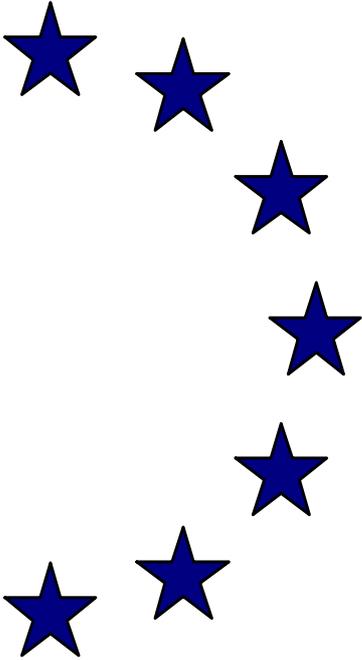


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**Can fiscal consolidations be expansionary in the  
EU? Ex-post evidence and ex-ante analysis**

by

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## **Abstract**

This paper analyses non-Keynesian effects in fiscal consolidations in the EU. The analysis is carried out both ex-post, i.e. by looking at the emergence of expansionary consolidations in the past and at their characteristics, and ex-ante, i.e. by simulating with the European Commission QUEST model under which conditions public finance consolidation would exhibit non-Keynesian effects in the current EMU context.

Cross-country analysis shows that roughly half of the episodes of fiscal consolidations that have been undertaken in the EU in the last thirty years have been followed by an acceleration in growth. The consolidations that turned out to be expansionary were in general based on expenditure cuts rather than on revenue increases. These results are robust with respect to the criteria used to identify the consolidation episodes and to classify such episodes as expansionary. Simulations with the QUEST model show that expansionary effects from fiscal consolidations can emerge in the short/medium run provided that consolidations are expenditure-based. Irrespective of the type of expenditure cut simulated, non-Keynesian effects in QUEST are associated with a reaction of aggregate consumption to expected future incomes; in the case of cuts to the government wage bill the investment channel is also relevant. In the short-run there could be a trade-off between the role of the consumption and the investment channel in conveying non-Keynesian effects.

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## 1. Introduction

In the last two decades, several OECD countries have undertaken large budgetary adjustments in order to reduce, or at least stabilise, previously escalating debt to GDP ratios. According to the standard Keynesian view, this should have had a contractionary impact on output. Moreover, short-run fiscal multipliers should be above unity according to standard Keynesian analysis, meaning that fiscal contractions should have a more than proportional negative impact on aggregate output. However, empirical evidence estimating the effects of fiscal policy on output on the basis of VAR analysis have called into question the conclusions from conventional demand driven models (Blanchard and Perotti, 2002, Perotti, 2002). These studies typically find that the values of fiscal multipliers are likely to be quite small and falling over time, and that a negative response of GDP to increases in fiscal spending is not unusual, especially in European countries. In fact, in some well-documented cases, most notably Denmark in 1983-86 and Ireland in 1987-89, the economy experienced an acceleration in growth after sharp fiscal retrenchments. These episodes have been cited in the literature as examples of fiscal policies exhibiting ‘non-Keynesian’ effects (Giavazzi and Pagano, 1990).

A good understanding of the short-run growth impact of fiscal consolidations is crucial for a proper implementation of the EU fiscal framework. In particular, a better knowledge of the conditions under which fiscal contractions are not necessarily associated with weaker short-run growth would help EU policy makers in calibrating over the cycle the timing and intensity of the fiscal adjustment required for reaching a close-to-balance position or bringing back deficits below the 3% Maastricht threshold.

The aim of this paper is that of providing a systematic analysis of the factors affecting the emergence of expansionary effects from fiscal consolidations in EU countries. In carrying out our analysis, we address two basic questions. First, is there something peculiar about the episodes of expansionary fiscal consolidations and can one identify in which circumstances fiscal policy can have expansionary effects? Second, what are the channels through which these non-conventional effects operate? The characteristics and the effects of fiscal consolidations carried out in EU Member States in the past decades are investigated *ex-post* by means of descriptive statistical analysis and Probit regressions. Moreover, in order to evaluate *ex-ante*, and in isolation from other policy or non-policy shocks, the impact of alternative types of fiscal consolidation packages on short/medium run growth in EU countries, simulations are performed with the European Commission’s QUEST model.

Among the factors that have been found empirically to be relevant to characterise episodes of expansionary consolidations are the size of fiscal adjustment (as measured by a sufficient degree of improvement in structural budget balances), the composition (i.e. the extent to which it is achieved through tax increases or expenditure cuts) and the initial state of public finances (the debt/GDP ratio).

Most research (e.g., Giavazzi and Pagano, 1990; Perotti, 1999; Giavazzi et al., 2000) has focussed on the response of private consumption or savings to large fiscal policy adjustments. It has been shown in theory (e.g., Blanchard, 1990; Bertola and Drazen, 1993) that fiscal retrenchments may lead to an increase in aggregate consumption already in the short run if households anticipate lower future tax liabilities. Given these wealth and confidence effects, the role of consumers’ expectations becomes crucial in determining the impact of fiscal consolidations on the short-run behaviour of consumption and such impact, in turn, is affected by the size of consolidations and by the state of public finances. A different strand of research (e.g.,

Alesina et al, 2002) focuses instead on the effects of fiscal policy on business investment and concentrates on the supply side, in particular on how profits are affected through the impact of fiscal policy on real wages in the private sector. Fiscal consolidations may lead to higher expected profits and higher investment by reducing the tax burden on firms and inducing wage moderation. Also in this respect, the composition of the fiscal adjustment and the institutional characteristics of the labour market may play a major role.

