0.76)	(1.17)	(0.56)	(0.48)	(0.88)
L.	-0.004	-0.001	0.014	0.010	-0.016	-0.010	0.352	0.184
	(0.93)	(0.23)	(2.38)*	(2.62)**	(3.23)**	(2.29)*	(1.97)*	(0.92)
L2.	-0.007	-0.007	0.008	0.012	-0.012	-0.009	-0.125	-0.296
	(0.67)	(0.72)	(1.18)	(1.47)	(2.34)*	(1.95)	(0.45)	(0.98)
age		-0.002		0.000		0.002		0.068
		(1.23)		(0.16)		(0.68)		(1.02)
highedrate		-0.100		0.140		-0.091		-1.146
		(2.91)**		(2.83)**		(1.72)		(1.01)
immrate		-0.022		0.017		0.023		-2.189
		(0.46)		(0.33)		(0.54)		(1.18)
tenurerate		0.078		-0.016		-0.017		3.152
		(1.35)		(0.23)		(0.32)		(2.01)*
GDP		0.000		-0.000		0.000		0.000
		(3.08)**		(1.72)		(0.54)		(1.40)
Public		0.001		-0.001		-0.000		0.046
		(2.62)**		(1.25)		(0.09)		(3.26)**
industry		-0.000		0.000		-0.000		0.004
		(1.91)		(1.78)		(0.11)		(0.73)
Constant	0.005	0.008	0.151	0.219	0.065	0.071	7.221	4.664
	(1.19)	(0.10)	(3.24)**	(1.74)	(3.15)**	(0.59)	(3.36)**	(2.17)*
Observations	336	248	336	248	336	248	333	245

Robust z-statistics in parentheses
* significant at 5% level; ** significant at 1% level

Table 11: Women, SSC

	(1) urate	(2) urate	(3) erate	(4) erate	(5) inrate	(6) inrate	(7) HOURS	(8) HOURS
dep t-1	0.823	0.777	0.774	0.616	0.818	0.697	0.774	0.633
	(19.65)**	(13.27)**	(10.61)**	(6.24)**	(15.10)**	(7.37)**	(13.52)**	(7.62)**
dwomen_ssc	0.000	0.004	0.004	-0.001	-0.004	-0.002	-0.047	0.016
	(0.17)	(1.76)	(2.20)*	(0.24)	(1.82)	(0.52)	(0.64)	(0.15)
L.	0.000	-0.001	-0.002	-0.004	0.001	0.005	0.022	0.026
	(0.13)	(0.47)	(0.86)	(1.98)*	(0.46)	(2.15)*	(0.36)	(0.46)
L2.	-0.003	-0.001	0.003	0.001	-0.003	-0.001	-0.094	-0.123
	(0.64)	(0.20)	(1.23)	(0.43)	(1.82)	(0.36)	(1.11)	(1.04)
age		-0.002		-0.000		0.003		0.065
		(1.14)		(0.14)		(1.00)		(1.04)
highedrate		-0.103		0.153		-0.099		-0.876
		(3.30)**		(3.09)**		(2.01)*		(0.73)
immrate		-0.010		0.021		0.027		-2.144
		(0.20)		(0.36)		(0.56)		(1.15)
tenurerate		0.084		-0.023		-0.016		3.039
		(1.49)		(0.32)		(0.30)		(1.91)
GDP		0.000		-0.000		0.000		0.000
		(3.06)**		(1.76)		(0.54)		(1.61)
Public		0.001		-0.001		-0.000		0.046
		(2.58)**		(1.06)		(0.22)		(3.29)**
industry		-0.000		0.000		-0.000		0.004
		(1.97)*		(1.81)		(0.22)		(0.82)
Constant	0.018	-0.012	0.111	0.242	0.083	0.040	7.660	5.241
	(3.33)**	(0.16)	(2.95)**	(2.02)*	(3.20)**	(0.35)	(3.83)**	(2.31)*
Observations	336	248	336	248	336	248	333	245

Robust z-statistics in parentheses
* significant at 5% level; ** significant at 1% level

Youngsters

Results for youth workers are reported in Table 12 and Table 13.

There is no evidence that European reforms targeting the young workforce had an impact on any of the relevant outcomes. In some specifications, reforms related coefficients are significant, but results are not robust, since the signs change with the inclusion of time varing controls (see employment and inactivity rates in Table 12). Overall, these findings replicate the results from the general sample. Hence, given this evidence, it is difficult to draw any strong conclusion about tax policies targeted to the youngsters, although it seems safe to conclude that, if an impact exists, it must be relatively weak.

Table 12: Youngsters, PIT

	(1) urate	(2) urate	(3) erate	(4) erate	(5) inrate	(6) inrate	(7) HOURS	(8) HOURS
dep t-1	0.824	0.779	0.883	0.690	0.821	0.620	0.645	0.509
	(17.26)**	(10.35)**	(19.13)**	(9.30)**	(11.85)**	(6.68)**	(7.13)**	(6.42)**
dyoung_tax	0.002	-0.005	-0.001	0.000	0.002	0.005	0.155	0.091
	(0.62)	(1.76)	(0.33)	(0.04)	(0.54)	(0.79)	(1.11)	(0.59)
L.	0.001	0.001	0.008	-0.002	-0.007	0.003	0.055	0.005
	(0.37)	(0.23)	(1.21)	(0.34)	(1.01)	(0.57)	(0.52)	(0.05)
L2.	-0.002	0.003	0.002	-0.009	-0.002	0.010	-0.034	-0.070
	(0.45)	(1.11)	(0.51)	(3.81)**	(0.35)	(2.37)*	(0.33)	(0.71)
sex		0.083		0.082		-0.128		23.349
		(0.44)		(0.93)		(0.79)		(4.09)**
highedrate		-0.136		0.107		-0.081		2.726
		(2.07)*		(1.97)*		(0.93)		(1.08)
immrate		-0.053		-0.133		0.256		-5.800
		(0.55)		(2.00)*		(3.58)**		(2.22)*
tenurerate		0.066		0.008		-0.033		-1.474
		(1.01)		(0.21)		(0.77)		(0.99)
GDP		0.000		-0.000		0.000		0.000
		(1.25)		(3.42)**		(2.26)*		(0.35)
Public		0.002		-0.001		0.001		-0.007
		(3.04)**		(2.20)*		(1.20)		(0.46)
industry		-0.001		0.000		-0.000		0.006
		(2.21)*		(1.97)*		(0.05)		(1.16)
Constant	0.022	-0.118	0.056	0.172	0.079	0.191	12.693	8.837
	(3.12)**	(1.09)	(2.11)*	(3.41)**	(2.75)**	(2.04)*	(3.70)**	(2.61)**
Observations	336	248	336	248	336	248	336	248

Robust z-statistics in parentheses
* significant at 5% level; ** significant at 1% level

Table 13: Youngsters, SSC

	(1) urate	(2) urate	(3) erate	(4) erate	(5) inrate	(6) inrate	(7) HOURS	(8) HOURS
dep t-1	0.824	0.787	0.884	0.691	0.823	0.624	0.648	0.502
	(19.24)**	(10.40)**	(19.46)**	(8.78)**	(12.36)**	(6.53)**	(7.50)**	(6.44)**
dyoung_ssc	-0.001	0.002	-0.007	0.000	0.008	-0.003	0.016	-0.061
	(0.17)	(0.55)	(1.55)	(0.13)	(1.41)	(0.63)	(0.17)	(0.45)
L.	-0.006	-0.004	-0.006	-0.005	0.015	0.009	-0.113	-0.111
	(0.77)	(0.54)	(0.83)	(0.78)	(1.08)	(0.86)	(0.57)	(0.86)
L2.	0.003	0.006	-0.003	-0.000	0.001	-0.006	-0.260	-0.138
	(0.48)	(1.70)	(0.40)	(0.01)	(0.13)	(0.92)	(1.05)	(0.87)
sex		0.074		0.082		-0.095		23.058
		(0.40)		(0.87)		(0.62)		(3.97)**
highedrate		-0.131		0.113		-0.091		2.243
		(1.90)		(1.87)		(0.97)		(0.94)
immrate		-0.042		-0.127		0.231		-6.057
		(0.43)		(1.77)		(3.13)**		(2.42)*
tenurerate		0.069		0.011		-0.037		-1.269
		(1.05)		(0.31)		(0.99)		(0.85)

GDP		0.000		-0.000		0.000		0.000
		(1.10)		(3.30)**		(2.46)*		(0.49)
Public		0.002		-0.001		0.001		-0.003
		(2.91)**		(2.19)*		(1.25)		(0.24)
industry		-0.001		0.000		0.000		0.006
		(2.24)*		(1.72)		(0.07)		(1.20)
Constant	0.020	-0.115	0.060	0.168	0.075	0.172	12.608	8.857
	(2.21)*	(1.09)	(2.53)*	(2.91)**	(2.89)**	(1.95)	(3.84)**	(2.60)**
Observations	336	248	336	248	336	248	336	248

Robust z-statistics in parentheses
* significant at 5% level; ** significant at 1% level

2.2 Poverty

In this section we perform some econometric analysis to check whether reforms in labour market regulations have affected the poverty levels in the sampled countries. In the first paragraph we will discuss data and the measure of poverty adopted in the analysis, then we will show results for reforms concerning both income tax and social security contributions.

We leave in annex VII the description of the evolution of poverty in the period 1994-2008 for a sample of 26 countries.

2.2.1 Measuring Poverty

For the first period (1994-2001) analysis, we use European Community Household Panel (ECHP) Dataset. ECHP is a survey based on a standardized questionnaire that involves annual interviewing of a representative panel of households and individuals in each country, covering a wide range of topics: income, health, education, housing, demographics and employment characteristic, etc. The countries covered by the survey are: Austria, Belgium, Germany, Denmark, Spain, Finland, France, Greece, Ireland, Italy, Luxemburg, Netherlands, Portugal, Sweden, United Kingdom. The project was interrupted in 2001, and substituted by the European Union Statistics on Income and Living Conditions (EU-SILC), that we use for covering the second period of analysis (2004-2007). In this second period, the surveyed countries are the same as in ECHP plus Cyprus, Czech Republic, Estonia, Hungary, Iceland, Lithuania, Latvia, Norway, Poland, Slovenia, Slovakia and with the exception of the Netherlands. The country coverage by years is summarized in Table 14.

Table 14: Country Coverage by years and by dataset

	ECHP								EUSilc				
	94	**95**	**96**	**97**	**98**	**99**	**00**	**01**	**04**	**05**	**06**	**07**	**08**
Austria	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT
Belgium	BE	BE	BE	BE	BE	BE	BE	BE	BE	BE	BE	BE	BE
Cyprus										CY	CY	CY	CY
Czech Republic										CZ	CZ	CZ	CZ
Germany	DE	DE	DE	DE	DE	DE	DE	DE		DE	DE	DE	DE
Denmark	DK	DK	DK	DK	DK	DK	DK	DK	DK	DK	DK	DK	DK
Estonia									EE	EE	EE	EE	EE
Spain	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Finland	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI
France	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR
Greece	GR	GR	GR	GR	GR	GR	GR	GR	GR	GR	GR	GR	GR
Hungary										HU	HU	HU	HU
Ireland	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE
Iceland									IS	IS	IS	IS	IS
Italy	IT	IT	IT	IT	IT	IT	IT	IT	IT	IT	IT	IT	IT
Lithuania										LT	LT	LT	LT
Luxemburg	LU	LU	LU	LU	LU	LU	LU	LU	LU	LU	LU	LU	LU
Latvia										LV	LV	LV	LV

Netherlands	NL	NL	NL	NL	NL	NL	NL	NL				NL	NL
Norway									NO	NO	NO	NO	NO
Poland										PL	PL	PL	PL
Portugal	PT	PT	PT	PT	PT	PT	PT	PT	PT	PT	PT	PT	PT
Sweden	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE
Slovenia										SI	SI	SI	SI
Slovakia										SK	SK	SK	SK
United Kingdom	UK	UK	UK	UK	UK	UK	UK	UK		UK	UK	UK	UK

For the different countries in the different years we compute three poverty indexes: (a) the headcount poverty index; (b) the poverty gap index and (c) the squared poverty gap index. These measures are members of a more general class of indexes, the Foster Greer and Thorbecke (1984) measures (from now on FGT), and they are computed as follows:

$$FGT(\alpha) = \frac{1}{n}\sum_{i=1}^{n}\left(\frac{(z-y_i)}{z}\right)^{\alpha}$$

Where n is the dimension of the population, z denotes the poverty line, y is the dimension used for the measurement of poverty censored at the poverty line[69] (in our case, as we will specify later, it represents the equivalent income) and α is the inequality aversion parameter.

When α=0 the index is the headcount index:

$$FGT(0) = \frac{q}{n}$$

where q is the number of poor individuals (i.e. those $i=1,2,...,q$ individuals whose income is below the poverty line). This index has an intuitive interpretation, since it denotes the percentage of poor individuals in the population. Despite its widespread use, it suffers from a serious shortfall: it does not take into account the dimension of the poor individuals shortfalls, in other words it does not take into account by how poor the poor are. The following example will clarify the problem. Assume there are two populations *A* and *B*, made of three individuals each, and let the distributions of the relevant indicator (e.g. income) be respectively:

$$Y^A=4,4,6$$

$$Y^B=0,0,6$$

Let the poverty line be set at a level of *5* ($z=5$). The headcount index for the two populations is the same, since exactly *2/3* of individuals are poor in both populations. However we would intuitively point out population *B*

[69] Where *censored* means that all incomes above the poverty line are substituted by the poverty line itself. The normative idea here underlined is the *Focus Axiom:* a poverty measure cannot be sensitive to any change in the income of not-poor individuals.

as the poorest, since in population *A* the poor individuals are right below the poverty line, while in population *B* they own nothing.

In order to enrich the poverty analysis, we therefore choose to use also a second indicator of poverty.

When $\alpha=1$ the index becomes the poverty gap index:

$$FGT(1) = \frac{1}{n}\sum_{i=1}^{n}\frac{(z-y_i)}{z}$$

The poverty gap index denotes the average shortfall between the poor individuals. In this case, we take into account not only the percentage of poor individuals, but also the dimensions of the shortfalls. Looking at the previous example, the index *FGT(1)* for population *A* would be *2/15*, while for population *B* it would be *2/3*. Therefore, using the poverty gap index, we find out that population *B* has a higher poverty than population *A*, as it seems reasonable. Anyways, also the poverty gap index is not free from criticism. Consider two populations, *C* and *D*, having the following distribution of the relevant indicator:

$$Y^C=2,3,6$$

$$Y^D=1,4,6$$

Both the headcount index and the poverty gap index are the same for the two populations: in fact, the percentage of poor individuals is the same (2/3) in both *C* and *D*, and the sum of the shortfalls in *C* equals the sum of shortfalls in *D* (*3+2=5* and *4+1=5*). But are the two populations truly equally poor? To answer this question it is worth noticing that *D* can be obtained from *C* by a transfer of *1* between the poorest individuals and the second poor individual. Note that as a consequence of this transfer, the inequality among poor individuals has been increased, and a poor individual is made even poorer (she used to have *2*, now she has *1*). If we care about inequality among poor individuals, we must move from the poverty gap index to a third poverty index.

When $\alpha=2$ we are giving more weight to individuals in the bottom part of the distribution, and therefore we care about inequality among poor individuals:

$$FGT(2) = \frac{1}{n}\sum_{i=1}^{n}\left(\frac{(z-y_i)}{z}\right)^2$$

The poverty dimension used for the analysis is the equivalent household disposable income, using the OECD modified scale. A valuable feature of adopting the equivalent income is that it allows taking into account economies of scale generated within the family. On the other hand, it does

not allow controlling for the within-family income distribution, which could be of some relevance for the analysis of poverty by gender and age classes. Unfortunately, we could not build up a measure of individual income which could be comparable in the two dataset that we need to merge (ECHP and EU-SILC).

The poverty line z is set at the 60% of the median income for each country in each year.

Setting this kind of relative poverty line is common practice in developed countries analysis; still it is not free from criticism. First, it does not really allow inter-temporal and inter-countries comparisons because the order implied by the indexes is valid for a given threshold. Second, if all incomes rise by the same constant (for all the individuals y_i becomes y_i*k), poverty remains unchanged, and therefore we cannot appreciate the welfare improvement due to pure growth. Third, it is affected by the inequality in the income distribution.

An interesting feature of the FGT class of measures is the decomposability by subgroups. Overall poverty in the society can be decomposed into the marginal contribution to poverty of different j=1,2,..k subgroups of population each of dimension n_j and such that $n_1+n_2+\ldots+n_k=n$.

$$FGT(\alpha) = \sum_{j=1}^{k} \left[\frac{n_j}{n} \sum_{i=1}^{n_j} \left(\frac{(z - y_i)}{z} \right)^{\alpha} \right]$$

We exploit this feature to study the composition of overall poverty by age groups and by gender.

2.2.2 The impact of reforms on poverty

In this paragraph we perform some econometric analysis to check whether reforms in personal income taxation and social security contribution have affected poverty (as measured by fgt0, fgt1 and fgt2).

Recall that an individual is defined poor if her income falls below the poverty line, which is set at the sixty per cent of the median equivalent income in each country at each moment in time. Index fgt0 indicates the percentage of individuals having an equivalent income below the poverty line, regardless of the shortfall's depth. Index fgt1, instead, takes into account the income gaps, and can be interpreted as the average income gap between the poor individuals in the population. Finally, index fgt2 gives more weight to the poorest individual, not allowing the index to fall if regressive transfers between two poor individuals take place.

As before, we use here a *linear dynamic panel-data model*, including 2 lags of

the dependent variable (the poverty indexes). We present results both for overall poverty and for poverty divided into gender and age subgroups, to check if targeted measures had some effect on specific groups' poverty.

2.2.3 Personal Income Tax Reforms

Overall Poverty

As in the previous section, we present two tables for each outcome variable (i.e. poverty indices fgt0, fgt1, fgt2). The first table reports results when, beside the reform, only time dummies and the lagged dependent variable are used as controls. In the second table we add the same time-varying controls as in the analysis on labour market indicators. Note that in this second case we lose some observation due to the fact that for some countries and in some years time-varying controls are not available.

The main results are reported in Table 15 Table 20.

In general, the impact of the reforms is quantitatively very limited and statistically non significant. Even when they are significant, policy related coefficients have very limited economic meaning.

On this regard, it has to be stressed that the number of observations is too small for the analysis to be convincing, as our analysis misses all the reforms that took place in Eastern Europe during the nineties, due to lack of coverage of the microdata used to compute poverty. Notice also that poverty changes are very little within countries across time.

When the impact of a reform reducing personal taxation or social security contribution is statistically significant, it has the opposite sign of what we would expect. In fact, we find that reforms decreasing income taxation or social security contribution in general are positively correlated with the percentage of poor individuals (see Table 15). When measuring poverty as average poverty gap (Table 17) or squared poverty gap(Table 19), we keep finding the positive correlation with social security contribution reforms, and in particular with reforms affecting employers social security contribution. In other words, even if the magnitude of the effect is negligible, a reduction in personal income tax (or in social security contribution) results in a higher number of individuals below the poverty line. This effect is probably guided by the definition of poverty we used: given a relative definition of poverty, the poverty line moves along the income level of the median individual. Generally, at the very bottom of the distribution, individuals are in a no-tax area, and therefore they are not affected by the tax reduction. On the other hand, if everybody else is

better off after the reform, so it is the median individual. As a result the poverty line increases and more individuals will fall below it. Therefore, the effect we find on poverty is indirectly due to the reform, by the definition of relative poverty we apply. At the same time, we cannot exclude reverse causality issues.

With respect to the time-varying controls, immigration rate consistently appears to have a positive correlation with poverty (see Table 16, Table 18 and Table 20). Given that immigrants tend to cover low-paid jobs, this is as expected. Instead, the percentage of women is positively correlated only with the average income gap (Table 18). This result is probably capturing the gender wage gap: across Europe, in fact, according to the European Commission, women earn on average 17.8% less than men and in some countries the gender pay gap is widening. GDP and public expenditures are positively correlated just with the average squared poverty gaps (Table 20).

Table 15: Percentage of poor people

	(1) fgt0	(2) fgt0	(3) fgt0	(4) fgt0	(5) fgt0
fgt0 t-1	0.183	0.162	0.187	0.148	0.160
	(0.168)	(0.176)	(0.168)	(0.161)	(0.157)
dreform_ssceyer		7.80e-05			
		(0.00301)			
L.		0.00251			
		(0.00172)			
L2.		-0.000304			
		(0.00217)			
dreform_ssceyee			0.000449		
			(0.00252)		
L.			-8.42e-05		
			(0.00175)		
L2.			0.000492		
			(0.00211)		
dreform_ssc				0.000679	0.000428
				(0.00260)	(0.00239)
L.				0.00341***	0.00273**
				(0.00112)	(0.00123)
L2.				0.00102	0.000282
				(0.00185)	(0.00180)
dreform_tax	-0.00179				-0.00174
	(0.00185)				(0.00182)
L.	0.00323**				0.00295*
	(0.00156)				(0.00167)
L2.	0.00188				0.00218
	(0.00180)				(0.00193)
Constant	0.127***	0.131***	0.127***	0.131***	0.130***
	(0.0284)	(0.0285)	(0.0273)	(0.0259)	(0.0267)
Observations	100	100	100	100	100
Number of country	24	24	24	24	24

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 16: Percentage of poor people with time varying controls

	(1)	(2)	(3)	(4)	(5)

	fgt0	fgt0	fgt0	fgt0	fgt0
fgt0 t-1	0.00322	0.0304	0.0431	-0.00913	-0.0260
	(0.130)	(0.140)	(0.132)	(0.122)	(0.122)
dreform_ssceyer		-0.00111			
		(0.00407)			
L.		0.000178			
		(0.00261)			
L2.		0.00102			
		(0.00265)			
dreform_ssceyee			-0.00205		
			(0.00244)		
L.			0.000426		
			(0.00226)		
L2.			0.00528***		
			(0.00163)		
dreform_ssc				0.000524	-2.76e-07
				(0.00315)	(0.00280)
L.				0.00265*	0.000936
				(0.00152)	(0.00193)
L2.				0.00379**	0.00255
				(0.00185)	(0.00217)
dreform_tax	-0.00135				-0.00128
	(0.00213)				(0.00221)
L.	0.00608**				0.00607**
	(0.00241)				(0.00262)
L2.	0.00492**				0.00392
	(0.00246)				(0.00280)
Age	0.00243	0.00146	0.00143	0.00131	0.00274
	(0.00629)	(0.00815)	(0.00648)	(0.00724)	(0.00614)
SEX	0.341	0.339	0.188	0.296	0.388
	(0.369)	(0.320)	(0.288)	(0.322)	(0.374)
Highedrate	-0.00957	0.0503**	0.0436	0.0330	-0.0128
	(0.0334)	(0.0256)	(0.0282)	(0.0233)	(0.0369)
Tenurerate	0.218	0.120	0.117	0.146	0.219
	(0.166)	(0.156)	(0.146)	(0.160)	(0.166)
Immrate	0.605**	0.622***	0.788***	0.764***	0.634***
	(0.269)	(0.237)	(0.223)	(0.233)	(0.231)
GDP	-3.98e-07	-4.76e-07	-4.82e-07	-7.15e-08	-1.23e-07
	(6.21e-07)	(7.65e-07)	(6.35e-07)	(7.58e-07)	(7.83e-07)
Public	-0.000728	-0.00142	-0.00127	-0.00125	-0.000712
	(0.000883)	(0.000879)	(0.000908)	(0.000886)	(0.000906)
Industry	0.000141	0.000200	0.000267	0.000306	0.000202
	(0.000319)	(0.000363)	(0.000329)	(0.000326)	(0.000357)
Constant	-0.253	-0.126	-0.0636	-0.141	-0.299
	(0.237)	(0.257)	(0.261)	(0.267)	(0.292)
Observations	76	76	76	76	76
Number of country	21	21	21	21	21

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 17: Average income gap

	(1) fgt1	(2) fgt1	(3) fgt1	(4) fgt1	(5) fgt1
fgt1 t-1	0.149	0.111	0.174	0.142	0.152
	(0.209)	(0.187)	(0.191)	(0.178)	(0.188)
dreform_ssceyer		0.000269			
		(0.00120)			
L.		0.00146**			
		(0.000633)			
L2.		0.00112			
		(0.00107)			
dreform_ssceyee			-0.000916		
			(0.000767)		
L.			-0.000161		
			(0.000531)		
L2.			0.000551		
			(0.000698)		
dreform_ssc				-0.000390	-0.000388
				(0.00115)	(0.00119)
L.				0.00101*	0.000945
				(0.000572)	(0.000686)
L2.				0.000993	0.00102
				(0.000919)	(0.000889)
dreform_tax	-0.000361				-0.000307
	(0.000589)				(0.000559)

L.	0.000419				0.000354
	(0.000736)				(0.000755)
L2.	9.23e-05				-0.000208
	(0.000720)				(0.000694)
Constant	0.0371***	0.0381***	0.0356***	0.0363***	0.0366***
	(0.0103)	(0.00910)	(0.00900)	(0.00828)	(0.00921)
Observations	100	100	100	100	100
Number of country	24	24	24	24	24

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 18: Average income gap with time varying controls

	(1) fgt1	(2) fgt1	(3) fgt1	(4) fgt1	(5) fgt1
fgt1 t-1	0.0177	0.0432	0.0209	0.0510	0.0554
	(0.153)	(0.148)	(0.152)	(0.148)	(0.158)
dreform_ssceyer		-0.000642			
		(0.00167)			
L.		0.000172			
		(0.00102)			
L2.		0.000724			
		(0.00124)			
dreform_ssceyee			-0.00115		
			(0.000704)		
L.			-0.000213		
			(0.000475)		
L2.			0.000507		
			(0.000876)		
dreform_ssc				-0.000787	-0.000893
				(0.00121)	(0.00120)
L.				0.000291	0.000157
				(0.000543)	(0.000622)
L2.				0.00113	0.00120
				(0.000994)	(0.000907)
dreform_tax	-0.000846				-0.000963
	(0.000700)				(0.000811)
L.	0.00100				0.000948
	(0.000777)				(0.000733)
L2.	0.000753				-4.13e-05
	(0.000937)				(0.000942)
age	0.00158	0.00147	0.00137	0.00179	0.00237
	(0.00187)	(0.00181)	(0.00171)	(0.00165)	(0.00193)
SEX	0.259*	0.201	0.258*	0.168	0.201
	(0.151)	(0.144)	(0.151)	(0.158)	(0.156)
highedrate	-0.0104	0.00337	-0.000489	0.00522	-0.00318
	(0.0101)	(0.0156)	(0.0103)	(0.0145)	(0.0141)
tenurerate	0.0922*	0.0765	0.0912*	0.0785	0.0808
	(0.0543)	(0.0516)	(0.0535)	(0.0529)	(0.0558)
immrate	0.332**	0.314**	0.339**	0.377**	0.379**
	(0.158)	(0.141)	(0.156)	(0.155)	(0.150)
GDP	6.91e-07	6.62e-07	6.77e-07	7.00e-07*	7.81e-07**
	(4.44e-07)	(4.25e-07)	(4.55e-07)	(3.97e-07)	(3.97e-07)
Public	0.000279	-2.03e-05	0.000180	-2.03e-05	0.000113
	(0.000368)	(0.000290)	(0.000325)	(0.000315)	(0.000357)
industry	9.89e-05	9.15e-05	9.25e-05	0.000110	0.000141
	(0.000121)	(0.000125)	(0.000118)	(0.000113)	(0.000135)
Constant	-0.260***	-0.202**	-0.246***	-0.204**	-0.255**
	(0.0810)	(0.0943)	(0.0890)	(0.0987)	(0.110)
Observations	76	76	76	76	76
Number of country	21	21	21	21	21

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 19: Average squared income gap

	(1) fgt2	(2) fgt2	(3) fgt2	(4) fgt2	(5) fgt2
fgt2 t-1	0.264	0.221	0.286*	0.243	0.264
	(0.174)	(0.152)	(0.156)	(0.151)	(0.167)
dreform_ssceyer		0.000399			
		(0.000746)			
L.		0.00114**			

		(0.000476)			
L2.		0.00129			
		(0.000877)			
dreform_ssceyee			-0.000935*		
			(0.000515)		
L.			7.30e-05		
			(0.000418)		
L2.			0.000582		
			(0.000578)		
dreform_ssc				-0.000137	-0.000144
				(0.000727)	(0.000767)
L.				0.000789*	0.000837*
				(0.000404)	(0.000438)
L2.				0.00111	0.00133*
				(0.000803)	(0.000767)
dreform_tax	-1.44e-05				-4.40e-05
	(0.000378)				(0.000380)
L.	7.93e-05				-5.70e-05
	(0.000536)				(0.000526)
L2.	-0.000268				-0.000814*
	(0.000552)				(0.000456)
Constant	0.0156***	0.0158***	0.0150***	0.0154***	0.0151***
	(0.00482)	(0.00400)	(0.00422)	(0.00402)	(0.00432)
Observations	100	100	100	100	100
Number of country	24	24	24	24	24

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 20: Average squared income gap with time varying controls

	(1) fgt2	(2) fgt2	(3) fgt2	(4) fgt2	(5) fgt2
fgt2 t-1	0.0714	0.0708	0.0769	0.0724	0.0800
	(0.156)	(0.141)	(0.149)	(0.148)	(0.163)
dreform_ssceyer		-0.000128			
		(0.00106)			
L.		0.000458			
		(0.000761)			
L2.		0.000788			
		(0.000896)			
dreform_ssceyee			-0.000691**		
			(0.000346)		
L.			1.90e-05		
			(0.000380)		
L2.			1.39e-05		
			(0.000681)		
dreform_ssc				-0.000424	-0.000463
				(0.000697)	(0.000756)
L.				0.000282	0.000385
				(0.000382)	(0.000362)
L2.				0.000810	0.000965
				(0.000819)	(0.000734)
dreform_tax	-0.000470				-0.000578
	(0.000428)				(0.000407)
L.	0.000125				4.62e-05
	(0.000571)				(0.000484)
L2.	-0.000137				-0.000744
	(0.000693)				(0.000579)
age	0.000767	0.00119	0.000881	0.00129	0.00133
	(0.00133)	(0.00131)	(0.00121)	(0.00123)	(0.00136)
SEX	0.258**	0.178*	0.216**	0.157	0.212*
	(0.116)	(0.106)	(0.109)	(0.122)	(0.117)
highedrate	-0.00975*	-0.00183	-0.00345	-8.43e-05	-0.00564
	(0.00587)	(0.00919)	(0.00610)	(0.00819)	(0.00810)
tenurerate	0.0683*	0.0470	0.0575*	0.0559*	0.0637*
	(0.0367)	(0.0291)	(0.0337)	(0.0311)	(0.0362)
immrate	0.166	0.159*	0.172	0.206**	0.202**
	(0.102)	(0.0952)	(0.109)	(0.105)	(0.0965)
GDP	5.75e-07*	6.23e-07**	5.30e-07*	6.20e-07**	6.90e-07**
	(3.01e-07)	(3.12e-07)	(3.07e-07)	(2.91e-07)	(2.86e-07)
Public	0.000517**	0.000351*	0.000419*	0.000339*	0.000410*
	(0.000244)	(0.000180)	(0.000220)	(0.000191)	(0.000214)
industry	7.06e-05	8.26e-05	5.98e-05	8.32e-05	0.000114
	(8.04e-05)	(7.98e-05)	(7.66e-05)	(7.56e-05)	(8.29e-05)
Constant	-0.236***	-0.192***	-0.206***	-0.193***	-0.234***
	(0.0625)	(0.0690)	(0.0649)	(0.0733)	(0.0756)

Observations	76	76	76	76	76
Number of country	21	21	21	21	21

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Poverty by Gender

To understand results on poverty by gender subgroups, we should first recall the definition of income adopted in the analysis. The choice of using the equivalent household income as an indicator of poverty has the advantage of taking into account the economy of scales generated within a family. On the other hand we assume income to be equally spread among the different household components. Consider, for example, two women A and B, without children, living with their husbands. Let A living in a family where all income is her husband wage income, and B living in a family where both spouses have the same income from wage, and the sum of their wages is the same as A husband's income. According to our definition of equivalent income, the two women are in the same situation. But this is true only if income is in fact equally distributed between the two spouses, which may not be the case. Another fact to keep in mind is that personal taxation systems, which may be more or less progressive, can vary from individual-base to family-base, and therefore the extent of the reform can vary a lot from one country to another. Recall that given m groups in the population, each of cardinality n_m, and level of poverty $fgt\alpha\_m$, $\alpha=0,1,2$, overall poverty can be obtained as the sum of the poverty levels in each subgroup. Therefore, the effect on reforms targeted to women are intrinsically biased both by the relative nature of the poverty measure, as discussed in the previous paragraph, and by the definition of income used in the analysis.

Table 21 shows a positive correlation between female poverty and decreasing income tax reforms targeted to women with one year time lag. On the other hand, no statistically significant effect is found for social security contributions reforms on female poverty.

As for the controls, the positive correlation between immigration rate and poverty that we find in the overall poverty analysis is here traceable in the results of the analysis of the effects of social security contributions reforms, and it is stronger for male than for women (Table 23 - Table 24). Gross domestic product and the extent of public expenditures are negatively correlated with the percentage both of poor female and male individuals. In particular, the negative correlation between public expenditure and percentage of poor seems stronger for women than for men.