Building on such research, we have focused our analysis on European countries to identify specific patterns. Through systematic cross-country analysis on a dataset covering 14 countries of the EU during the 1970-2002 period we show in this paper that roughly half of the episodes of fiscal consolidations that have been undertaken in EU countries in the past three decades are followed by an immediate acceleration in growth, therefore exhibiting non-Keynesian features. Moreover, roughly half of these consolidations that turned out to be expansionary were not matched by reductions in the real interest rate, meaning that the expansionary effect on output is hardly attributable to concomitant expansionary monetary policies or exchange rate depreciations. We call these episodes ‘pure expansionary’. These results seem to be quite robust with respect to both the criteria used to identify the consolidation episodes and to classify such episodes as expansionary. Through Probit analysis we investigated which factors are most relevant in affecting the likelihood for fiscal consolidations to exhibit non-Keynesian features. Our results show that the composition of adjustment (based on expenditure cuts rather than on tax increases) is the most important factor affecting the probability of consolidations to be followed by accelerated growth.

Since results from ex-post statistical analysis are subject to possible misinterpretations (due especially to the difficulty of interpreting correctly the direction of causality and to properly account the impact of concomitant factors such as the stance of monetary policy) we have also performed model simulations with the European Commission’s QUEST model, with the aim of investigating the likelihood of the emergence of expansionary effects from fiscal consolidation policies in a representative EU country. Such policy experiments permit to evaluate the likely impact of fiscal retrenchment obtained either through tax increases or via cuts in different expenditure items, controlling for other factors, such as the stance of monetary policy. The model simulations allow also an evaluation of the relevance in different scenarios of the alternative channels identified in the theoretical literature for the transmission of the fiscal policy impulse. Results show that fiscal consolidations have in general a negative, albeit small, impact multiplier as would be predicted by standard theory in the Keynesian tradition. However, even in absence of exchange rate effects (as it is in EMU), concomitant monetary expansions or reductions in risk-premia, expansionary ‘non-Keynesian’ effects on private demand from fiscal adjustments obtained through expenditure cuts can emerge already in the short/medium run and become to dominate in consecutive years. This results from the working of the channels highlighted in the theoretical and empirical literature on the non-Keynesian effects of fiscal policy.

The remainder of the paper is structured as follows. The next section reviews the theoretical literature on non-Keynesian effects of fiscal consolidations. Section 3 gives a review of the existing cross-country studies on the short-run growth effects of fiscal consolidations in industrialised countries and presents an original analysis on EU countries. The simulations using the QUEST model on the impact of alternative types of fiscal consolidations are performed in section 4. Section 5 concludes.

## 2. Expansionary budgetary consolidations: theoretical insights

According to the standard Keynesian view fiscal multipliers are expected to be positive, although there are several factors (substitution effects, interest rates response, wealth effects, openness) that could explain values smaller than one.<sup>1</sup> The idea that fiscal policy may have short-run effects opposite to those predicted by the Keynesian model has been first suggested by Giavazzi and Pagano (1990) who, looking at the fiscal consolidation experiences of Denmark and Ireland in the mid eighties, documented in both cases an acceleration in growth just after the governments put in place measures that drastically reduced budget deficits.

The possibility that fiscal policy may have non-Keynesian effects has attracted increasing attention among academics. There is a large literature investigating empirically the cases of expansionary fiscal consolidations (for an overview, see section 3.1) Some of the research was directed at providing a conceptual framework in which non-Keynesian effects of fiscal policy could be rationalized. Most of this work has emphasised the consumption channel. If agents are forward-looking and rational in forming their expectations, they will anticipate that a tax cut today, financed by government debt, will translate into higher taxes at some point in the future. If, in addition, government intervention is non-distortionary, capital markets are perfect and consumers sufficiently long-lived, the so-called Ricardian equivalence will hold, namely, permanent income, and so consumption, will be unaffected by fiscal policy. Under these abstract circumstances, fiscal multipliers will be zero, since higher government savings obtained through fiscal consolidations will be compensated by an equivalent reduction in private savings.<sup>2</sup>

However, if distortions introduced by taxation are taken into account, a first reason for expecting non-Keynesian effects of fiscal policy emerges. This can be the case, for instance, when a current expenditure cut is expected to be offset in the future by a reduction in distortionary taxes. In that case agents' permanent income may increase due to the future reduction in the dead-weight losses induced by taxation. Such a case for non-Keynesian effects of fiscal policy has been first illustrated by Blanchard (1990). In this model, it is shown that the effects of fiscal policy on aggregate consumption are likely to be *non-linear*. The reason for this is that the dead-weight loss of taxation increases significantly with the extent of taxation. So, if a consolidation is made starting from a low level of current debt, a traditional positive fiscal multiplier will result.<sup>3</sup> If instead a fiscal consolidation is made starting from a high debt level, consumption may react positively as a result of an expected increase in permanent income. The reason is that by consolidating now, the government will not be obliged to raise taxes by much in the future to pay back the debt. Since the extent of distortions increase with the tax rate, this smoothing of government revenues reduces the dead-weight loss imposed by taxes, thus raising agents' permanent income.<sup>4</sup>

A different motive to expect fiscal policy to have non-linear effects has been proposed by Bertola and Drazen (1993). The assumption here is that when public expenditure become sufficiently high, then agents start anticipating a future major fiscal adjustment to occur. A consolidation

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<sup>1</sup> For a recent survey on the estimated value of fiscal multipliers see, for instance, Hemming, Kell and Mahfouz (2002).

<sup>2</sup> If consumers have short-term horizons or are affected by liquidity constraints (as is the case in the QUEST model simulations in this paper) Ricardian equivalence will no longer hold, and fiscal policy will affect consumption according with the predictions of standard models in the Keynesian tradition (see, e.g., Blanchard, 1985).

<sup>3</sup> In Blanchard (1990) this is due to the fact that agents' horizons are short-term, since each of them are faced with a constant positive probability of death. Hence, Ricardian equivalence does not hold in this model even in absence of tax distortions.

<sup>4</sup> Results similar to those to Blanchard (1990) are obtained in Perotti (1999). Also in this model Ricardian equivalence does not hold on aggregate. However, the reason in this case is that a fraction of consumers are assumed to be liquidity-constrained.

occurring when public spending is high may then change agents' expectations concerning a future major retrenchment, thus raising permanent income and consumption.<sup>5</sup>

A further rationale for possible non-Keynesian effects through the consumption channel emerges if fiscal consolidations are assumed to affect the risk of government insolvency. By reducing their budget deficits, governments will signal to markets their willingness to switch to 'sound finances'. If this signal is taken as credible, interest premia on government bonds will fall. The consequent reduction in interest rates will in turn contribute to raise agents' permanent income, since they will discount future income streams at a lower rate. At the same time, lower interest payments imply lower taxes as government spending is accordingly reduced. The crucial ingredient of this explanation for the emergence of non-Keynesian effects is the *credibility* of government action to make public finances sustainable. As emphasised, for instance, by Feldstein (1982), the credibility of the regime shift can be enhanced by the *size* of the consolidation. While small adjustments in the budget may be believed to be short-lived, major fiscal retrenchments may signal the willingness of the government to face the political costs associated with the shift to sound public finances. Furthermore, as illustrated for instance by Cotis et al. (1998), the credibility of the fiscal adjustment can also be increased by the introduction of fiscal rules for the maintenance of budgetary discipline (like the SGP) and thereby the likelihood of the emergence of non-Keynesian effects could be higher.

Expansionary consolidations working through the consumption channel act on aggregate demand, leaving supply conditions unaffected. Output expansions above potential obtained through the consumption channel are therefore inevitably short-lived. However, recent empirical research has shown that fiscal consolidations may produce significant short-run expansionary effects also through the investment channel, thus affecting not only demand but also supply factors (Alesina and Ardagna 1998, Alesina, Perotti and Tavares, 1998, Alesina et al., 2002). The rationale for fiscal policies producing non-Keynesian effects through an investment channel has been formalized in Alesina et al. (2002). The highlighted channel is not working via possible reductions in real interest rates associated with fiscal contractions as predicted by standard macroeconomic models. The link between fiscal policy and investment behaviour is rather represented by the impact of government spending, in particular of the government wage bill, on the labour market. As in models rationalising non-Keynesian effects through the consumption channel, agents are assumed to be forward-looking and to optimise the expected value of future income streams. The relevant agents are in this case firms, that decide about their factor service purchases by looking at the present value of future profits. Investment decisions are driven by the expected present value of the net marginal product of capital, which in turn is a negative function of real wages. Fiscal consolidations obtained through expenditure cuts can then reduce wage pressures and so increase short-run investments. The possibility for fiscal consolidations to exhibit non-Keynesian effects through the investment channel will then crucially depend upon the composition of adjustment (expenditure cuts versus tax increases) and on institutional factors, above all the working of the labour market.

In sum, a number of reasons have been identified in the theoretical literature that may explain why fiscal consolidations may have expansionary effects. The possibility of non-Keynesian effects working through the consumption channel depends on agents' expectations and behaviour, which are mainly affected by factors affecting the credibility of the adjustment, such as the size of the consolidation, the initial state of public finances and the perception about the permanence of the adjustment, the matter being influenced by the composition of the adjustment. The

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<sup>5</sup> A similar non-linear effect of fiscal policy is obtained in Sutherland (1997).

likelihood of non-Keynesian effects acting via the investment channel is also crucially affected by the composition of the adjustment. As illustrated in the next section, the empirical research on budgetary consolidations has focused on the above factors to identify the characteristics of expansionary consolidations and the relevant channels.

### **3. Evidence from ex-post cross-country analyses**

#### ***3.1. Findings from existing studies***

In existing cross-country studies aimed at assessing ex-post the emergence of expansionary fiscal consolidations, fiscal consolidations are defined in terms of a given improvement in the budget balance as a fraction of GDP achieved over a time period of several years. In order to exclude changes in the budget balance associated with the economic cycle, measures of the cyclically-adjusted budget balance have generally been used. Moreover, in order to better isolate fiscal policies of discretionary type, interest expenditures have been deducted from the structural budget balance in most studies, i.e., changes in the primary cyclically-adjusted budget balance have been adopted to identify consolidation periods.

Depending on the particular study considered, the concept of fiscal consolidation has been focused either on the idea of a sufficiently strong fiscal adjustments achieved in a given period (*size criterion*), or on the idea of a sufficiently long time period during which the budget balance constantly improves (*persistence criterion*). Some studies refer to a further refinement of the concept of consolidation, by defining as *successful* those consolidations that manage to bring about a sustained reduction in the debt/GDP ratio.

The methodologies adopted in the existing studies differ quite widely. In almost all studies there is a descriptive analysis of the sample characteristics of relevant fiscal and macroeconomic variables before, during and after consolidations periods. This permits to check the general requirement for the identification of expansionary fiscal consolidations: the occurrence of positive growth development after the fiscal adjustment. By looking at sample averages of fiscal variables it is possible to describe the characteristics (in terms of size of adjustment, initial conditions of public finances or composition of adjustment) of fiscal consolidations, and to identify how these characteristics differ depending on whether consolidations turned out to be expansionary or contractionary. In some studies Probit/Logit regressions have also been performed in order to identify econometrically the main factors affecting the probability for fiscal consolidation to be successful (Von Hagen, Hughes-Hallett and Strauch (2001) ) or expansionary (Alesina and Ardagna (1998)). Sample evidence on relevant macroeconomic variables (e.g., interest rates, exchange rates) permits to judge whether fiscal consolidations have in general been accompanied by active monetary policies or devaluations. Some studies complement descriptive sample statistics with country case studies, aimed at better understanding the policy environment during consolidation periods (e.g., wage agreement policies, exchange rate devaluations,...).

In a number of studies, empirical tests of theoretically grounded hypotheses are also provided. Giavazzi and Pagano (1996) estimate consumption functions to test whether fiscal consolidations may have non-Keynesian effects via the consumption channel, due to consumers' revised expectations and increased expected lifetime income. Giavazzi, Pagano and Jappelli (2000) perform a similar test by estimating saving functions. Alesina et al. (2002) instead verify

empirically the hypothesis that non-Keynesian effects of consolidations may come from the investment channel by estimating investment equations.

In spite of the above mentioned differences in methodology, a number of results are common to almost all studies.