Table 21: Effect of PIT reforms targeted to women on poverty (w-women)

	(1) fgt0_w	(2) fgt0_w	(3) fgt1_w	(4) fgt1_w	(5) fgt2_w	(6) fgt2_w
dep t-1	0.334	0.190	0.253**	0.230*	0.235**	0.219**
	(0.209)	(0.139)	(0.127)	(0.129)	(0.0975)	(0.0949)
dwomen_tax	0.00444	0.00378	-0.000213	0.000991	-0.000174	0.000820
	(0.00738)	(0.00821)	(0.00106)	(0.00192)	(0.000343)	(0.000916)
L.	0.0112*	0.0152**	0.00108	0.00356**	-0.000190	0.00204*
	(0.00601)	(0.00667)	(0.00154)	(0.00177)	(0.000698)	(0.00107)
Age		0.00146		0.00163*		0.00122**
		(0.00282)		(0.000969)		(0.000585)
highedrate		0.0537***		0.00902**		0.00234
		(0.0152)		(0.00400)		(0.00195)
Immrate		-0.0420		0.00675		-0.00100
		(0.0655)		(0.0227)		(0.0142)
tenurerate		0.0603		0.0337		0.0169
		(0.0719)		(0.0235)		(0.0115)
GDP		-4.62e-07*		1.23e-07		1.50e-07
		(2.81e-07)		(1.41e-07)		(9.59e-08)
Public		-0.00126***		-0.000250		-6.89e-05
		(0.000440)		(0.000171)		(0.000126)
industry		-6.84e-05		-5.80e-05		-2.58e-05
		(0.000151)		(7.14e-05)		(4.80e-05)
Constant	0.0573***	0.0366	0.0174***	-0.0565	0.00866***	-0.0483
	(0.0197)	(0.140)	(0.00389)	(0.0506)	(0.00185)	(0.0309)
Observations	137	105	137	105	137	105
Number of country	24	21	24	21	24	21

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 22: Effect of PIT reforms targeted to women on poverty (m-men)

	(1) fgt0_m	(2) fgt0_m	(3) fgt1_m	(4) fgt1_m	(5) fgt2_m	(6) fgt2_m
dep t-1	0.388***	0.312**	0.349***	0.406***	0.346***	0.398***
	(0.112)	(0.144)	(0.0871)	(0.101)	(0.0990)	(0.119)
dwomen_tax	0.000781	-0.000121	-0.000239	-0.000265	-7.89e-05	0.000101
	(0.00543)	(0.00670)	(0.00161)	(0.00235)	(0.000950)	(0.00153)
L.	-0.000391	0.00320	0.000329	0.000705	-0.000253	0.000366
	(0.00448)	(0.00615)	(0.00107)	(0.00191)	(0.000722)	(0.00127)
Age		0.000925		0.000346		0.000501
		(0.00274)		(0.000779)		(0.000467)
highedrate		0.0144		0.00165		-0.000591
		(0.0125)		(0.00444)		(0.00306)
Immrate		0.0107		0.0134		0.00813
		(0.0588)		(0.0234)		(0.0148)
tenurerate		0.0225		-0.00559		-0.00652
		(0.0432)		(0.0134)		(0.0111)
GDP		-5.42e-07*		-4.60e-08		4.67e-08
		(2.99e-07)		(1.58e-07)		(1.03e-07)
Public		-0.000513*		-6.18e-05		7.31e-06
		(0.000299)		(0.000178)		(0.000140)
industry		-0.000306**		-6.24e-05		-2.26e-05
		(0.000132)		(6.50e-05)		(4.59e-05)
Constant	0.0419***	0.0547	0.0126***	0.0109	0.00631***	-0.00827
	(0.00932)	(0.111)	(0.00253)	(0.0452)	(0.00169)	(0.0293)
Observations	137	105	137	105	137	105
Number of country	24	21	24	21	24	21

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 23: Effect of SSC reforms targeted to women on poverty (w-women)

	(1) fgt0_w	(2) fgt0_w	(3) fgt1_w	(4) fgt1_w	(5) fgt2_w	(6) fgt2_w
dep t-1	0.101	0.0403	0.0464	0.0241	0.192	0.0297
	(0.213)	(0.146)	(0.261)	(0.160)	(0.182)	(0.147)
dwomen_ssc	-0.00130	-0.000460	-0.00126*	-0.000612	-0.000698	-0.000143
	(0.00221)	(0.00280)	(0.000742)	(0.000873)	(0.000517)	(0.000497)

L.	0.000128	-5.55e-05	-0.000441	2.13e-05	-0.000378	-0.000111
	(0.00167)	(0.00202)	(0.000967)	(0.000977)	(0.000535)	(0.000632)
L2.	-8.10e-05	-0.000321	-0.000165	-0.000282	-6.44e-05	-0.000280
	(0.00252)	(0.00262)	(0.000972)	(0.00111)	(0.000841)	(0.000778)
Age		0.00163		0.00199		0.00155**
		(0.00548)		(0.00140)		(0.000757)
Highedrate		0.0403**		0.00555		0.00110
		(0.0170)		(0.00738)		(0.00400)
Immrate		0.271*		0.163*		0.101
		(0.161)		(0.0875)		(0.0639)
Tenurerate		0.0635		0.0626		0.0505**
		(0.112)		(0.0447)		(0.0243)
GDP		-2.00e-07		3.14e-07		3.00e-07**
		(3.83e-07)		(2.14e-07)		(1.41e-07)
Public		-0.000998**		-0.000283*		1.59e-05
		(0.000489)		(0.000167)		(0.000104)
Industry		0.000270		3.55e-05		3.42e-05
		(0.000205)		(7.79e-05)		(4.35e-05)
Constant	0.0793***	-0.0168	0.0226***	-0.105	0.00904***	-0.102**
	(0.0189)	(0.234)	(0.00650)	(0.0758)	(0.00251)	(0.0472)
Observations	101	77	101	77	101	77
Number of country	24	21	24	21	24	21

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 24: Effect of SSC reforms targeted to women on poverty (m-men)

	(1) fgt0_m	(2) fgt0_m	(3) fgt1_m	(4) fgt1_m	(5) fgt2_m	(6) fgt2_m
dep t-1	0.195*	0.0586	0.117	0.0440	0.228	0.112
	(0.110)	(0.112)	(0.149)	(0.124)	(0.160)	(0.150)
dwomen_ssc	-0.00250	-0.00211	-0.00219***	-0.00165**	-0.00151***	-0.00127**
	(0.00175)	(0.00205)	(0.000732)	(0.000809)	(0.000571)	(0.000596)
L.	-0.000128	-6.89e-05	-0.000556	-0.000737	-0.000140	-0.000428
	(0.00133)	(0.00133)	(0.000680)	(0.000570)	(0.000436)	(0.000417)
L2.	-0.00162	-0.00123	-0.000782	-0.000873	-0.000160	-0.000580
	(0.00183)	(0.00183)	(0.000733)	(0.000834)	(0.000623)	(0.000632)
Age		0.00101		-0.000673		-0.000402
		(0.00279)		(0.000655)		(0.000628)
Highedrate		0.0189		0.00331		0.00100
		(0.0133)		(0.00466)		(0.00302)
Immrate		0.424***		0.163***		0.0727**
		(0.102)		(0.0455)		(0.0317)
Tenurerate		0.0298		0.00644		0.00381
		(0.0792)		(0.0257)		(0.0187)
GDP		-2.72e-07		2.53e-08		7.41e-08
		(3.30e-07)		(1.34e-07)		(9.59e-08)
Public		-0.000704		-6.90e-05		6.05e-05
		(0.000516)		(0.000149)		(0.000116)
Industry		-8.24e-05		2.03e-05		2.61e-05
		(0.000151)		(4.68e-05)		(3.59e-05)
Constant	0.0556***	0.0361	0.0176***	0.0370	0.00768***	0.0132
	(0.00815)	(0.148)	(0.00346)	(0.0437)	(0.00226)	(0.0375)
Observations	101	77	101	77	101	77
Number of country	24	21	24	21	24	21

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Poverty by Age Cohorts

For the specification of the model across ages, recall that the youngsters group is made of individuals aged 16-30, the middle age individuals are in the cohort 31-55, the old individuals are aged 55-65 and the pensioners are individuals older than 65.

Table 25 to Table 32 show results of the analysis of the effect of reforms on poverty in different age subgroups. For the youngest group (16-30) we find that the lagged reforms dummy variable is positively correlated with

the percentage of poor individuals in the youngest cohort. Immigration rate and percentage of female population are positively correlated with the three poverty indicators (Table 25). For the second age group (31-55), reforms targeted to young aim at lowering income taxation have a negative effect on the percentage of poor individuals in that age brackets, and also, when looking at the lagged independent variables, on the average poverty gap (Table 26). Reforms lowering social security contribution targeted to young individuals appear to be negatively correlated with the average poverty gap and square average poverty gaps for the second age cohort (Table 30), and positively correlated with poverty in the age bracket 55-65, as reported.

Immigration rate is still positively correlated with poverty. Here we get some important hints about which age groups are more affected by immigration: for the youngest group all three poverty measures are positively correlated with immigration (Table 25 and Table 29), in the age bracket 31-55 we see the positive correlation just for the percentage of poor individuals and the average poverty gap (Table 26 and Table 30), while for the oldest working age group the positive correlation remains only for the percentage of poor (Table 27and Table 31). The percentage of individuals with long term contracts is positively correlated with poverty for the two oldest age groups (Table 27, Table 28, Table 31and Table 32).

Table 25: Effect of PIT reforms targeted to young individuals on poverty by age subgroups (y-age16-30)

	(1) fgt0_y	(2) fgt0_y	(3) fgt1_y	(4) fgt1_y	(5) fgt2_y	(6) fgt2_y
dep t-1	0.377**	0.0869	0.156	-0.0249	0.146	-0.0466
	(0.149)	(0.122)	(0.139)	(0.111)	(0.133)	(0.113)
dyoung_tax	-0.00232**	-0.00342**	-0.000358	-0.00104	0.000189	-0.000426
	(0.00117)	(0.00151)	(0.000501)	(0.000978)	(0.000426)	(0.000810)
L.	0.00217*	0.00229**	0.000469	0.000272	0.00103	0.000794
	(0.00124)	(0.000956)	(0.00100)	(0.000712)	(0.00125)	(0.000915)
L2.	0.00102	0.00147	0.00136	0.00103	0.00160	0.00125*
	(0.00115)	(0.00102)	(0.00111)	(0.000645)	(0.00127)	(0.000727)
SEX		0.411**		0.197**		0.131**
		(0.186)		(0.0988)		(0.0585)
highedrate		-0.00461		-0.000105		0.00172
		(0.0161)		(0.00632)		(0.00547)
immrate		0.333**		0.159**		0.135*
		(0.144)		(0.0766)		(0.0796)
tenurerate		-0.0723		-0.0309		-0.0256
		(0.0451)		(0.0273)		(0.0210)
GDP		-2.16e-08		3.27e-07		3.51e-07
		(5.31e-07)		(3.44e-07)		(2.74e-07)
Public		-0.000482		5.13e-05		8.82e-05
		(0.000518)		(0.000194)		(0.000109)
industry		-6.34e-05		-2.89e-05		-1.25e-05
		(0.000129)		(6.86e-05)		(4.78e-05)
Constant	0.0275***	-0.0908	0.0129***	-0.0708	0.00756***	-0.0513*
	(0.00761)	(0.0920)	(0.00377)	(0.0487)	(0.00280)	(0.0304)

Observations	100	76	100	76	100	76
Number of country	24	21	24	21	24	21

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 26: Effect of PIT reforms targeted to young individuals on poverty by age subgroups (m-age31-55)

	(1) fgt0_m	(2) fgt0_m	(3) fgt1_m	(4) fgt1_m	(5) fgt2_m	(6) fgt2_m
dep t-1	0.00362	-0.0821	0.225	0.109	0.368**	0.230**
	(0.137)	(0.169)	(0.143)	(0.0971)	(0.144)	(0.0995)
dyoung_tax	-0.00194**	-0.00323**	0.000405	-0.000161	0.000592	0.000329
	(0.000868)	(0.00146)	(0.000721)	(0.000996)	(0.000676)	(0.000909)
L.	-0.00268***	-0.00244*	-0.00138***	-0.000954*	-0.000438	5.29e-05
	(0.000969)	(0.00125)	(0.000493)	(0.000536)	(0.000520)	(0.000504)
L2.	-0.00519***	-0.00468***	-0.000551	-0.000602	0.000587	0.000642
	(0.00109)	(0.00174)	(0.000554)	(0.000656)	(0.000626)	(0.000482)
SEX		0.0472		0.107		0.0950
		(0.151)		(0.102)		(0.0852)
highedrate		0.0226*		0.00511		0.000757
		(0.0130)		(0.00582)		(0.00522)
immrate		0.302**		0.200*		0.124
		(0.123)		(0.105)		(0.0890)
tenurerate		-0.0178		-0.0210		-0.0165
		(0.0531)		(0.0254)		(0.0191)
GDP		1.07e-07		2.49e-07		1.96e-07
		(2.91e-07)		(2.38e-07)		(1.95e-07)
Public		2.11e-05		0.000252		0.000247
		(0.000488)		(0.000263)		(0.000211)
industry		-0.000287*		-7.57e-06		3.38e-05
		(0.000162)		(8.14e-05)		(5.58e-05)
Constant	0.0552***	0.0625	0.0128***	-0.0458	0.00548***	-0.0513
	(0.00615)	(0.0821)	(0.00209)	(0.0450)	(0.00126)	(0.0385)
Observations	100	76	100	76	100	76
Number of country	24	21	24	21	24	21

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 27: Effect of PIT reforms targeted to young individuals on poverty by age subgroups (o-age55-65)

	(1) fgt0_o	(2) fgt0_o	(3) fgt1_o	(4) fgt1_o	(5) fgt2_o	(6) fgt2_o
dep t-1	0.300**	0.182***	0.217**	0.167	0.157*	0.0352
	(0.127)	(0.0698)	(0.101)	(0.173)	(0.0801)	(0.145)
dyoung_tax	-0.000793	-0.000278	0.000213	0.000400	0.000300	0.000446
	(0.000657)	(0.000638)	(0.000327)	(0.000356)	(0.000324)	(0.000374)
L.	-0.000309	-0.000486	-1.21e-05	7.51e-05	4.51e-05	4.94e-05
	(0.000711)	(0.000471)	(0.000474)	(0.000256)	(0.000351)	(0.000288)
L2.	-7.94e-05	-9.92e-06	5.75e-05	0.000340	0.000132	0.000313
	(0.000721)	(0.000574)	(0.000536)	(0.000263)	(0.000364)	(0.000221)
SEX		0.0354		-0.0229		-0.00536
		(0.0511)		(0.0453)		(0.0410)
highedrate		0.00466*		-0.000933		-0.00131
		(0.00252)		(0.00169)		(0.00136)
immrate		0.0492**		-0.00349		-0.0121
		(0.0225)		(0.0198)		(0.0215)
tenurerate		0.0549**		0.0287***		0.0209***
		(0.0219)		(0.0104)		(0.00768)
GDP		-1.20e-07		1.06e-07		1.02e-07
		(1.87e-07)		(8.10e-08)		(7.59e-08)
Public		-0.000173		-1.67e-05		-2.34e-05
		(0.000222)		(0.000136)		(0.000111)
industry		0.000115**		1.78e-05		9.01e-06

		(5.73e-05)		(2.81e-05)		(2.10e-05)
Constant	0.0130***	-0.0443	0.00432***	-0.00779	0.00245***	-0.0113
	(0.00264)	(0.0412)	(0.000765)	(0.0344)	(0.000495)	(0.0294)
Observations	100	76	100	76	100	76
Number of country	24	21	24	21	24	21

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 28: Effect of PIT reforms targeted to young individuals on poverty by age subgroups (p-age >65)

	(1) fgt0_p	(2) fgt0_p	(3) fgt1_p	(4) fgt1_p	(5) fgt2_p	(6) fgt2_p
dep t-1	0.544***	0.246	0.504***	-0.174	0.524***	0.0296
	(0.169)	(0.155)	(0.173)	(0.140)	(0.191)	(0.0941)
dyoung_tax	0.00184	0.00290	0.000788	0.000837***	0.000574	0.000543***
	(0.00426)	(0.00339)	(0.00108)	(0.000269)	(0.000503)	(0.000185)
L.	0.00155	0.00117	0.00193***	0.00141***	0.00131***	0.000823***
	(0.00180)	(0.00211)	(0.000365)	(0.000265)	(0.000226)	(0.000186)
L2.	-0.000137	-0.00107	0.000627	0.000674	0.000230	0.000121
	(0.00176)	(0.00232)	(0.000402)	(0.000461)	(0.000275)	(0.000203)
SEX		-0.181		0.000173		0.0325
		(0.200)		(0.0488)		(0.0227)
highedrate		0.0260**		0.00308		0.00122
		(0.0112)		(0.00490)		(0.00171)
immrate		0.0637		-0.00629		0.00353
		(0.0848)		(0.0210)		(0.0181)
tenurerate		0.146		0.0688*		0.0346***
		(0.105)		(0.0353)		(0.0132)
GDP		3.34e-10		8.04e-08		6.76e-08
		(3.56e-07)		(9.20e-08)		(4.45e-08)
Public		-0.000419		-0.000166		-2.51e-05
		(0.000717)		(0.000202)		(9.39e-05)
industry		0.000256		7.48e-05		4.23e-05*
		(0.000257)		(6.98e-05)		(2.40e-05)
Constant	0.0190***	0.00560	0.00420***	-0.0418	0.00151***	-0.0432**
	(0.00723)	(0.116)	(0.00120)	(0.0376)	(0.000514)	(0.0173)
Observations	100	76	100	76	100	76
Number of country	24	21	24	21	24	21

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 29: Effect of SSC reforms targeted to young individuals on poverty by age subgroups (y-age16-30)

	(1) fgt0_y	(2) fgt0_y	(3) fgt1_y	(4) fgt1_y	(5) fgt2_y	(6) fgt2_y
dep t-1	0.341**	0.0929	0.0858	-0.0582	0.0752	-0.108
	(0.143)	(0.109)	(0.126)	(0.0992)	(0.123)	(0.0895)
dyoung_ssc	-0.00430	-0.00390	-0.00371	-0.00294	-0.00255	-0.00197
	(0.00694)	(0.00544)	(0.00278)	(0.00248)	(0.00174)	(0.00180)
L.	-0.000178	-0.000581	-0.00102	-0.00102	-0.000849	-0.000736
	(0.00291)	(0.00262)	(0.000952)	(0.00121)	(0.000598)	(0.000820)
L2.	-0.00167	-0.000989	-0.00110	-0.000331	-0.000652	0.000278
	(0.00275)	(0.00337)	(0.00110)	(0.00165)	(0.000696)	(0.00110)
SEX		0.517**		0.199*		0.183**
		(0.233)		(0.114)		(0.0801)
highedrate		-0.00196		-1.38e-05		0.000731
		(0.0161)		(0.00593)		(0.00422)
immrate		0.293***		0.138**		0.0929*
		(0.112)		(0.0644)		(0.0480)
tenurerate		-0.0499		-0.0324		-0.0218
		(0.0492)		(0.0334)		(0.0254)
GDP		-5.67e-09		3.39e-07		3.67e-07
		(5.38e-07)		(3.37e-07)		(2.67e-07)

Public		-0.000359		3.85e-05		0.000177
		(0.000531)		(0.000210)		(0.000136)
industry		-6.60e-06		-5.56e-06		7.85e-06
		(0.000125)		(7.17e-05)		(5.16e-05)
Constant	0.0291***	-0.179	0.0139***	-0.0750	0.00811***	-0.0882**
	(0.00739)	(0.129)	(0.00369)	(0.0621)	(0.00282)	(0.0421)
Observations	101	77	101	77	101	77
Number of country	24	21	24	21	24	21

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 30: Effect of SSC reforms targeted to young individuals on poverty by age subgroups (m-age31-55)

	(1) fgt0_m	(2) fgt0_m	(3) fgt1_m	(4) fgt1_m	(5) fgt2_m	(6) fgt2_m
dep t-1	0.0491	-0.127	0.211	0.106	0.338**	0.232**
	(0.117)	(0.130)	(0.145)	(0.0986)	(0.155)	(0.110)
dyoung_ssc	-0.00141	-0.00117	-0.00344	-0.00337	-0.00355*	-0.00342
	(0.00536)	(0.00464)	(0.00281)	(0.00324)	(0.00207)	(0.00261)
L.	-0.00220	-0.00165	-0.00269**	-0.00242*	-0.00256***	-0.00234**
	(0.00244)	(0.00188)	(0.00112)	(0.00129)	(0.000820)	(0.00110)
L2.	0.00179	0.00189	-0.00142	-0.00100	-0.00181	-0.00156
	(0.00430)	(0.00459)	(0.00203)	(0.00242)	(0.00143)	(0.00179)
SEX		0.125		0.0637		0.0574
		(0.236)		(0.0949)		(0.0779)
highedrate		0.0188*		0.00753		0.00394
		(0.0104)		(0.00464)		(0.00435)
immrate		0.259***		0.180**		0.110
		(0.0997)		(0.0898)		(0.0834)
tenurerate		-0.0103		-0.0332		-0.0258
		(0.0473)		(0.0265)		(0.0233)
GDP		7.96e-08		1.44e-07		1.08e-07
		(2.56e-07)		(2.48e-07)		(1.85e-07)
Public		-5.23e-05		7.78e-05		0.000116
		(0.000510)		(0.000233)		(0.000171)
industry		-0.000300**		2.27e-06		4.69e-05
		(0.000151)		(6.56e-05)		(4.47e-05)
Constant	0.0520***	0.0247	0.0130***	-0.00725	0.00575***	-0.0201
	(0.00533)	(0.121)	(0.00203)	(0.0438)	(0.00130)	(0.0360)
Observations	101	77	101	77	101	77
Number of country	24	21	24	21	24	21

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 31: Effect of SSC reforms targeted to young individuals on poverty by age subgroups (o-age55-65)

	(1) fgt0_o	(2) fgt0_o	(3) fgt1_o	(4) fgt1_o	(5) fgt2_o	(6) fgt2_o
dep t-1	0.315**	0.233***	0.204**	0.171	0.167**	0.0741
	(0.124)	(0.0727)	(0.101)	(0.158)	(0.0773)	(0.131)
dyoung_ssc	0.00233**	0.00343***	0.00101*	0.00230***	0.000889	0.00154***
	(0.00118)	(0.000977)	(0.000605)	(0.000523)	(0.000566)	(0.000508)
L.	0.00287***	0.00330***	0.000774**	0.00154***	0.000403	0.000878***
	(0.000573)	(0.000508)	(0.000360)	(0.000489)	(0.000281)	(0.000328)
L2.	0.00113**	0.00185***	0.000190	0.00154***	0.000176	0.00107**
	(0.000521)	(0.000672)	(0.000462)	(0.000474)	(0.000446)	(0.000447)
SEX		0.0740		0.0290		0.0277
		(0.0644)		(0.0405)		(0.0407)
highedrate		0.00197		-0.00366		-0.00364**
		(0.00402)		(0.00249)		(0.00183)
immrate		0.0699**		-0.00223		-0.00472
		(0.0325)		(0.0191)		(0.0229)
tenurerate		0.0591***		0.0373***		0.0264***

		(0.0195)		(0.00866)		(0.00687)
GDP		-7.11e-08		1.58e-07*		1.48e-07**
		(2.01e-07)		(8.06e-08)		(7.14e-08)
Public		-4.44e-05		0.000128		9.13e-05
		(0.000205)		(0.000132)		(0.000117)
industry		0.000113**		2.66e-05		1.96e-05
		(5.38e-05)		(2.76e-05)		(2.20e-05)
Constant	0.0127***	-0.0767*	0.00430***	-0.0496	0.00237***	-0.0402
	(0.00259)	(0.0429)	(0.000694)	(0.0314)	(0.000422)	(0.0288)
Observations	101	77	101	77	101	77
Number of country	24	21	24	21	24	21

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 32: Effect of SSC reforms targeted to young individuals on poverty by age subgroups (p-age >65)

	(1) fgt0_p	(2) fgt0_p	(3) fgt1_p	(4) fgt1_p	(5) fgt2_p	(6) fgt2_p
dep t-1	0.550***	0.197	0.452**	-0.0769	0.499**	0.0203
	(0.170)	(0.151)	(0.193)	(0.129)	(0.197)	(0.112)
dyoung_ssc	0.000754	0.00165	0.000396	0.00111**	0.000501	0.000733**
	(0.00253)	(0.00169)	(0.000904)	(0.000551)	(0.000645)	(0.000328)
L.	-0.00151	-0.000294	0.000459	0.000796	0.000552*	0.000644*
	(0.00142)	(0.00224)	(0.000453)	(0.000847)	(0.000296)	(0.000338)
L2.	-0.00100	0.00158	0.000274	0.00138**	0.000346	0.000680
	(0.00287)	(0.00210)	(0.000779)	(0.000631)	(0.000497)	(0.000434)
SEX		-0.151		0.0199		0.0430
		(0.212)		(0.0518)		(0.0281)
highedrate		0.0223		0.00395		0.00117
		(0.0156)		(0.00473)		(0.00174)
immrate		0.0931		0.0112		0.00813
		(0.0985)		(0.0177)		(0.0159)
tenurerate		0.164		0.0700**		0.0366***
		(0.118)		(0.0342)		(0.0121)
GDP		-3.12e-08		1.22e-07		9.20e-08*
		(3.51e-07)		(1.03e-07)		(5.02e-08)
Public		-0.000394		-8.65e-05		1.88e-05
		(0.000749)		(0.000203)		(0.000103)
industry		0.000251		7.00e-05		3.72e-05*
		(0.000266)		(6.58e-05)		(2.06e-05)
Constant	0.0181**	-0.0207	0.00466***	-0.0594	0.00163***	-0.0530***
	(0.00723)	(0.130)	(0.00129)	(0.0375)	(0.000517)	(0.0192)
Observations	101	77	101	77	101	77
Number of country	24	21	24	21	24	21

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

2.3 Inequality

The analysis for inequality mimics that of poverty. The countries are grouped into five sets:

1. Austria, Belgium, Germany, France, Luxembourg, Netherlands
2. Cyprus, Spain, Greece, Italy, Portugal
3. Bulgaria, Czech Republic, Hungary, Poland, Romania
4. Estonia, Latvia, Lithuania, Slovenia, Slovakia
5. Denmark, Finland, Ireland, Sweden, United Kingdom

As in the previous sections, we perform three analyses using information on household equivalent income: (i) overall inequality, (ii) inequality by gender, and (iii) inequality by age groups. For the different countries in the different years we compute two indices: a) the Gini coefficient, the most commonly used index of inequality; and (b) one percentile ratio to summarize the relative distance between two points on the income distribution, in particular, here we chose P90/P10 ratio which is the proportion between the top highest percentile (P90) to the bottom lowest percentile (P10).

The Gini coefficient ranges between zero (no inequality, that is, all individuals possess the same level of income) and one (maximum inequality, that is, total income of the country is monopolized by only one individual).

P90 is the income level dividing the bottom 90% of the population to the top 10%; similarly P10 is the income level separating the bottom 10% to the rest. If, for example, P90 is 300 euro and P10 is 100 euro, P90/P10 would be 3.

Annex VII summarizes the evolution of the Gini index and the P90/P10 ratio in the period 1994-2008 in the sample of countries described above.

2.3.1 Inequality and the reforms

In this section we run some regressions to investigate whether the reforms in the labour market have an effect on inequality, as measured by the Gini coefficient. We use the panel data over the 28 countries surveyed in ECHP and EU-SILC. We replicate the analysis performed for poverty.

We use a *linear dynamic panel-data model*, including 2 lags of the dependent variable (the Gini coefficients).

Results are reported in Table 33 through Table 38. As in the previous sections, for each outcome variable, two tables of results are presented: the

first one without time-varying controls other then time dummies and the lagged dependent variable, the second with the same time-varying controls as the previous analysis. Again, in this second case we lose some observation due to the fact that for some countries and in some years time-varying controls are not available.

Inequality as measured by the Gini index does not seem to be influenced by any reforms in labour income taxation. The only exception is when we study inequality separately by age subgroups (Table 37 through Table 38). In that case, there is some evidence that reforms regarding income tax and reforms of social security contributions have an impact in lowering poverty for the youngest cohort. It is interesting to notice that the contemporaneous reform dummy variable is positively correlated with youth inequality, which might be evidence of reverse causality: a reform targeted to young individuals takes place where youth inequality is a serious problem. The lagged variable instead is negatively correlated, suggesting the effectiveness of the policy in reducing inequality.

With respect to the time-varying controls, we keep finding the same results as in the poverty analysis in terms of the sign and statistical significance of the immigration rate (the higher, the worse inequality). The percentage of women in the population is instead negatively correlated with inequality (which is the opposite finding than the poverty analysis). Here we find a significant, even if vary small, positive effect of age on inequality: the older the population, the more inequality is there.

Overall Inequality

Table 33: Inequality

VARIABLES	(1) Gini	(2) Gini	(3) Gini	(4) Gini	(5) Gini
L.Gini	0.124	0.162	0.106	0.123	0.0953
	(0.181)	(0.185)	(0.183)	(0.187)	(0.178)
Reform_sscyer		0.00493**			
		(0.00233)			
L.		0.00389			
		(0.00261)			
L2.		0.00282			
		(0.00220)			
Reform_sscyee			0.000847		
			(0.00203)		
L.			0.00258		
			(0.00227)		
L2.			0.000798		
			(0.00248)		
ssc				0.00302	0.00351
				(0.00203)	(0.00221)
L.				0.00350	0.00429
				(0.00239)	(0.00266)
L2.				0.00197	0.00257
				(0.00152)	(0.00169)
Reform_tax	-0.00115				-0.00123

	(0.00198)				(0.00178)
L.	-0.00194				-0.00297
	(0.00281)				(0.00278)
L2.	-0.000344				-0.00131
	(0.00176)				(0.00174)
Constant	0.258***	0.241***	0.262***	0.249***	0.262***
	(0.0551)	(0.0564)	(0.0569)	(0.0567)	(0.0542)
Observations	99	99	99	99	99
Number of country	24	24	24	24	24

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 34: Inequality with time varying control

VARIABLES	(1) Gini	(2) Gini	(3) Gini	(4) Gini	(5) Gini
Gini t-1	0.190*	0.185	0.198**	0.185	0.156
	(0.114)	(0.113)	(0.0992)	(0.113)	(0.116)
dreform_tax	-0.00164				-0.00206
	(0.00221)				(0.00212)
L.	-0.00150				-0.00280
	(0.00290)				(0.00304)
L2.	8.88e-05				-0.00129
	(0.00199)				(0.00245)
dreform_sscyer		0.00465			
		(0.00380)			
L.		0.00393			
		(0.00333)			
L2.		0.00352			
		(0.00249)			
dreform_sscyee			-0.000323		
			(0.00184)		
L.			0.00213		
			(0.00188)		
L2.			-0.000125		
			(0.00289)		
dreform_ssc				0.00255	0.00353*
				(0.00205)	(0.00206)
L.				0.00365	0.00516**
				(0.00238)	(0.00252)
L2.				0.00200*	0.00295**
				(0.00115)	(0.00129)
age	0.0114**	0.0119**	0.0113**	0.0104**	0.0103*
	(0.00562)	(0.00478)	(0.00510)	(0.00492)	(0.00569)
SEX	-0.920*	-0.931*	-0.999*	-1.109**	-0.984*
	(0.472)	(0.506)	(0.515)	(0.535)	(0.511)
highedrate	0.0161	-0.00684	0.0115	-0.0103	-0.00254
	(0.0394)	(0.0383)	(0.0311)	(0.0442)	(0.0437)
tenurerate	0.236	0.271	0.261	0.277*	0.199
	(0.178)	(0.170)	(0.168)	(0.164)	(0.177)
immrate	0.457**	0.317	0.413**	0.435**	0.580***
	(0.203)	(0.216)	(0.204)	(0.199)	(0.190)
GDP	3.04e-07	4.72e-07	9.54e-08	3.61e-07	8.53e-07
	(6.13e-07)	(6.84e-07)	(6.63e-07)	(6.61e-07)	(6.61e-07)
Public	-0.00171**	-0.00177**	-0.00195***	-0.00193**	-0.00148*
	(0.000857)	(0.000856)	(0.000738)	(0.000765)	(0.000863)
industry	0.000452	0.000598	0.000487	0.000514	0.000630
	(0.000464)	(0.000435)	(0.000442)	(0.000415)	(0.000476)
Constant	0.106	0.0510	0.143	0.217	0.175
	(0.234)	(0.235)	(0.236)	(0.235)	(0.237)
Observations	76	76	76	76	76
Number of country	21	21	21	21	21

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Inequality by Gender

Table 35: Effect of PIT reforms targeted to women on inequality, by gender subgroups (w-women, m-men)

	(1) Gini_w	(2) Gini_w	(3) Gini_m	(4) Gini_m
dep t-1	0.340**	-0.0118	0.262*	0.000935
	(0.159)	(0.109)	(0.156)	(0.118)
dwomen_tax	0.00505	0.00629	-0.000943	0.00199
	(0.0114)	(0.0123)	(0.0114)	(0.0119)
L.	-0.0216	-0.0162	-0.0283*	-0.0251
	(0.0152)	(0.0187)	(0.0169)	(0.0195)
age		-0.000625		-0.000336
		(0.00587)		(0.00573)
highedrate		0.0429**		0.0234
		(0.0167)		(0.0175)
immrate		-0.0294		-0.0596
		(0.0558)		(0.0663)
tenurerate		0.106		0.0959
		(0.129)		(0.105)
GDP		-2.42e-07		-5.12e-07
		(1.37e-06)		(1.74e-06)
Public		-0.00212*		-0.00148
		(0.00109)		(0.000996)
industry		-0.000717		-0.000703
		(0.000531)		(0.000503)
Constant	0.193***	0.413	0.216***	0.381
	(0.0486)	(0.324)	(0.0475)	(0.272)
Observations	136	105	136	105
Number of country	24	21	24	21

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 36: Effect of SSC reforms targeted to women on inequality, by gender subgroups (w-women, m-men)

	(1) Gini_w	(2) Gini_w	(3) Gini_m	(4) Gini_m
L.Gini_w	0.154	0.142	0.189	0.197*
	(0.186)	(0.115)	(0.157)	(0.114)
dwomen_ssc	0.00242	0.000535	-0.000751	-0.00159
	(0.00485)	(0.00452)	(0.00363)	(0.00359)
L.	0.00165	0.00218	0.00511	0.00440
	(0.00476)	(0.00523)	(0.00446)	(0.00411)
L2.	0.00356*	0.00277	-0.00154	0.000492
	(0.00201)	(0.00270)	(0.00273)	(0.00225)
age		0.00859		0.00708
		(0.00528)		(0.00522)
highedrate		-0.00409		-0.00223
		(0.0348)		(0.0316)
immrate		0.349*		0.378*
		(0.206)		(0.223)
tenurerate		0.257		0.210
		(0.167)		(0.170)
GDP		5.71e-07		2.94e-07
		(7.05e-07)		(7.15e-07)
Public		-0.00102		-0.000331
		(0.00114)		(0.00104)
industry		0.000563		0.000525
		(0.000495)		(0.000425)
Constant	0.250***	-0.316	0.236***	-0.262
	(0.0577)	(0.350)	(0.0477)	(0.348)
Observations	100	77	100	77
Number of country	24	21	24	21

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Inequality by Age Groups

Table 37: Effect of PIT reforms targeted to young individuals on inequality, by age subgroups (y-age16-30; m-age31-55; o-age55-65; p-age >65)

	(1) Gini_y	(2) Gini_y	(3) Gini_m	(4) Gini_m	(5) Gini_o	(6) Gini_o	(7) Gini_p	(8) Gini_p
dep t-1	0.217	-0.0106	0.0567	-0.0132	0.0993	0.271*	0.127*	-0.0382
	(0.153)	(0.0897)	(0.113)	(0.0795)	(0.215)	(0.140)	(0.0654)	(0.0437)
dyoung_tax	0.00424	0.00337	0.0129***	0.0135***	0.0137	0.0254***	0.0195***	0.0221***
	(0.00920)	(0.0125)	(0.00216)	(0.00344)	(0.00867)	(0.00534)	(0.00621)	(0.00337)
L.	0.00102	-0.00449	-0.00809*	-0.0128***	-0.00442	-0.00361	0.00387	0.00247
	(0.00604)	(0.00661)	(0.00459)	(0.00385)	(0.00547)	(0.00340)	(0.00605)	(0.00183)
L2.	0.00723	0.00399	0.00239	-0.00246	0.000848	-0.00133	0.00183	-0.00115
	(0.00741)	(0.00835)	(0.00639)	(0.00347)	(0.00552)	(0.00492)	(0.00777)	(0.00401)
SEX		-0.309		-0.313		-3.573***		0.970
		(0.806)		(0.622)		(1.087)		(0.677)
highedrate		0.00216		0.0149		-0.0116		-0.0558**
		(0.0303)		(0.0220)		(0.0415)		(0.0281)
immrate		0.501		0.0853		0.286		-0.259
		(0.367)		(0.223)		(0.463)		(0.205)
tenurerate		0.330**		-0.0156		0.580*		0.543***
		(0.143)		(0.178)		(0.322)		(0.151)
GDP		-1.86e-06*		8.59e-07		-3.57e-07		-9.21e-07
		(1.05e-06)		(1.09e-06)		(1.44e-06)		(5.88e-07)
Public		-0.00188		-0.000925		-0.00401**		-0.000420
		(0.00132)		(0.00109)		(0.00175)		(0.00109)
industry		-0.000186		-9.07e-05		0.00127*		0.000549
		(0.000406)		(0.000399)		(0.000667)		(0.000378)
Constant	0.221***	0.340	0.266***	0.484*	0.272***	1.691***	0.235***	-0.608
	(0.0464)	(0.448)	(0.0319)	(0.279)	(0.0664)	(0.557)	(0.0187)	(0.394)
Observations	99	76	99	76	99	76	99	76
Number of country	24	21	24	21	24	21	24	21

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 38: Effect of SSC reforms targeted to young individuals on inequality, by age subgroups (y-age16-30; m-age31-55; o-age55-65; p-age >65)

	(1) Gini_y	(2) Gini_y	(3) Gini_m	(4) Gini_m	(5) Gini_o	(6) Gini_o	(7) Gini_p	(8) Gini_p
dep t-1	0.230	0.000167	0.0433	-0.0524	0.0972	0.275	0.114*	-0.0396
	(0.160)	(0.0952)	(0.113)	(0.0683)	(0.235)	(0.214)	(0.0657)	(0.0634)
dyoung_ssc	-0.0117	-0.0160*	-0.00379	0.000245	0.0140*	0.00277	0.0212***	0.0241***
	(0.00814)	(0.00925)	(0.00414)	(0.00536)	(0.00784)	(0.0101)	(0.00572)	(0.00510)
L.	-0.00676	-0.00914**	-0.00218	-0.00118	-0.00521	-0.00973	0.0123***	0.0136***
	(0.00573)	(0.00454)	(0.00246)	(0.00232)	(0.00593)	(0.00877)	(0.00330)	(0.00443)
L2.	-0.00322	-0.0123	-0.00107	0.00241	0.0138	0.00278	0.0149***	0.0191***
	(0.00643)	(0.00987)	(0.00354)	(0.00419)	(0.0111)	(0.0117)	(0.00488)	(0.00385)
SEX		-0.417		-0.229		-3.382***		1.189*
		(0.809)		(0.729)		(1.090)		(0.676)
highedrate		0.00576		0.0122		-0.00811		-0.0604*
		(0.0260)		(0.0336)		(0.0585)		(0.0343)
immrate		0.566*		0.150		0.677		-0.0604
		(0.332)		(0.227)		(0.657)		(0.248)
tenurerate		0.310**		-0.0130		0.547*		0.574***
		(0.138)		(0.182)		(0.319)		(0.128)
GDP		-1.86e-06*		8.47e-07		-1.14e-07		-5.55e-07
		(1.08e-06)		(9.85e-07)		(1.22e-06)		(6.91e-07)
Public		-0.00233*		-0.00105		-0.00394*		0.000510
		(0.00130)		(0.00130)		(0.00209)		(0.000902)
industry		-0.000267		-9.98e-05		0.000974		0.000405
		(0.000400)		(0.000391)		(0.000641)		(0.000285)
Constant	0.218***	0.431	0.270***	0.448	0.273***	1.611***	0.239***	-0.791**
	(0.0480)	(0.439)	(0.0314)	(0.328)	(0.0726)	(0.533)	(0.0193)	(0.376)
Observations	100	77	100	77	100	77	100	77
Number of country	24	21	24	21	24	21	24	21

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

2.4 Robustness checks

We here present a set of robustness checks.