- i)* There is evidence of fiscal consolidations exhibiting non-Keynesian features in almost all studies.
- ii)* Consolidations leading to a permanent reduction in debt ('successful') are more likely to be expansionary.
- iii)* During expansionary consolidations both an acceleration in private consumption and business investment is observed.
- iv)* The policy environment in which fiscal consolidations are undertaken matters. In particular, the exchange rate and wage policies accompanying consolidations may affect significantly the impact of fiscal adjustments on growth.

Where consensus is missing is on the characteristics of expansionary fiscal consolidations. Some papers find that fiscal adjustments with expansionary effects are more likely when the size of consolidation is large (Giavazzi and Pagano, 1996, Giavazzi, Pagano and Jappelli, 2000). In other studies instead it is found that what is most significant to characterise expansionary consolidations is the composition of the adjustment. Fiscal adjustments based on expenditure cuts rather than tax increases have a higher probability of showing expansionary effects, especially if expenditure cuts are concentrated on public employees compensations and on government transfers (Alesina, Perotti and Tavares, 1998, Alesina and Ardagna, 1998, Alesina et al., 2002). Finally, there are studies that emphasize the initial state of public finances. Consolidations are more likely to have non-Keynesian effects when they occur in countries and periods where debt/GDP ratios are high (Alesina and Ardagna, 1998, Perotti, 1999).

Overall, although cross-country empirical analyses permit to shed light on several features of fiscal consolidations, the results arising from such analyses need to be interpreted with caution for a number of reasons. First, there are problems in measuring and defining fiscal consolidation episodes. In particular, relying on deficit-based measures tends to exclude fiscal reforms with a limited impact on current budget balances but potentially large effects on long-term public finances and on permanent income, such as pension reforms. Second, existing empirical analyses quite often fail to take properly into account relevant factors, such as developments in monetary and exchange rate policies, that contribute to shape the links between fiscal consolidations and economic activity.<sup>6</sup> Third, when interpreting the links between fiscal policy and economic activity spurious relations and simultaneity issues are to be taken into account. The output expansion following fiscal consolidations may be due to independent cyclical developments rather than to the factors outlined in the previous section, especially when fiscal consolidations are undertaken in weak phases of the cycle. Moreover, the relation between fiscal consolidations and short run growth may go the other way round: the expectation of a recovery (stronger during the trough of the cycle) may increase the likelihood of public finance consolidation.<sup>7</sup> Finally, there is the possibility that results are driven to some extent by a sample selection bias. Most of the episodes of fiscal consolidations that, once started, have been aborted due to very adverse growth consequences are by definition missing from the samples used in cross-country analyses.

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<sup>6</sup> In Von Hagen, Hughes-Hallett and Strauch (2001) there is an attempt to take into account the links between fiscal and monetary policies by estimating, together with output equations, fiscal and monetary policy reaction functions.

<sup>7</sup> Some studies (Giavazzi and Pagano, 1996, Giavazzi, Jappelli and Pagano, 2000) account for possible simultaneity problems by using 2SLS estimation techniques.

**Table 1. Cross-country evidence on fiscal consolidations**

Study	Definition of consolidation	Aim of the analysis	Type of analysis	Main findings
McDermott and Westcott (1996), IMF (1996). 20 OECD countries, 1970-95.	The primary structural balance improves by at least 1.5 % of GDP over 2 years and does not decrease in any year.	Analyse the characteristics and effects of successful consolidations, i.e., of consolidations leading to a 3 % of GDP reduction in debt.	Descriptive.	Successful consolidations leads on average to increased growth, unsuccessful to reduced growth. Size and composition both important to identify successful consolidations.
Giavazzi and Pagano (1996). 19 OECD countries, 1970-92.	The cumulative change in the primary structural balance is above a given threshold as a % of GDP (5, 4, or 3) over a given number of years (resp. 4, 3, or 2).	Analyse the existence of non-Keynesian effects of fiscal consolidations via the consumption channel.	Panel data estimation of consumption functions.	Size of adjustment is relevant to identify episodes exhibiting non-Keynesian features.
OECD (1996): 18 OECD countries, 1975-95.	The cumulative change in the structural budget balance is above 3 % of GDP over a period of at least 2 years.	Analyse characteristics and effects of fiscal consolidations.	Descriptive.	There were fiscal consolidations during which growth was above potential. Accommodating monetary policy seems to matter to limit output contractions.
Cour et al. (1996). 17 OECD countries, 1970-94.	Continuous improvement in the primary structural budget balance, with a period of at most three years during which the primary structural budget balance improves by at least 3 % of GDP.	Analyse characteristics and effects of fiscal consolidation episodes with a particular focus on the consumption channel of non-Keynesian effects.	Descriptive and estimation of consumption functions.	Size of adjustment is relevant to identify expansionary episodes.
Alesina, Perotti and Tavares (1998). 19 OECD countries, 1960-95.	The primary structural balance improves by at least 1.5 % of GDP.	Analyse characteristics and effects of fiscal consolidation, exploring alternative channels for non-Keynesian effects.	Descriptive.	Successful consolidations more likely to lead to expansions. Composition more important than size to identify expansionary episodes. Labour market structure also matters.
Alesina and Ardagna (1998). 20 OECD, 1960-94.	The primary structural balance improves by at least 2 % of GDP or by at least 1.5 % of GDP per year over two years.	Analyse characteristics and effects of fiscal consolidation, exploring alternative channels for non-Keynesian effects.	Descriptive, Probit regressions, collection of case studies.	Composition more important than size to identify expansionary episodes. Wage agreements and exchange rate devaluations are also relevant accompanying factors.
Perotti (1999). 19 OECD countries, 1965-94.	n.a.	Analyse whether initial fiscal conditions are relevant for the effects of fiscal policy.	Estimation of dynamic consumption functions.	High debt levels are associated with a higher probability for fiscal policy to have non-Keynesian effects.
Giavazzi, Jappelli and Pagano (2000). 18 OECD countries, 1970-96.	The structural balance improves by at least 1.5 % of GDP per year over two years.	Analyse the existence of non-Keynesian effects of fiscal consolidations via the consumption channel.	Panel data estimation of saving functions.	Size of adjustment is relevant to identify episodes exhibiting non-Keynesian features. Non-Keynesian effects more likely for tax changes than expenditure changes and for fiscal consolidations than for fiscal expansions.
Von Hagen, Hughes-Hallett and Strauch (2001). 20 OECD countries 1960-98.	The structural balance improves by at least 1.25 % of GDP per year over two years or by at least 1.5 % of GDP in one year and by a positive amount in a consecutive year.	Describe characteristics and effects of fiscal consolidations with special reference to the EU.	Descriptive analysis, case studies, Probit regressions, estimation of output equations and monetary and fiscal policy reaction functions.	Fiscal policies exhibit in general Keynesian effects, but in the EU in the nineties there is no evidence neither in favour nor against Keynesian effects.
Alesina et al. (2002). 18 OECD countries 1960-96	The primary structural balance improves by at least 2 % of GDP or by at least 1.25 % of GDP per year over two years.	Analyse the existence of non-Keynesian effects of fiscal consolidations via the investment channel.	Estimation of investment equations, descriptive analysis.	Cuts in public expenditure, particularly in public employees' compensations, boost investment. Expansionary consolidations associated with acceleration in investment growth.

### 3.2. *Were there expansionary fiscal consolidations in the EU? A close look at the data*

This section carries out a statistical analysis of the fiscal consolidations that took place in the EU in the past decades. The analysis covers the current EU countries with the exception of Luxembourg during the period 1970-2002.<sup>8</sup> The source of the data used in the analysis is the AMECO database developed by the European Commission DG ECFIN. In our analysis, we identify first (section 3.2.1) the fiscal consolidation episodes that occurred in the past decades in EU countries, further highlighting those that appear to be expansionary, i.e., that were followed by accelerated dynamics of output. Moreover, in identifying expansionary consolidations, a further distinction will be made, in order to isolate those expansionary consolidation episodes that are unlikely to be attributable to concomitant monetary policy easing or exchange rate devaluation policies.<sup>9</sup> The notion of *'pure' expansionary* fiscal consolidation is thus proposed as one during which short run real interest rates do not fall.<sup>10</sup>

Subsequently (section 3.2.2.), the main characteristics of non-expansionary and expansionary consolidations are described. Several characteristics of consolidation periods are analysed including their size, the initial state of public finances and how the fiscal adjustment is achieved (tax increases or expenditure cuts). *t* tests are performed to isolate the characteristics that are significantly different between the consolidations that were expansionary and those that were not. Afterwards (section 3.2.3.), an analysis of the macroeconomic scenario preceding and following the fiscal consolidation episodes is provided, with the aim of acquiring information on the autonomous effects of fiscal consolidations on macroeconomic conditions and on those associated with alternative policy factors, such as the exchange rate regime. The macroeconomic environment before, during and after consolidation periods is analysed by reporting average statistics on growth, output gaps, exchange and interest rates and on the change in the different components of aggregate demand. Moreover, the contribution to growth of the various components of aggregate demand is analysed.

Finally (section 3.2.4.), Probit analysis is carried out in order to identify which factors mainly affect the probability of fiscal consolidation to be expansionary, distinguishing between factors related with the initial conditions in which consolidations took place (debt level, output gap level) and those factors related with the composition of fiscal consolidations.

Compared with existing event studies of expansionary fiscal consolidations, our analysis tries to make a step forward in checking the robustness of results with respect to alternative definitions of fiscal consolidation episodes and of their expansionary status. In the existing literature analysing fiscal consolidation episodes using country/year panel datasets, quite different definitions of fiscal consolidation have been proposed, so that the comparison of findings is not always easy and immediate.

By fiscal consolidation period it is generally meant either a sufficiently large improvement in budget balance in a given time period (*size* criterion) or a sufficiently long period of continuous improvement of the budget balance (*persistence* criterion), or a combination of both the above criteria. For instance, the definitions provided in Alesina and Ardagna (1998) or Alesina et al.

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<sup>8</sup> The exclusion of Luxembourg is due to missing data. As will be clear in the following exposition, the very last years of the sample are necessarily dropped when identifying expansionary consolidations since it is not possible to evaluate countries growth performances after those years.

<sup>9</sup> It has been shown in fact that fiscal contractions have been quite frequently accompanied by exchange rate devaluations or expansionary monetary policies in EU countries (see, e.g., OECD, 1996, Alesina and Ardagna, 1998).

<sup>10</sup> Under likely assumptions, non decreasing real interest rates tend to exclude both monetary expansions under floating exchange rates and devaluation policies under fixed exchange rates regimes. This the case for instance in a Mundell-Fleming open economy setting with uncovered interest rate parity (see, e.g., Krugman and Obstfeld, 2001).

(2002) mainly refer to the size criterion, while those in Cour et al; (1996), Giavazzi and Pagano (1996) or OECD (1996) refer especially to the persistence criterion (see table 1).

Concerning the definition of *expansionary* fiscal consolidations the criteria used in existing work differ widely. In general, for a fiscal consolidation period to be defined as expansionary, the economy must perform sufficiently well (e.g., growth sufficiently fast compared to previous years or some benchmark growth rate) after the fiscal adjustment takes place. The reference period considered to evaluate the growth performance of consolidating countries is generally a relatively *short-term* one (1 to 3 years after consolidation).