First, we introduce three distinct dummies to better identify labor tax reforms. The previous sections report the results of the regression analysis using one single indicator for tax-reducing reforms. As we already stressed, this implies that the control group comprises all cells *t, i, j*, that have experienced either no reforms or other types reforms. The identification of this reference group is convenient for expositional purposes, although, by including the tax-increasing policies, it could bias our results by making more likely to find a significant effect of tax reforms. We address this issue by using three different dummies: tax-increasing, tax-reducing and other reforms, the reference group being triplets cells *t, i, j*, that experienced no reform. As before, all types of reforms are allowed to affect the outcome variables up to three periods.

Second, the variable for the reforms indicates if at *t, i, j*, a reform has been implemented, but it says nothing on its relevance. This can cause an attenuation bias, by joining important and marginal reforms. This is a limit of the data, which we can try to address only indirectly. In particular, we assume that the reforms which have involved social partners are more significant relative to the reforms which have not involved them. We therefore interact the dummy for a tax-reducing reform with the indicator for the involvement of social partners, which should help to identify more important reforms[70].

Finally, we replicate the econometric analysis limiting the sample to the low-employment countries, identified in next Section 4.

All the results are reported in Annexes VII (different types of reforms), IX (interaction with the involvement of social parts) and X (low employment countries). All regressions control for the time varying country characteristics introduced in Table 1. However, due to the low number of available information for either the dependent or the control variables, in some cases one or more time varying controls have been dropped. These regressions are denoted by an (*) in the title of the table[71].

[70] It is worth reminding that there is a large share of reforms for which the information on the involvement of social parts is missing. In order not to lose too many reforms, missing observations have been coded in an additional category, not presented.

[71] Notice that, because of the scarce number of countries and years, and the low variability of the variables within each country, observations, it is sometimes impossible to compute the variance matrix. In these cases we do not report results.

For expositional convenience, we only report coefficients and standard errors of the variables of interest, described in the following table.

Table 39: Explanatory variables used in Annexes VIII-X

Explanatory Variables	Description
in_tx_drd	=1 if a tax-reduction reform has been introduced in country j and year t
in_tx_dri	=1 if a tax-increasing reform has been introduced in country j and year t
in_tx_dro	=1 if a tax reform which has been categorized as "other" has been introduced in country j and year t
ssc_drd	=1 if a SSC reduction reform has been introduced in country j and year t
ssc_dri	=1 if a SSC increasing reform has been introduced in country j and year t
ssc_dro	=1 if a SSC reform which has been categorized as "other" has been introduced in country j and year t
sscyer_drd	=1 if a SSC-employer reduction reform has been introduced in country j and year t
sscyer_dri	=1 if a SSC-employer increasing reform has been introduced in country j and year t
sscyer_dro	=1 if a SSC-employer reform which has been categorized as "other" has been introduced in country j and year t
sscyee_dri	=1 if a SSC-employee reduction reform has been introduced in country j and year t
sscyee_dri	=1 if a SSC-employee increasing reform has been introduced in country j and year t
sscyee_dro	=1 if a SSC-employee reform which has been categorized as "other" has been introduced in country j and year t
in_tx_wdrd	=1 if a tax-reduction reform specifically targeting female employment has been introduced in country j and year t
in_tx_wdri	=1 if a tax-increasing reform specifically targeting female employment has been introduced in country j and year t
in_tx_wdro	=1 if a tax reform specifically targeting female employment which has been categorized as "other" has been introduced in country j and year t
ssc_wdrd	=1 if a SSC (employer+employee) reduction reform targeting female employment has been introduced in country j and year t
ssc_wdri	=1 if a SSC (employer+employee) increasing reform targeting female employment has been introduced in country j and year t
ssc_wdro	=1 if a SSC (employer+employee) reform targeting female employment which has been categorized as "other" has been introduced in country j and year t
in_tx_ydrd	=1 if a tax-reduction reform specifically targeting youth employment has been introduced in country j and year t
in_tx_ydri	=1 if a tax-increasing reform specifically targeting youth employment has been introduced in country j and year t
in_tx_ydro	=1 if a tax reform specifically targeting youth employment which has been categorized as "other" has been introduced in country j and year t
ssc_ydrd	=1 if a SSC (employer+employee) reduction reform targeting youth employment has been introduced in country j and year t
ssc_ydri	=1 if a SSC (employer+employee) increasing reform targeting youth employment has been introduced in country j and year t
ssc_ydro	=1 if a SSC (employer+employee) reform targeting youth employment which has been categorized as "other" has been introduced in country j and year t

For poverty, we only focus on the percentage of poor people, the measure that turns out to be more correlated with the reform in the previous analysis.

In general, results are consistent with those reported in the main text. We here summarize the main findings. The discussion mostly focuses on lagged reforms, as the contemporaneous correlation between outcomes and reforms might be driven by reverse causality.

Annex VIII

Tables A-D confirm that, in general, decreasing reforms have a very **weak**, if any, **impact on the macroeconomic variables considered**. At the same time, there is some evidence reforms increasing personal income taxes rise the unemployment rate (Table A, columns 1 and 5) and reduce the employment rate (table B, columns 1 and 5); they are also associated to an increase in hours worked (table D). At the same time, an increase of SSCs appears to be positively correlated with the employment rate.

The effect of reforms targeted to women is restricted to SSCs, to avoid multicollinearity. The only remarkable effect is the positive (negative) correlation between increasing (decreasing) reforms and hours worked.

Tables G seems to confirm the perverse effect of PIT reforms on poverty, which is likely to depend on the measure of poverty here adopted. We also find some evidence of a positive correlation between inequality and increasing PIT reforms targeted to young individuals (Table L).

Annex IX

The interaction between the reform dummy and the involvement of social partners appears to be negatively correlated with unemployment rate and poverty and positively correlated with the employment rate and hours worked. This is an important finding, which merits to be explored more deeply in future research. However, we find no significant effect of the interaction term.

Annex X

The analysis for the subsample of low-employment countries is less precise, due to the low number of observations. The problem is particularly important for poverty and inequality, as we only have 23-31 observations and 5 countries. Unfortunately, in fact, we do not have any income data to compute inequality or poverty indices for Bulgaria and Malta, while data for Poland, Lithuania and Hungary are accessible only for the years 2005, 2006, 2007, 2008. Moreover, time-varying controls are not available for Lithuania. Therefore, out of the eight countries of the

sample of low-income countries, we are left with Spain, Italy and Greece for the whole period and Poland and Hungary for four years each.

3. Change in tax-benefit systems and employment goals: assessing consistency for low-employment countries.

3.1 Objective and tools

Section 2 of the present Chapter and Annexes VIII-X address econometrically the labour market impact of tax reforms. As discussed throughout the text, the econometric analysis does not include the benefit side. We know from the survey of the theoretical and empirical literature that the individual incentives to work depend on both taxes and net benefits. For this reason, we here complement the previous analysis with information on the overall financial incentives to work. More precisely, the aim of the section is to assess whether tax-benefit systems in Europe have been evolving consistently with the goal of increasing employment. We propose using the OECD tax-benefit model[72] to simulate the change in employment incentives over the present decade for a selected group of countries. The direction and magnitude of this change in incentives are taken as indicators of overall consistency (or otherwise) of the reforms of the tax-benefit systems enforced in this period.

This computation exercise is conducted on a subgroup of 19 Member States, because either the OECD model or the data sources used in the calculations are not available for the remaining countries. However, the exercise is of direct interest for those countries that recorded medium and high employment gaps with respect to the 2010 Lisbon targets[73] at the start of this decade, and some of the computations will only be reported for these countries.

Medium-to-high employment gap countries comprise Belgium, Bulgaria, Greece, Hungary, Italy, Latvia, Lithuania, Luxemburg, Malta, Poland, Romania, Slovakia and Spain[74]. Only 8 of them could be included in the

[72] http://www.oecd.org/document/3/0,3343,en_2649_34637_39617987_1_1_1_1,00.html.

[73] 70% for the total employment rate and at least 60% for the female employment rate in 2010.

[74] See Tab. 1 for the actual ranking and the next section for more details on the grouping of countries.

calculations (see Tab. 2). Most of these countries continued to rank among those with the lowest employment records in 2008, the final year we consider. The glaring exceptions are Bulgaria, Spain and Latvia that managed to considerably improve their relative position, mainly by increasing female employment: the rate of growth in women's employment over this period was respectively +13.2, +13.6 and +11.7, the highest in Europe. The choice of 2008 as the final year is dictated by data availability (2008 is the latest year in the OECD database), but it also serves to remove from our evaluations the effect of the financial crisis on employment.

It is no secret that for many countries women still represent an important workforce reserve, with the gap in the female employment rate (with respect to the Lisbon target) reaching 22.6% in Malta, 12.8% in Italy and 11.3% in Greece. In some other countries, and the best examples are Denmark and Sweden, the EU female employment target has been achieved and largely exceeded long time ago. In these countries, further gains in employment would imply longer hours for women, which is a notably problematic policy goal. For this exercise, therefore, our primary focus is on potential gains in participation (below the Lisbon target), the so called extensive employment margin. The issue of working hours remains nevertheless important for any evaluation of tax-benefit policies and we shall take it on board where needed.

The Lisbon agenda set both total and female employment targets. Given the well-known correlation between them (see the Rank columns in Tab. 1), in selecting the countries for this exercise we have considered both targets, but in carrying out the simulations we looked primarily at two typologies of workers, both of which tend to be highly feminized. These are lone parents and so called secondary earners. Our criterion for potential secondary workers is married women whose reference income, if employed, is below 45% of that of the husband (see Bettio and Verashchagina 2009 for details). Both groups are primary 'targets' for any policy wishing to boost participation[75].

Table 40: The change of employment rates in EU Member States during the years 2000-2008

Country	*Total employment*						*Female employment*					
	ER 2000	Rank	ER 2008	Rank	Δ ER [2008-00]	Rank	Fem_ER 2000	Rank	Fem_ER 2008	Rank	Δ Fem ER [2008-00]	Rank
DK	76.3	1	78.1	1	1.8	19	71.7	1	74.3	1	2.6	21

[75] Refer to Bettio and Verashchagina (2009) for the procedure followed to identify target family typologies.

SE	73	2	74.3	3	1.3	22	70.8	2	71.8	2	1	24
NL	72.9	3	77.2	2	4.3	12	63.5	5	71.1	3	7.6	7
UK	71.2	4	71.5	5	0.3	26	64.7	3	65.8	6	1.1	23
AT	68.5	5	72.1	4	3.6	15	59.7	7	65.8	7	6.1	11
PT	68.4	6	68.2	12	-0.2	27	60.5	6	62.5	12	2	22
FI	67.2	7	71.1	6	3.9	14	64.2	4	69	4	4.8	15
CY	65.7	8	70.9	7	5.2	9	53.6	16	62.9	11	9.3	5
DE	65.5	9	70.7	8	5.2	10	58.1	9	65.4	9	7.3	8
IE	65.2	10	67.6	13	2.4	17	53.9	14	60.2	15	6.3	10
CZ	65	11	66.6	14	1.6	20	56.9	12	57.6	17	0.7	27
SI	62.9	12	68.6	10	5.7	5	58.4	8	64.2	10	5.8	12
LU	62.7	13	63.4	19	0.7	24	50.1	20	55.1	19	5	14
FR	62.1	14	65.2	15	3.1	16	55.2	13	60.7	14	5.5	13
BE	60.5	15	62.4	20	1.9	18	51.5	18	56.2	18	4.7	16
EE	60.4	16	69.8	9	9.4	3	56.9	11	66.3	5	9.4	4
LT	59	17	64.3	16	5.3	8	57.8	10	61.8	13	4	18
RO	57.6	18	59	24	1.4	21	51.8	17	52.5	22	0.7	26
LV	57.4	19	68.6	11	11.2	2	53.7	15	65.4	8	11.7	3
SK	56.8	20	62.3	21	5.5	6	51.4	19	54.6	21	3.2	20
EL	56.5	21	61.9	22	5.4	7	41.7	24	48.7	25	7	9
HU	56.3	22	56.7	26	0.4	25	49.8	21	50.6	24	0.8	25
ES	56.2	23	64.3	17	8.1	4	41.3	25	54.9	20	13.6	1
PL	55	24	59.2	23	4.2	13	48.9	22	52.4	23	3.5	19
MT	54.2	25	55.2	27	1	23	33.2	27	37.4	27	4.2	17
IT	53.7	26	58.7	25	5	11	39.5	26	47.2	26	7.7	6
BG	50.5	27	64	18	13.5	1	46.3	23	59.5	16	13.2	2

Note: ER- employment rate, Fem_ER – female employment rate. Countries are ordered by the employment rate in 2000.

Source: own elaboration on the basis of Employment in Europe Report (2009: Tab. 4, p. 19).

The OECD tax-benefit mode is available for 2001 through 2008 and is used here to trace the change in fiscal incentives over time, as measured by the Average Effective Tax Rate (AETR). The AETR tracks financial incentives for a person belonging to a given family type and contemplating entering employment at X level of income. The model has been used extensively in a series of OECD reports (OECD 2001-2009), looking at specific components of the tax-benefit systems in various countries or trying to evaluate the impact of tax reforms (see also Carone et al. 2004, 2009).

The valuable feature of the model is that it allows simulating the outcome for different types of families (e.g. single parent household, couple with/out children) and different situations (e.g. unemployment and inactivity traps, entry into work and increasing work hours).

In line with the approach adopted in Bettio and Verashchagina (2009), here we add realism to the OECD model by combining it with the data on

earnings derived from the EU-SILC survey. Specifically, in the EU-SILC database we select the family type of interest (e.g. a couple with two children) and compute the reference labour income (average, gross) for husband and wife (when in employment). This reference income is then used in the simulations, expressed in terms of the OECD average wage[76].

The OECD model also requires specification of which benefits the hypothesized individual is entitled to. In our specific case we assume that individuals are entitled to social assistance, not unemployment benefits. The reason is that possible changes in participation often concern women that are more likely to be out of the labour market or to belong to the pool of long-term unemployed. The estimates thus imply that social assistance is paid if eligibility conditions are met.

3.2 Identifying low-employment countries

Based on the employment gap in 2000 with respect to the Lisbon target for 2010, three groups of countries can be identified, respectively *high, middle and low employment countries*. A further within-group distinction can be made between those countries that recorded sufficient progress by 2008 (*movers*) and those making slow or no progress (*stayers*).

1. *High employment countries* comprise those whose employment rates were already higher than the Lisbon target, or where the gap was at most 5% in total or female employment: Austria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Ireland, the Netherlands, Portugal, Slovenia, Sweden and the United Kingdom. Of these
    a. *movers* recorded more than +5% in female employment, total employment or both: Austria, Cyprus, Estonia, France, Germany, Ireland, the Netherlands and Slovenia;
    b. the countries with neither female nor total employment growing more than five percent (*stayers)* include: the Czech Republic, Denmark, Finland, Portugal, Sweden and the United Kingdom.
2. *In middle employment countries* the employment rate was between 5 and 10% lower compared to the Lisbon target in female or total employment. Belgium, Latvia, Luxembourg, Romania and Slovakia fit into this group.
    a. Latvia and Slovakia are the *movers*;
    b. Belgium, Luxembourg and Romania qualify as *stayers*.
3. *Low employment countries* make up the residual group and comprise Bulgaria, Greece, Hungary, Italy, Lithuania, Malta, Poland and Spain.

[76] For more details on methodology see Bettio and Verashchagina (2009).

a. Bulgaria, Greece, Lithuania, Italy and Spain qualify as *movers*;
b. Hungary, Malta, Poland qualify as *stayers*.

As already noted, the simulation exercise shall be performed for all the countries featuring in Tab. 1, for which the OECD model and suitable EU-SILC data are available[77] (19 altogether as in Figures 1 and 2[78]). Some key results, however, will be reported only for the countries belonging to groups 2 (middle employment) and 3 (low employment), in particular 8 of them for which the exercise is feasible (see Tab. 2).

3.3 The findings from OECD tax-benefit model

Figures 1 and 2 depict the Average Effective Tax Rate for the two groups of potential entrants: 1) *lone parents with children* and 2) *secondary earners within a family with two children.*

The graphs afford a view at a glance of the pattern of incentives (to participate) over a spectrum of earnings ranging from zero to a maximum which is obtained by doubling the reference income for the group[79]. Disincentives thus computed capture the combined effect of labour income taxation and withdrawal of benefits as income rises.

The initial part of the graphs, say up to 15-20% of the OECD wage, corresponds to very low levels of earnings (few hours) and is therefore likely to refer to a negligible share of the working population, except where so called 'mini jobs' of a German type are important. However, even modest variations in the withdrawal of benefits tend to cause visible changes in initial earnings and may therefore bias the overall perception of change. For this reason the commentary below focuses on income levels above 20% of the OECD wage except where explicitly mentioned.

[77] The latest year for France is 2007, since the income data for this country is missing in the available release of the EU-SILC 2008.

[78] Cyprus, Estonia, Latvia, Lithuania, Malta, Slovenia, Bulgaria and Romania have been excluded from the analysis, since the tax-benefit model for them exists only starting from 2005 or 2008.

[79] The reference income for the group is calculated using the EU-SILC gross income data (e.g. for lone mothers with children or secondary earners whose income does not exceed 45 % of the total couple's income). The values are then transformed in percentages of the OECD average wage (AW) for the country and are instrumental for the calculation of the AETR using tax-benefit models. The range of income varies from 0 to double the reference income. The vertical dashed line in Figures 1 and 2 identifies the level of the 2008 reference income in terms of the percentage of the OECD country average wage for the same year.

When the AETR line rises with income it is, ceteris paribus, more fiscally advantageous to enter the labour market as a short-hours worker than as a full-timer (or long-hours worker). With respect to the change in AETR over the decade, the higher the blue line is in comparison to the grey line, the lower were the incentives in 2001 with respect to 2008, and conversely. Countries enforcing change consistent with employment growth are therefore expected to record a grey line below the blue one over a significant range of earnings.

The change was more pronounced for single parents. Figures 1 and 2 allow to identify only one case, Hungary, where incentives decreased, with the values of AETR consistently higher in 2008 compared to 2001. The minimum values of AETR in the country increased to between 60% and 83% for low-income workers (part-timers), enough to augment the incidence of inactivity traps for lone parents. The opposite occurred in Slovakia - where a notable AETR decrease took place over the entire range of earnings - and in two high employment countries, such as France and Ireland.

In three other countries, the Czech Republic, Luxembourg and Poland, potential inactivity traps for single parents at low earnings were smoothed, although initial AETR values remain high in the Czech Republic and Luxembourg.

The change was modest or nil for secondary earners, although where it occurred it went consistently in favour of stronger incentives. Two positive exceptions are the Czech Republic and France, where the AETR dropped by about 20% around average levels of earnings for this target group. In two countries – Hungary and Poland – the AETR decreased at middle to high levels of earning, but the change was generally below 5% (see Tab. 2 and Fig. 2). In Denmark, the Netherlands and Sweden, fiscal incentives improved for low-to-middle income earners, but the reduction in AETR was small, especially in Denmark where it remains at 50% or higher. In Belgium, Italy, Slovakia and Spain the AETR was lowered at initial levels of earnings, often below 30% of the OECD average wage. For the above noted reasons, any positive effect on participation would therefore concern relatively small segments of marginal workers in these countries. Also, in order to verify this effect more fine-grained employment statistics than those available for this exercise would be needed.

The intensity of change in the AETR for middle-to-low employment countries can also be gauged by looking at Tab. 2, where point values are reported (i.e. minimum and maximum values over a certain range of incomes). The reason why the table reports point values rather than

averages is worth commenting. As apparent from the graphs in Figures 1 and 2, the AETR often records 'peaks'. The occurrence of peaks is associated with the change in the tax-benefit schedule. It is reasonable to assume that people would try to avoid entering work at exactly those levels of earnings where the peak occurs. Such peaks, however, complicate the analysis of the change in fiscal incentives over time. In particular, computing the simple average of AETR values over certain ranges of income may not be entirely appropriate, since maximum (peak) values can be considered a sort of a 'noise'. We thus report the minimum and the maximum values of the AETR for: 1) earnings corresponding to up to 33% of the OECD average wage in the country; 2) earnings between 33-100% of the OECD average wage in the country and 3) earnings up to the reference income calculated for the specific family setting using EU-SILC 2008 data[80] (see Tab. 2). Of these three income ranges, the latter is the most suitable for a synthetic assessment.

[80] Since EU-SILC was launched in 2004, and thus the income data was missing for our starting point of analysis (the year 2001), we opted to use the Harmonized Index of Consumer Prices (Eurostat) in order to deflate the earnings.

Figure 1: Change in Average Effective Tax Rates in middle-to-low employment countries, 2001-2008.

Lone parent with two children

Country	Year	Trends in employment	up to 33 % of average OECD wage		33-100 % of average OECD wage		up to the reference income	
			AETR min	AETR max	AETR min	AETR max	AETR min	AETR max
Slovakia	2001	middle increasing	>120	>120	80	>120	73	>120
	2008		78↓	86↓	35↓	78↓	39↓	86↓
Belgium	2001	middle stable	85	>120	66	86	72	>120
	2008		89↑	>120	69↑	89↑	77↑	>120
Luxembourg	2001		12	86	54	92	12	92
	2008		12	76↓	61↑	86↓	12	86↓
Spain	2001	low but increasing	89	106	49	89	50	106
	2008		89	106	44↓	89	52	106
Italy	2001		<-20	-3	-14	18	<-20	5
	2008		<-20	-5	-18	17	<-20	4
Greece	2001		16	52	25	38	16	52
	2008		16	60↑	24	33↓	16	60↑
Hungary	2001	low and stable	24	112	36	50	24	112
	2008		83↑	>120↑	62↑	83↑	63↑	>120
Poland	2001		37	97	68	97	37	97
	2008		50↑	100↑	44↓	74↓	44↑	100↑

Secondary earner (able to potentially earn 45% of the joint family income)

Country	Year	Trends in employment	up to 33 % of average OECD wage		33-100 % of average OECD wage		up to the reference income	
			AETR min	AETR max	AETR min	AETR max	AETR min	AETR max
Slovakia	2001	middle increasing	13	60	31	44	13	60
	2008		30↑	30↓	30↑	30↓	30↑	30↓
Belgium	2001	middle stable	44	52	45	53	44	52
	2008		36↓	42↓	41↓	51	36↓	46↓
Luxembourg	2001		<-20	21	21	33	<-20	25
	2008		<-20	25↑	25↑	34	<-20	26
Spain	2001	low but increasing	26	30	21	26	21	30
	2008		<-20↓	25↓	19↓	25	<-20	25↓
Italy	2001		10	50	28	35	10	50
	2008		10	33↓	19↓	34	10	32↓
Greece	2001		16	16	16	20	16	18
	2008		16	16	16	25↑	16	16↓
Hungary	2001	low and stable	21	22	22	38	21	31
	2008		17↓	17↓	17↓	35↓	17↓	22↓
Poland	2001		15	31	31	38	15	32
	2008		21↑	28↓	28↓	30↓	21↑	29↓

Source: own elaboration using OECD tax-benefit models and EU-SILC.

Countries in Tab. 2 have been grouped according to their belonging to middle or low employment clusters. The Table also indicates the intensity of employment growth. Analysis of the change in the min/max AETR values in this table discloses no systematic relationship between the intensity of change in incentives on the one hand and, on the other hand, (i) the size of the initial employment gap or (ii) variations in employment over the decade. To quote just some examples, Greece recorded hardly any change in AETRs – for single parents or secondary earners – which is partly justified by the fact that, in both cases, the values are middle to low compared to the other countries; Greece was and remains a low employment country despite low levels of the AETRs. In Spain the increase in incentives occurred for secondary earners but at such low income levels that it may be neglected; yet Spain recorded a brilliant increase in female employment. Finally, in Belgium incentives for secondary workers increased consistently, but the gain in female employment was not large.

Overall, and with the exception of single mothers in Hungary, the change in tax-benefit systems went in the right direction. However, we could not clearly detect a relationship between the magnitude of the change in incentives and the size of the initial employment gap. This is probably due to the reduced sample of countries for which we could conduct the analysis as well as to the preliminary nature of the latter. At the same time it suggests that taxation policy might have played some role in pursuing employment targets in countries at the middle or the bottom of the employment pyramid, but not a central role. One possible reason is that creating incentives via tax-benefit system is a costly alternative, especially in view of the time lag necessary for the employment effect to materialize.

Our findings on a possible association between stronger incentives and important employment gains are also less than clear cut at this stage of the analysis. However the above exercise, and in general the OECD model, is not the appropriate tool to test the final employment effect of tax-policy reforms. It can only be used to monitor the incentive impact. Also, and more importantly, in all the eight middle-to-low employment countries included in the exercise the AETR is below the 40% mark for secondary earners (with the exception of Belgium) and cannot therefore be considered a major obstacle to increasing employment. At the same time, lone parents face rates consistently below 40% in only two countries, Italy and Greece, where the effort to address potential inactivity traps is more visible. In the other countries there is more room to step up economic incentives for lone parents in order to encourage participation.

The exercise here was undertaken partly for heuristic purposes, i.e. to show how the OECD tax-benefit model and EU-SILC data can be used to monitor the actual incentive effects of reforms over time. A step forward in the analysis can be made by means of the data-base constructed for this project. Specifically the data base can be accessed to select reforms worth monitoring and the OECD model can be used to compute the overall incentive effect created by the reform on the chosen policy target, in the country and period of interest.

References

Arellano, M. and S. Bond (1991): "Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations", Review of Economic Studies, 58, pages 277-297-

Bettio, F. and Verashchagina A. (2009) "Fiscal systems and female employment in Europe", EC's Expert Group on Gender and Employment. Available at: [http://ec.europa.eu/social/BlobServlet?docId=5545&langId=en]

Cameron A. C. and P. K. Trivedi (2010), "Microeconometrics using Stata", Stata Press Pubication, College Station, Texas, US.

Carone, G. et al. (2004) 'Indicators of unemployment and low-wage traps' (Marginal Effective Tax rates on Labour), Directorate for Employment, Labour and Social Affairs. Employment, Labour and Social Affairs Committee. OECD Social, Employment and Migration Working Paper No. 18., 15 March.

Carone, G., K. Stovicek, F. Pierini and E. Sail (2009): "Recent reforms of the tax and benefit systems in the framework of flexicurity", European Economy, Occasional Papers 43.

Employment in Europe Report, EiE (2009). Available at: http://ec.europa.eu/social/main.jsp?langId=en&catId=113&newsId=642&furtherNews=yes

European Commission, Directorate General for Economic and Financial Affairs, Coverage and structure of the Labour Market Reform (LABREF) Database, December 2005.

Foster Greer and Thorbecke (1984): "A Class of Decomposable Poverty Measures", *Econometrica*, Vol. 52, No. 3, pp. 761-766.

Greene W. H. (2003), "Econometric analysis", Prentice Hall, USR.

Nickell S., Nunziata L., Ochel W. (2005), Unemployment in the OECD since the 1960s. What Do We Know?, The Economic Journal, 115 (January).

OECD Database and Tax-Benefit models. Available at: http://www.oecd.org/document/3/0,3343,en_2649_34637_39617987_1_1_1_1,00.html

OECD (2001-2009) Taxing Wages, Benefits and Wages.

Chapter 3: Thematic analysis of reforms

Executive summary

Task 3 is devoted to the discussion of three specific topics that are strictly connected to the general theme of this study:

1. **Tax measures in time of recession**: this paper discusses a number of past episodes of macroeconomic downturn and the tax reforms carried out by governments to cope with these crises. In particular the focus is on the effects of those tax reforms on the adjustment capacities of workers and firms to deteriorating economic conditions, on dispersion/inequality of income and on the financial sustainability of welfare systems.

2. **Shift of tax bases**: this paper reviews pros and cons of measures aimed at shifting the tax burden from labour to other fiscal bases, particularly to consumption, in the light of both recent reforms actually enacted and theoretical arguments.

3. **Policy response to 2008-2009 downturn**: this paper is devoted to a thorough discussion and evaluation of the tax-benefit measures undertaken in order to alleviate the negative employment and social implications of the macroeconomic downturn started in late 2008.

1. Tax measures in time of recession

The recent history of Europe is replete with examples of financial crises. Four out of the "Big Five" financial crises took place in Europe (Spain, 1977; Norway, 1987, Finland and Sweden, 1991) and only one outside Europe (Japan, 1992). These crises are characterized by common patterns and the main driving factors are of either macroeconomic or institutional nature. Tax-related factors play a minor role. However, pervasive corporate-level tax biases favouring debt finance, the favourable tax treatment of housing investment and the development of complex financial instruments designed to take profit of tax differentials are often mentioned as potential causes of financial crises.

Removing these inefficiencies is only one of the potential objectives of a post-crisis tax reform. The latter should, ideally, aim at contributing to economic and employment recovery by: i) increasing the adjustment capacities of workers and enterprises while ii) reducing (or, at least, not amplifying) the dispersion and inequality of income distribution and iii)

enhancing financial sustainability of welfare systems by preserving tax revenues.

In this paper we evaluate 4 tax reforms which have been implemented after or during a financial crisis: a) the Swedish tax reform of 1991 (SR91) following the banking and economic crisis of 1991-1994 (SBC91); b) the Norwegian 1987-1992 tax reform (NR92) following the banking and economic crisis of 1987 (NBC87); c) the Finnish 1993 tax reform (FR93) along with other reforms implemented in the second-mid of Nineties after the banking and economic crisis of 1991-1994 (FBC91); d) the Nakasone-Takeshita reforms of late Eighties (JR89) in Japan.

These tax reforms share a number of features. First, they are all characterized by a shift away from progressivity and a reduction of marginal tax rates on labour income, especially, if not exclusively, at higher income levels. Second, they all contain measures aiming at restoring neutrality of capital income taxation and at reducing the favour for debt-financed investment. Third, all of these reforms tended to reduce revenue losses, or even to be revenue-neutral, by closing loopholes and reducing distortion of the tax systems. In two cases (Sweden and Japan) these reforms also brought about higher indirect taxes to offset direct tax revenue losses.

Finally, we also consider the case of 1994 Estonian tax reform, which was implemented in the final phase of a severe economic downturn. The main feature of this reform was its focus on flat rate taxation with the adoption of a single rate for personal and corporate income taxes. The analysis of episodes of tax reforms implemented in the midst of or immediately after a financial crisis show that there does not seem to exist a reform which is able to help economic recovery *and* to reduce inequalities *and*, at the same time, to be financially sustainable. Tax reforms can help economic recovery, can work to reduce or to put a limit on inequality and also contribute to fiscal consolidation. However, due to inherent limits of tax policies, these objectives cannot be all satisfied simultaneously. Every country should choose its own 'reforming-path' depending on priorities given to these objectives. The choice of priorities depends on a number of factors, such as the relative strength of the economy, the potential benefits of a tax stimulus and the sustainability of public finances.

2. Shift of tax bases

Making taxes less distortionary by shifting taxation from more mobile to less mobile tax bases and by broadening the tax base while reducing rates, may improve the economic performance. In particular, reducing the tax

burden on labour is considered an effective way to increase employment and growth. In a period of tight fiscal constraint, there is little hope to be able to reduce total tax pressure, hence the emphasis is on the possibility to shift tax from labour income to other tax bases. Given the lack of popularity of (and the limited scope for) taxes on residential property, attention has been paid in particular to the possibility to finance a reduction of the labour income tax (personal income taxes or social security contributions) by an increase in consumption taxes. Due to the broad base of the VAT, an increase in its tax rate is usually considered as a crucial ingredient of such a tax reform.

Some European countries have recently enacted tax reforms which included a tax shift from labour taxes to the VAT (Germany, Hungary, Czech Republic). Moreover a tax shift from social security contributions to the VAT, named "social VAT", has been discussed in France after the last general election, although this reform has not been implemented. Finally, in response to 2008-09 financial crisis some countries (e.g. Finland, Latvia, Lithuania) increased indirect taxes (VAT and excise duties) to offset lower direct tax revenues.

The standard argument in favour of such a tax shift is that, since consumption is also financed by a number of sources other than labour income, including government transfers, economic rent, previously accumulated wealth, etc. it represents a broader tax base than labour income, so that a shift would allow to raise the same revenue using lower tax rate, with clear benefits in terms of lower distortions.

Since for an individual, abstracting from bequests, lifetime income is equal to lifetime consumption, it is not obvious why the base of a consumption tax is broader than the base of an income tax. Looking at a growing economy with capital accumulation and overlapping generation, it is made clear that a tax shift from labour income to consumption implies a one-off redistribution of tax burden from the active current and future generations to the current old generation of individuals who finance part of their consumption out of cumulated savings (wealth).

Additionally, as long as social benefits (unemployment and disability benefits, possibly pensions) are not adjusted to take into account the increase in consumption prices, the tax shift brings about a reduction of the real value of such transfers and, correspondingly, of the cost of financing them. According to standard models of the labour market, the increase in difference between wage earners and the inactive population results in an increased labour supply. Hence, for some governments the advantages of a tax shift are likely to be mostly political, given that the unpopular effects of the reform take the form of an increase in

consumption prices, and therefore may result less visible, while the reduction in the labour tax income has direct and visible effects on post-tax income of taxpayers.

Another alleged advantage of a shift to consumption taxes which is sometimes considered is the possibility to shift the burden towards tax evaders, who can evade most of their income, but are able to evade the VAT only to a limited extent. However, the argument is unconvincing: when there is joint evasion of the income tax and the VAT, as it is very often the case, the only effect is a shift from the income tax to the VAT in the sectors/goods which do not evade taxes, which changes nominal price but leaves the underlying real equilibrium, and the resulting distribution of tax burden among individuals, unaffected. The conclusion is that evasion should not be a significant issue in the choice of the appropriate tax mix.

Equally unconvincing are the objections to the tax shift based on the fact that a consumption tax is more regressive than an income tax. First of all, the correct comparison should be with regard to lifetime consumption and income, so that a change in a general consumption tax is equivalent to a proportional change in the income tax. Second, a government concerned with equity and distribution can design the income tax change so that the distributional effect of the reform can be neutralized to a large extent; namely, regressive effects originating from the tax shift can be compensated by increasing the progressivity of the income tax.

For similar reasons, we think that the issue of the tax shift can be kept conceptually distinct from considerations related to the advantages of differentiated commodity taxation, be it motivated by the minimization of labour supply distortions or by externalities correction (i.e. green taxes).

The tax shift has interesting implications when we consider an open economy subject to international competition in product and capital markets. From a first point of view, the tax shift can be seen as a way to improve competitiveness in a fixed exchanges environment. Indeed, while lower payroll taxes translate into lower costs and prices for domestically produced products, the VAT selectively affects only consumption prices of non traded and imported goods. The shift is equivalent, in its effects, to a nominal exchange rate devaluation. Although the beneficial effects on competitiveness are only temporary and depend on the speed of prices and wages adjustment, the possibility to help exports can be particularly attractive as a stimulus to the economy in the current phase of difficult recovery from the financial crisis.

From a second perspective, in light of capital mobility and the resulting intense capital/corporate tax competition, the increase in the VAT can be

interpreted as a way to implement a destination-based cash-flow tax on corporate income. This solution seems to have some advantages either over the current source-based taxation of corporate taxation, which would require an increase in coordination among states, or over a switch to a residence-based taxation of capital income, which is extremely demanding in terms of collection and exchange of information.

There is no empirical evidence so far on the effect of reforms. The indirect evidence on which policy recommendations are based is given by cross country analyses based on aggregate indicators of the tax mix. Although such contributions show a significant correlation between the tax structure and the growth rate, heterogeneity of the tax systems, as well as the lack of attention to the joint effect of taxes and expenditure, suggest some cautions on these results.

In conclusion, although some of the alleged advantages of such a reform may be overstated, the tax shift from labour income to consumption taxes can be proposed as part of a strategy aiming at increasing employment and reducing the efficiency cost of taxation. However, the possible adverse distributive effects of such a reform for beneficiaries of transfers should be carefully taken into account.

3. Policy responses to 2008-2009 downturn

Since early 2009 most EU Member States introduced fiscal stimulus packages to contrast the effects of the economic crisis on consumption, employment and production. In some cases these packages were of significant financial dimension, but countries with less healthy public finances were more constrained in the design of discretionary fiscal packages and generally could not sustain a strong fiscal effort for long. Some countries with highly compromised public finance conditions could not devise any significant fiscal support measure.

Fiscal packages included both revenue and expenditure measures and were often consistent with the guidelines detailed in the European Economic Recovery Plan (EERP), but were highly diversified across countries. As for labour market and employment support, expenditure side measures made up most of the measures implemented, together with the revision of labour market institutions. Employment support came also from attempts to reduce the tax wedge on labour, tax disincentives to work and unemployment traps, through, for instance, cuts to personal income taxes and to social security contributions.

More generally, the implemented expansionary tax reforms contributed to sustain household purchasing power and aggregate demand. They were mostly focused on the reduction of direct tax liabilities, through cuts to personal income tax rates and reforms of the tax base, and in some cases also through the reduction of social security contributions. In addition, cuts were introduced to company income tax rates, together with revisions of the tax base, to sustain the supply side of the economy. Conversely, reforms of indirect taxation were mostly restrictive and encompassed tax increases (in particular, of VAT and excise duties), primarily to finance expansionary policies, but also reflecting a trend already detectable before the crisis. Overall, the tax measures introduced seem consistent with a body of literature suggesting that corporate income taxes and personal income taxes are the most harmful to growth, followed by consumption taxes, while recurrent taxes on immovable property are the least distortive in terms of their effect on long-run per capita GDP (Johannson et al., 2009).

As the economy starts recovering, countries face now two difficult challenges: fiscal consolidation, to revert the trend of increasing public debt, and continued support to economic growth, to mitigate the potential output losses and ensure growth returns close to its pre-crisis path. Some of the tax reforms introduced during the crisis may be consistent also with these long term objectives. For instance the reduction of corporate income tax rates should contribute to improving the attractiveness and competitiveness of European economies in a global context characterized by high factor mobility. Similarly, incentives for energy saving and low emission technologies should favour a conversion of the economy to more sustainable models. Conversely, social security contributions remain high in many EU countries and make up a significant part of the total tax wedge on labour, which is again very high in the EU: discretionary fiscal packages seldom included significant generalised or targeted reductions of social security contributions.

Finally, a remarkable difference between public intervention during the current downturn and previous financial crises remains not on the individual measures introduced, but on the proactive role explicitly taken by governments to contrast the downturn, on the design of targeted discretionary fiscal measures, specifically conceived for recovery purposes, and on the steering and coordinating role played by EU institutions.

1. Tax measures in time of recession

1.1 Economic crises and tax reforms

In their recent and comprehensive empirical investigation of the history of economic crises, Reinhart and Rogoff (2009) adopt two different approaches. The first one is based on quantitative thresholds, and encompasses inflation and currency crises. The second one is based on the identification of the triggering event, and it allows to distinguish between banking, domestic debt and internal debt crises. In this perspective, the recent (and, in some respects, still ongoing) worldwide downturn was originated by a banking crisis arising, in turn, from a protracted deterioration in asset quality and a collapse in real estate prices (Reinhart and Rogoff, 2009, p.9).

Reinhart and Rogoff (2009, pp. 152-173) list as many as 26 banking crises in Europe and more than 30 in America and Oceania since the end of the Second World War. However, 4 out of the "Big Five" banking crises took place in Europe (Spain, 1977; Norway, 1987, Finland and Sweden, 1991) and only one outside Europe (Japan, 1992). There are some common features of these crises, namely capital flow bonanzas and equity and housing price cycles. Capital flow bonanzas consist of sustained surge in capital inflows which are often observed in the periods preceding banking crises. These massive inflows and other institutional and economic factors inflate equity and housing prices. Typically, a banking crisis tends to start when asset prices are at their peak values or right after the bust and is often so pervasive to extend to the entire financial system.

The literature has identified many macroeconomic and institutional factors behind these patterns, such as financial (excessive) deregulation, overcapacity bubbles in the financial sector and the lack of transparency and information. Relatively to these, tax-related factors play a minor role in these crises. However, pervasive corporate-level tax biases favouring debt finance, the favourable tax treatment of housing investment and the development of complex financial instruments designed to take profit of tax differentials are often mentioned as potential causes of financial crises (see IMF, 2009, for an analysis referring to the current crisis).

Thus, there is scope for tax reforms aiming at removing these tax distortions and non neutralities. However, this potential should be evaluated carefully in the light of possible time-inconsistency problems. For example, although it is plausible that the mortgage interest relief encourages heavy household leverage thus contributing to the inflation of

housing prices, once the bubble has busted the elimination or reduction of this distortion would exacerbate the collapse of prices. As we shall see, this kind of time-inconsistency problem, which is typical of many if not all tax reforms, is particularly acute when a tax reform is designed or implemented after a financial crisis.

More in general, one can conceive a number of potential benefits of tax reforms aiming at contributing to economic and employment recovery after a macroeconomic downturn triggered by a financial crisis. More specifically, after a crisis tax reforms should aim at:

i) increasing the adjustment capacities of workers and enterprises;

ii) reducing (or, at least, not amplifying) the dispersion and inequality of income distribution;

iii) enhancing financial sustainability of welfare systems.

Any serious economic downturn reduces both production and employment, though these two phenomena may occur with different magnitudes and different time lengths. Provided that production, investment and labour decisions react to some extent to post-tax levels of profits, returns and wages, tax reforms may help economic recovery in various ways.

First, **personal income tax reforms** that reduce marginal and average effective tax rates on labour income can increase labour supply and rates of participation in the labour market. By the same token, a reduction of social security contributions and/or of other payroll taxes also decreases the tax wedge and may stimulate labour supply. This is a standard economic effect whose magnitude, however, depends on the actual value of the elasticity of labour supply (and of the choice whether to work or not) to wages, an issue which is quite controversial in the economic literature. Second, a change of **consumption tax rates** can also act as a macroeconomic stimulus, in ways which depend on the structure of the economy and on the trade balance. Namely, an export-oriented economy may increase consumption taxes based on the destination principle (such as the actual VAT) to reduce the production costs of exporting firms, thus providing a substitute for currency devaluation. On the other hand, internal demand could be boosted by a reduction of consumption tax rates though this is greatly limited by the propensity to consume in highly unstable times as are those following a macroeconomic downturn.

Clearly, the economic recovery in the medium term depends crucially on investments, which may be stimulated by a **reduction of marginal and**

average capital income tax rates, possibly accomplished within a reform boosting neutrality as mentioned before.

The impact of these reforms on inequality depends on a number of issues. Ignoring tax evasion issues, a personal tax reform may reduce inequality if reductions are focused on lowest brackets of the tax schedule. However, the literature suggests that labour supply elasticity depends also on non-income variables, especially gender, so that reforms targeted at low incomes may be at least partially ineffective in boosting employment. An increase (decrease) in consumption taxes alters the intergenerational equality, by hitting (favouring) older generations whose propensity to consume is usually deemed to be higher. Finally, reductions of capital income tax rates are seen as increasing inequality, since capital is usually more unequally distributed than income. Thus, **the reforms described above seem reasonable means to help the economic recovery and to attain objectives listed under i), but they may not reduce inequality, thus conflicting with objective ii)**.

This kind of conflict is even more acute when one considers objective iii), i.e. the need to enhance the financial sustainability of public expenditure and welfare. An economic crisis naturally tends to shrink tax bases and to call for public intervention in financial markets (bailouts) thus increasing government debt. Fiscal stimulus packages, including those of the kind envisaged before, exacerbate these trends. Looking at past banking crises, Reinhart and Rogoff (2009, 170) calculate that if the stock of debt is indexed to equal 100 at the time of the crisis (t) the average experience is one in which real stock of debt nearly doubles in the three years after the crisis (t+3). Thus, **the financial feasibility of revenue-reducing tax reforms after serious crises is severely limited by the fiscal position of single countries involved**, as we have been witnessing during the on-going crisis.

1.2 The "Big Five" banking crises and associated tax reforms

As mentioned above, there are Big Five crises emerging neatly in the history of post SWW banking crises among advanced economies: Spain, 1977; Norway, 1987, Finland and Sweden, 1991 and Japan, 1992 (Reinhart and Rogoff, 2009). They are characterized by a common pattern whose distinguishing elements concern both the origin and the consequence of the crises. The run-up to these crises is marked by a boom in real housing prices followed by an economic downturn whose duration is not less than 4 years (in the case of Japan one could argue that the 1992 crisis is still ongoing). The magnitude of these crises is also important: during the Big

Five, *negative* real GDP growth rates are recorded in the year of the crisis as well as in the two following ones. Finally, in all these cases estimated bailout costs are remarkable, ranging from 2% in the case of Norway to some 16% of GDP for Japan. Some of these patterns bear striking resemblances to the current one.

In 4 of these 5 cases (i.e. all of them excluding Spain 1977) it is possible to isolate past tax reforms which were to some extent related to, if not triggered by, these crises. In particular, we shall focus here on the following episodes:

a) the-Swedish banking and economic crisis 1991-1994 (SBC91) and the tax reform of 1991 (SR91);

b) the Norwegian banking and economic crisis 1987 (NBC87) and the tax reforms accomplished between 1987 and 1992 (NR92);

c) the Finnish banking and economic crisis 1991-1994 (FBC91) and the 1993 tax reform (FR93) along with other reforms implemented in the second-mid of Nineties;

d) the Japanese banking and economic crisis 1992-1997(JBC92) and Nakasone-Takeshita reforms of late Eighties (JR89).

We shall now focus on tax reforms, while the Appendix contains tables summarizing the main features of these 4 episodes of financial crises.

The analysis will be completed by looking at the impact of the Estonian flat-tax reform of 1994.

1.2.1 Sweden

SR91 has been defined as one of the most far-reaching tax reforms in any industrialized country in the post-war period and it has been extensively studied[81]. In short, SR91 can be defined as an application of the strategy of rate cuts cum base broadening, by means of a major reallocation of the total tax burden away from earned income to consumption and to individual capital income. SR91 marked a turning point and a clear depart from the historically prevailing (in North European countries) idea that tax policy should mainly consist in a steeply progressive income tax. To understand why it gathered wide political support, both external and internal considerations are important. On the one hand, the integration of world capital markets during the Eighties implied that it became more difficult to tax capital income at rates much higher than those applicable

[81] See in particular Agell et al. (1996); Klevmarken (1997); Blomquist et al. (1997); Davis and Henrekson (2006). Some of these papers were part of a major evaluation effort of SR91, commissioned by the Swedish government and involving a large number of foreign and Swedish researchers (Agell, Englund and Sodersten, 1995, in Swedish).

elsewhere. On the other hand, it was believed that the progressive income tax had created such strong incentives for high-income individuals to exploit various tax avoidance schemes (including outright tax fraud) that the Swedish tax system no longer redistributed income[82].

More precisely, the main features of SR91 are the following ones:

i) the principle of global income taxation was abandoned to adopt **a dual income tax with separate tax schedules for earned (labour) income and capital income**. The new taxation of labour income implied that almost 85% of income earners would pay only the local income tax, whose average value in 1991 was around 31%. A national income tax of 20% was imposed only for incomes exceeding a given threshold, thus capping the top marginal tax rate at approximately 51%. Overall, this reform implied a reduction of the marginal personal income tax rate by between 24 and 27 percentage points for large groups of full-time employees. The reduction was especially strong for high-income earners;

ii) all kinds of **capital income** (dividends, interest income, long and short term realized nominal capital gains) **were taxed at a flat rate of 30% rather than progressively** as it used to be before SR91, while the full deductibility of interest payments was maintained; the **corporate income tax rate was also greatly reduced from 57% to 30%** although such a reduction was combined with a substantial broadening of the tax base;

iii) the **effective VAT rate increased from 21.3% to 25% measured as a percentage of the net price** and the majority (though not all as originally projected) of goods and services were included in the tax base;

iv) the **child allowance was increased by approximately 40%** per child and the part of housing allowance dependent on family composition was **more than tripled**.

Although SR91 was not triggered in a proper sense by SBC91, since the discussion and design of the reform preceded the crisis, it is relatively easy to see the relations between these features of SR91 and the objectives of 'ideal' post-crises tax reforms depicted above. More in general, one could say that SR91 is an example of tax policies inspired by the optimal tax literature.

Feature i), i.e. the substantial reduction of marginal personal income tax rates, is clearly aimed at lowering the historically high tax wedge between

[82] Nobel Laureate Gunner Myrdal complained that high marginal tax rates had turned Sweden into a "nation of wanglers" and such a view was probably instrumental in softening the Social Democrat's traditional resistance to proposals involving lower marginal tax rates since Myrdal belonged to the political left.

labour costs to the employer and after-tax remuneration of employees in Sweden. The ultimate goal of this policy change is to increase employment and participation rates. Feature ii), i.e. the introduction of a flat (rather than an increasing-in-income) marginal tax rate on capital income and the rate reduction cum base broadening of the corporate income tax income are purported to increase capital income taxation neutrality and to cap the post-tax advantage of debt for the richer individuals. Feature iii) was primarily meant to yield additional revenue up to 30% of the loss caused by the decrease in personal income taxation and, finally, feature iv) was an attempt to compensate the adverse distributional effects coming from the other parts of SR91 by favouring households with low income and/or many children.

However not all of the objectives of an 'ideal' post-crisis tax reform (see them listed under i)-iii) in Section 1.1) were actually fulfilled.

Labour supply and employment

In a recent study of the Swedish economic performance and work activity in Sweden after SBC91, Davis and Herenkson (2006) note that Sweden provides an example of a jobless recovery. On the one hand, after SBC91 growth in Sweden has been impressive from a European perspective, and one must return to the so-called Swedish golden age in the 1960s to find comparable rates of output growth. On the other hand, aggregate employment in 2005 was 5 percent off its 1990 level, despite a population increase of more than 5 percent. Hours worked per person 20–64 years old in 2005 were a mere 1 percent above their 1993 level and 10.5 percent below the 1990 level. Davis and Herenkson (2006) consider such a performance of employment rates and working hours as having been 'disappointing'.

A natural question to be asked is how this performance relates to potentially pro-employment features of SR91. In logical terms, one could argue that either these reforms had an inherently limited impact or that their impact was offset by some other non-tax factors. The literature provides arguments to support both these explanations.

Some studies claim that labour supply elasticity in Sweden was simply too low to expect a remarkable impact on labour supply from SR91. Agell and Meghir (1995) estimate the magnitude of male labour supply responses to changes in taxes in Sweden using two alternative wage growth measures: one based on the lifecycle model and the other based on the conventional "within period" model of labour supply. In both cases, they obtain low labour supply elasticities with quite small standard errors and therefore conclude that SR91 was unlikely to have large incentive effects on hours worked. Results obtained by Klevmarken (1997) indicate that only those

taxpayers who experienced large tax decreases may have increased their working hours significantly because of SR91. They are consistent with the upper limits of the estimates by Agell and Meghir (1995). As mentioned above, this kind of results is not uncommon in the literature on elasticities to tax changes. For example, Slemrod (1992) studies the evidence about the responses to the major U.S. tax reforms of the Eighties and defines a sort of behavioural hierarchy. The most responsive decisions, at the top of the hierarchy, are those involving the timing of transactions, followed by a variety of financial, accounting and evasion responses. The least responsive decisions, at the bottom, concern "real" ones, including labour supply, savings and investment, which do not seem to be significantly affected by tax reforms. A similar conclusion seems valid also for the Swedish case. According to Agell et al. (1996, p. 653) results confirm the elasticity pessimism underlying Slemrod's response hierarchy with labour supply at the bottom.

An alternative explanation of the limited impact of SR91 on labour supply and employment is provided by Blomquist et al. (1997). Their approach is based on the attempt to estimate a whole budget set where consumption levels are a function of hours of work. Such a function depends on gross wages, marginal labour and capital income tax rates as well as on consumption tax rates. Thus, this approach is more comprehensive and ambitious than that endorsed in conventional studies of labour supply elasticity. Proper estimation of non-linear budget sets requires the use of non parametric techniques applied to a large database. Blomquist et al. (1997) compare tax structures in the period 1980-1991 and decompose them in four parts: changes in the personal tax rules, in the value added and payroll taxes, in the capital income tax rules (with special emphasis on real estate taxes) and finally in housing and child allowance rules. In sum, this decomposition shows that the reductions of marginal tax rate on labour income within SR91 considerably encouraged labour supply, on average by more than 4 percentage points. However, all of the other components of the reform actually acted to reduce the average hours of work. In particular, the increase in consumption taxes and the reform of capital income taxation decreased labour supply by approximately 1% and 0.4% respectively, and, finally, the new transfer system for families lowered labour supply by 0.7%. In sum, the explanation of limited impact of tax measures[83] provided by Blomquist et al. (1997) is based on the *tax mix* of the reform: positive effects of reduced marginal tax rates were partially offset by increased indirect taxation and by the redesigned transfer system.

[83] Results provided by Aronsson and Palme (1998) are quite similar, since they estimate the increase of labour supply induced by SR91 to be equal to 3% for men and to 2,8% for women.

The explanation offered by Davis and Herenkson (2006) is somewhat different. Rather than pointing at specific features of SR91, they suggest that one should look at absolute levels of taxation within a broader perspective. More specifically, they stress that the Swedish context is characterized by tax rates on labour income and consumption expenditures which remain high even after SR91 and which create incentives to work in the black market. In Sweden the wage-setting environment is such that wage dispersion is quite low, so that unskilled workers are relatively more costly for employers. This makes 'black' contracts an attractive option for employers in sectors where the workforce is relatively unskilled, such as retail trade, repair services, hotels and restaurants. According to this viewpoint, SR91 has not succeeded to decrease labour and consumption tax rates so much to reduce workers' scope of accepting the option, where available, to work in the underground economy. More in general, Davis and Herenkson (2006) attribute the lack of an employment recovery after SBC91 to the fact that tax policies, even after SR91, still appear to disfavour labour-intensive industries and technologies and to penalize wealth accumulation in individual or family-owned small businesses.

Inequality

Measuring the impact of a tax reform on inequality is not an easy task since a number of issues have to be considered. Among these, the choice of an income concept (disposable, comprehensive or full income, money metric utility measures), the methodology to deal with tax-unit heterogeneity (equivalence scales versus sequential dominance criteria) and, last but not least, the inequality measure (indexes versus absolute/relative concentration curves).

There are two major studies estimating the impact of SR91 on inequality. The first one is Bjorklund et al. (1995) who opts for an evaluation of the Kakwani index of distribution of both comprehensive and (a proxy of) full income for equivalent adults[84]. In general, taxes and benefits have an equalising effect on income distribution, i.e. this distribution is less unequal after than before taxes and benefits. The Kakwani index decomposes the change in the distribution inequality induced by the tax system into three parts. The first part is the overall tax rate, the second is a measure of tax progressivity (vertical equity) and the third one is a measure of horizontal inequality[85]. In their application, Bjorklund et al.

[84] Comprehensive income includes the value of consumption plus any increase in real net wealth. Full income includes leisure as an item of consumption. The number of equivalent adults in every family is obtained by means of equivalence scales. Total income in every household is divided by the number of equivalent adults and then each of these as an equal share of this equivalized income.

[85] By horizontal inequality or inequity it is meant the "unequal treatment of equals" where equals, in the framework of Bjorklund et al. (1995), are households having the same equivalized pre-tax and benefits income.

(1995) consider first the impact of 'gross' taxes and then that of the net tax system where benefits are also included. Results are provided for a number of reforms undertaken in Sweden from mid of the Sixties, while here we limit the attention to SR91. The main indication is that the decrease of the overall tax rate (and the increase in benefits) tends to reduce the equalising effect of taxes and benefits. Moreover, SR91 decreased progressivity of taxes on personal income, and by doing so, the equalising effect of taxes. However, there are two offsetting factors. First, horizontal inequity generated by the tax system is also reduced by SR91 and, second, the drop in progressivity of tax rates is almost completely offset by the increase in vertical equity induced by enhanced family benefits (child and housing allowances). These results hold for different specifications of equivalence scales and of relevant income (comprehensive or full). The second relevant study is by Aronsson and Palme (1998) who enrich the approach of Bjorklund et al. (1995) by including indirect taxes, considering money metric utility and looking at dominance sequential criteria rather than at equivalent incomes[86]. Their results are more ambiguous, but overall they are consistent with those obtained by Bjorklund et al. (1995).

To sum up, SR91 has probably achieved distibutional-neutrality, since the reduction in the redistributive impact of earned-income taxation has been offset by the substantial increase in allowances for families with children. On the other hand, the much-discussed redistributive impact of the part of SR91 aiming at reducing loopholes and opportunities for tax arbitrage has been less remarkable than expected.

Investment

As seen above, SR91 reduced the favourable treatment of debt-financed investment (especially in houses), by imposing a flat (rather than an increasing-in-income) marginal tax rate on capital income and on interest deductions. Such a reform is theoretically correct, since it aims at increasing neutrality of capital income taxation, but it was implemented when the housing market bubble was already bursting, thus providing another example of the well known time-inconsistency problem of tax reforms. More specifically, by lowering the value of household interest deductions, SR91 increased real after-tax borrowing costs and stimulated indebted households to sell off assets. Also, higher borrowing costs, in conjunction with certain tax hikes aimed specifically at the housing sector, contributed to the collapse of the construction sector. These contradictory impulses amplified the downturn and contributed to a general weakening

[86] Money metric utility is the income in pre tax-benefit state to obtain the same utility as in the presence of the program. Sequential dominance criteria à la Atkinson and Bourguignon compare the distribution of incomes starting from the "most needy" group, i.e. households with at least three children, and adding up all the others until the "least needy", i.e. singles, are included.

of aggregate demand in this sector by an estimated 20%. On these bases, Agell et al (1996, p. 648) conclude that the timing of SR91 was unfortunate since it was designed to be implemented with fair macroeconomic wind and not in the midst of a crisis. Time-inconsistency costs, however, could have been fully justifiable had the reform spurred (or at least limited the fall of) investment in the period following SBC91. According to Auerbach et al. (1995), however, the reform succeeded in reducing the user cost of capital, but only to a limited extent, which was then swamped by the rise in interest rates. Their main conclusion is that the impact of SR91 on investment is likely to have been minor, and had little to do with the contemporaneous sharp drop in investment.

1.2.2 Norway

NR92 is, in many aspects, similar to SR91. The centrepiece of NR92 was the move towards a pure *dual income tax*, which strictly separates the taxation of labour and capital income at the level of individual taxpayers. It ensures that capital income is consistently taxed at a low, flat rate, while income from labour is subject to a higher, progressive rate. At the same time, statutory tax rates on both capital and labour income were lowered, tax bases broadened and effective rates harmonised across sources of capital income in order to enhance tax neutrality (Van der Noord, 2000).

To see how NR92 was designed, one has to consider that the Norwegian tax system is based on two concepts of income: ordinary income, which is the sum of income from labour, pensions and capital net of deductions, and personal income, which includes gross values of wages, self-employed income and pensions. Clearly, personal income can be thought of as a subset of ordinary income. Prior to NR92, ordinary income was, in principle, taxed progressively according to 3 brackets[87] at increasing marginal rates (26.5%, 33.5% and 40.5%). Moreover, personal income was subject to a flat (but varying across types) social security tax and to a surtax of 9.5% for incomes exceeding a given threshold. Thus, the maximum marginal tax rate on personal income was equal to 62.8% for self-employed income, to 57.8% for dependent workers and to 51.6% for pensioners.

While keeping basically unaltered the distinction between ordinary and personal income, NR92 changed the applicable tax rates. In particular, ordinary income turned to a flat tax of 28%, while the surtax on personal income turned to a two-step structure and the rates of the social security

[87] The Norwegian system also distinguishes between two tax classes, class 1 designed for singles or single-earners family and class 2 for households with two earners. The structure of the system is the same, but values of deductions and thresholds are higher for class 2.

taxes were slightly changed. Considering all of these changes together, NR92 determines:

- a sharp reduction of marginal tax rates on wage and self-employment income at all but the lowest levels of income; in particular, the top marginal tax rate on labour income was reduced from 57.8% to 49.5%, while lowest marginal tax rates were virtually unchanged (AArbu and Thoresen, 1997, pp. 6-7)[88];
- the introduction of one single statutory tax rate for all capital income, of 28%, against which interest expenditure and depreciation allowances can be deducted, and the removal of double taxation of dividends and capital gains; at the same time, tax depreciation rates were lowered and a number of loopholes were eliminated.

Overall, NR92 was clearly aiming at reducing the disincentive effects of high marginal tax rates by moving away from the existing steep progressive tax schedule and towards a flatter one. At the same time, NR92 probably accomplished the most complete and radical step toward neutral taxation of capital income observed in the history of tax reforms in developed countries. To offset these sources of revenue loss, NR92, rather than raising VAT rates as it happened in SR91, introduced upward changes of the flat rate on ordinary income and of the highest rate of the surtax, and the elimination of a number of non-neutralities and loopholes in capital taxation.

Labour supply and employment

According to Van der Noord (2000, p 17), labour supply has soared in Norway in 1992 and this may have been due also to lower marginal effective tax rates brought about by NR92.

However, empirical estimates of this impact vary across sources and methods. According to Aaberge et al. (1995) the increase in annual worked hours induced by NR92 was of almost 13% for females and of slightly more than 9% for men. The reform should have generated an increase also in the participation rate of females by approximately 2.3 percentage points, while that of men should have kept fairly stable. These numbers are fairly large as compared to those provided by the literature and, in particular, by Bjorklund et al. (1995) for the Swedish case (see above). They arise from quite high estimates of (unconditional[89]) labour supply elasticities, ranging, according to

[88] The reduction of marginal personal tax rates was actually a gradual policy adopted in Norway through the Eighties, but the 1992 reduction was the most significant one (see Aaberge et al.1997, p. 636).

[89] The unconditional elasticity is the sum of elasticity conditional upon participation and of elasticity of the probability of participation to the labour market. Hours of work, however, are supplied only by those who participate to the labour markets.

different model specifications, from 0.33 to 0.45 for males and from 1.59 to 1.82 for females (Aaberge et al., 1995, p. 650).

Lower unconditional elasticity estimates are indeed provided by Dagsvik et al (2009), though only for females, equal to 0.45 in the public sector and to 0.82 in the private sector, with an average of 0.64. Accordingly, the increase in females' hours of work induced by NR92 is estimated to be around 8.6% as the weighted average of 11.2% in the private sector and slightly more than 6% for men. The authors interpret these responses as a rather modest impact of NR92 on labour supply, but they claim that the reform had another potentially positive effect: it stimulated the women to shift their labour from the public to the private, more productive, sector.

Although results of Aaberge et al. (1995) differ from those of Dagsvik et al. (2009), many qualitative conclusions are similar. Both papers suggest, in accordance with the literature, that labour supply elasticity is higher for females and decreasing in income. The former result justifies somehow the claim that the reform may have been particularly effective in enhancing part-time work, which is mainly chosen by women, although a number of institutional factors and regulations should be considered (Van der Noord, 2000). The inverse relationship between elasticity and income explains why both studies conclude that a pure flat tax would have elicited an aggregate stronger labour supply response had it decreased also marginal rates on lower incomes, while still being revenue neutral. However, NR92 managed to increase revenues on personal incomes, and probably the high level of the first-bracket tax rate (28%) was instrumental to this result.

Inequality

The literature indicates quite unanimously that NR92 probably acted to increase the inequality of income distribution, though it kept the level of income relatively (to other developed countries) low. According to Aaberge et al. (1995) the Gini coefficient of disposable income distribution increased from 16.1% to 17.7%. Limiting the attention to female labour supply, Dagsvik et al. (2009) calculate the mean compensated variation for different households, and conclude that the richest households benefited far more from NR92 than did the poorest households. However, to precisely detect the sources of this increase in inequality has proven not to be an easy task. AAarbu and Thoresen (1997) note that the observed rise in income inequality was not predictable ex-ante using a standard tax benefit model, nor it could be attributed entirely to behavioural responses by high-income earners. Their main result is that more than 60% of the rise in the inequality is due to increases in dividends, which are channelled almost exclusively to high income individuals. NR92 has probably encouraged the distribution of dividends through different channels (Aarbu and Thoresen, 1997, p. 32-34). First, although NR92 did not actually reduce the overall cost of paying

dividends, it eliminated their double taxation, since after NR92 the whole tax is paid at the corporate level. Such a change may have been perceived as a tax reduction by corporations and shareholders. Second, the reduction of the tax rate on interest income brought about by the reform decreased the attractiveness of real investments compared to financial investments. Firms have therefore chosen to pay off their profits in dividends. A third possible reason is the change in firms' preferred source of finance. Since the cost of using retained earnings increased relatively more after the tax reform compared to new share issues and borrowing, more dividends have been paid out.

1.2.3 Finland

In Finland, in the fall of the 1988 a reform of the business income tax was decided by the Parliament and put into force in 1989 and 1990. In 1993 a more comprehensive tax reform was enacted (FR93) and it included two parts: a reform of the taxation of capital income of individuals and a reform of business taxation. The main features of FR93 were a broadening of the tax base in capital and business taxation and the significant lowering of the corporate tax rate. Labour income tax rates were reduced later on, namely a 2 percent decrease was accomplished between 1997 and 2001.

Some features of the various tax reforms (FR93 and others) implemented in Finland after FBC91 were consistent with suggestions of the economic theory:

- a reduction of the statutory labour income tax rates and of the threshold for the zero-rate bracket, along with an increase in standard allowances for work-related and commuting costs allowances and an increase in the coverage and generosity of earned-income tax allowance (in the second-mid of Nineties);
- a broadening of the tax base in capital and business taxation and the significant reduction of the corporate tax rate (within FR93).

The evidence on the impact of these reforms is quite scant. However, several years after the implementation of the reforms, the overall participation rate had lifted, but not climbed back to its pre-recession level, though the GDP growth rate had more than fully recovered. This discrepancy, which provides another example of jobless recovery, has been explained also (though, not exclusively) by tax factors and by their interactions with some specific features of the Finland's economy and labour market (Joumard, 2002). Finland is specialized in high-tech and fast-growing sectors for which highly qualified workers are necessary.

However, this kind of workers is highly mobile and thus sensitive to cross-country tax differentials. Despite the reforms, the Finnish income tax schedule is still highly progressive with respect to many other countries, and this has hampered the competitiveness of the Finnish labour market. On the other hand, low-paid workers benefitted more directly from reductions of labour income tax rates, but actual reductions of labour costs were lower because of increasing wage compression. Moreover, the interaction between various tax reductions has produced adverse effects and disincentives, especially for females, because of various poverty-traps at low wage levels. In sum, it has been argued that taxes have contributed to the raising of equilibrium unemployment during the recession years, and that successive reforms have not succeeded in reducing it (Honkapohja and Koskela, 1999, p. 422).

According to the literature (Tikka, 1993, p. 94), some of the features of the tax system previous to FR93 may have favoured the boom of bank loans and the overheating of the economic cycle which led to FBC91. Among these, we can mention the non-neutrality of the capital income taxation and the preferential tax treatment of interest deposits. FR93 abolished some of these asymmetries and was a move towards a neutral tax system. However, when FR 93 has been enacted, the banking system was already in deep crisis, so this may have been another example of a time-inconsistency cost of the tax reform. FR93 has contributed to improve the possibility to finance capital expenditures by issuing equity, but the increase of investments in the period 1993-1996 has probably been due mainly to the decision to let the markka floating (Honkapohja and Koskela, 1999).

1.2.4 Japan

The case of Japan is different from the Sweden and Finland ones because the phase economic downturn, though reaching a dramatic peak during JBC92, has actually characterized a much longer period, and, according to some views, it is still going on. A recession induced by a strong yen (*endaka fukyo*) set place in the late 1980s, while the economic stagnation, coupled with negative real interest rates and a liquidity-trap, lasted since the end of JBC92 until 2006. After that, Japan economy was overtaken by the events of the 2007 crisis. Thus, one can argue that Japan has experienced economic depression or stagnation for the last twenty years and this naturally calls for macroeconomic explanations which go well beyond tax-related factors. Nevertheless, Hatta (1992) offers a critical perspective on NT89. After the Second World War, the Japanese tax system, known as the Shoup system, was designed mainly to attain vertical equity by requiring the rich to pay a higher share of direct taxes.

During the high growth of 1960's, revenues often increased more than the budget forecasts, and tax rates were cut frequently. On the contrary, during the sluggish period of the late 1970's and early 1980's, however, the increase in revenue was slow, and government deficits accumulated, creating an unfavourable political climate for the fiscal authority of the time. In this context, NT89 was basically characterized by a shift away from a system based on highly progressive taxation to one where indirect taxation plays a greater role. Its main features were the following:

- the consumption tax, a 3% across-the-board VAT, replaced the selected excise taxes in place at the time, thus inducing a net increase of revenue from indirect taxation;
- the system of labour taxation was characterized by two major changes i) the establishment of a flat 20% tax rate on interest incomes, thereby ending income tax exemptions for small savers, and (ii) a large reduction in the personal income tax rate. In particular, the top marginal tax rate on personal income fell from 89 to 65%.

To sum up, according to Hatta (1992), NT89 did not realize any of the objectives which should ideally characterize a post-crisis tax reform. It was highly regressive and actually redistributed income from the poor to the rich. It did not preserve tax revenues, since the loss in direct tax revenues was larger than the increase in revenues from indirect. And finally, NT89 did not have any visible effect on the Japanese economic cycle, which, according to Obstfeld (2009), was driven by a combination of monetary policies, productivity differentials and trade frictions with the United States.

1.2.5 Estonia

The analysis of the Estonian banking and economic crisis (1992-1995) and of the tax reform of 1994 diverges from the previous cases. First, the crisis in Estonia, although per se important, is commonly conceived as strictly associated with the economic downturn following the collapse of the Soviet Union. Second, the 1994 Estonian tax reform is strikingly different from those of Nordic Countries considered above, since it is the first example of adoption of a comprehensive flat-tax system. By reducing distortions and disincentives to work, a flat-tax system may be seen as a close-to-optimal way to boost economic recovery after a recession. On the other hand, such a reform is potentially inequality-increasing and also detrimental for government revenues, in particular if the "turning point" of the Laffer curve has not been reached when the reform takes place.

Estonia was hit by a banking crisis in between 1992 and 1995. Among the proximate causes of the crisis, the literature (Fleming et. al., 1997) has mentioned the freezing of the assets in Moscow of two important Estonian

banks, and the drying up of cheap credit from the central bank, which had previously provided Estonian banks with significant profits and liquidity. However, more systemic factors characterized this and other similar financial crises in Baltic countries formerly member of USSR, such as poor regulation and supervision, poor accounting and an inadequate legal infrastructure for lending, and pervasive corruption coupled with weak banking skills and mismanagement. Taking a broader perspective, the crisis was only a part of a deep recession and hyperinflation which hit Estonia (as well as Latvia and Lithuania) during the first Nineties. This period was then followed by a fast recovery, with aggregate GDP increasing steadily in the second mid of Nineties. More precisely, real GDP fell by 8.2% in 1993 and by 1.8% in 1994 and then increased by 4.3% in 1995 and by 4% in 1996 with unemployment lowering from 8.5% in 1993 to 7.3% in 1996 (IMF, 1998).

It is interesting to look at possible interactions between these macroeconomic trends and fiscal policy. Estonia radically reformed its tax system in 1994 (Keen et al., 2006) by:

- replacing the 3-bracket (with rates at 16, 24 and 33%) general income tax with a flat tax at the rate of 26% and increasing the personal allowance by approximately 1/3 in nominal terms;
- lowering the corporate tax rate from 35% to 26%.

In practice, Estonia was the first country to move to a comprehensive flat-tax system, by opting for an equal rate for labour and corporate income. On the other hand, such a rate was set close to the highest marginal tax rate previously enacted and the increase in the personal allowance was designed to limit the additional tax burden for less highly paid.

The patterns described above may suggest that the 1994 reform played an important role in boosting the economic recovery. However, the analysis by the IMF (1998, pp. 54-56) suggests that the competitiveness of Estonia was driven by the combination of real exchange rates and labour productivity, while tax-related factors are never mentioned. More precisely, the IMF attributed the remarkable growth in labour productivity in the second mid of Nineties to enterprise restructuring which resulted in the replacement of old capital with modern machinery and equipment, financed in large part by foreign direct investment coming through joint ventures with a number of countries (principally Finland, Sweden, and Germany). In principle, this increase in FDI flows may in turn having been favoured by the reduction in the corporate tax rate, although no empirical evidence is available.

To evaluate the impact of the 1994 tax reform on labour supply, one should consider that, differently from Russia in 2001, Estonia initially adopted a flat rate which was relatively high, i.e. close to the highest among marginal tax rates previously enacted, so that the decrease in taxation was perceived only by a minor fraction of the working force. Moreover, those who benefitted from the reform were concentrated among higher incomes that, according to Staehr (2008), tend to have lower participation elasticities and negligible values of elasticity of number of hours worked by individuals already working. The impact on low and middle incomes was hampered by the combination of the increase in the tax rate and high inflation, which made the 1/3 increase in personal allowance "modest" in real terms (Keen et al., 2006).