The benchmark definition of fiscal consolidation used in this study is taken from Alesina and Ardagna (1998). According to this definition, a year of fiscal consolidation is “a year in which the cyclically-adjusted primary balance improves by at least 2 per cent of GDP or a period of two consecutive years in which the cyclically-adjusted primary balance improves by at least 1.5 per cent per year, in both years”. This notion of fiscal consolidation puts emphasis on the size of the improvement in the primary budget balance. Concerning our benchmark notion of *expansionary* fiscal consolidation, we use the same as that proposed by Alesina et al. (2002). This criterion classifies as expansionary an episode of fiscal consolidation where “the average real GDP growth in each adjustment year and in the two years after is greater than the average real GDP growth in the two years before”.<sup>11</sup>

In performing our analysis we proceed as follows. We first identify and analyse the fiscal consolidations (non-expansionary and expansionary) consistent with our benchmark criteria to define consolidations and the subset of expansionary consolidations. Subsequently, while keeping the benchmark criterion for expansion (acceleration in *growth*), we adopt a different criterion for consolidation, based on persistence instead of size, and redo the analysis. Finally, we keep the benchmark criterion to identify consolidations and adopt different definitions of expansion, based on accelerated *trend growth* or *growth differential with respect to the EU average*.<sup>12</sup>

### 3.2.1. Identifying expansionary fiscal consolidation episodes

Table 2 reports various cases of fiscal consolidations identified in the EU according to the different criteria proposed to define consolidations and to isolate expansionary consolidations. The table also presents for each country the periods in which it experienced expansionary episodes. In the sample of 462 observations used (14 EU countries, 33 years), our benchmark definition (size of consolidation) leads to the identification of 49 fiscal episodes of fiscal

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<sup>11</sup> The above criterion is different, for instance, from that employed in Alesina and Ardagna (1998) which specifies that the average real GDP growth rate (in difference from the G7 average) in the period of consolidation and in the two years after must be greater than the average value of the same variable across all episodes of consolidation. While the concept of expansion used in Alesina et al. (2002) selects consolidation periods after which growth picked up, that in Alesina and Ardagna (1998) identifies those consolidation episodes after which growth has been higher compared with average consolidation periods. In this study the criterion based on growth acceleration is chosen as the benchmark because it seems better suited to identify fiscal consolidation episodes potentially exhibiting non-Keynesian features.

<sup>12</sup> The idea behind the use of trend output growth, as opposed to actual real GDP growth, in the identification of expansionary episodes (see note to Table 2 for the formal definition) is that it should help to isolate those expansionary episodes where the acceleration in growth is not purely cyclical. The third criterion of expansion proposed defines as expansionary those fiscal consolidations that are associated with an increase in the difference between the growth rate in countries' GDP and the EU average GDP. The aim of this criterion is that of identifying as expansionary episodes only those where the growth acceleration is not attributable to the EU-wide economic cycle.

consolidation.<sup>13</sup> Using the concept of fiscal consolidation based on persistence, the number of consolidation episodes rises to 74.<sup>14</sup>

Concerning the number of expansionary episodes, roughly half of the total number of consolidation experiences amounts to be expansionary. This result does not seem to depend on the definition of fiscal consolidation employed (size or persistence) neither on that of expansion (our benchmark definition of acceleration in actual growth, or on the alternative definitions based on trend growth or actual growth relative to EU average growth).<sup>15</sup> The concept of expansionary consolidation can be refined further to account for the monetary stance or possible exchange rate devaluations: in this case 11 and 19 consolidation episodes are found to be 'pure' using, respectively, the size and the persistence concept of consolidation period (keeping the benchmark expansion criterion based on GDP growth acceleration). That is, about one half of the expansionary fiscal consolidations identified can be classified as pure. A similar fraction of pure over total expansionary consolidations is maintained also irrespective of the criterion of expansion used.

Regarding the description of the expansionary consolidation episodes, a number of findings appear to be robust with respect to the criteria used to identify consolidations and expansions. The evidence of expansionary effects in Denmark and Ireland in the mid-eighties reported in previous studies is confirmed. Similar evidence of non-Keynesian effects from consolidations that took place in the mid eighties is obtained for Belgium. Expansionary fiscal consolidations are also found in Spain and Portugal in 1986 as well as in West Germany in 1982. Concerning Finland, an expansionary period in 1993 is found using all criteria except that based on trend growth, which is not surprising since results are driven by the strong output contraction experienced in 1991. The identification of expansionary consolidations in the remaining EU countries depends to some extent on the concept used to define consolidations and expansions. Using our benchmark consolidation criterion, no expansionary episodes are found for France (due to the fact that no consolidations are found) whereas using the persistence criterion expansionary consolidations are identified at mid nineties. Results for Italy, Sweden and the UK change quite substantially depending on the criterion used for expansion. While in Italy several episodes have been identified using the criterion of acceleration in the growth differential with respect to the EU average and fewer episodes are found using the criterion of trend output, the opposite holds for the UK. Concerning Sweden, it appears to have registered expansionary consolidations in the mid-eighties and in the late nineties, but the exact episodes identified are not robust with respect to the consolidation or expansion criteria used.

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<sup>13</sup> The episodes may not coincide with those reported in Alesina and Ardagna (1998) because the method used to obtain cyclically-adjusted figures differ (HP filter in the present study, Blanchard's trend regressions in Alesina and Ardagna, 1998).

<sup>14</sup> Overall, the correlation index between 'size' and 'persistence' consolidation indicators (taking the value 1 for country/year combinations in which consolidations occur and zero otherwise.) is positive but quite low (0.33).

<sup>15</sup> Correlation indexes among expansionary consolidation indicators based on different definitions of expansion help to understand the extent to which alternative criteria tend to yield overlapping results. The correlation coefficient between the benchmark criterion based on the acceleration of real GDP growth and the trend growth criterion is 0.63, while the correlation with the measure based on actual minus EU growth is 0.76. The trend growth criterion has a relatively low correlation with the criterion based on actual minus EU growth (0.51).