For similar reasons, one would expect the 1994 reform to have had a minor impact on tax revenues. As a matter of fact, although a decrease of personal and income tax revenues as share of GDP after the reform is visible for Estonia as well as for other countries which turned to flat rate taxation (Keen et al., 2006, p. 6), a cross-country analysis which controls for changes in inflation, real wages and real GDP finds that the rate changes brought by these reforms are on average statistically insignificant (Saavedra et al., 2007).

1.3 Concluding remarks

We noted above that ideally a tax reform implemented in a post-crisis period should satisfy a number of potentially conflicting objectives, such as the reduction of marginal tax rates to boost labour supply, the elimination of non-neutralities in capital income taxation to enhance efficiency of capital markets, the decrease or non-increase in inequalities and the stability of revenues to preserve the financial stability of the welfare system.

The analysis of past episodes of tax reforms implemented after a crisis, and particularly those of the Nordic countries (Sweden, Norway and Finland) confirms that each of the objectives listed above can motivate well-targeted changes of the tax system, but it also suggests that it is difficult to conceive a tax reform which accomplishes all these objectives altogether.

Empirical studies of labour supply elasticity confirm that reduced marginal tax rates on labour income can indeed help employment and participation in the labour market (see in particular references quoted for Norway and Sweden). However, this optimistic remark has to be qualified

since estimates of elasticity vary across countries and, within given countries, across genders and income classes. Thus, in general, a reform which reduces marginal tax rates on labour income is more likely to be effective if it is targeted to females and to lower incomes. A second qualification concerns the importance of the regulatory environment: the experience of Sweden and of Finland seems to show that wage compression in the labour market can greatly reduce the potential impact of the decrease in marginal tax rates.

Also, dual income tax systems as those designed by reforms in the Nordic countries during the Nineties, may be able to boost savings and investment (as apparently happened in Norway), but in other cases (see the Sweden and Finland's experience) they turned out to be, if not irrelevant, of a minor importance with respect to variables such as the interest rate and the change in trade of terms. Moreover, tax reforms aiming at restoring neutrality of capital income taxation usually increase the cost of financing housing investment and this is likely to exacerbate the fall of prices which characterizes the housing sector in a typical post-crisis scenario. To put it alternatively, even if non neutralities may have contributed to a crisis (IMF, 2009), eliminating them after the crisis may worsen it as a typical example of the time-inconsistency of tax reforms (as happened in Sweden, Norway and Finland).

The major problems arise when tax reforms are evaluated with respect not only to economic recovery (via a higher labour supply and or investment) but also to their impact on inequality and on total tax revenue. There seems to be a trade-off between the objectives listed above, as shown by the Swedish and the Norwegian cases. In the former, the tax reform, while lowering marginal tax rates on labour and increasing the neutrality in capital income taxation, has probably succeeded in limiting the impact on inequality (by increasing children and housing allowances) and in reducing revenue losses (by increasing indirect tax rates). However, the resulting tax-mix has somehow 'fired back' reducing the attractiveness of the reform and its impact on labour supply (see in particular estimates from Blomquist et al., 1997). In the Norwegian case, on the other hand, the pre-existing structure of the tax system has allowed decreasing marginal tax rates without reducing greatly tax revenues, but this has come at the price of excluding lower incomes from those benefitting from the reform, thus reducing the boost to labour supply and increasing inequalities.

The Japanese tax reform also has something to say about the effectiveness of 'optimal' tax reforms, i.e. of reforms lowering marginal tax rates on high labour incomes. In the Japanese case, the force of the recessionary macroeconomic factors exceeded the potential boost from tax reforms

which, on the other hand, raised the inequality of income distribution and reduced tax revenues.

Finally, the 1994 flat-tax revolution of Estonia seemed to have played a minor role in boosting the economic recovery of the second mid of Nineties, which seemingly depended on increase in labour productivity due, in turn, to massive capital restructuring. On the other hand, the 1994 reform did not cause major reductions in tax revenues.

Thus, it does not seem to exist a reform which is able, at the same time, to help economic recovery *and* to reduce inequalities *and* to be financially sustainable. Every country should probably choose its own 'reforming-path' depending on priorities given to these objectives, thus focussing on one (or two) of them while sacrificing, at least in the short term, the other(s). In doing so, however, it should always be remembered that tax reforms are only one among many policy tools available, and they are not necessarily the most effective to achieve these goals, since their impact depends on interactions between tax-related and political, institutional and regulatory factors.

References

Aarbu and Thoresen, 1997, "The Norwegian Tax Reform: Distributional Effects and the High Income Response", Discussion Paper N0 207, Statistics Norway, Research Department.

Aaberge, Dagsvik and Strom, 1995, "Labour Supply Responses and Welfare Effects of Tax Reforms", Scandinavian Journal of Economics, 97, 4, 635-659.

Agell and Meghir, 1995, "Male Labour Supply in Sweden: Are Incentives Important?", Swedish Economic Policy Review, 2, 391-418.

Agell, Englund and Sodersten, 1995, "Swedish Tax Policy in Theory and Practice. The 1991 Tax Reform", Stockholm, Fritzes.

Agell, Englund and Sodersten, 1996, "Tax Reform of the Century-The Swedish Experiment", National Tax Journal, 49, 4, 643-64.

Aronsson and Palme, 1998, "A Decade of Tax and Benefit Reforms in Sweden: Effects on Labour Supply, Welfare and Inequality", Economica, 65, 39-67.

Auerbach, Hasset and Sodersten, 1995, "Taxation and Corporate Investment: The impact of the 1991 Swedish Tax Reform", Swedish Economic Policy Review, 2, 361-383.

Bjorklund, Palme and Svensson, 1995, "Tax Reforms and Income Distribution: An Assessment Using Different Income Concepts", Swedish Economic Policy Review, 2, 229-266.

Blomquist, Eklöf and Newey, 1997, "Tax Reform Evaluation Using Non-Parametric Methods: Sweden 1980-1991", Working Paper, University of Uppsala.

Dagsvik, Locatelli and Strom, 2009, "Tax Reform, Sector-specific Labour Supply and Welfare Effects", Scandinavian Journal of Economics, 111, 2, 299-321.

Davis and Henrekson, 2006, "Economic Performance and Work Activity in Sweden after the Crisis of the Early 1990s", Working Paper NBER 12768/2006.

Fleming, Chu and Bakker, 1997, "Banking Crises in the Baltics", Finance and Development, 37, 1, 42-45.

Hatta, 1992, "The Nakasone-Takeshita tax reform: a critical evaluation", American Economic Review, 82, 2, 231-236.

Honkapohja and Koskela, 1999, "The economic crisis of the 1990s in Finland", Economic Policy.

IMF, 1998, "Republic of Estonia: Selected Issues and Statistical Appendix", IMF Staff Country Report 98/12.

IMF, 2009, "Debt Bias and Other Distortions: Crisis-Related Issues in Tax Policy", Fiscal Affairs Department, International Monetary Fund, Washington DC.

Joumard, 2002, "Options for reforming the Finnish tax system:", OECD, Economics Department, ECO/WKP(2002)5.

Keen, Kim and Varsano, 2006, "The Flat Tax(es): Principles and Evidence, IMF Working Paper 06/218.

Klevmarken, 1997, "Did the tax cuts increase hours of work? A pre-post analysis of Swedish Panel Data", Working Paper, University of Uppsala.

Ongena, Smith and Michalsen, 2000, "Lessons from Norwegian Banking Crisis: 1988-1991", Center for Economic Research, Discussion Paper 2000-13, University of Tillburg.

Obstfeld, 2009, "Time of troubles: the Yen and Japan's economy: 1985-2008", Working Paper NBER 14816/2009.

Reinhart and Rogoff, 2009, "This time is different: eight centuries of financial folly", Princeton University Press.

Saavedra, Marchinchin and Valachi, 2007, "Flat Income Tax Reforms", in Fiscal Policy and Economic Growth: Lessons for Eastern Europe and Central Asia, 253-279, The World Bank.

Slemrod, 1992, "Do Taxes Matter? Lessons from the 1980s", American Economic Review, 82, 2, 250-256.

Staehr, 2008, "Estimates of Employment and Welfare Effects of Personal Labour Income Taxation in a Flat-Tax Country: The Case of Estonia", Bank of Estonia Working Paper Series, WP 3/2008.

Tikka, 1993, "A 25% Flat Rate Tax on Capital Income: The Finnish Reaction to International Tax Competition", in Tax Reform in the Nordic Countries, Nordic Council for Tax Research.

Van der Noord, 2000, "The Tax System in Norway: Past Reforms and Future Challenges", OECD Economics Department, ECO/WKP (2000)17.

2 Shift of the tax bases

1.1 Shifting the tax burden from labour income to consumption

In recent years, a consensus has emerged among tax policy analysts that the tax structure is relevant for the economic performance of countries. A ranking of taxes according to their distortionary effect has been identified, where the least distortive are taxes on immobile property, followed by consumption taxes, personal income taxes and corporate income taxes.

This ranking reflects quite straightforwardly the effects of openness of economies on the mobility of tax bases. The ease of changing location for firms, especially multinational firms, makes the corporation income tax most vulnerable to the effect of increased openness and to tax competition among countries. Labour income is certainly less mobile, although high skilled workers may have become more mobile. Since the main consumption tax, the VAT, is designed to be destination based, its base is relatively immobile and less vulnerable to competition, the main exception being cross-border purchases and tourism. Finally, immobile property is the least affected by globalization.

Another important dimension is the effect of taxes on the labour market and on capital accumulation, the latter being a crucial determinant of economic growth. With regards to labour supply, income tax has always been considered harmful since it discourages both labour participation (the so called extensive margin) and the number of hours worked (the intensive margin), although the relevance of these effects is debated and is not uniform across individuals. Although consumption taxes, by reducing the real value of wages, have similar effects on labour supply, the fact that their base is generally broader and that they are not progressive makes them less distortionary at the margin for given revenue. As to returns to savings (interests and dividends), while they are typically subject to the income tax, they are not affected by a consumption tax, which taxes current and future consumption at the same rate.

Finally, consumption taxes may be designed to correct some externalities (environment taxes) or to reduce the distortion on labour supply (differential taxation of goods which are complements to labour) so to improve the efficiency of the tax system.

This consensus on the opportunity to introduce growth oriented reforms in the tax system along the lines described above is reflected in the "tax

and growth" recommendations by OECD (2008b), which can be summarized as follows (OECD 2010, box 1.2):

- the implementation of revenue-neutral reforms that shift the burden of taxation from income to consumption and/or residential property;
- the improvement of the design of the tax system, by broadening the tax base, reducing tax rates and improving its externality correction content.

At least in principle, the best option could be an increase in property taxes. Not only supply of property is inelastic and investments in property are less vulnerable to international tax competition; additional advantages are the fact that evasion is difficult and the distribution of property across the population is such that even a proportional property tax would have a progressive impact, and hence would be equitable. Due to the relation between property value and supply of local services and public goods, these taxes are usually considered a fiscal instrument suited to finance local governments. However, taxes on residential properties are particularly unpopular in most countries among taxpayers, which tend to consider their residence as an essential good that should not be taxed or should be taxed only at a low rate. This limits severely the possibility to raise revenue from this source.

As to environmental taxes, aimed at discouraging the consumption of goods with negative externalities, a shift from labour taxes to these taxes is often presented as bringing about a "double dividend":[90] on the one hand, they have positive effects on the environment, on the other hand, they allow to reduce a distortionary tax. Although the role for these taxes is probably larger than it has been experienced so far, its use has proved quite difficult in most States (with some exceptions). Moreover, the main environmental tax is the excise tax on fossil fuels, which is generally already heavy in most EU countries and consequently offers limited scope for further increases. In addition, political concern that an increase in fuel taxes can affect production and competitiveness negatively may play a role. Finally, environmental taxes, as all taxes aimed at correcting externalities, have a self-defeating nature, as their success in reducing the tax base implies a reduction in revenue.

For these reasons, most attention has been paid to the possibility to carry out a reduction in non-wage labour costs through a tax shift from labour income, and especially from social security contributions, to broad base

[90] As stated for example by Fullerton *et al.* (2010) «[t]he economic argument is, however, far from clear. Environmental taxes create their own distortions, raising the price of goods, which may or may not be offset by reduced distortions elsewhere in the tax system». On this point, see also below.

general consumption taxes, and an increase in the VAT is usually considered as the key ingredient of the tax reform.

In the following, after a short presentation of some European experiences of tax shift (section 2.2), we assess the rationale for such a tax reform, making a distinction between the effects in a closed (section 2.3) and in an open economy (section 2.4). Section 2.5 discusses some empirical evidences. Section 2.6 concludes.

1.2 European experiences

Looking at European countries in the last decade, we observe an increase in the use of general consumption taxes such as the VAT. If we compare the standard VAT rate in 2000 and 2009, we find that (in addition to Germany, Hungary and the Czech Republic on which we will concentrate below) the rate has been raised in Greece (from 18% to 19%), Iceland (24.5% to 25.5%), Netherlands (17.5% to 19%) and Norway (23% to 25%). This more than compensates the reduction in the standard VAT rate which has taken place in the same period in France (20.6% to 19.6%), Slovak Republic (21% to 20%) and Spain (23% to 19%). However, the increased role of the VAT does not allow us to conclude that there has been a clear move towards consumption taxes, due to the general decline in the revenue share of specific consumption taxes (excises); as to environmentally-related taxes, although they have raised some interest, there has been no relevant increase in their revenue. Indeed, indirect taxes as a whole have not increased in the EU in the last ten years. However, in response to 2008-09 financial crisis some countries (e.g. Finland, Latvia, Lithuania) increased indirect taxes (VAT and excise duties) to offset lower direct tax revenues.

In the same period, we see that the tax wedge (calculated as the sum of personal income tax, social contributions and payroll taxes as a proportion of labour cost) for the average worker in the private sector declined by 4% or more in Denmark, Finland, Ireland, Poland, the Slovak Republic and Sweden; at the same time, it increased by more than 3% in Greece. However, data only show a slight decline in the average tax wedge. As it has been observed (OECD, 2010), the reduction in top statutory income tax rates has not been followed by a decrease in personal income taxes at middle or lower level, and social security contributions have increased in the meanwhile.

It seems that recommendations for a more growth-oriented tax structure along the pro-growth lines described in the previous section have found their way into actual reforms only in a small number of countries. In the following, we briefly summarize the experiences of Germany, Hungary, and the Czech Republic, where reforms of the tax system aimed at shifting the tax burden from labour to consumption have been implemented.

Additionally, we will consider the case of France, where the possibility of a similar tax shift has been considered and debated (although it seems that the proposal has been put aside for now).

2.2.1 Germany

The German 2006 budget law increased the standard VAT from 16% to 19% starting January 1st 2007.[91] No change was introduced in the reduced rate of VAT (levied on certain foods, books and magazines, transports etc.), which remained at 7%. At the same time, the unemployment insurance contribution rate was decreased from 6.5% to 4.2%.

The reform was not revenue-neutral: the revenue increase due to the higher VAT rate was about three times the revenue loss following the reduction in unemployment contributions. Indeed, the primary goal of the reform was to improve fiscal sustainability, after the general government deficit reached 3.3% of GDP in 2005. Higher tax revenue was deemed necessary in the extremely tight situation of German public finances. The revenue from VAT (and insurance tax) increased by 16% in 2007 with respect to 2006, contributing to the balancing of government budget. Mirroring the net increase in revenue, the purchasing power of labour income recipients decreased as an effect of the reform.

Among the reasons for the tax shift from social contribution to VAT, a great importance was also given to the expected beneficial effect on external competitiveness, as VAT is levied on imported but not on exported goods and services, while the opposite is true for social security contributions. In a context of fixed exchanges regime, this was expected to have a temporary positive effect on exports (we will return on this aspect below).

It should be noted that before the reform indirect taxes were relatively low in Germany by international standard, and social contributions were comparatively high, as shown in Table 1.

Tab. 1 Tax structure in Germany compared to EU15 – 2005

	Personal income taxes	Social security contributions	Taxes on goods and services
EU15 (%GDP)	10.6	11.1	11.9
(% tax revenue)	25.3	27.7	30.3
Germany (%GDP)	9.4	14.5	10.1
(% tax revenue)	25.3	39	29

Source: OECD, *Revenue statistics 1965-2008*

[91] Together with the VAT, the rate of the insurance tax (Versicherungssteuer), levied on gross insurance premium, was also increased from 16% to 19%.

Since one of the feared effects of the increase in VAT was price inflation, the increase was prepared and announced much in advance; this allowed producer to spread price increases over 2006 and 2007.[92]

2.2.2 Hungary

A similar switch from social contribution to VAT was implemented in Hungary in 2009, while the country was facing one of the most severe recessions among OECD countries. The objective of the tax reform, which was implemented together with a pension reform and other structural measures, was to restore growth and confidence of foreign investors with regard to fiscal sustainability. It should be noted that already in 2006 the government deficit had reached a level as high as 9.4% of GDP.

Effective on 1 July 2009, the government reduced the personal income tax and cut employers' social contributions by 5%, increased the standard VAT rate by the same percentage (from 20% to 25%)[93] and introduced (effective 1 January 2010) a market-based property tax. The reform was calibrated to be revenue-neutral from an ex ante point of view.

The reduction in the income tax was the effect of an increase in the threshold for the initial tax rate in 2009, and of lower tax rates from 2010, as illustrated in Table 2.

The estimated reduction in tax wedge was different at different wage levels. The total reduction in the labour tax wedge between 2009 and 2010 as a percentage of total labour cost for a single earners with no children is calculated to be 4.4% at the minimum wage (which was around 35% of average wage in 2008), 7.0% at the average wage, and only 1.7% at 5 times the average wage (Hungary 2010, table 2.7).

Tab. 2 The reform of the personal income tax in Hungary

2008		2009		2010	
Annual wage (x 1000 HUF)	Tax Rate %	Annual wage (x 1000 HUF)	Tax Rate %	Annual wage (x 1000 HUF)	Tax Rate %
0 – 1700	18	0 – 1900	18	0 – 5000	17
1700 – 7448	36	1900 – 7450	36	5000 – 7658	32
7448 –	40	7450 –	40	7658 –	32

Source: *Economic Surveys: Hungary 2010*, Table 2.6

The inflation was expected to rise,[94] and output be reduced, in the short run, although in the medium term growth is expected to be stimulated. However, the impact on inflation has been less pronounced than in other

[92] Another effect of the early announcement was to encourage strategic behaviour (for example, deferral of export to meet internal demand for cars at the end of 2006).

[93] There is a *de facto* agreement that EU members should not increase VAT standard rate above 25%.

[94] Hungary does not belong to the Euro area, so a steep depreciation of the exchange rate was triggered.

experiences, probably due to the recession (in July 2009, over June, the price increase was 1.4%, to be compared to a potential VAT-induced 3.4% increase).

With a total tax burden above 40%, Hungary is considered a high tax country compared to other countries with similar incomes. A large share of tax revenue comes from very high combined employer-employee social security contributions. The reform reduced employers' contributions by 5%.

Czech Republic

In Czech Republic a series of tax changes took place in 2008, aimed at promoting growth and employment through a reduction in the tax rates and a broadening of the tax base.

The reduced VAT rate applied to basic goods and services was increased from 5% to 9% in 2008 (although this was partly compensated by the inclusion of certain environmentally friendly products in the group). In 2010, in response to the necessity to balance the government budget, both the regular VAT rate and the preferential rate were increased by 1%, so that they reached respectively 20% and 10%.

It should be noted that the tax structure of the Czech Republic has some peculiarities:

- a low share of personal income taxes (10.8% in 2008) and property taxes (1.2%) in total tax revenues, compared to the EU15 averages (respectively 25.2% and 5.6% in 2008);
- social security contributions represent 45% of total tax revenues in 2008 (28.2% in EU15), also well above Poland (36%) Hungary (32%) and Slovakia (40%); they amount to 16.2% of GDP. The share on employers is 34%, with 11% on employees (on earnings below a maximum of 6 times the average wage).

The total tax wedge on labour depends significantly on family composition. As a percentage of labour cost, it is 41.3% for a couple with no children where one spouse earns average wage and the other 1/3 of average; it drops to 30.4% if the couple has two children. Consumption taxes are 28.9% of total tax revenue, aligned to the average in EU15 (30.1%).

The 2008 personal income tax reform introduced a flat-rate system with a rate of 15% levied on direct labour cost (the so-called "super-gross" earning, i.e. gross salary plus social insurance and health contributions) which is equivalent to a 23% rate on gross salary for dependent employees. This was accompanied by various tax credits (family tax

credits replaced joint taxation of couples) which implied a high threshold of basic tax-exempt income (45% of average income for a single earner with no children, up to a level as high as 130% of average income for a single earner with two children). Additionally, a 2.5 reduction in social security contributions was introduced later in 2008, partly as a response to the financial crisis.

The reform involved also a reduction in several steps of the statutory rate of the corporate income tax: from 24% in 2007 to 21% in 2008, to 20% in 2009 and to 19% in 2010; taxes on capital return were unified at 15%.

The debate on the "social VAT" in France

In France, the possibility of a tax shift from labour to consumption taxation has been object of interest by politicians and academics since 2004, and especially after the general election of 2007. In September 2007, the Secretary of State responsible for Forward Planning and Assessment of Public Policies, Eric Besson, submitted a report to Prime Minister Fillon in which the "social VAT" (TVA sociale) was considered a viable solution to encourage competitiveness and reduce tax distortions. The main option considered was a reduction of employers' contributions to social security financed by an increase in the VAT. A rise in the VAT rate seemed an attractive option in France, given that this country has the highest level of social contributions among OECD countries.[95]

The reform proposal revived a longstanding debate among scholars and commentators. The pertinence of using labour income as the sole source of finance for a social security system which secured universal provision had been questioned already in the 1970s and 1980s.[96] The controversy among scholars regarded also the choice of the proper tax base that should be used: as an alternative to VAT, which excludes investments, a new VAC (Value Added Contribution) which includes capital income was considered. Moreover, some suggested that the decrease of contributions should be targeted to low wages only, as employment of low skilled workers seems more responsive to such policies.[97]

[95] The current VAT rates in France are: standard rate 19.6%, reduced rates 5.5% and 2.1% (the latter rate only for a very limited number of goods including newspapers and medications). As 90% of receipts come from goods and services taxed at the standard rate, it has been estimated that a 1% increase of the standard rate can finance a 1.7% decrease in the payroll tax.

[96] A step in the direction of a broader base had been the introduction of Contribution Sociale Generalisee in 1991 to replace employee payroll taxes.

[97] Notice however that for lowest income individuals the level of social contributions was already as low as 2.1%. An additional argument against such option was the fear of adverse incentive effects from increased progressivity.

Due also to the strong criticism received, especially for its redistributive implications, by trade unions, consumer associations and opposition political parties, the project slipped at the end of the queue of reforms. It is not clear whether it has been definitely put aside by the government or it might reappear in the future.

1.3 The theoretical rationale for a tax shift: closed economy

The idea of a tax shift is justified as a way to broaden the tax base so that tax rates can be reduced at a given total revenue.

Labour taxes affect labour supply and demand decisions. With regard to labour supply, both the decision to enter the labour force (the so called extensive margin) and the hours worked (intensive margin) are affected, although by different characteristics of the tax. Participation is responsive to total tax burden, usually at low level of income, while the hours worked are affected by the marginal tax rate, and responsiveness is usually higher for high income individuals. The empirical evidence also suggests that the labour supply of women is much more sensitive to marginal tax wedge than supply by men (Meghir and Phillips, 2010).

While the effect of labour taxes on employment depends on the elasticity of labour demand and supply, the side of the market where the tax is levied is deemed irrelevant by the economic theory of tax incidence, as the burden is shifted according to relative elasticities of demand and supply and the equilibrium depends only on the tax wedge. However, at least in the short run, taxes on employers may have different effects than taxes on employees for given total tax wedge, especially if there are institutions that create market rigidities, such as an institutionalized bargaining system or minimum wages.

As we said, the attractiveness of a shift to a consumption tax stems from the fact that consumption is a broader base than labour income. Consumption is financed also by a number of sources other than labour income, including government transfers, corporate income, previously accumulated wealth, etc. A higher base obviously means a lower rate, and this reduces the distortionary effect on labour supply and possibly, given that the distortion increases more than proportionally with the rate, the overall distortionary effect of the tax system. However, the conclusion that consumption exceeds labour income needs to be qualified and put in the right perspective, to avoid misleading and possibly wrong conclusions on the exact effect of a tax shift.

As a matter of fact, the argument that labour income tax and consumption tax may have different effects on labour supply should be considered in the light that workers make their labour supply choices motivated by the quantity of goods and services they are able to purchase with their post-tax income. In other words, while a drop in wage taxes will bring either lower producer prices (if this is shifted onto lower production costs) or higher disposable income, an increase in taxes on goods and service leads to an offsetting increase in price which reduced the real value of labour income. The two effects tend to cancel out. We should conclude that the incentive to work is affected by consumption taxes as well, so that the case for a shift must rely on aspects other than the fact that labour income tax is accounted for as part of the labour tax wedge while consumption tax is not. A more precise analysis of the incidence of alternative taxes is necessary.

Are a labour income and a consumption tax equivalent?

The advantages of general consumption taxes over income taxes in terms of efficiency have been pointed out by a long tradition in public finance. The traditional argument is that, since it does not affect the relative price between current and future consumption, a general consumption tax is neutral with respect to saving decisions; although there is no conclusive evidence that the effect of capital taxes (such as taxes on interests on dividends) on savings is large, even a simple model of inter-temporal choice implies that a general consumption tax is less distortionary than an income tax which includes capital income in its base with regard to saving decisions, and encourages capital accumulation. However, although this argument has been traditionally used to justify the shift from a comprehensive income tax to the VAT (a possibility which is still debate in the US, where the VAT has never been introduced),[98] it is less relevant in our context, where the focus is on labour income taxes and capital income tax is almost everywhere subject to a distinct tax regime than labour income.[99]

Indeed, it is easily illustrated with reference to the individual choice problem that a general consumption tax with uniform rates and a proportional income tax on labour income are equivalent in their impact on taxpayers. More precisely, for an individual who uses labour income to finance consumption, any proportional change in commodity taxes rates is

[98] Another possibility to implement a tax on consumption is to adopt an "income as expenditure" notion of the income tax base, i.e. to exempt savings from the income tax base. Such a solution has been advocated historically by economists such as J.S.Mill or, more recently, by J. Meade as an alternative to comprehensive income according to the Haig-Simons definition.

[99] Although Fitoussi (2005) has considered and discussed the effect of passing to a consumption tax, i.e. to exempt savings, this does not seem to be the main concern in Europe, here the objective seems to be just the opposite: to reduce the tax burden on labour.

equivalent (in the sense that the available consumption choices are unaffected) to a proportional change in the income tax, and vice versa. Le w be wage, L labour supply, m the rate con labour tax, p is consumption price; the individual budget constraint for an individual spending all his/her income is:

$$(1-m)wL = pC$$

where mwL is tax revenue. If we substitute a consumption tax of rate t for the labour tax we have instead:

$$wL = (1+t)pC$$

where t is the consumption tax rate. It is easy to check that the budget constraint is unchanged for the individual as long as the substitution of one tax for the other is revenue-neutral, or $mwL=tpC$, which will be the case with $t=m/(1-m)$. The increase in the price of goods and services after the reform is exactly equivalent, in real terms, to the increase in wage due to the elimination of the income tax.

In this simplified setting, absent fiscal illusion, rational individuals should consider a general (uniform across commodities) consumption tax as equivalent to a proportional tax on labour income.[100] This is to say that, for given government revenue, a shift from one tax to the other should have no effect on individual choices, and leave the equilibrium unaffected.

The conclusion naturally extends to a multiple period setting, by assuming the possibility of savings to finance consumption at future periods (or conversely, the individual can borrow and finance current consumption with future income). If the individual earns income only in the first period and consumes in the first and in the second period (in the second period he uses all his savings), we have the following inter-temporal budget constraint:

$$(1-m)wL = pC_1 + pC_2/(1+r)$$

to be compared with

$$wL = (1+t)pC_1 + (1+t)pC_2/(1+r).$$

The equivalence between proportional labour income taxation and consumption taxation remains, although the reference is to lifetime income and consumption (i.e. there is no equivalence as to the timing of taxation, and consumption and income taxes can have different effects when there are financial constraint that limit the ability to transfer income

[100] It should be emphasized that we have equivalence only if capital income is not part of the income tax base.

from one period to another). This can be further extended to more than two periods, to the possibility that the individual supplies labour also in the following periods, and to the case of bequests.

As we will see below, although the equivalence between the two taxes in terms of revenue is not necessarily satisfied in the aggregate in a growing economy, the general conclusion that consumption taxes and labour income taxes bear upon the same tax basis is general and robust. An implication is that attention only to the "tax wedge" can provide a misleading picture of the total effect of taxation on labour market.[101]

Even more important from our point of view, it is not clear *prima facie* that a modification of the tax mix implying a proportional reduction of the labour income tax and an increase of the consumption tax, as long as it leaves the life-time tax burden of an individual unchanged, brings to a more efficient tax structure.[102] If there is an effect, this must depend on the fact that the tax shift brings about a redistribution among individuals. In particular:

1. there may be individuals who finance their consumption from sources other than labour income (such sources include wealth, pure economic rent and social transfers) or who escape the income tax (e.g. tax evaders);
2. while the income tax is usually progressive, the consumption tax can be differentiated among commodities, so that the tax shift redistributes the tax burden according to the level of income or consumption mix.

Broadening the tax base by taxing wealth

The equivalence between labour income and consumption in a lifetime perspective at an individual level does not imply that such equivalence is true in the aggregate in a growing economy with capital accumulation on a per-period basis. This is more easily explained if we consider that, in a closed economy, tax base of a general consumption tax such as VAT

[101] Consistently with the idea that the tax wedge is not a good proxy for the total effect of taxes on labour supply, in one of its last reports on "taxing wages" the OECD (2008) considered the possibility to redefine the notion of tax wedge taking into account the effect of consumption taxes as an additional burden on labour income. Note that to this purpose it is not correct a simple sum of the total effect of labour and consumption taxes, as in some cases the individual can finance consumption with benefits which are not subject to the income tax (consider for example the case in which the alternatives are working and getting tax-exempt unemployment benefits; in this case consumption taxes play no role). Consumption taxes are instead relevant when the decision is between household production and work, for example by a nonworking partner. Though still at a very early stage, the initiative seems very promising.

[102] In the light of what we have just said, it is not surprising that the theory of optimal taxation does not give much emphasis to the optimal mix between direct and indirect taxes.

corresponds to the value added net of gross investment in fixed capital by firms:[103]

$$C = Y - I = wL + rK - I$$

where C is aggregate consumption, Y is income, I is investment, L and K are labour and capital and w and r their respective remunerations. This makes clear that consumption C corresponds to labour income wL only when $rK=I$, i.e. when capital revenue equals investment. As emphasized by Gauthier (2009), this is the case when the "golden rule" of accumulation is satisfied. However, the balance between the growth rate and the return to capital implied by the golden rule need not be satisfied by an economy which is dynamically efficient. As long as the per capita level of capital is below the level which maximizes the steady state level of consumption, so that the rate of return from capital investments is higher than the steady state rate of growth, savings and investment are less than capital income ($rK > I$), and the VAT will have a broader tax base than a labour tax. This leaves room for a reduction in the effective burden of taxation on labour income in case a tax shift is implemented. Indeed, in stationary state, $I = dK$, where d is capital depreciation, and we have that the tax base of VAT is $C = wL + (r - d)K$: the VAT indirectly taxes the share of capital income corresponding to the difference between the rate of return and the replacement rate.

It should be made clear that the reduced tax burden on labour (for the current and future generations) is a consequence of a shift from labour to consumption in the period in which the reform is implemented, which is paid by those individuals who at the time of the shift are financing their consumption using their wealth (i.e. past savings). In fact, an increase in the consumption tax is equivalent to a one-off tax on existing wealth. The reduced flow of real consumption from an existing asset due to the higher consumption tax will be capitalized into lower market value for the asset.

In other words, since cumulated savings have already paid the labour income tax in previous periods, the shift has its losers in those individuals who have more savings cumulated in previous periods. Conversely, the reduction in the effective labour tax rate, hence the benefits for workers in the current and future periods, will be larger the larger is the initial shift of tax burden to savings.

Therefore, the tax shift could be also represented as redistribution among different generations. The young and the old tend to consume a larger share of their income, so they will be the "losers" of the reform. It is true that the young will become "winners" later on, but, in case they are

[103] In this sense, the name of Value Added Tax is deceptive.

financial constrained, the higher tax burden can reduce their ability to invest in physical and human capital and reduce their opportunities.

This redistribution is expected to have positive effects on growth, as the lower cost of labour will induce an increase in investments. Note that we have a positive effect on employment and growth even if the joint final effect of the change in wages and prices offset each other. This is because the initial tax shift brings to an increase in employment (depending by specific form taken by the reduction in labour taxes, this may come either by an increase in labour supply if real wage increases, or by an increase in demand if labour cost decreases) and this on turn determines an increase in investments in the medium term. The final equilibrium will be at the pre-reform capital labour ratio, which is the equilibrium ratio at given user cost of capital (the latter is unaffected by the tax change). The new equilibrium will be at a higher level of employment and capital.[104]

The increase in employment and production/income will further benefit current and future active generations, beyond the initial lifetime tax reduction, so that the effect of the shift is not just a zero sum game among generations. However, the benefit to younger generations and in general to individual who finance their consumption out of labour income should be weighted against the loss suffered by individuals who finance their consumption with cumulated savings (or bequests), presumably the "old" generations. That it is not possible to use the tax shift to reduce the tax burden for all generations at the same time is a consequence of the fact that we are in a situation of dynamic efficiency.

Shifting the tax burden to beneficiaries of social expenditure

A further distributional effect involves those individuals who are beneficiaries of transfers financed using taxes paid by labour income (typically social contributions): pensioners, unemployed, individuals with disabilities. These individuals will be subject to the higher consumption tax, but they will have no direct benefit from the reduction in the labour income tax. Note that we should be more precise here as to what we really mean by revenue-neutral tax shift. This may be taken to mean that the increase in consumption taxes will exactly compensate the reduction in labour income taxes while leaving welfare benefits – and the social contributions aimed at financing such benefits – unchanged *in nominal terms*. However, in this case the increase in consumption taxes will cut down benefits in real terms; hence it will reduce the purchasing power of benefit recipients. An alternative way to describe the same situation is by considering that the broader tax base of the consumption tax might simply

[104] For a detailed description of the dynamic of adjustment, see European Commission (2008), pp.193-98, where a simulation of growth effects with the Quest III model are presented.

reflect the fact that some consumers are benefit recipients who pay back part of the transfers they receive in the form of higher consumption taxes. In other words, the shift is in fact equivalent to a reduction of benefits. From this point of view, it may be seen as a way to overcome the political obstacles to a direct reduction of social benefits.

Similarly, the shift may affect the purchasing power of those individuals whose income is affected by minimum wages or other provisions expressed in nominal terms, if these are not adjusted or indexed. We have here a relevant trade-off: by indexing or adjusting to the price change minima expressed in nominal terms, the effect of the tax burden is lessened because the reduction in labour taxes will translate into higher nominal wages. If on the contrary there is no compensation for inflation, or in case indexation is reduced or eliminated by the law, the effect on tax shifting may be enhanced (so long as lower minimum wages increase employment) but we might have adverse distributional effects.

Shifting the tax burden to tax evaders

A further reason why a tax shift may imply a broadening of the tax base is related to the idea that consumption taxes can be an indirect way to tax those incomes that evade the income tax. The argument goes that, even if it is possible to evade income, and even if the VAT is itself evaded to some extent, a shift to consumption tax could spread the tax burden more evenly among compliant taxpayers and evaders; even if some taxpayers may be able to evade most of their income, they will not be able to spend all of their evaded income in goods and service for which it is possible evade the VAT. A consumption tax ensures that income which avoids or evades the income tax will bear some tax liability when it is spent; hence, a shift from the income tax to consumption tax is tantamount to a shift from honest taxpayers to evaders.

A related argument is that, in terms of enforcement and incentives to evade, it is better to have two "medium rate" taxes than having one tax with a high rate (for which the incentive to evade would be very high) and another with a low rate.

Unfortunately, these arguments do not take into account the fact that in most cases there is joint evasion of the income tax and the VAT: individuals who intend to evade the former tax must hide the value of their sales and output, and hence evade the latter; honest report of their gross sales would signal their income to the authorities.

As shown by Kesselman (1993) using a general equilibrium model, when the income tax and the VAT are jointly evaded, a change in the tax mix will have little or no effect in reducing or "distributing" evasion.

To illustrate, assume two sectors, one where both the income tax and the VAT are evaded, the other in which there is tax compliance; assume further that the producer in each sector buys goods from both sectors. Consider a revenue neutral tax reform consisting in an increase in the VAT rate and a decrease in the income tax rate.

The price of the first good (the taxed good) increases and the second sector producers, who evade the income tax, pay a higher tax on consumption. However, this causes an excess demand for the second good, whose price increases; this brings about an increase in the income of the second good producers. In the new equilibrium the increase in the evaded income in the second sector equals the higher tax paid consuming the first good. In fact, the whole tax revenue comes from the first sector. It is easy to realize that the only effect of the reform is a shift from the income tax to the VAT of the first sector, which leaves the total tax burden unchanged.

The conclusion is that evasion should not be a significant issue in the choice of the appropriate tax mix.[105]

Progressivity and non uniform commodity taxes

An aspect which is given much relevance in the debate is the alleged regressive character of the consumption tax. A general consumption tax is considered regressive in itself, because the share of income which is consumed is decreasing in income. However, over the life-cycle there is equivalence between income and consumption so that, as explained above, from an inter-temporal perspective a consumption tax should be considered equivalent to a proportional income tax.

Even accepting this, it may be claimed that replacing an income tax with a consumption tax has adverse effects in terms of equity because the income tax is progressive and can be tailored to the individual characteristics of the taxpayer and include deductions, exclusions and credits aimed at making the tax system more equitable, while the consumption tax is at best proportional (see however the discussion on differential commodity taxation below).

It is certainly true that a complete elimination of the income tax could reduce the ability to enact progressive taxation, but as long as the shift is of limited amount, it is possible to reduce the income tax rate by the same amount at all income levels and maintain the same degree of progressivity. It might be impossible to reduce the tax rate at very low levels of income, which are usually exempted from the tax; the individual

[105] A different view of the problem is offered by Boadway et al (2002). Their conclusion is that different evasion characteristics of direct and indirect taxes can indeed make the tax mix relevant as to enforcement and evasion. However, differently than Kesselman (1993) it is possible to evade direct and indirect taxes separately.

whose income is in this no tax area will suffer for the increase in the consumption tax while having no benefit from the decrease in the income tax. However, the reduction is usually in social contributions, whose rate is uniform and positive even at very low levels of income (note that when there is an upper limit to the tax base, as it is sometimes the case, a uniform decrease in the rate will result progressive). Additionally, a government concerned with equity and distribution can design the income tax change so that this is distributionally neutral and compensate any regressive effect of the increase in the tax shift by increasing the progressivity of the income tax.

This is not to say that the tax shift cannot be considered by the government as an opportunity to actually decrease the progressivity and distributional content of the tax system. Indeed, a reduction in progressivity has taken place in the last decades, also following the idea that the high tax rates implied by a very progressive tax system are harmful for incentives. It should be made clear however that the tax shift in itself can either increase or decrease progressivity, so this should not be used as an argument in favour or against such a reform.

Another important difference between the consumption tax and the income tax is that the former can be differentiated for different goods and services. Differentiation can be justified on the ground of efficiency of the tax system, when a higher tax is levied on goods and services which are complementary to labour supply (such as child care or transports) or on goods that produce negative externalities (e.g. carbon emissions).

From the first point of view, the difficulty in identifying the cases in which a higher or lower tax actually improves efficiency to an extent that outweighs the increase in administrative costs may be a reason why countries seem to prefer uniform taxation. It is true that the VAT has usually two or three different rates, but the fact that to good or service is assigned the standard, the reduced, or the super-reduced rate does not seem to be explained in terms of its degree of complementarity with labour supply; rather, differentiation seems to respond to the idea that it is consumed in a higher proportion by low income individuals (this is the justification for taxing food at a low rate), to the willingness to encourage consumption (books and newspapers) or the reasons related to international competitiveness (hotels and restaurants to encourage tourism).

Whatever our conclusion on the optimal extent of commodity taxes differentiation, it can be argued that the issue of differentiation is largely independent from the issue of the level of commodity taxation, and hence the pros and cons of the tax shift from labour income to commodity taxes.

Efficiency can also be improved by using taxes to correct externalities. A shift of the tax burden from distortionary labour taxes to green/environment taxes is often considered. The main examples of the latter are the carbon tax or taxes on the use of energy and petrol taxes.

In which sense the dividend might be considered "double" has long been (and still is) debated. If on the one hand a reduction in externalities is beneficial from a social point of view, optimal taxation theory shows that a reduction in labour taxes does not necessarily imply a reduction in distortion; it all depends on the distributive effect of the green taxes, i.e. on how the consumption of the externality generating goods is related to the distribution of income. If these goods are more valuable to individuals with a high income, the green tax will bring about a reduced incentive to earn income, which is analogous to the one induced by an income tax. If instead the reduction involves goods which are consumed in a higher proportion by lower income individuals, then the lower distortion is accompanied by an adverse distributive effect. Indeed, the distributional aspect of the joint change should be taken into account. In the limiting case where consumption of environment is perfectly related to income, so that green taxes have the same distributional effect of the reduced income tax, the distortion on labour market is unchanged by the tax shift. If on the other hand the distributive content is different, the usual trade-off between equity and efficiency may result. In any case, the conclusion is similar to the one we reached above for differentiated commodity taxes: the issue of specific taxes aimed at reducing externalities can be kept conceptually distinct from the issue of the optimal mix between labour income and consumption taxes.

1.4 The effects of a tax shift in an open economy

Up to this point, we have discussed the possible benefits from a tax shift in a closed economy. However, as said above, the benefits from the tax reform should be evaluated with reference to the challenge posed by the competition in the global economy.

The tax shift and competitiveness

The tax shift can be seen as a way to improve competitiveness in a fixed exchanges environment, i.e. as a substitute for a currency devaluation. The intuition is simple: while lower payroll taxes translate into lower costs and prices for domestically produced products, the VAT selectively affects only consumption prices of non traded and imported goods. As a consequence, domestic producers benefit from the tax change. Indeed, the shift is equivalent, in terms of effects, to a nominal exchange rate devaluation. The possibility to use the tax shift to increase the

competitiveness of domestic products might be a reason of popularity of such a reform. Unfortunately, this is at best a short term effect.

To illustrate, consider that, in the short term, with fixed nominal wages, the reduction in social security contributions translates into a reduction in production costs of domestically produced goods. This is where the improvement in competition comes from. At the same time, the VAT rate increase determines an increase by the same amount of prices of goods and services consumed domestically (non-traded goods and imports), hence a reduction in the purchasing power of wages. If the tax shift is revenue-neutral, so that the VAT increase fully finances the reduction in taxes on labour income, the net effect on prices is an increase in the imports prices and a decrease in exports producer prices, while prices of non-traded goods will be unchanged.

However, in the longer run, due also to the indexation of wages, the price of exports and non traded goods must increase. This is consistent with the fact that, in a fixed exchange regime, the temporary surplus of the balance of payments will require a monetary adjustment to a new equilibrium with a higher domestic price level.[106] Therefore, once prices and wages have adjusted to the new equilibrium, unless the terms of trade react to changes in the tax structure, all real variables are back to their initial values.

The tax shift is equivalent to a depreciation of the nominal exchange rate, whose beneficial effects on competitiveness are only temporary.[107]

It is possible to make the adjustment longer and the effect on competitiveness more permanent by resisting to the wage increase by limiting indexation and nominal adjustments in wages and prices. This would make the improved competitiveness permanent, although it would come at the cost of a reduction in the purchasing power and consumption of workers and pensioners, which would be very unpopular (and possibly counterproductive, especially in a period of economic crisis, where it is important to sustain aggregate demand).[108]

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[106] Under floating exchanges, the equilibrium would be reached through an appreciation of the exchange rates which reverses the initial effect.

[107] Early contributions emphasizing the fallacy in the argument that VAT promotes competitiveness are Shibata (1967) and McLure (1987). Feldstein and Krugman (1990) show that a shift from the income tax to the VAT can indeed have some effect on trade, but this depends either on the assumption that income tax is levied also on capital income or from the circumstance that the VAT frequently exempts housing and many personal services; the latter case, contrary to the lay view about the benefits of the VAT, implies a reduction of exports

[108] It has been suggested (OECD, 2010Germany, box 1.1) the possibility of a different outcome if all changes in labour taxes are borne (at least partially) by labour. As an extreme care, consider the possibility that the labour cost is not affected by the reduction in social security contributions. In this case the VAT increase would shift onto price, but there would be no offsetting effect on price

The tax shift as a response to corporate income tax competition

It is possible to give a different interpretation of the tax shift which is related to the issue of capital and corporate tax competition. There are different opinions among scholars about the extent of tax competition in capital and corporate taxes. Although it is possible to observe a clear downward trend in the corporate tax rates in recent years, tax revenue has been remarkably stable, and the evidence that tax competition is taking place and is limiting the possibility to raise revenue by taxing corporate profit is disputed (Hines, 2007; Devereux et al. 2008).

Looking at alternatives to the current system of source based taxation of corporate income, some possible options are (Auerbach, Devereaux and Simpson, 2010; Devereaux and Sörensen, 2006; see also OECD 2007):

- increasing coordination among states to charge the same corporate tax rate. This seems quite unlikely in the close future. Moreover, although there could be a common corporate tax system, there would remain an incentive to attract firms by over-providing infrastructures and various kinds of benefits, so that harmful competition would simply take a different form;

- switching to residence-based taxation of capital, so that investors would be taxed in their country of residence rather than in the country where they invested. This is considered an overwhelmingly difficult option to implement, as it requires that authorities collect and exchange information on all capital income earned abroad. Moreover, it would be difficult to coordinate taxation at the corporation and at the shareholder level, especially if the corporation and the shareholder reside in different countries. Finally, this would still require a high degree of international coordination, to avoid that the same income is taxed twice, once according to the source and then according to the residence;

- introducing, in connection with the idea of the tax switch, a "destination based" cash-flow corporate tax, so that profits would be taxed where goods and services are actually sold. This tax, in addition to avoiding (like any other cash flow tax) distortions in the investment decision and the choice of financial instruments, would have no effect on the location of capital or profits, which is irrelevant as to where the

from the cut in social security contribution, so that we would have an increase (by the amount of the VAT increase) in prices of imports and non-traded goods, with exports producer prices unchanged. The resulting surplus in the balance of payment would bring about an increase in domestic prices (in floating exchanges regime, we would have an appreciation of the nominal exchange rate), and the final effect would be a reduction of traded-goods (both imports and exports) and an increase of non-traded goods as a share of GDP.

tax is paid. A destination-based (R-based)[109] cash flow tax could be implemented through the VAT. Indeed, the value added of the firm (net of investment) can be thought of as a tax on economic rent (profit in excess to the "normal" remuneration of capital), plus a tax on labour income at the same rate. The destination-based character is secured by the zero rate on exports and taxation at full value of imports, whose effect is that the whole payment of exported goods goes to the destination country.

With regard to the latter option, it has been suggested (Calmfors et al., 2007, ch. 5) that a VAT could be enacted jointly with an offsetting decrease of labour tax, so that the net effect would amount to a tax on corporate rent. Such a tax system, is argued, would have several advantages with respect to a conventional corporation tax, whose rate could be lowered as well.[110]

Note that, even if it is not usually presented in this way, the tax shift under analysis goes exactly in the direction suggested. According to this perspective, it can be advocated as a way to contrast competition in capital and corporate income taxation.

1.5 Empirical evidence

There is no empirical evidence so far on the effects of reforms enacted in recent years. All available evidence is indirect and comes from cross-country analyses based on aggregate indicators of the tax structure. Arnold (2008), using a panel of 21 OECD countries over a period of 35 years, finds a robust positive correlation between a stronger reliance on consumption and property taxes and the growth rate, controlling for the tax level. The analysis takes into account the possible impact of variables such as inflation, trade openness and R&D expenditure and is robust with respect to endogeneity biases due to the impact of the business cycle. However, a limit of this kind of cross-country analysis, which is only partially addressed in the research, is heterogeneity of the tax systems, so that similar figures often correspond to quite different situations in terms of net tax effect. For example, there are cases in which pensions are taxed as income and others in which they are considered as capital income and taxed separately, so that a higher aggregate level of a tax does not always correspond to a higher net burden on the tax base (this mirrors the

[109] A R base cash flow tax considers sales of products and fixed assets minus purchases of materials, fixed assets and wages. A R+F base includes also financial flows such as increase in/repayment of borrowing and interests received/paid.

[110] Such a corporation tax would neither distort the investment decision nor affect the choice of the type of finance used. It would only reduce the scope for elusive location of debt in high tax countries.

analysis on net expenditure by Adema, 2001). Moreover, the analysis does not rule out the possibility that different tax structures and different growth rates can have common explanations rather than being one the cause for the other. Finally, and most important, different tax structures can reflect different degrees of distribution, so that it is the redistributive content of the tax rather than the relative importance of tax instruments that matters.

More recently, Xing (2010) has analysed a panel of 17 OECD countries over the period 1970-2004 and has shown that, under different model specifications, a revenue neutral shift towards property taxes from other categories is associated with a higher steady-state level of income per capita (hence with a higher growth rate in the transitional period). However, although there is strong evidence that personal income taxes, corporate taxes and consumption taxes are all worse than property taxes, no similar evidence is found for consumption over personal income taxes (or corporate over personal income taxes).

Therefore, further analysis, at a more disaggregate level and paying more attention to the net tax incidence of different taxes, is required.

1.6 Conclusions

In conclusion, a revenue-neutral shift from labour tax to consumption may prove to be an effective way to encourage growth by reducing the tax burden on labour.

However, we must be aware that the shift brings about some side distributional effects which might be taken into account. First, the lower tax burden on current and future generations' income is "paid" by an increase in the tax burden for individuals who finance their current consumption out of cumulated savings (wealth). Second, the positive effect on labour costs is stronger when benefits (pensions, unemployment benefits, etc.) are not adjusted to compensate for the increase in consumption goods and services; and when provisions such as minimum wages are not indexed, so that the shift results in a reduction in their real values. However, this may be difficult to accept from a distributional and political point of view, as it involves a growth-equity trade-off.

Put differently, for some governments a tax shift can be attractive on the political grounds since this kind of measure shifts total tax burden from labour to other taxpayers in a way that is less visible than direct redistributive measures.

We have instead rejected as implausible the claim that, by increasing the total tax burden of those categories or sectors which evade the income taxes but cannot evade (most of) taxes paid on their consumption, the shift could indirectly alleviate the problem of tax evasion. Similarly, we find that objections to the tax shift based on the alleged regressivity of a general consumption tax vis-à-vis the income tax miss the point, either because they fail to consider lifetime income and consumption as the proper basis of comparison, or because they do not take into account the possibility to compensate adverse changes in progressivity through appropriate adjustments in the income tax.

A further advantage of the reform is that an increase in the VAT coupled with a decrease of labour tax is equivalent, in an open economy, to a destination-based cash-flow tax on profits, i.e. a tax on pure rent of firms. Given the mobility of capital and the resulting tax competition, this objective may be taken into consideration, although it requires a certain degree of international coordination.

Finally, there may be some benefits from the tax shift in an open economy, as it represents a substitute for a nominal exchange rate devaluation (which is of course banned in a common currency area as the EU). Although the beneficial effects on competitiveness are only temporary and depend on the speed of prices and wages adjustment, the possibility to help exports can be particularly attractive as a stimulus to the economy in the current phase of difficult recovery from the financial crisis.

References

Adema, W., 2001. "Net social expenditure. 2nd edition". Labour Market and Social Policy Occasional Papers 52, OECD.

Alho, K. E. O., 2004. "The Finnish ENU buffers and the labour market under asymmetric shocks". Discussion Paper 914, The Research Institute of The Finnish Economy.

Arnold, J., 2008. "Do tax structures affect aggregate economic growth? Empirical evidence from a panel of OECD countries". Economic Department Working Paper 643, OECD.

Auerbach A., M. P. Devereaux and H. Simpson, 2010. "Taxing corporate income". In: *Dimensions of Tax Design. The Mirrlees Review*, Oxford University Press, Oxford.

Boadway R., Marchand M. and Pestieau P., 2002. "Towards a theory of the direct-indirect tax mix", *Journal of Public Economics*, 55, 71-88.

Calmfors, L., 1998. "Macroeconomic policy, wage setting, and employment: what difference does the EMU make?" *Oxford Review of Economic Policy*, vol. 14, pp. 125–51.

Calmfors, L., 2003. "Nominal wage flexibility and fiscal policy: how much can they reduce macroeconomic variability in the EMU?" In: *Submissions on EMU from leading academics*, HM Treasury, London, pp. 43–55.

Calmfors L., G. Corsetti, M. Deveraux, S. Honkapohja, G. Saint-Paul, H.-W. Sinn, J.-E. Sturm and X. Vives, 2007. *EEAG Report on the European Economy 2007*, CESifo, Munchen.

Devereux, M., B. Lockwood and M. Redoano, 2008. "Do countries compete over corporate tax rates?," *Journal of Public Economics*, 92, 1210-1235.

Devereaux M. P. and P. B. Sörensen, 2006. "The corporate income tax: international trends and options for fundamental reform", European Commission Economic Paper, n. 264.

EEAG, 2007. *Report on the European Economy*, CES-Ifo, ch. 5.

European Commission, 2008. *Public finances in EMU*, Report of the Directorate-General of Economic and Financial Affairs

Feldstein M. and Krugman P., 1989. "International trade effects of value added taxation", NMER Working paper n. 3163.

Fitoussi, J.-P., 2005. "Shifting the tax burden: from direct to indirect tax". Briefing Paper 3, European Parliament.

Fullerton D., Leicester A. and S. Smith, 2010. "Environmental taxes". In: *Dimension of tax design. The Mirrlees Review* , Oxford University Press, Oxford.

Hines, J. R., 2007. "Corporate Taxation and International Competition". In: A. J. Auerbach, J. R. Hines Jr, and J. Slemrod (eds), *Taxing Corporate Income in the 21st Century*, Cambridge, Cambridge University Press.

Kesselman J., 1993. "Evasion effects of changing the tax mix" *Economic Record*, 69, 131-48.

Johansson, A., Heady, C., Arnold, J., Brys, B., Vartia, L., 2008. "Tax and economic growth". Economic Department Working Paper 620, OECD.

Lipi´ska, A., von Thadden, L., 2009. "Monetary and fiscal policy aspects of indirect tax changes in a monetary union". Working Paper 1097, European Central Bank.

McLure C., 1987. *The Value-Added Tax: key to deficit reduction?*, Washington: American Enterprise Institute.

Meghir C. and D. Phillips, 2010. "Labour supply and taxes". In: *Dimensions of Tax Design. The Mirrlees Review , Oxford University Press, Oxford.*

Myles, G., 2008. "Economic growth and the role of taxation". Report prepared for the OECD.

OECD, 2007. "Fundamental Reform of Corporate Income Tax", Tax Policy Study No. 16, Paris.

OECD, 2008. *Taxing wages 2007-2008.*

OECD, 2008b. *Tax and economic growth.*

Shibata H., 1967. "The theory of economic unions: a comparative analysis of customs unions, free trade areas, and tax unions". In C. S. Shoup (ed) *Fiscal harmonization in common markets*, New York: Columbia University Press.

TAXUD, E. C. S., 2006. "Macroeconomic effects of a shift from direct to indirect taxation: a simulation for 15 EU member states". Note presented at the 72nd Meeting of the OECD Working Party No.2 on Tax Policy Analysis and Tax Statistics, Paris, 14-16 Nov. 2006.

Timbeau X., C. Blot, E. Heyer and M. Plane, 2006. "Contribution sur la valeur ajoutée: emplois à tout prix?," Documents de Travail de l'OFCE (Observatoire Francais des Conjonctures Economiques) 2006-21.

http://www.people.ex.ac.uk/gdmyles/papers/pdfs/OECDfin.pdf.

3 Policy responses to 2008-2009 downturn

3.1 Introduction

In late 2008 the world entered a major recession, the deepest since the 1929 Great Depression. During 2009, GDP fell by 4 percentage points over OECD countries, demand shrank drastically, industrial production and global trade contracted and unemployment in industrial countries swiftly rose into double digits. Some signs of slow recovery started being detected in the second half of 2009, but by mid 2010 world economic conditions were still weak.

The 2008-2010 economic downturn was prompted by a financial crisis, which started in the second half of 2007 with a subprime mortgage related turmoil in the US, and evolved by the third quarter of 2008 into a generalised loss of confidence in financial markets. This produced strong constraints to the liquidity of the economic system and therefore triggered a contraction of demand, which in turn caused cuts on investments and jobs, in a downward spiral.

The negative effects of the wide and deep financial crisis were partly mitigated by swift and unprecedented measures taken by governments and central banks. These actions prevented the world from going through an economic collapse similar to the one experienced in the 1930s. In addition, many governments approved major fiscal stimulus packages which, together with the effects of automatic stabilisers, help contain the economic downturn and paved the way for the economic recovery.

3.2 The 2008-2010 economic downturn

3.2.1 The prelude: the 2007-2008 financial crisis

In the second half of 2007 US sub-prime mortgage loans suffered wide losses, revealing the vulnerability of financial intermediaries. This caused a crisis of confidence in financial institutions and concerns over their solvency, rapidly spreading and producing significant losses to financial assets and undermining banks liquidity. The magnitude of the crisis became manifest in March 2008, with the US government-facilitated take-over of the investment bank Bear Stearns by JPMorgan Chase. The financial system was deeply weakened, but there were expectations that the crisis would mostly remain restricted to the US.

Conversely, from mid March 2008 concerns about banks' solvency spread, putting increased stress on the global financial sector. In June doubts about banks' capital position resurfaced as rating agencies downgraded

some insurance companies. The US government stepped in, providing liquidity support to a number of financial institutions, but the turmoil in the US financial market deepened up to 15 September, when the investment bank Lehman Brothers went bankrupt.

From mid September to late October 2008 the crisis of confidence spread rapidly across markets and countries and many other financial institutions faced the risk of default. Policymakers were forced to strengthen their interventions, to move from mere liquidity support to broader measures, including banks recapitalisation, nationalisations, and to act in a coordinated manner. This helped contain the financial distress, and from the second quarter of 2009 the first signs of financial market stabilisation were detectable.

Two broad categories of causes contribute to explain the upsurge of the financial crisis, namely macroeconomic and microeconomic causes. In addition, the crisis spread rapidly due to strong financial market integration and trade openness.

As for macroeconomic causes, these comprise global imbalances in countries current accounts and a long period of low interest rates (since the beginning of the decade). Low interest rates reduced the cost of borrowing, led to a credit boom and yielded to an increase of home purchases and households revolving debt in most developed economies. Low interest rates also induced asset managers in financial intermediaries to take on more risks, in order to guarantee higher returns to investments.

In addition, a number of microeconomic factors caused a growth of risks in the financial sector, which eventually led to its collapse and to the ensuing crisis. Among these, asymmetric information in capital markets, compensation schemes for financial sector employees which rewarded risk taking, and skewed incentives of rating agencies. Further, risk measurement techniques were probably inadequate with respect to new financial instruments.

3.2.2 The economic recession

Although national authorities coordinated actions helped to contain the financial distress, the financial crisis spread quickly and since mid 2007 industrial economies were hit by a restraint on liquidity and started experiencing a contraction of growth. The weakening hit the US first, while in most other advanced economies growth slowed down only by early 2008. Emerging market economies continued to experience growth, but export-oriented economies were hit by plummeting exports and tightening financial conditions and started showing signs of a slowing down. From late October 2008 the global economy experienced a severe decline, the worst in decades, magnified by rapid fall in trade volumes,

large employment cuts and a huge crisis of confidence. EU countries where also largely hit.

The global macroeconomic conditions before the crisis were characterised by a polarisation of savings and consumptions and by global imbalances in international demand patterns. Consumption growth was highly concentrated in few industrialized countries (mainly the US) and countries current accounts showed large global imbalances. Saving rates were high and increasing in most emerging market countries (particularly China and the Middle East) and declining in advanced economies. In addition the composition of capital spending in advanced economies showed a drift turn towards residential construction.

Expansionary policies allowing low policy rates for a very long period of time, contributed to a household spending boom in many industrialized countries and to a misallocation of resources. Advanced economies were affected by three main critical factors which made them highly vulnerable to negative income and asset price shocks. First, household debt relative to income rose swiftly, particularly in the US and UK. Second, residential investments and real house prices increased (this reinforced the growth of household debt, as it eased borrowing against housing collaterals). Third, the spending boom generated distorted signals to producers, causing overproduction and overinvestment in some sectors, primarily consumer durables, such as the automotive industry.

When the financial crisis burst, household balance sheets deteriorated significantly, household consumption contracted, as did output. This in turn caused a severe reduction of employment, and unemployment rates rose sharply. Similarly to households, also corporate balance sheets before the crisis had experienced increasing debt levels. The crisis reduced both corporate profitability and the value of corporate investments, with further negative effects on investments and employment.

The economic crisis affected all European economies, though with significant differences across countries, mainly reflecting the differing conditions of housing markets, the degree of export-dependency of the economy, the status of public finances, the size of the financial sector and its exposure to toxic assets. First, the more real estate were overvalued and the construction industries were oversized, the more domestic demand fell (for instance in Spain). Second, export-dependent economies suffered more from the collapse of global trade (for instance Germany). Third, when public finances were not healthy, governments faced stronger constraints to the implementation of discretionary expansionary policies (e.g. Greece). Finally, exposed financial sectors produced significant damages to the economies of Ireland, UK and Luxembourg, for instance.

The economic crisis brought to a halt the trend of GDP growth experienced in the EU during previous years (+3.2% in 2006 and +3.0% in 2007). Technically the recession began in the third quarter of 2008, after two successive quarters of negative quarter-on-quarter growth, and the economy deteriorated further in the following two quarters, when sharp GDP contractions were recorded (-1.9% and -2.5% respectively). The GDP fall resulted primarily from the severe reduction of output in the manufacturing and construction sectors. In mid 2009, at the height of the recession, GDP was down by 5.1% year-on-year. Despite modest signs of recovery during 2009, EU economic output at the end of 2009 had contracted by 2.2% compared to end 2008 and became positive, year-on-year, only in the second quarter of 2010 (+1.9%), when however EU output was still 3.3% less than before the burst of the crisis in the second quarter of 2008.

Table 1 shows selected indicators for the EU economy and government finances. As the result of the crisis, in the EU GDP grew only by 0.5% in 2008, then contracted by -4.2% in 2009 and slightly recovered during 2010. Simultaneously, inflation drop dramatically, from 3.7% in 2008 to 0.9% in 2009 and 1.3% in 2010. European labour markets were also strongly hit. In 2009 about 4 million jobs were lost in Europe, unemployment rate rose sharply from 7% in 2008 to 8.9% in 2009 and 9.6% in 2010. These data conceal wide differences across Member States, as shown in table 2. For instance, unemployment increased more than average in Baltic countries, Spain and Ireland, while it rose only limitedly in Belgium, Finland, Italy, Luxembourg, Malta, Poland, Sweden, and The Netherlands.

In addition, EU public finances deteriorated markedly in 2009. In the EU, the government deficit to GDP ratio increased from 2.3% in 2008 to 6.8% in 2009 and the government debt to GDP ratio increased from 61.8% to 74%. Again, as shown in table 3, debt and deficit increases and the pace of recovery are highly dispersed across EU Member States.

Table 1. Selected macroeconomic and public finance indicators for the EU27

	2008	2009	2010
GDP (% change)	0.5%	-4.2%	1%*
Unemployment rate	7%	8.9%	9.6%**
Inflation rate	3.7%	1%	1.3%*
Government deficit/GDP	2.3%	6.8%	n.a.
Government debt/GDP	61.8%	74%	n.a.

*forecasted; **September 2010

Source: Eurostat

Table 2. Selected indicators on the impact of the crisis on EU27 Member States

	Real GDP growth rate			Unemployment rate			Private consumption growth 2009–private consumption growth 2008	Fall in industry production index (09m2/08m2)	Export growth 2009 - Export growth 2008
	2008	2009	2010 (f)	2008	2009	2010 (June)			
AT	2.2%	-3.9%	2.0%	3.8%	4.8%	4.5%	-0.8%	-14.6%	-12.9%
BE	1.0%	-2.8%	2.0%	7.0%	7.9%	8.5%	-1.7%	-19.0%	-15.2%
BG	6.2%	-4.9%	2.3%	5.6%	6.8%	10.0%	-5.1%	-17.4%	-14.0%
CY	3.6%	-1.7%	8.2%	3.6%	5.3%	7.2%	-6.0%	-5.1%	-7.3%
CZ	2.5%	-4.1%	2.4%	4.4%	6.7%	7.1%	-2.7%	-20.3%	-18.5%
DE	1.0%	-4.7%	3.7%	7.3%	7.5%	6.9%	-0.4%	-20.6%	-18.8%
DK	-1.1%	-5.2%	2.4%	3.3%	6.0%	7.4%	-1.5%	-11.8%	-12.9%
EE	-5.1%	-13.9%	2.9%	5.5%	13.8%	18.5%	-5.2%	-30.2%	-13.0%
ES	0.9%	-3.7%	-0.2%	11.3%	18.0%	20.2%	-3.2%	-22.0%	-10.9%
FI	0.9%	-8.0%	3.2%	6.4%	8.2%	8.4%	-3.4%	-19.9%	-17.2%
FR	0.2%	-2.6%	1.7%	7.8%	9.5%	9.8%	-1.2%	-16.3%	-12.9%
GR	1.3%(p)	-2.3%(p)	-4.1%	7.7%	9.5%	12.2%	-1.8%	-4.9%	-9.5%
HU	0.8%	-6.7%	1.1%	7.8%	10.0%	11.3%	-5.9%	-25.4%	-16.5%
IE	-3.5%	-7.6%	0.4%	6.3%	11.9%	13.7%	-7.1%	n.a.	-8.5%
IT	-1.3%	-5.0%	1.1%	6.7%	7.8%	8.3%	-0.8%	-20.7%	-11.9%
LT	2.9%	-14.7%	0.7%	5.8%	13.7%	18.2%	-22.2%	-12.4%	-26.4%
LU	1.4%	-3.7%	5.7%	4.9%	5.1%	4.9%	-0.6%	n.a.	-6.6%
LV	-4.2%	-18.0%	13.3%	7.5%	17.1%	19.4%	-11.0%	-24.2%	-11.6%
MT	2.6%	-2.1%	16.7%	5.9%	7.0%	6.5%	-3.3%	n.a.	6.2%
NL	1.9%	-3.9%	1.8%	3.1%	3.7%	4.5%	-1.8%	-5.9%	-13.3%
PL	5.1%	1.7%	3.5%	7.1%	8.2%	9.5%	-4.7%	-12.4%	16.8%
PT	0.0%	-2.6%	1.9%	7.7%	9.6%	11.1%	-2.9%	15.6%	-11.2%
RO	7.3%	-7.1%	-1.7%	5.8%	6.9%	7.1%	-12.8%	-13.9%	-36.3%
SE	-0.6%	-5.3%	5.0%	6.2%	8.3%	8.1%	-2.8%	-20.3%	-11.1%
SL	3.7%	-8.1%	6.0%	4.4%	5.9%	7.4%	-2.6%	-21.2%	-15.1%
SK	5.8%	-4.8%	4.8%	9.5%	12.0%	14.4%	-5.6%	-27.4%	-13.4%
UK	-0.1%	-5.0%	1.8%	5.6%	7.6%	7.7%	-4.8%	-13.9%	-10.6%
EU	0.5%	-4.2%	1.8%	7.0%	8.9%	9.6%	-	-	-

(p) provisional

Source: Eurostat and European Commission (2009b) for the last three columns.

Table 3. Selected indicators on the impact of the crisis on public finances of EU27 Member States

	Budget balance 2008 (% GDP)	Budget balance 2009 (% GDP)	Government debt 2008 (% GDP)	Government debt 2009 (% GDP)
AT	-0.5	-3.5	62.5	67.5
BE	-1.3	-6.0	89.6	96.2
BG	1.7	-4.7	13.7	14.7
CY	0.9	-6.0	48.3	58.0
CZ	-2.7	-5.8	30.0	35.3
DE	0.1	-3.0	66.3	73.4
DK	3.4	-2.7	34.2	41.4
EE	-2.8	-1.7	4.6	7.2
ES	-4.2	-11.1	39.8	53.2
FI	4.2	-2.5	34.1	43.8
FR	-3.3	-7.5	67.5	78.1
GR	-9.4	-15.4	110.3	126.8
HU	-3.7	-4.4	72.3	78.4
IE	-7.3	-14.4	44.3	65.5
IT	-2.7	-5.3	106.3	116.0
LT	-3.3	-9.2	15.6	29.5
LU	3.0	-0.7	13.6	14.5
LV	-4.2	-10.2	19.7	36.7
MT	-4.8	-3.8	63.1	68.6
NL	0.6	-5.4	58.2	60.8
PL	-3.7	-7.2	47.1	50.9
PT	-2.9	-9.3	65.3	76.1
RO	-5.7	-8.6	13.4	23.9
SE	2.2	-0.9	38.2	41.9
SL	-1.8	-5.8	22.5	35.4
SK	-2.1	-7.9	27.8	35.4
UK	-5.0	-11.4	52.1	68.2
EU	-2,3	-6,8	61,8	74,0

Source: Eurostat

3.3 Policy responses to the economic downturn

At the onset of the financial crisis authorities all over the world implemented emergency measures to stabilise financial markets, including both monetary and fiscal policy. At first, in 2008, **bank rescue packages** and other **measures to stabilize the financial system** were introduced to ease financial markets distress, together with **policy rates cuts**, to improve the liquidity of the system. Policy choices varied across countries, depending on the distinctive features of their financial systems and economic structures. By the end of 2008 it was clear that these measures were not enough to definitely stabilize the financial system nor to prevent a sharp contraction of the real economy and give impulse to economic

activity in the short term. As the contagion spread to the real economy, and economic growth and employment collapsed, governments introduced also measures to stimulate aggregate demand and support supply. From late 2008 and early 2009 **fiscal stimulus packages** were approved and implemented in many countries. These included a mixture of public spending increases and tax cuts. In early 2009 the fiscal packages approved by most EU Member States to stimulate growth amounted to up to 2% of GDP on a two year period.

3.3.1 Measures to stabilise financial markets

In 2008, **bank rescue packages** were introduced with the aim to stabilize the financial system. Following the bankruptcy of Lehman Brothers in September 2008, the solvency of many important financial institutions was put under question and with it the liquidity of the economic system. In order to prevent a deepening of the financial crisis, many central banks and governments, including the European Central Bank and other European central banks, engaged in direct operations in financial markets and provided liquidity to the financial system, in addition, policy rates were also reduced. Banks and governments acted to restore the confidence in the financial system, to prevent further bankruptcies and to ensure that lines of credit to households and businesses were not endangered.

The initial targeted actions to rescue specific banks taken in early 2008 were soon followed by special **measures to stabilise the financial system**. This wide array of financial relief measures introduced between mid 2008 and mid 2009 addressed banks assets, banks liabilities and banks behaviour.

Measures tackling banks assets comprised deposit insurance (Austria, Belgium, Czech Republic, Denmark, Finland, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Netherlands, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland, UK, USA, Australia, Hong Kong, New Zealand) and capital injections to ensure bank solvency (Austria, Belgium, Denmark, Germany, Greece, Finland, France, Hungary, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, Norway, Poland, Portugal, Sweden, Switzerland, UK, USA, Brazil, Hong Kong, Korea). Bank recapitalisation was pursued mostly through purchases of preferred shares, which limit the risk of losses to the taxpayers. Government capital injections often came with strings attached, such as France requirements for beneficiary banks to extend new domestic loans or US, UK and German limits to the payment of common dividends. In other cases debt guarantees were provided (Austria, Belgium, Denmark, Germany, Finland, France, Greece, Hungary, Ireland, Italy, Japan, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, UK, USA, Australia, Canada, Korea, Mexico, New Zealand). Finally, the nationalisation of

insolvent financial institutions was a last resort to protect savings and prevent contagion. Banks were nationalised in Austria, Iceland, Ireland, Netherlands, Portugal, United Kingdom and the United States.

As regards bank liabilities, the measures introduced included both asset purchases (Germany, Japan, Ireland, Switzerland, UK, USA, Australia, Canada, Korea) and asset insurance (UK, Netherlands, USA), which were offered in order to address impaired assets. In particular, asset insurance was offered by the Dutch, UK and US governments and benefitted banks such as ING, RBS, Lloyds TSB, Bank of America and Citigroup. Finally, restrictions on short selling were introduced (Austria, Belgium, Denmark, Germany, Finland, France, Iceland, Italy, Japan, Netherlands, Portugal, Spain, UK, USA, Australia and Canada).

These actions were successful in preventing the collapse of the financial system and in limiting the crisis of confidence. However concerns about the health of major global banks remained high and banks continued to find it difficult to raise new capital from private investors. To increase confidence, stress test were conducted in the US and UK. In addition, the implemented measures were not as successful in targeting the credit exposures of main banks. This remains a main unresolved weakness of the financial system, even more critical if analysed in the light of lessons from the banking crises that hit Finland, Norway and Sweden in the late 1980s and early 1990s. Policy responses in Nordic countries showed that, besides acting quickly, optimal financial crisis management requires in-depth actions to clean up balance sheets and eradicate bad assets, thus restoring the ability of the financial system to operate effectively and achieve long-term profitability.