**Table 2. Expansionary consolidations: description of episodes**

Criteria	Consolidation: Size (benchmark)	Consolidation: Persistence	Consolidation: Size	Consolidation: Size
	Expansion: Growth (benchmark)	Expansion: Growth	Expansion: Trend growth	Expansion: <b>Actual minus EU growth</b>
Number of <i>consolidation</i> episodes	49	74	49	49
Number of <i>expansionary</i> episodes	24	43	22	21
Number of ' <i>pure</i> ' expansionary episodes	11	19	11	11
<b>Description of expansionary episodes ('pure' episodes in bold)</b>				
BE	1984, <b>1985</b>	1984, <b>1985</b> , 1986, 1987	1984, <b>1985</b>	1984, <b>1985</b>
DK	<b>1983, 1984</b>	<b>1983, 1984</b>	<b>1983, 1984</b>	<b>1983, 1984</b>
DE	1982	1982, 1983, 1984	1982	1982
EL	1982, <b>1987</b> , 1994, 1996	1994, 1996, <b>1997, 1998</b>	<b>1986, 1987, 1991</b> , 1994, 1996	1982, <b>1991</b> , 1994, 1996
ES	<b>1986</b>	1985, <b>1986, 1987</b>	<b>1986</b>	<b>1986</b>
FR	..	1995, 1996, 1997	..	..
IE	1976, 1987, 1988	<b>1984</b> , 1987, 1988, <b>1989</b>	1987, 1988	1987, 1988
IT	<b>1976, 1977, 1993</b>	<b>1993</b> , 1995	1997	<b>1976, 1977, 1992, 1993</b>
NL	1993	1982, 1983	..	1993
AT	..	1995, <b>1996, 1997</b>	1984	..
PT	<b>1986</b>	..	<b>1986</b>	<b>1986</b>
FI	1993	<b>1977</b> , 1998	..	1993
SE	<b>1983</b> , 1987, 1995, 1998	<b>1982, 1983, 1984</b> , 1987, 1994, 1995, 1997, 1998	1995, 1996, 1998	<b>1983</b> , 1998
UK	<b>1997</b>	<b>1981, 1982, 1997</b>	<b>1980, 1997, 1998</b>	..

*Definitions of fiscal 'consolidation'.*

Size: The primary cyclically adjusted budget balance improves by at least 2 percentage points of GDP at time t or by at least 1.5 points in each of two consecutive years (i.e., t and t-1 or in t and t+1).

Persistence: The primary cyclically adjusted budget balance improves by at least 3 percentage points of GDP over three consecutive years (i.e., between t-2 and t, or between t-1 and t+1 or between t and t+2) and in each year the change in the primary cyclically adjusted budget balance cannot be below -0.5 percentage points of GDP.

*Definition of an 'expansionary' fiscal consolidation.*

Growth: Average real GDP growth between t and t+2 greater than between t-1 and t-2.

Trend growth: Average trend growth between t and t+2 greater than between t-1 and t-2.

Actual minus EU growth: Average difference (actual real GDP growth - EU average real growth) between t and t+2 greater than between t-1 and t-2.

*Definition of a 'pure' expansionary consolidation.*

An expansionary fiscal consolidation in which the average change in real short run interest rates between t-1 and t+1 is non-negative.

### 3.2.2. The characteristics of expansionary fiscal consolidations

Table 3 reports statistics concerning the characteristics of the fiscal consolidations identified, distinguishing whether the consolidation was expansionary or not. The characteristics include the size of adjustment, the initial state of public finances and the composition of the adjustment. Results appear to be quite robust with respect to the concept of consolidation or expansion employed and supportive of findings reported in previous studies (Alesina and Ardagna, 1998, Alesina et al., 2002). While the size of the adjustment and the initial conditions of public finances do not appear to be significantly different between expansionary and non-expansionary consolidations, the composition of fiscal adjustment differs significantly. Concerning the initial state of public finances, the average value of debt/GDP ratios are found to be substantially higher in expansionary fiscal consolidation periods, irrespective of the concept of consolidation or expansion employed. However, t tests show that this difference is generally not statistically significant.<sup>16</sup>

**Table 3. Size and composition of expansionary consolidations**

Criteria	Consolidation: Size (benchmark)			Consolidation: Persistence			Consolidation: Size			Consolidation: Size		
	Expansion : Growth (benchmark)			Expansion: Growth			Expansion: Trend growth			Expansion: <b>Actual minus EU growth</b>		
	Average values		t test	Average values		t test	Average values		t test	Average values		t test
	Non exp. (1)	Exp. (2)	for (1)≠(2)	Non exp. (3)	Exp. (4)	for (3)≠(4)	Non exp. (5)	Exp. (6)	for (5)≠(6)	Non exp. (7)	Exp. (8)	for (7)≠(8)
Variables (yearly change as a % of GDP)												
<b>Primary CAB</b>	2.9	2.8	0.8	1.4	1.6	-0.5	2.9	2.8	0.2	2.9	2.7	0.7
<b>Debt</b> (level as a % of GDP)	65.4	75.1	-0.9	68.7	74.6	-0.8	63.9	77.7	-1.6	61.6	81.1	-2.2**
<b>Primary expenditure</b>	0.0	-1.6	2.9**	0.2	-1.2	3.5***	0.0	-1.8	3.6***	-0.4	-1.4	1.7*
<b>Government investment</b>	-0.2	-0.3	1.6	-0.2	-0.2	0.8	-0.2	-0.3	-0.13	-0.2	-0.3	0.0
<b>Public employees compensation</b>	0.0	-0.2	1.4	0.0	-0.2	1.4	0.1	-0.4	4***	0.0	-0.2	1.2
<b>Total government revenues</b>	2.3	1.0	4.1***	1.3	0.5	2.8**	2.2	0.9	4.1***	2.0	1.1	2.8**
<b>Total cyclically- adjusted government revenues</b>	2.4	1.1	3.3**	1.4	0.3	2.9**	2.6	0.8	4.9***	2.1	1.2	2.1**

Notes: t test values labelled by \*, \*\* and \*\*\* refer, respectively, to cases in which the average value of variables during expansionary and non-expansionary consolidations are statistically different at a 90, 95 and 99% confidence interval.

Fiscal adjustments based on expenditure cuts are more likely to be expansionary than consolidation periods based on tax increases. Looking at overall values for primary expenditure and for government revenues (cyclically-adjusted or not) differences are statistically significant irrespective of the concept of consolidation employed (size or persistence). The definition of consolidation appears to matter instead as far as the composition of expenditure is concerned. In particular, the reduction in the public wage bill, found to be relevant to characterise expansionary fiscal consolidations in other studies (Alesina et al., 2002), is significantly higher in expansionary than in non-expansionary consolidations only when a criterion of expansion based on trend

<sup>16</sup> When performing comparisons between variables, t tests permit to take into account both measures of position (averages) and of variability (standard deviations). This helps in understanding when apparently large differences in averages are mainly driven by the fact that variables are highly volatile.

growth is chosen. This last finding is consistent with the idea that the link between the wage bill of public employees and real output is through higher profits and then greater investment. To the extent that investment affects both demand and supply conditions, one should expect trend output to be affected, while this is not the case if the link is a purely demand one.