It is debatable whether in the current crisis authorities fully pursued this objective. Surely, given the width of the crisis and the significant financial dimension of rescue packages financed by governments, it proved hard to stress public finances further. In addition, emergency measures should be scaled back as financial markets normalise. At the same time, problem assets in banks' balance sheets need to be addressed. The focus for further strengthening the financial sector and prevent future crises is therefore rather on regulation than on direct public sector intervention (OECD Outlook 2010).

Bank rescue packages were coupled with **monetary policy** measures: policy rates were cut by Central Banks, to historically low levels, in many cases near to zero. Significantly, these measures were often taken in a coordinated manner by central banks. At the same time, central banks ensured liquidity to the system by establishing swap lines with other central banks. These were needed in particular for US dollars, the euro

and Swiss francs. So the Federal Reserve announced swap lines with the European Central Bank and the Central Bank of Switzerland (end 2007) with the Central Banks of Japan, England, Australia, Canada, Denmark, Norway, Sweden, Brazil, Korea, Mexico, New Zealand and Singapore (Autumn 2008).

As regards policy rates, cuts were often coordinated, so, for instances, in October 2008 there was a joint policy rate cut by the European Central Bank, the Federal Reserve, and the central banks of Canada, Switzerland, Sweden and England. By mid 2009 the Federal Reserve and the central Banks of Japan, England, Canada, Sweden, Switzerland had cut policy rates close to zero. The European Central Bank had cut its rate by ¾ percentage points between September 2008 and mid 2009, stopping before the zero lower bound. A few countries, such as Hungary and Iceland, were not able to follow this trend, due to a run on their currency, which their Central Bank contrasted through a tightened policy.

However monetary policy was less effective than forecasted, mostly because lending institutions reduced nominal rates but simultaneously tightened their credit standards, as a response to the crisis of confidence in the financial system. Therefore liquidity in the system remained constrained.

3.3.2 Measures to support the real economy

Towards the end of 2008 it was clear that both bank rescue packages and monetary policy were not enough, neither to definitely stabilize the financial system nor to prevent a sharp contraction of the real economy and give impulse to economic activity in the short term. By mid 2009 **fiscal stimulus packages** were approved in many countries for the purpose of stimulating aggregate demand and containing the economic downturn.

Faced with collapsing output and rising unemployment in EU countries, in late November 2008 the European Commission approved a European Economic Recovery Plan, providing a framework for growth-sustaining fiscal and structural measures to be implemented both by Member States and EU institutions. The set of actions proposed under the EERP include financial rescue packages, fiscal stimuli, temporary support to hard-hit sectors, and targeted support to vulnerable groups.

In response to the economic crisis, by late 2008-early 2009 most EU Member States took a proactive stance and adopted fiscal measures to support the real economy, generally including both tax cuts and increased government spending, and broadly in line with the EERP principles (European Commission 2009b).

The size and composition of fiscal stimulus packages implemented in 2009 and 2010 is highly dispersed across countries. Differences are first explained by the varying degrees to which Member States were hit by the crisis and by the country-specific features of the recession, caused by the diverse sector composition and macroeconomic conditions across countries. In addition, the different status of each Member State public finances at the outset of the crisis set differing constraints to government fiscal policies. Thus, expansionary policies prevailed during the year 2009, while in 2010 they continued to be implemented by those Member States whose public finances were relatively healthy at the outset of the crisis (Austria, Czech Republic, Finland, Germany, Sweden). Conversely, Member States with less healthy public finances or whose public finances deteriorated sharply, had to reduce or even reverse the previous year expansionary policies. In 2009-2010 some countries had to pursue fiscal discipline through tighter fiscal policies and consolidation measures due to public finances sustainability concerns and financial market constraints (Estonia, Greece, Hungary, Ireland, Latvia, Lithuania). In order to contrast the economic crisis and, at the same time, to prevent strong imbalances in public finances, some of the measures introduced were only temporary, aiming to provide an immediate support to the economy, while avoiding long term effects on public finances.

Under the EERP, the EU Commission proposed a 200 billion euro package of short- and long- term measures to boost aggregate demand and support growth and employment. Measures taken by Member States under the European Economic Recovery Plan are estimated to amount to approximately 2% of the European Union GDP in 2009-10. Measures introduced in 2009 were slightly above 1% of GDP and those introduced in 2010 were a little below 1% of GDP. Overall the financial dimension of revenue side measures is slightly larger than that on the expenditure side. As reported in table 4, among the biggest stimulus packages approved in the EU, there is Germany's, with an estimated fiscal cost of about 3.6% of GDP over 2009 and 2010; Finland, 3.8% of GDP in 2009-2010; Austria, 3.5% of GDP in 2009-2010; Sweden, 3.2% of GDP in 2009-2010; the UK, 2.6% of GDP in 2009-2010. Outside the EU, the US announced the largest package among OECD countries, with estimated fiscal costs equal to 2% of 2008 GDP both in 2009 and 2010. Japan approved a vest package too, amounting to 1.5% of the country's 2008 GDP in 2009 and 0.5% in 2010.

The size of the fiscal package is not a good proxy of the size of overall fiscal impulse to the economy, which is better captured by the change in governments' expected near-term budget balance (table 4, last column). The latter captures the effects of the fiscal packages as well as of the financial rescue packages and of the revenue deterioration due to the drop

in asset prices. It also captures the effects of automatic stabilisers, which contribute to smoothing the trend even when discretionary stimulus packages are absent.

Table 4. Composition of fiscal stimulus packages in EU27

	Discretionary fiscal stimulus (2009-2010) %GDP					**Fiscal balance % change (aggregate 2008-2010)**
	Overall	Measures aimed at households	Increased expenditures on labour market	Measures aimed at businesses	Increased investment expenditures	
AT	3.5	2.6	0.2	0.2	0.5	-5.2
BE	1.8	0.9	0.5	0.1	0.3	-4.9
BG	0.1	0.0	0.0	0.0	0.1	-1.9
CY	1.8	0.0	0.0	0.0	1.8	-3.5
CZ	2.2	0.1	1.1	0.5	0.5	-3.4
DE	3.6	1.5	0.5	0.8	0.9	-5.8
DK	1.5	0.0	1.0	0.1	0.4	-7.5
EE	0.6	0.0	0.5	0.0	0.1	-0.9
ES	4.0	1.6	0.1	1.4	0.9	-6.0
FI	3.8	2.6	0.0	0.7	0.4	-7.1
FR	1.0	0.2	0.1	0.4	0.3	-3.6
GR	0.3	0.3	0.0	0.0	0.0	-0.8
HU	0.0	0.0	0.0	0.0	n.a.	-0.5
IE	1.4	0.8	0.2	0.4	0.0	-8.5
IT	1.2	0.2	0.4	0.5	0.1	-2.1
LT	0.0	0.0	0.0	0.0	n.a.	-4.7
LU	n.a.	n.a.	n.a.	n.a.	1.7	-5.4
LV	0.9	0.6	0.0	0.3	0.1	-9.7
MT	1.2	0.4	0.0	0.2	0.6	1.5
NL	1.6	0.4	0.2	0.5	0.5	-7.1
PL	2.8	1.2	0.0	0.4	1.2	-3.4
PT	1.3	0.4	0.2	0.4	0.3	-4.0
RO	0.3	0.1	0.0	0.2	n.a.	-0.2
SE	3.2	0.4	1.8	0.4	0.6	-6.4
SL	2.2	0.0	0.8	0.2	1.2	-5.5
SK	1.2	0.6	0.2	0.2	0.2	-3.2
UK	2.6	1.7	0.3	0.4	0.2	-8.2

Source: European Commission 2009b.

As for the composition of stimulus packages, they generally include both tax cuts and increased public expenditure. Over OECD countries, cuts in personal taxes outweigh all other measures (approximately 0.3% of GDP on average in 2009), but overall increases in government spending outweigh overall tax cuts (approximately 1% of GDP versus approximately 0.55% of GDP on average in 2009). Besides for personal taxes, tax cuts were approved also for business taxes and consumption taxes. Some cuts were also introduced for contributions for public pensions, unemployment, health care, invalidity. The increase in spending

included public consumption, public investments, transfers to households and transfers to businesses. On average, spending on public investments as well as transfers to households was larger than expenditures for public consumption.

In the EU, under the EERP Member States were steered to implement programmes to support aggregate demand, employment and/or household income in the short-run, but at the same time to design measures that are consistent with the long term policy objectives of raising growth and jobs potential in the longer run, in line with the Lisbon strategy and with objectives of smooth functioning of the single market and of facilitating a conversion of the economy towards "greener" approaches.

Table 4 displays a breakdown of measures approved by EU Member States distinctively by target: households, labour market, businesses, investments. It shows that in most countries the financial weight of measures aimed at supporting household purchasing power was the highest, but that no uniform ranking of measures can be detected for all countries. In some countries investment expenditures rank second, in some other measures aimed at businesses and, finally, some countries put significant resources on labour market measures. On average, around 39% of the Member States' stimulus measures have been directed towards supporting households' purchasing power (including vulnerable groups), 16% to supporting labour market, 20% to investment activities, and 25% as support to businesses (European Commission, 2010c).

Labour market measures included both tax and expenditure measures. The former are described in paragraph 3.4, but a brief outline of non-tax labour market measures implemented by EU member states is provided here.

Non tax reforms targeting the labour market

Besides tax reforms, EU Member States introduced also significant non-tax measures to sustain employment and improve the functioning of the labour market. The European Economic Recovery Plan provided a framework for action also in this respect, further detailed at the beginning of 2009 in a communication by the European Commission (European Commission, 2009a) stating the following guiding principles for labour market policy:

- keep people in viable employment, by supporting employability and easing transitions to new jobs;
- support income and activation;
- introduce measures to boost labour demand and labour supply;

- invest in training and skills upgrading, and improve employment services.

Labour market policies approved by EU Member States were mostly consistent with these guidelines (European Commission, 2009b) and with the labour market strategies prevailing before the economic crisis. In addition, policy measures jointly pursue two objectives: i) containing the negative impact of the crisis on employment during the crisis and ii) not hampering reallocation and avoiding unemployment hysteresis, while preparing a well functioning labour market and a qualified workforce for the time when the economy will recover.

As shown in table 5, all Member States have introduced some kind of labour market support measures and 16 of them have also increased expenditures on labour market programmes (table 4). Table 5 shows that non-tax measures are highly diversified, but most countries have reinforced activation policies, to facilitate the transitions to new jobs, and invested in training and improvements of job placement systems. In addition, on the expenditure side, publicly sponsored short-time working schemes were reinforced (e.g. through part time unemployment support) and the coverage and generosity of unemployment and other social benefits were extended. However, the eligibility criteria and duration of benefit schemes was fine-tuned in order to prevent undesirable side-effects such as the unemployment trap and disincentives to work. Education and life-long learning measures were less common, while measures cutting labour costs were implemented in almost all countries (similarly, almost all countries introduced also some form of support for household purchasing power).

Despite unemployment rates rose since 2008, their increase has been below the worst expectations and labour shedding and job losses have not soared excessively. Discretionary measures introduced to contain the impact of the crisis on the labour market may have played their role, for instance through the increased flexibility granted by shorter hours or partial unemployment benefits. In addition, reinforced social safety nets are acting as automatic stabilisers to soften the impact of the economic downturn. Conversely, less emphasis was given to policies aimed at increasing labour productivity, such as enhancing education and life-long learning. These reforms would strengthen human capital and would have a positive impact on future EU competitiveness. In addition policies were also not sufficiently targeted at improving labour utilisation, a purpose that would contribute also to favourable future developments of European labour markets.

From a financial point of view, table 4 shows that increased expenditures on labour market measures make up only a minor share of total discretionary expenditures in all but few countries. Exceptions include Estonia, where labour market expenditures make up nearly all discretionary spending (0.5% GDP over a total of 0.6%), followed by Denmark, Sweden, and the Czech Republic, where labour market expenditures make up more than half of total discretionary expenditures (respectively: 1% GDP on a total of 1.5% GDP; 1.8% GDP over 3.2% GDP; 1.1% GDP over 2.2% GDP).

Table 5. Labour market measures in EU27 recovery plans (as of mid 2009)

	Encouraging flexible working-time	Improving job placement and investing in re-training	Enhancing education and life-long learning	Reinforcing activation	Cutting labour costs	Reinforcing social protection
AT	✓	✓	✓	✓	✓	
BE	✓	✓		✓	✓	✓
BG	✓	✓	✓	✓	✓	✓
CY	✓	✓				
CZ	✓	✓		✓		
DE	✓	✓	✓	✓	✓	
DK	✓	✓	✓	✓	✓	
EE						✓
ES		✓		✓	✓	
FI		✓		✓		✓
FR	✓	✓		✓	✓	✓
GR		✓		✓		✓
HU	✓	✓			✓	
IE		✓		✓		✓
IT	✓	✓		✓		✓
LT	✓	✓	✓	✓	✓	
LU	✓			✓	✓	
LV					✓	✓
MT		✓		✓		
NL	✓	✓			✓	
PL				✓		
PT	✓	✓	✓		✓	✓
RO		✓			✓	✓
SE		✓	✓	✓	✓	✓
SL	✓	✓		✓	✓	
SK	✓	✓		✓	✓	
UK		✓				✓

Source: European Commission, 2009b.

Despite most labour market measures are costly to the public budget, not all of them are expected to produce the same long-term effects. Expenditure on unemployment and other benefit schemes, on activation and training programmes and on measures to facilitate job reallocation introduced or reinforced during the crisis should decline as the economy recovers, while cuts on social security contributions are harder to reverse. In addition, the restructuring of labour support measures carried out

under the urgency of the crisis, together with some kind of experimentation, may be a positive legacy for EU labour market institutions.

3.4 Tax policy responses by EU Member States

On average, approximately half of the fiscal stimulus over EU Member States came from tax cuts, aiming at supporting household purchasing power, and therefore aggregate demand, at sustaining the supply side and at easing hiring conditions to reduce the stress on the labour market. With reference to taxation and social benefits the EERP suggests to Member States:

- a temporary increase in transfers to the unemployed or low income households, or a temporary lengthening of the duration of unemployment benefit;
- a reduction of social contributions paid by employers and a decrease of taxation of labour income for low wage earners;
- temporary reductions in the level of the standard rate of VAT;
- a reduction of employers' social charges on lower incomes to promote the employability of lower skilled workers;
- the removal of the requirement for micro-enterprises to prepare annual accounts (which may require a reform of business taxation, usually based on annual account).

Furthermore the EERP urged the Council to adopt the directive to make permanent reduced VAT rates for labour-intensive services and announces a Commission proposal on reduced VAT rates for green products and services, aimed at improving in particular energy efficiency of buildings.

Among revenue measures implemented by Member States, besides the effect of automatic stabilisers (public revenues deteriorated significantly due to the substantial output drop), discretionary tax reforms accounted for most of the impulse, and included both delays of tax payments or refunds, mostly temporary, and changes to the tax structure (reduction of tax bases and rates), mostly permanent. In addition, in some cases tax reforms approved before the crisis were revised or their implementation postponed.

Table 6 reports, distinctively for major types of taxes, the breakdown of measures implemented since 2008 by EU Member States by target (tax base or tax rate) and direction of change (increase or decrease). It shows that the number and scope of discretionary tax measures adopted by Member States was highly diversified and that tax reforms affected both

direct taxes (personal income tax, corporate income tax, social security contributions), and indirect taxes (value added tax, excise duties). In addition, both tax rates and tax bases were affected and the direction of change was not homogeneous, since both tax increases and tax cuts were introduced. Cuts most often affected personal and corporate income taxation, while increases prevailed in VAT and excise duties.

Table 6. Recent tax measures by type and direction of change

	Statutory rate	**Base or special regimes**	**Timing (revenue effect)**
	Personal income taxation		
Increase	FR, GR, IE, LV, PT, SL, UK (new top rate)	DK, EE, ES, GR, HU, IE, LT, LV, PT	
Decrease	AT, DE, DK, FI, FR, HU, LV, LT, PL, RO	AT, BE, BG, DE, DK, ES (2008), FI, GR, HU, IE, IT, LT, LV, LU, MT, NL, PL, PT, RO, SE, SL, SK	BE, DE, DK, PT,RO
	Social security contributions		
Increase	CY, EE, FI, HU, RO, SK	BG, CZ, EE, LT, LV	
Decrease	BG, CZ, FI, HU, RO, SE	FI, ES	
	Corporate income taxation		
Increase	HU, LT	BE, BG, GR (2009-2013), HU, IE, IT, LT (2009-2011)	IE
Decrease	CY, CZ, HU, LT, LU, GR (2010-2014), SE, SL, UK	AT, BE(2010-2011), CZ, DE, ES (2009-2011), IT, LT, NL, PL, PT, RO, SE, SK, SL, UK (2009-2011)	AT , FR, DE, NL, PT, IT
	Value added tax		
Increase	CZ, EE, ES, FI, GR, HU,IE, LV, LT,PT,RO	GR, LV, LT	CY
Decrease	IE, PT, UK (12.2008-2009)	BE, CY, DE, ES, FI, FR, HU, IT, LT, LV, MT, NL, RO, SK	BE, CZ, DK, ES, FR, IT, NL, PL, PT, SL, SK
	Excise duties		
Increase	BG, DK, EE, ES, FI, GR, HU, IE, LV, LT, PL, PT, RO, SL	DK, FI, GR, LV	
Decrease	IT, LT (2009-2011), PL, SK	BG	

Source: own elaborations based on European Commission (2010f) and European Commission (2010g).

Tax reforms introduced to contrast the economic downturn include first measures to support aggregate demand and therefore prevent a deepening of the recession. These primarily include support to household disposable income, through reforms of direct taxation, such as revisions of the personal income tax rates and base (brackets, allowances and credits), as well as "green" tax credits and allowances (i.e. energy subsidies and facilitations for energy savings), direct support to low income earners and other vulnerable social groups, targeted reductions of social security contributions. Changes to indirect taxes for the purpose of sustaining aggregate demand were extremely sporadic, for instance VAT rate reductions were rare, generally only temporary or only targeted at specific sectors. In a high tax area as the EU, discretionary tax cuts contribute to offset the negative impact of the crisis on labour market conditions, on employment and on household purchasing power. In addition, support to the supply side was equally pursued for its side effects on employment and thus aggregate demand, but also to foster medium term growth. Measures include targeted reductions of social security contributions, tax breaks for business, reforms of corporate income tax, facilitations for VAT payments and refunds. Finally, preferential tax regimes were often introduced, including measures such as special low rates on certain activities.

As reported in European Commission (2010c), the budgetary impact of most expansionary measures was well below a half percentage point of GDP, but some measures, mostly those involving adjustments in the tax rate, amount to nearly one percentage point of GDP. Reforms of the personal income tax, the VAT, or the reforms of social security, as well as some excise rate increases, have often involved large amounts.

Expansionary reforms were generally matched by measures to increase public revenue, in order to finance tax cuts and ensure public finances sustainability. They include primarily changes affecting indirect taxes, including increases in VAT rates and VAT base broadening measures, increases in excise duties rates and widening of the excisable base through the inclusion of previously exempted goods and services, primarily energy and alcoholic products. Environmental taxes were also increased, for instance by introducing or increasing carbon taxes or levies on motor vehicles. Property taxation increases were also introduced. Further, some expansionary measures had an explicit end date, so that their negative effects on the public budget were only limited to the short term. Finally, some Member States engaged also in tax administration reforms and introduced measures to contrast tax evasion. These measures help raising revenues and also contribute to a better functioning of tax systems once the economy will recover.

Therefore, expansionary measures were primarily pursued through reductions of direct taxation. This approach is broadly consistent with pre-crisis trends witnessed in the European Union and characterised by a greater reliance on consumption taxes and a reduction of the tax burden on labour and capital, in order to foster labour supply and labour demand and to increase employment and labour market participation (for instance, corporate income tax rates have been broadly declining since the 1980s). Furthermore, decreases of corporate taxation are also a result of increased fiscal competition, especially on mobile factors such as capital, and are consistent with recent trends towards a downward convergence of corporate tax rates in the EU. Finally, Member States have more room for manoeuvre when introducing changes to direct taxes than to partly harmonised EU taxes, such as VAT or excise duties.

3.4.1 Personal income tax reforms

During the years 2009-2010 a number of EU Member States introduced discretionary changes to their personal income tax rate and tax base. The reduction of the personal income tax liability was a primary measure to increase household disposable income and support household purchasing power. In many countries these expansionary measures are estimated to produce a budgetary impact of almost 1 %GDP on the two year period 2009-2010 (Austria: -1.15% GDP; Belgium: -2.11% GDP; Denmark: -1.62% GDP; Germany: -1.2 % GDP; Hungary: -1.1% GDP; Italy: - 1.2% GDP; Malta: -0.2% GDP; the Netherlands: -0.13% GDP; Poland: -0.6% GDP; Slovakia: -0.48% GDP; Slovenia: - 0.11% GDP; Spain: -0.75% GDP; Sweden: -1.1% GDP)[111]. Often measures were targeted only to lower incomes, specifically pursuing the increase of disposable income of the social groups more threatened by the economic crisis. In addition, an increase of disposable income of the lower earners has a proportionally higher impact on consumption, due to the direct correlation between income and the marginal propensity to save: one euro increase of disposable income of the low income earners produces a higher increase of consumption than an equal increase of higher income earners' disposable income. Finally, most reforms were permanent, although in some cases temporary schemes were introduced. Measures offering only a temporary relief to taxpayers were also set up, for instance by introducing payment delays.

Main changes introduced to the personal income tax include the reduction of marginal rates (either all, or only some, for instance the lower ones), the revision of the tax scale, by broadening income brackets (either again a generalized revision, affecting all income brackets, or a more targeted one,

[111] The net budgetary effect of personal income tax reforms is given by the sum of the negative impact of expansionary measures and the positive impact of consolidation measures. Details on the latter are available in European Commission (2010f).

focused only on selected income brackets, for instance the lower ones or the top one), the introduction or increase of exemptions and allowances.

Tax rate cuts were introduced less often than changes to the tax base, such as new or increased tax exemptions and allowances. First, measures affecting the tax base are generally less costly than changes to the tax rates in political terms. In addition, changes to the tax base can more easily be designed to target specific groups of taxpayers. Furthermore, increased allowances have a proportionally higher impact on the disposable income of low-income households. Finally, tax allowances were in some cases used to target specific objectives. For instance, tax allowances for housing expenditures were introduced to dampen the slump in the housing sector.

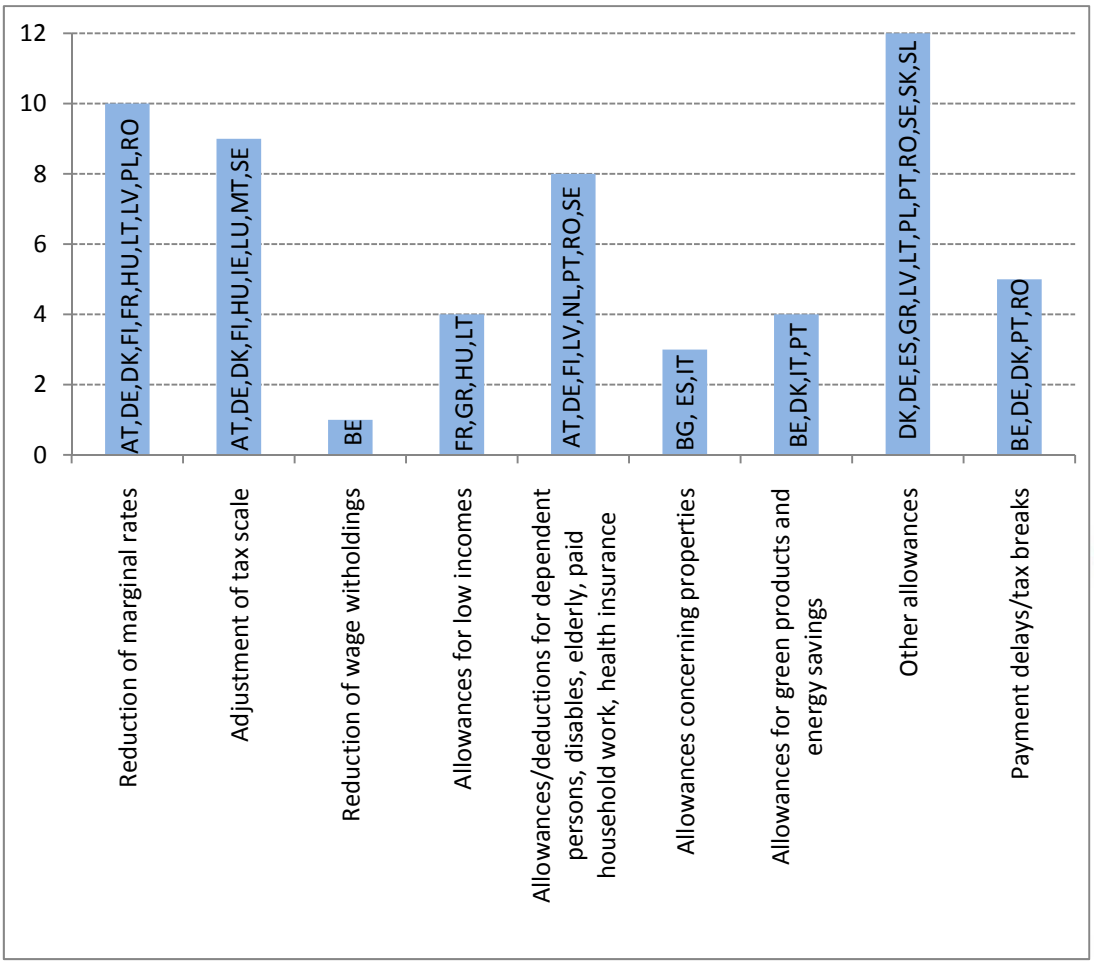
Tax rate cuts were often introduced only for the lower brackets, and in some cases coupled with lower income brackets enlargement, so as to provide support to lower income earners. Conversely, for fiscal consolidation purposes, tax cuts were in some cases matched with top rate increases. This may increase the progressivity of the tax systems. Finally, some countries suffering from particularly stressed public finances adopted measures to increase personal income tax revenue or decided to postpone previously approved tax decreases (Greece, Ireland, Estonia, Portugal).

As shown in fig. 1, ten countries have reduced personal income tax marginal rates (Austria, Denmark, Finland, France, Germany, Hungary, Latvia, Lithuania, Poland and Romania), five of them have also revised the tax scale (Austria, Denmark, Finland, Germany and Hungary), and other four countries have revised only the tax scale (Ireland, Luxembourg Malta and Sweden). One country has adopted measures to reduce wage withholdings (Belgium). Finally, relatively short payment delays have been introduced in Belgium, Denmark, Germany, Portugal and Romania. Generally, these measures have been introduced in 2009 and some in 2010.

In addition, many countries have sought to support income of taxpayers in specific conditions, by granting them special tax allowances and tax credits. Those entitled to these measures include families with children, dependent or disabled persons, elderly, and families incurring in costs related to childcare, healthcare and paid household works. Despite the existing differences across countries, these measures can be found in Austria, Finland, Germany, Latvia, the Netherlands, Portugal, Romania and Sweden. In order to support specific groups of taxpayers, that are more exposed to the effects of the economic downturn, other allowances or non taxable income or tax rate reductions can be found in some countries for specific sources of income, for instance pension income

(Denmark, Germany, Greece, Latvia, Lithuania, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden).

Fig. 1. Main personal income tax reforms 2008-2010



Source: European Commission (2010g).

Favourable treatments are also granted in some countries to household incurring costs related to the purchase or renovation or their homes: mortgage interest deductions or tax credits on renovation expenses have been introduced in Bulgaria, Italy and Spain.

Finally, the objective of supporting household income in some cases has been conjugated with the pursuit of a "greener" economy. So tax credits, allowances and benefits have been introduced for expenditure related to green products or for energy-saving restructuring of buildings (Belgium, Denmark, Italy, Portugal).

In conclusion it is worth noticing that many countries introduced also pro-cyclical measures such as increased tax rates, reduced personal allowances and increased taxation of bonuses and capital gains (in particular: Estonia, Greece, Latvia, Lithuania, Portugal).

3.4.2 Social security contributions reforms

The reduction of the tax wedge on labour was a policy issue in many countries well before the upsurge of the economic crisis in 2008. The crisis has added further incentives to these reforms. On average, the EU has a very high tax wedge on labour, and in two thirds of EU Member States, social security contributions by employers are the largest part of the tax wedge on labour, followed by income tax and employees' social security contributions (European Commission, 2010d). Social security contributions increase the cost of labour for employers and reduce disposable income for employees. In addition, the lowering of social security contributions also attenuates their regressive effect (which partly offsets the progressive impact of personal income taxes). A cut in social security contributions was therefore a policy choice introduced to increase labour demand and labour supply, and also to stimulate aggregate demand, through the increase of workers net income.

Despite the general pursuit of increased employment rates and participation to the labour market over EU countries, relatively few policy measures addressed social security contributions. Most often reforms reduced social security contributions only for low wage workers (at least this lessened the regressive structure of social security contributions) or for new hires. Even in countries adopting major expansionary reforms of social security contributions, the budgetary impact of such measures was on average much more limited than that of personal income tax changes (Bulgaria: -0.59% GDP; Hungary: -1.5% GDP; Slovakia: -0.06% GDP; Sweden: -0.3% GDP)

Generally, the restraints of public finances and the growing financing needs for expenditures related to labour market policies, such as increased unemployment benefits and widened employment support programmes, put additional constraints to governments' discretion over reducing social security contributions. In practice, more countries have introduced or revised their unemployment benefit or employment support systems than have reduced social security contributions. Thus incentives to labour demand and labour supply were mainly pursued through non-tax labour market measures and through changes to direct taxes (personal income tax and corporate income tax).

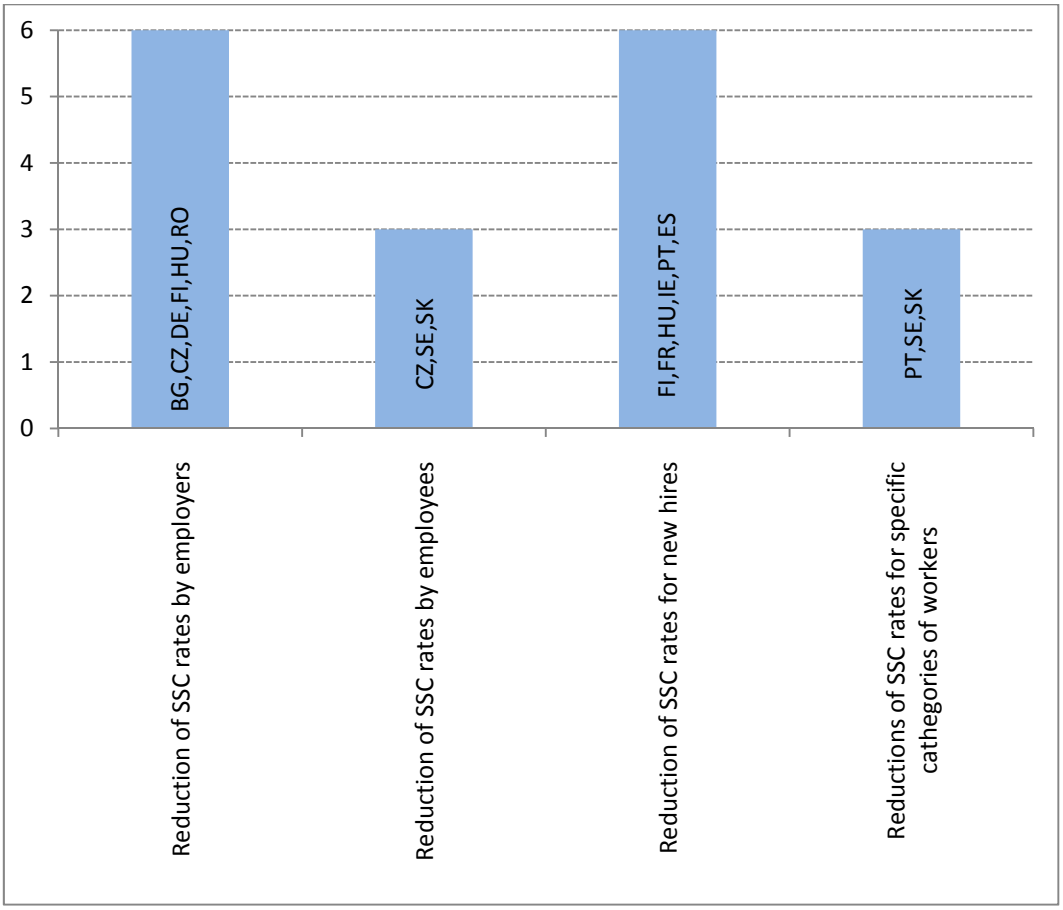
Among EU countries

- some lowered employers' social security contributions (Bulgaria, Czech Republic, Finland, Hungary, Romania and Germany – only temporarily);
- others lowered only employees' rates (Czech Republic, Sweden, Slovakia).

In addition to generalised rates cuts, in a number of countries SSC reductions were targeted:

- at new hires (Finland, France, Hungary, Ireland, Portugal, Spain);
- at other specific groups of workers (Portugal, Slovakia, Sweden). For instance, Portugal eliminated or reduced employer social security contributions for the first years of employment for permanent contracts or for new hires of workers over 55 years of age, who have been unemployed for at least six months. Ireland eliminated employer social security contributions for one year for new hires of people unemployed for at least six months. France and Spain reduced employer social contributions for new hires (reductions are relatively larger for low-wage workers). In Spain reductions apply to new hires of workers with family responsibilities on permanent contracts. In Hungary and Finland employer social contributions were reduced for specific groups, such as new hires of mid- to longer-term unemployed (Hungary) or workers in peripheral regions (Finland).

Fig. 2. Main reforms of social security contributions 2008-2010



Source: European Commission (2010g) and OECD (2010c).

Conversely, a number of countries did not introduce any significant change (Austria, Belgium, Greece, Italy, Malta, the Netherlands, Poland, Slovenia, United Kingdom), while others increased social security contributions by employers, or employees or both, possibly under the pressure of increased financial needs to fund expenditure programs and of deteriorating public finances (Bulgaria, Cyprus, Estonia, Finland, Latvia, Lithuania, Romania).

3.4.3 Other tax reforms

Value added tax reforms

Counter-cyclical VAT reforms to sustain demand would include the lowering of tax rates (both standard and reduced ones) and base narrowing measures, including the extension of goods and services subject to the reduced rate. In practice most of the expansionary measures targeting the VAT were introduced only temporary, to encourage spending by businesses and consumers in the short-term, without imposing a significant long-term burden on the public budget.

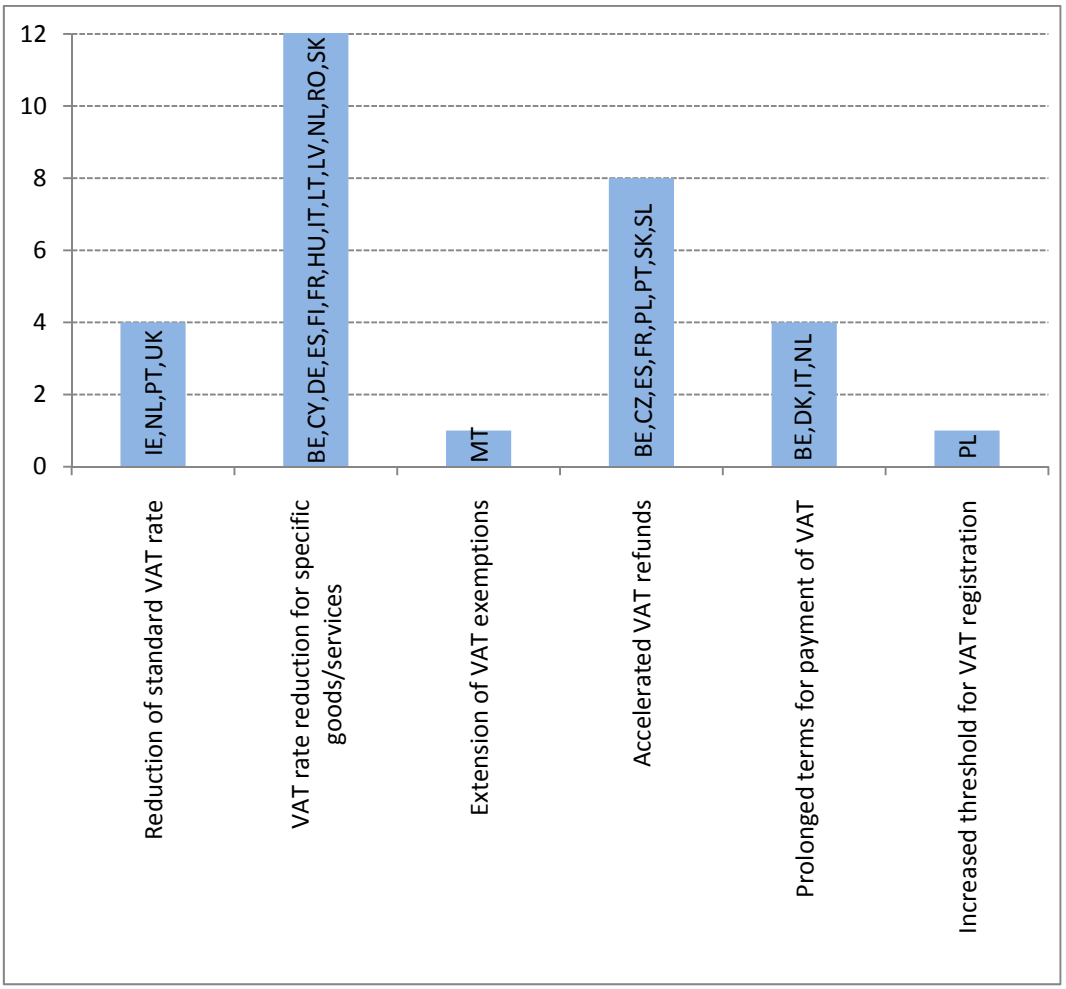
At the upsurge of the crisis, in late 2008 and early 2009 some countries postponed plans to increase VAT rates (Netherlands, from 19% to 20%) or actually reduced the standard VAT rate (Ireland, from 21.5% to 21% in 2010; Portugal, from 21% to 20%; UK, from 17.5%to 15% temporarily, between 1 December 2008 and 31 December 2009).

Later on, in 2009 and 2010, many more countries raised their VAT rates (Ireland, already in December 2008, from 21% to 21.5%; and, from mid 2009, Hungary, from 20% to 25%; Estonia, from 18% to 20%; Czech Republic from 19% to 20%; Latvia, from 21% to 23%; and then, from mid 2010: Lithuania, from 21% to 23%; Spain, from 16% to 18%; Portugal back to 21%; Greece, from 21% to 23%; Finland, from 22% to 23%; Romania, from 19% to 24%) and other increases are already planned for early 2011 (UK, from 17.5% to 20%).

These increases of VAT rates have undoubtedly a pro-cyclical effect and as VAT is shifted on to consumers, these measures may further depress demand. In addition, counter-cyclical reforms of VAT were introduced, but mostly with zero-effect on the long term public budget. These include, for instance, limited and temporary reliefs, for instance through the reduction of delays for value added tax refunds, or extending the deadlines for VAT payments. In addition, in a few cases, refunds and exemptions criteria were modified as well as other general provisions. As such, these reforms mostly benefitted businesses rather than consumers. Finally, a high number of base narrowing measures were introduced, in many cases for equity considerations: for instance the tax burden on food

or necessities was reduced (Belgium, Finland, Hungary, Lithuania, Slovakia). In addition, some countries introduced reduced rates for labour intensive sectors, such as tourism or restaurants (Belgium, Cyprus, Finland, France, Germany, Hungary, Latvia). Generally, however, the positive budgetary impact of VAT rate increases was much larger than the negative effect of the base narrowing measures.

Fig. 3. Main reforms of value added tax 2008-2010



Source: European Commission (2010g).

These measures may have been enacted to finance increased welfare spending (especially on social security) and other exceptional expenditures prompted by the economic crisis (such as measures adopted to save private banks) in order to limit the eroding effects on public finances and public debt. In addition, pro-cyclical reforms of the VAT may have been needed to offset the negative impact on the public budget caused by cuts to other taxes. If VAT rates increases are matched by cuts to direct taxes, then countries are experiencing some kind of tax shifting from direct to indirect taxes, also confirming the recent EU trends towards higher consumption taxes. This may be specifically the case for Finland,

Hungary and Lithuania, that modified their personal income tax scale and/or rates in 2009 and 2010 and at the same time increased their VAT rates.

The overall budgetary impact of both expansionary and consolidation VAT measures for 2009 and 2010 for countries that made available full estimates is highly dispersed, but in some countries is significantly positive: Belgium: -0.33% GDP; Bulgaria: -0.44% GDP; Estonia: +0.5% GDP; France: -0.45% GDP; Greece: +1.24% GDP; Hungary: +0.6% GDP; Latvia: +2.1% GDP; Lithuania: + 0.7% GDP; the Netherlands: -0.01% GDP; Poland: -0.25% GDP; Portugal: +0.3% GDP; Spain: -0.29% GDP; UK: -0.87% GDP.

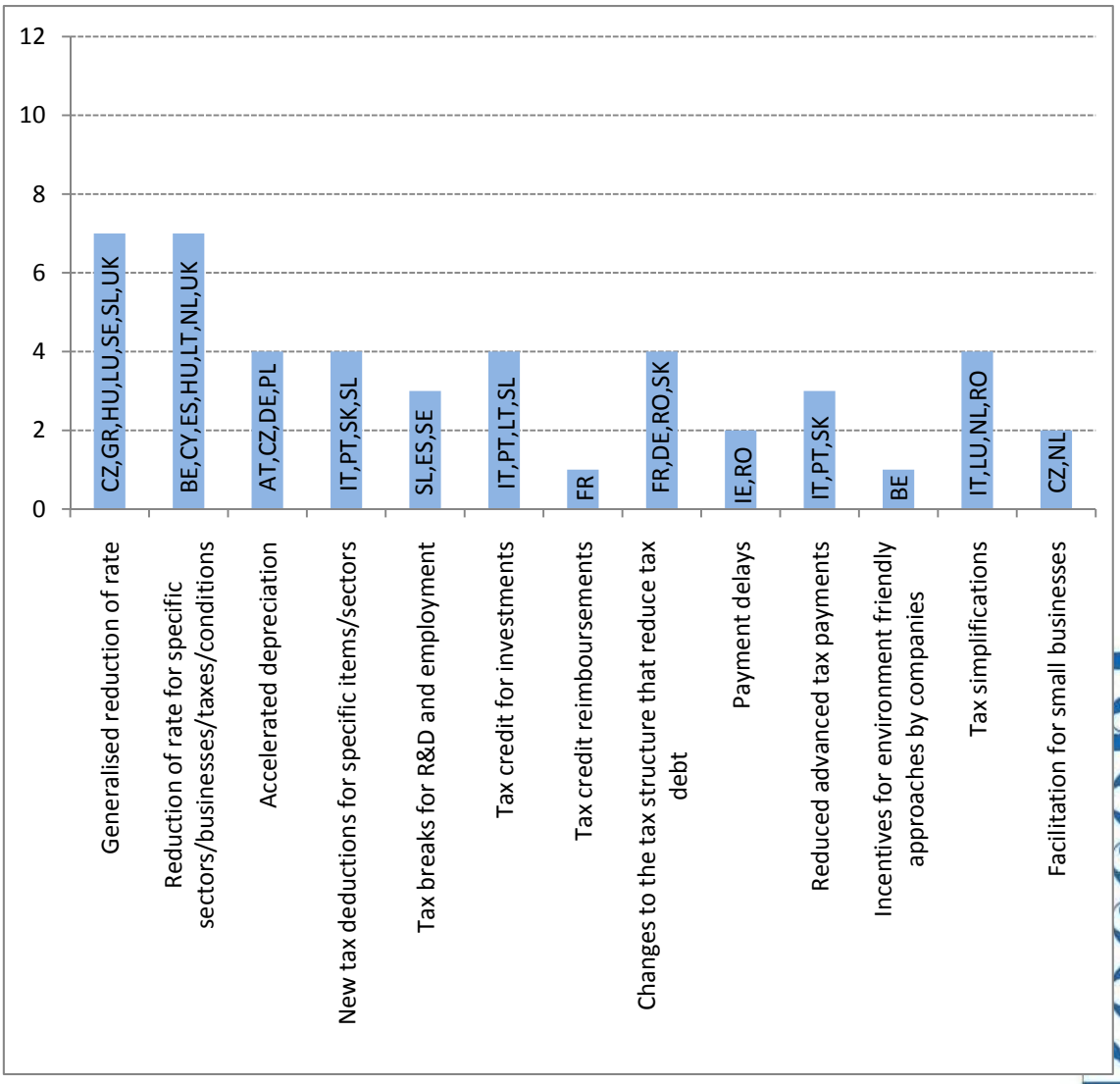
Corporate income tax reforms

A wide array of reforms affected the corporate income tax. Some countries reduced the general tax rate (Czech Republic, Greece, Hungary, Luxembourg, Sweden, Slovenia, United Kingdom) or the tax rate for specific sectors/businesses/taxes/conditions (Belgium, Cyprus, Hungary, Lithuania, the Netherlands, Spain). In times of recession these measures do not provide any benefit to the many loss making companies, but surely are consistent with recent trends towards a reduction of corporate taxation to increase a country attractiveness to investors. Other measures with zero effect on the public budget, but granting higher liquidity to companies, include payment delays (Ireland and Romania), reduced advanced tax payments (Italy, Portugal and Slovakia), tax simplifications (Italy, Luxemburg, the Netherlands, Romania), and facilitations for SMEs (Czech Republic, Slovakia).

Other countries opted for a revision of the tax base, for instance by introducing accelerated depreciation (Austria, Czech Republic, Germany, Poland) or new tax deductions for specific investments or sectors (Italy, Portugal, Slovakia, Slovenia), which should both bolster investments. In a few cases, tax cuts were granted to SMEs (Germany, the Netherlands).

Often tax base reforms were only temporary (for instance in Austria, Czech Republic, Italy). Tax breaks were also introduced for specific circumstances, for instance for Research & Development expenditures or for new employment (Spain, Sweden, Slovenia, France, Germany, Slovakia).

Fig. 4 Main corporate income tax reforms 2008-2010



Source: European Commission (2010g).

Excise duties and environmental reforms

Besides being used to contrast the economic crisis and avoid a deeper recession, tax reforms were also enacted to create the right incentives to change the economic structure and the behaviour of economic agents that will be useful to sustain growth when recovery will take hold. Thus, some countries reduced taxation on desirable choices and behaviours and increased taxation on undesirable choices and behaviours. The latter provide also an additional source of revenues. For instance, a number of countries introduced or increased excise duties on electricity, coal, tobacco and/or alcohol (Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Spain, Finland, Greece, Hungary, Ireland, Latvia, Romania, Slovenia, United Kingdom), or introduced/increased environmental or health related taxes (Germany, Denmark, Greece, Italy, the Netherlands, Poland).

Among these, a couple also introduced tax incentives to promote a "greener" economy and society: for instance, Germany introduced incentives for low emission vehicles and the Netherlands approved environmental subsidies.

3.4.4 Tax policy responses: an assessment

There is widespread consensus that the financial and, later, economic crises were not triggered by tax-related factors. Notwithstanding this, tax distortions may have exacerbated the spam and magnitude of the crisis (Hemmelgarn and Nicodème, 2010; Keen et al., 2010). For instance, some features of tax systems may have increased indebtedness by households and companies, and this contributed to the worsening of the fall of demand when the liquidity of the economic system became constrained. First, in many EU Member States, the non-neutrality of corporate income taxation and the preferential treatment for debt over equity may have increased the leverage by companies. Second, by the same token, the preferential tax treatment for house-related mortgage interests may have contributed to the increased leverage of households. Finally, the development of complex financial instruments designed to take profit of tax differentials across countries may have increased risk-taking by financial institutions (IMF, 2009a).

Conversely, among the measures to contrast the economic downturn, tax policy reforms had a significant role in fiscal stimulus packages, and were designed as a tool to support demand and to foster supply. Despite some common trends, tax reforms were highly differentiated across countries. These differences are partly explained by the different initial conditions of each country as regards both the economy and the status of its public finances. Given these differences, since 2009 some countries have performed better, while in others the economy is still compromised. The implementation of discretionary fiscal packages is too recent to allow a rigorous statistical assessment of the effectiveness of tax measures undertaken by Member States to alleviate the negative employment and social implication of the crisis, and to investigate how much the different economic performances by different countries can be explained by the different policies implemented, rather than by other non-tax factors, above all the different initial conditions. Comprehensive statistical data needed for such an evaluation are not yet available, and there are no empirical studies offering a deep and comprehensive analysis of these policies effectiveness. It is however possible to assess the discretionary tax reforms implemented with regard to:

a) the consistency of discretionary tax reforms with the theoretical prescriptions on optimal taxation and with empirical evidence on the

effects of fiscal policy on growth and employment that can be found in the literature;

b) the similarities and differences between current discretionary tax reforms and the main tax reforms triggered by past financial crises (as described in part 1).

Theoretical prescriptions on optimal tax reforms

The basis for assessing the consistency of discretionary tax reforms with theoretical prescriptions and with the pursuit of employment and growth recovery is the recognition that the immediate economic recovery requires tax changes that produce an increase in demand, while improving long-term growth requires tax changes that increase supply. As short-term tax concessions can be hard to reverse, there is a danger of short-run policy damaging the chances of sensible long-term policy. Hence policy responses to the downturn should allow a reconciliation of short-run and long run objectives.

While actual tax reforms that are most likely to enhance growth may differ across countries, depending on countries' specific tax and economic structures, some theoretical works suggests a "tax and growth ranking", as summarized by Johannson et al. (2009). However the magnitude of the effect of taxes on growth depends on a wide array of factors and is not clearly illustrated. Conversely, this literature suggests that recurrent taxes on immovable property are the least distortive in terms of their effect on long-run per capita GDP. They are followed by consumption taxes, which may reduce work incentives but do not affect incentives to save, and then by personal income taxes, which reduce employment and human capital investment, and can weaken labour productivity. "In-work benefits" may partly mitigate these effects for low income earners. Finally, corporate income taxes are deemed the most harmful to growth. Therefore a revenue-neutral growth-oriented tax reform would encompass the shifting of part of tax revenues from income taxes to the less distortive consumption and property taxes.

As reported in table 6 and discussed in paragraph 3.4, reductions of personal income tax rates and base are among the measures most frequently included in the fiscal stimulus packages recently approved by EU Member States. They are followed by reductions of corporate income tax rate. Based on the theoretical results summarized above, these reforms should have some growth enhancing effects, as they reduce the tax liability of personal and corporate income taxes – deemed to be harmful to growth. First, the reduction of personal income tax liabilities increases households purchasing power and therefore increases aggregate demand in the short run, which should in turn favour a swift economic stimulus. In addition, personal income tax reforms reducing marginal and average

effective tax rates on labour income may increase labour supply and rates of participation in the labour market. In some countries, tax reforms encompassed also a reduction of social security contributions by employers and employees. Cuts to social security contributions also decrease the tax wedge on labour, and they should thus contribute to boost aggregate demand, by increasing current employees' purchasing power. They may also increase employment by stimulating labour supply.

However the magnitude of this last effect is quite controversial in the economic literature, as it crucially depends on the value of the elasticity of labour supply to wages, which may vary greatly over countries, sectors and time. If labour supply elasticity is low, the reduction of the tax wedge has low incentive effects on employment (except for workers experiencing very large tax cuts). This position is supported by Slemrod (1992), providing evidence that "real" decisions (i.e. those concerning labour supply, savings and investments) are the least responsive to tax reforms. In addition, the literature suggests that the elasticity of labour supply mostly depends on non-income variables, especially gender. Therefore reforms that reduce the tax wedge on labour may be partially ineffective in boosting employment. Furthermore, the cost-effectiveness of cuts to social security contributions depends on the kind of reductions introduced, and generalised cuts, affecting all workers and sectors, are deemed less cost-effective than targeted reductions, as for instance those directed to new hires, young or old workers, specific sectors or employers, such as SMEs (OECD, 2010c). In addition, generalised cuts may be preferable during recessions and early stages of recovery, when the policy goals aim at maintaining overall employment. During recovery phases, targeted measures may better help reintegrating the unemployed into the workforce and encouraging hiring by firms (OECD, 2010c).

The overall effect of fiscal measures on employment is the result of the mix of tax measures implemented: if cuts to personal income taxation and social security contributions produce a positive effect on employment, this effect may be offset by other factors, for instance the increase in consumption taxes and the decrease of capital income taxation and increased allowances to families (Blomquist et al., 1997). As for personal income tax rate cuts, if cuts to social security contributions are not targeted only at lower income brackets, they may reduce the redistributive properties of progressive personal income taxation and thus lower the inequality reducing effects of the tax system.

Turning to medium-term growth prospects, these crucially depend on investments, which may be stimulated by increasing net returns to investments via a reduction of marginal and average capital income tax rates. Recent reductions of corporate income tax rates are consistent with a

trend already detectable in the EU before the crisis and aimed at improving the attractiveness and competitiveness of European economies in a global context characterized by high factor mobility. While corporate income tax cuts may be of limited relief for companies incurring losses during the crisis, when the economy will recover these measures should foster supply and therefore sustain medium-term growth. However, cuts to capital income tax rates may increase income inequality, since capital is usually more unequally distributed than income.

The financial feasibility of revenue-reducing tax reforms is limited by the fiscal position of single countries and any fiscal reform involving tax cuts should include provisions on how to finance the reduced revenues, either through expenditures cuts or through increased revenues from other sources, while increased debt is not a medium-term sustainable option. This is of particular significance during economic recessions, when public finances are already exposed to deterioration due to the effect of automatic stabilizers, and clearly the implementation of discretionary expansionary fiscal policies reinforces these effects. It has been estimated that financial crises shift the economic growth path on a lower level and increase public debt (Reinhart and Rogoff, 2009). Therefore a financially viable fiscal reform should match immediate tax cuts with simultaneous or subsequent measures to increase revenues, and the sustainability of revenue cuts is severely limited by countries fiscal position. If tax cuts are financed by increased debt, they may help a swift recovery, while in the medium term they impose a heavy burden on the economy and can become harmful to growth. As for discretionary fiscal packages implemented during the current economic downturn, they often included measures to increase revenues, primarily increases in consumption taxes (VAT and excise duties) and enlargement of corporate income tax base. These measures should help fiscal consolidation, reduce the risk of excessive growth of public debt and help sustain medium term growth. Despite tax cuts have been coupled with measures to increase tax revenues, on average EU Member States are now facing increased debt and the problem of fiscal consolidation will be a key issue in the in the coming years.

Finally, as reported above, tax distortions may have exacerbated the spam and magnitude of the crisis and tax reforms pursuing sustained long term growth should also aim to remove these tax distortions and non-neutralities. For instance tax provisions that foster households and corporate leverage, such as the preferential treatment for debt over equity in corporate income taxation and for house-related mortgage interests in personal income taxation should be revised. However, in this case, the time inconsistency problem, typical of many tax reforms, may be particularly severe. Removing these provisions during the economic

downturn may further depress demand at a time when demand is already low due to the crisis. A crucial issue for policy makers is therefore how to correct these asymmetries, while taking into account possible time-inconsistencies.

Current and past tax reforms

The current economic crisis stands out from major past crises described in part 1 for its global and transversal spam and for its huge negative effects on economic activity, demand and employment. As for tax reforms implemented, some of the main features of current reforms recall measures introduced after past financial crises, in particular, with reference to the results of part 1:

- the reduction of personal income tax rates was introduced also in Sweden, Norway, Japan and Finland (on labour income); reforms included also increased tax allowances for specific personal and family conditions such as: children allowances, work-related and commuting costs allowances, earned-income allowances. In these countries, personal income tax reforms marked a departure from the idea of tax systems as primarily based on a strongly progressive income tax. However, in the Nordic countries allowances favouring households with low income and/or many children were introduced to compensate for the adverse distributional effects of a less progressive income taxation;
- corporate tax rates were reduced and tax based broadened in Sweden, Finland and Norway. In addition, in Sweden and Norway the reform of capital income taxation introduced a flat rate equal to the lowest of the personal income tax (dual income tax);
- the VAT rate was increased significantly in the Swedish reform, the tax base largely broadened. In Norway and Japan, the reform encompassed the introduction of a VAT.

The measures introduced during the current crisis recall past measures for the emphasis given to the reduction of personal and corporate income taxation to boost demand and employment. They are also similar for the upward revision of indirect taxation, in particular the VAT, as a source of increased revenues.

Conversely, a remarkable difference with respect to previous crises relies not on the individual measures introduced, but on the proactive role explicitly taken by governments to contrast the economic downturn, on the design of targeted discretionary fiscal measure, specifically conceived for recovery purposes, and on the steering and coordinating role played by EU institutions.

In late 2008-early 2009, faced with collapsing demand and rising unemployment, the governments of many EU Member States quickly responded by devising first financial sector rescue measures and then fiscal stimulus packages. Differently from what happened in previous financial crises, the reaction was swift and targeted, the interventionist stance often openly declared: fiscal policy was to some extent "rediscovered" or at least explicitly exploited. In addition, tax reforms were often specifically designed to respond to the crisis, while in past financial crises the causal nexus between economic downturn and tax reforms was not so neat and straightforward. As an extreme example, in 2008-2009 some countries delayed or withdrew the implementation of previously approved tax reforms (e.g. VAT). Finally, at the onset of the crisis, EU institutions played a key role in promoting an interventionist stance by Member States, for instance through the EERP. EU institutions acted as a "fiscal policy board" (Solow, 2005) and, primarily through the EERP, provided guidelines and steered Member States to take swift action, in particular to support aggregate demand, employment and/or household income in the short-run, while at the same time to ensure the long term policy objectives of raising growth and jobs potential in the longer run, in line with the Lisbon strategy and with the objectives of smooth functioning of the single market and of facilitating a conversion of the economy towards "greener" approaches.

3.5 Concluding remarks

Since early 2009 most EU Member States introduced fiscal stimulus packages to contrast the effects of the economic crisis on consumption, employment and production. In some cases these packages were of significant financial dimension, but countries with less healthy public finances were more constrained in the design of discretionary fiscal packages and generally could not sustain a strong fiscal effort for too a long time. Some countries with highly compromised public finances could not devise any significant fiscal support measure.

Fiscal packages were broadly consistent with the guidelines detailed in the European Economic Recovery Plan (EERP) and included both revenue and expenditure measures.

As for labour market and employment support, expenditure side measures made up most of the measures implemented, together with measures pursuing a revision of labour market institutions. Employment support came also from cuts to social security contributions. In addition,

personal income tax cuts had a major role in sustaining household purchasing power.

Tax policy was highly diversified across countries, reflecting the complexity of tasks faced by governments, the differing macroeconomic and public finance conditions, the different pre-crisis composition of the public budget and its trends. For each type of tax, both cuts and increases can be found across Member States. However, expansionary reforms have some common features.

Expansionary tax reforms involved primarily the reduction of direct tax liabilities, through cuts to personal income tax rates and base and, in a limited number of cases, the reduction of employers' and employees' social security contributions. As for the supply side of the economy, significant cuts were introduced to company income tax base and rate.

Indirect taxes were primarily affected by increases (in particular, VAT and excise duties), mostly to finance expansionary policies, and reflecting a trend already detectable before the crisis.

Overall, the tax measures introduced seem consistent the "tax and growth ranking" described by Johannson et al. (2009). Among the measures most frequently included in the fiscal stimulus packages recently approved by EU Member States there are cuts to personal income tax rates and base. They are followed by reductions of corporate income tax rate. These two taxes are deemed the most harmful to growth: personal income taxes reduce employment and human capital investment, and can weaken labour productivity; corporate income taxes are the most harmful to growth. The reduction of personal income tax liabilities increases household purchasing power and therefore increases aggregate demand in the short run. In addition, by reducing marginal and average effective tax rates on labour income, it may increase labour supply and rates of participation in the labour market. In some countries, tax reforms encompassed also a reduction of social security contributions by employers and employees, which reinforce the boosting effect on aggregate demand and employment.

Turning to medium-term growth prospects, these crucially depend on investments, which may be stimulated by increased net returns to investments via a reduction of marginal and average capital income tax rates. Recent reductions of corporate income tax rates are consistent with a trend already detectable in the EU before the crisis and aimed at improving the attractiveness and competitiveness of European economies in a global context characterized by high factor mobility.

Discretionary fiscal packages implemented during the current economic downturn often included also measures to increase revenues, primarily increases in consumption taxes (VAT and excise duties) and enlargement of corporate income tax base. These measures should help fiscal consolidation, reduce the risk of excessive growth of public debt and help sustain medium term growth, and according to the theory are the less harmful to growth.

Two years after the burst of the crisis, all countries are left with increased public deficit and debt. In particular, most EU countries are left with the legacy of the largely accommodative monetary and fiscal policies they implemented: they are running significant budget deficits and public debt has soared. Unhealthy public finances may affect long-term income levels. Thus emergency measures should be now scaled back and "exit strategies" should be devised, for instance by reinforcing adequate medium-term budgetary frameworks. Therefore, as the economy starts recovering, countries face two difficult challenges: fiscal consolidation, to revert the trend of increasing public debt, and continued support to economic growth, to mitigate the potential output losses and ensure growth returns close to its pre-crisis path. Some of the tax reforms introduced during the crisis may be consistent also with long term fiscal consolidation objectives, such as the reduction of the tax wedge on labour, which should favour employment (although with caveats, see OECD 2010c), the reduction of the tax rates on capital (together with company income tax base widening measures), to increase competitiveness and attractiveness to mobile factors, and incentives for energy saving and low emission technologies, which should favour the conversion of the economy to more sustainable configurations. However, the economy has not fully recovered yet: macroeconomic conditions are still troubled, unemployment is high and demand has not returned to previous levels. In addition leverage remains high both in the financial and non-financial sector, and governments may be compelled to new bailouts, which they can face only if they are not too indebted. In this framework, the task for EU governments pursuing full economic recovery and sustained growth is still highly challenging.

Finally, among the measures introduced, the reduction of social security contributions was not significantly included by EU member States in their fiscal recovery packages. Only few countries introduced generalised or targeted cuts. Social security contributions remain high in many EU countries and make up a significant part of the total tax wedge on labour, which is again very high in the EU, and may negatively affect employment recovery and the competitiveness of EU economies. In addition, the reduction of the tax wedge on labour income may favour an

increase of aggregate demand, though increased purchasing power and spending by workers.

References

Bank for International Settlements (2009), 79th Annual Report, Bank for International Settlements: Basel.

Bank for International Settlements (2010), 80th Annual Report, Bank for International Settlements: Basel.

Blomquist, Eklöf and Newey (1997), "Tax Reform Evaluation Using Non-Parametric Methods: Sweden 1980-1991", Working Paper, University of Uppsala.

European Commission (2008a), Communication from the Commission to the European Council – A European Economic Recovery Plan, COM(2008)800, 26.11.2008.

European Commission (2008b), From financial crisis to recovery: A European framework for action, COM(2008)706, 25.10.2008.

European Commission (2009a), Driving European recovery. COM(2009)114, 04.03.2009.

European Commission (2009b), The EU's response to support the real economy during the economic crisis: an overview of Member States' recovery measure, *European Economy Occasional Papers, 51/2009.*

European Commission (2009c), Monitoring revenue trends and tax reforms in Member States – 2008, *European Economy, 4/2009*.

European Commission (2010a), EU fiscal consolidation after the financial crisis: Lessons from past experiences, *European Economy, 418/2010.*

European Commission (2010b), Fiscal stimulus and exit strategies in the EU: a model-based analysis, *European Economy, 426/2010.*

European Commission (2010c), Labour market and wage developments in 2009, *European Economy, 5/2010.*

European Commission (2010d), Monitoring tax revenues and tax reforms in EU Member States – 2010, *European Economy, 6/2010.*

European Commission (2010e), Public finances in the EMU – 2010, *European Economy, 4/2010.*

European Commission (2010f), Taxation trends in the European Union – 2010, European Commission: Luxembourg.

European Commission (2010g), 'Taxes in Europe' database, http://ec.europa.eu/tedb, last accessed July 2010.

Heady C., Johansson A., Arnold J., Brys B. and Vartia L. (2009), Tax policy for economic recovery and growth, University of Kent, School of Economics, *Discussion Papers 925*.

Hemmelgarn T. and Nicodeme G. (2010), The 2008 Financial crisis and taxation policy, European Commission, Taxation papers 20/2010.

International Monetary Fund (2008), Fiscal policy for the crisis, December 29, 2008.

International Monetary Fund (2009a), Debt bias and other distortions: Crisis-related issues in tax policy, http://www.imf.org/external/np/pp/eng/2009/061209.pdf.

International Monetary Fund (2009b), Initial lessons of the crisis, February 6, 2009.

International Monetary Fund (2009c), The state of public finances: Outlook and medium-term policies after the 2008 crisis, March 6, 2009.

International Monetary Fund (2009d), World economic outlook 2009: Sustaining the recovery, IMF: Washington D.C.

International Monetary Fund (2010a), From stimulus to consolidation: Revenue and expenditure policies in advanced and emerging economies, paper prepared by Fiscal Affairs Department

International Monetary Fund (2010b), World economic outlook 2010: Recovery, risk, and rebalancing, IMF: Washington D.C.

Johannson A., Heady C., Brys B. and Vartia L. (2008), Taxation and economic growth, *OECD Economics Department Working Papers, 620/2008*.

Keen M., Klemm A. and Perry V. (2010), Tax and the crisis, *Fiscal Studies*, 31(1), pp. 43-79.

Lipinska A. and von Thadden L. (2009), Monetary and fiscal policy aspects of indirect tax changes in a monetary union, *ECB Working Paper Series 1097/ 2009*.

OECD (2009a), Fiscal packages across OECD countries: Overview and country details, 31 March 2009.

OECD (2009b), Going for growth 2009, OECD: Paris.

OECD (2009c), Economic outlook 2009, OECD: Paris.

OECD (2009d), Taxing wages 2008-2009, OECD: Paris.

OECD (2010a), Going for growth 2010, OECD: Paris.

OECD (2010b), Economic Outlook 2010, OECD: Paris.

OECD (2010c), Employment Outlook 2010, OECD: Paris.

OECD (2010d), Tax expenditures in OECD countries, OECD: Paris

Reinhart C.M., Rogoff K. (2009), "The Aftermath of Financial Crises", American Economic Review 99, pp. 466-472.

Slemrod, J. (1992), "Do Taxes Matter? Lessons from the 1980's," American Economic Review 82(2), pp. 250-256.

Solow R.M. (2005), Rethinking fiscal policy, *Oxford Review of Economic Policy*, 21(4), pp. 509-514.

Bocconi

Chapter 4: Policy recommendations

The previous Tasks presented a review of the theoretical and empirical literature on the effects of taxes (personal income taxes, employers' and employees' social security contributions, payroll taxes) on labour market outcomes together with a catalogue of detailed information about labour tax reforms implemented in the recent past in a large sample of EU and non-EU countries. Moreover, on the basis of this information we developed our own empirical analysis in order to assess the role and impact of labour tax reforms on labour market performance in terms of employment, unemployment, participation rates, hours of work, poverty and income inequality.

It is not an easy task to derive from this analysis some policy recommendations on how to reform the structure of labour taxation in order to pursue a number of welfare-enhancing objectives such as minimize adverse effects on job creation and labour supply, to support the improvement of workers' skills and labour market inclusion of specific groups of workers, to reduce inequality and poverty, to strengthen growth. The difficulty to draw some general policy prescriptions from these findings stems mainly from the following issues.

1) The analysis of the broad statistical trends in personal income tax and social security contributions over the last decades (Task 1) and the study of the distinctive features of all reforms adopted by EU countries since 1990 (Task 2) show a strong heterogeneity of labour tax systems among different countries and time periods. As a consequence, it is hard to recognize a clear consensus on the appropriate design of labour taxation towards which the European countries are converging. During the period here considered (1990-2008) some countries increased labour taxation, others reduced it and others maintained their tax burden substantially unchanged, with the result that, according to aggregate data, the implicit tax rate on labour is now roughly at the same level as fifteen years ago. The same occurred for other fundamental features of the labour tax structure, such as the mix between personal income tax and social security contributions.

2) The effects of taxes on labour market performance cannot be adequately evaluated when taxation is considered in isolation, without explicitly taking into account public expenditure policies and regulation measures affecting labour markets (unemployment benefits, public provision of private goods that are complements with workers' labour

supply, such as child-care and elderly-care services, minimum wage regulations, wage bargaining institutions, etc.). This is relevant also in the light of a key message of the theoretical literature: when assessing the effects of taxation on employment and wages it is crucial to take into account also how the government makes use of tax receipts.

3) The practice of ex-post evaluation of real tax reforms to gauge their effects on the labour market is far from being widespread. The overview of labour taxation reforms reported in Task 2 points out that, apart from relevant cases such as France and the Netherlands, the share of reforms associated to some ex-post evaluation procedure is negligible. Also in the empirical literature the evidence on the impact of past tax reforms is quite scant: this kind of analyses are burdensome since they require to account for a large array of non-tax, institutional, economic factors, that interact with tax factors in affecting labour market performance.

Bocconi

Despite these issues, some very general policy prescriptions can be put forward on the basis of the analysis developed in Tasks 1-3.

1) Tax policy can play only a limited role in determining the outcomes of the labour market (employment, unemployment and inactivity rates, hours of work) compared to more effective policy measures such as wage bargaining arrangements, monetary and in-kind transfers, job placement services, training programmes, support to geographical mobility. This conclusion can be derived from the discussion of past episodes of tax reforms implemented after a crisis (Task 3) and from the econometric analysis developed in Task 2 and, in the latter case, it is robust to variations in the sample of considered reforms (in particular, when the analysis is extended to include also tax increasing reforms and when it is focused to consider solely major reforms).

2) In any case tax reforms should always be carefully coordinated with other policy tools, since their impact critically depends on the interactions between tax-related and institutional and regulatory factors.

3) In order to have some impact on the labour market, tax policies should not be across-the-board but targeted on particular groups of workers. Theoretical and empirical literature shows that, although the number of hours worked and the participation decisions are generally not strongly responsive to financial incentives created by tax changes, the impact may result significant if tax reforms are focused on specific segments of the labour market. In particular, this report shows that PIT reforms decreasing tax burden have an impact on the female workforce in terms

of labour supply. Female targeting PIT reforms are associated, for example, with an increase of the employment rate of more than 1%.

4) Within the groups of workers that are more responsive to fiscal incentives, the economic literature and the results of this report show that to use tax-reducing reforms is more effective in increasing the intensive margin (number of hours worked) than the extensive margin (the participation choice to the labour market).

5) Procedures of ex-post evaluation on the tax policies actually carried out should be more systematically and pervasively implemented by the government and/or independent organizations. This is essential to enhance governments' understanding about the actual impact of tax measures (in terms of the number of taxpayers involved, the effects on their available income, the change induced in their work decisions, etc.) and, as a consequence, to exploit past experiences in order to improve the design of future tax measures.

6) The timing of tax reforms should be thoroughly considered and evaluated, since the scope for tax reforms to positively affect labour market performance may be frustrated by possible time-inconsistency problems. Also the econometric analysis developed in Task 2 shows that one or two years are needed in order to detect any impact of reforms of labour taxation on countries' macroeconomic situation. This kind of issue is of course particularly acute when a tax reform is designed or implemented after a financial crisis.

7) Tax shifting from labour income to other bases, and in particular on consumption, can be part of a strategy aimed at increasing employment, fostering economic growth and reducing the efficiency cost of taxation. Alternative tax bases have to be broad, so as to require low tax rates and minimize distortions, and stable, so as to ensure certainty in public revenues, and should not ultimately shift the burden back to labour again. Possibilities which are often considered are a tax on estate property and "green" taxes on polluting activities. Although there may be room for an increase in estate property taxes in some countries, they are considered unpopular from a political point of view; as to environmental taxes (e.g. excises on fossil fuels) governments often resist proposals to increase them further, presumably because they fear this could adversely affect production, given also that their tax base is not broad enough to allow substantial revenue unless the rate is increased considerably. As a consequence, theoretical and especially policy discussion have identified consumption taxes as the main candidate to finance a reduction of labour taxation. Some EU countries (Germany, Hungary, Czech Republic, Finland, Latvia, Lithuania) have

recently implemented reforms including cuts in social security contributions financed by a balanced-budget increase in VAT. In particular, tax shift to VAT can be seen as a way to improve competitiveness in a fixed exchange rate regime, and its effect is equivalent to a nominal exchange rate devaluation. Although the beneficial effects on competitiveness are only temporary, since they depend on the speed of price and wage adjustment, the possibility to foster exports can be particularly attractive in the current phase of difficult recovery from the financial crisis. Moreover, in light of international capital mobility, the increase in the VAT coupled with a decrease of labour tax is a way to implement a destination-based cash-flow tax on corporate incomes, which is a solution to capital/corporate tax competition that has several advantages compared to alternative arrangements. However, the possible adverse distributive effects of a tax shift to VAT for beneficiaries of transfers should be carefully taken into account, even if this kind of reform can be attractive on the political grounds since it is less visible compared to direct redistributive measures.

8) As indications for the future research, reforms should be based on more thorough considerations of the specific features of tax/benefit systems and institutional settings at the national level, moving from a cross-country analysis to one conducted at a more disaggregate level.