### 3.2.3 *The macroeconomic environment during expansionary fiscal consolidations*

Table 4 presents data characterising the macroeconomic environment preceding, during, and following consolidation periods. Several results emerge.

First, as expected given our definitions, growth (and trend growth in most cases) appears to accelerate during the consolidation year and during the following year for expansionary episodes, while this is not the case in non-expansionary episodes.

Second, consolidations are more likely to be expansionary after periods characterised by relatively low growth and by negative output gaps.

Third, both private consumption and business investment accelerate during expansionary consolidation periods, with investment registering a much higher acceleration. By contrast, during non-expansionary periods investment decelerates and even drops after the consolidation (negative growth rates of investment).

Fourth, the view that expansionary fiscal consolidations should be seen as a phenomenon mainly associated with exchange rate depreciations or devaluations and consequent current account improvements does not seem supported. Table 4 shows that on average during fiscal consolidations the national exchange rate tends to depreciate with respect to the ECU (i.e., it shows a positive rate of change of the price of ECU in national currency). Such depreciation appears to be on average stronger in the year before and during expansionary consolidations. However, depreciations are not particularly larger in the case of expansionary consolidation than in the case of non-expansionary consolidations and results depend quite crucially on the consolidation and expansion criteria used. Moreover, in spite of the fact that before fiscal consolidations a higher growth rate in the current account balance is observed in the case of non expansionary consolidations, the differences in growth rates in the current account surplus between expansionary and non-expansionary episodes are on average quite small in the year where the consolidation takes place and in the following year.<sup>17</sup>

Finally, during consolidation periods, both expansionary and non-expansionary, there is a reduction in nominal interest rates, irrespective of the definition of consolidation employed. Looking at the behaviour of real interest rates a ‘U-shaped’ pattern is observed, with real rates falling and then rising after the consolidation takes place. This finding is consistent with the fact that in these periods the fiscal stance is meant to be contractionary. In general, expansionary episodes are characterised by higher levels of nominal and real interest rates. Overall, nominal and real interest rates do not seem to drop more significantly in the case of expansionary consolidations. Overall, there is not a strong indication in the data that the fiscal consolidations that were followed by output expansions were accompanied by a much more expansionary monetary policy stance.

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<sup>17</sup> Anecdotal evidence suggests that a number of fiscal consolidations experiences that turned out to be expansionary were preceded (rather than accompanied) by a depreciation of the currency associated with unilateral devaluations or ERM realignments. This was for instance clearly the case for the Danish consolidation started in 1983 and the consolidation of Italy in 1993.

**Table 4. Macroeconomic environment during fiscal consolidations**

Criteria  Variables (growth rates in %, unless otherwise stated)	Consolidation: Size (benchmark)		Consolidation: Persistence		Consolidation: Size		Consolidation: Size	
	Expansion: Growth (benchmark)		Expansion: Growth		Expansion: Trend growth		Expansion: Actual minus EU growth	
	Non exp.	Exp.	Non exp.	Exp.	Non exp.	Exp.	Non exp.	Exp.
<b>Real GDP</b>								
t-1	2.6	1.6	2.7	1.5	2.2	2.0	2.8	1.1
t	1.1	2.1	1.5	2.5	1.2	2.1	1.3	2.0
t+1	0.7	3.4	1.5	3.1	1.6	2.7	1.3	3.1
<b>Output gap</b> (% of trend output)								
t-1	0.4	-1.1	0.4	-2.0	0.9	-1.9	0.0	-0.7
t	0.2	-1.5	0.0	-1.6	0.1	-1.6	-0.3	-1.1
t+1	-0.3	-0.8	-0.1	-0.9	-0.2	-1.0	-0.2	-1.0
<b>Trend GDP</b>								
t-1	2.6	2.6	2.4	2.4	3.1	2.0	2.6	2.5
t	2.5	2.6	2.3	2.5	2.9	2.2	2.6	2.5
t+1	2.5	2.6	2.4	2.6	2.8	2.3	2.6	2.6
<b>Real private consumption</b>								
t-1	2.4	1.4	2.4	1.4	2.1	1.7	2.3	1.4
t	1.4	1.8	1.9	2.1	1.2	2.0	1.8	1.3
t+1	1.5	3.0	1.6	2.6	1.5	3.1	1.9	2.6
<b>Real business investment<sup>1</sup></b>								
t-1	3.5	0.3	5.4	0.9	0.4	3.4	4.5	-0.8
t	-0.6	3.7	1.5	4.8	-0.6	4.1	1.8	1.2
t+1	-3.3	6.7	-1.2	6.4	-2.6	6.8	-0.7	4.9
<b>Exchange rate with ECU</b>								
t-1	1.1	3.1	1.8	1.1	1.7	2.6	1.6	2.8
t	2.2	3.4	1.8	1.9	2.9	2.8	2.1	3.8
t+1	3.7	2.0	3.1	1.2	4.2	1.3	2.7	2.9
<b>Real current account surplus</b>								
t-1	3.0	0.1	1.7	0.0	0.3	2.5	2.3	0.3
t	-0.1	-0.2	1.5	0.0	0.1	-0.4	0.0	-0.4
t+1	-0.2	0.4	-0.1	-0.1	0.0	0.2	0.0	0.2
<b>Nominal short run interest rates (%)</b>								
t-1	11.3	12.5	11.8	10.0	12.4	11.4	10.3	13.2
t	10.9	11.5	11.7	9.4	12.0	10.5	9.5	12.7
t+1	9.9	10.2	11.4	8.7	10.8	9.3	8.9	11.2
<b>Real short run interest rate (%)</b>								
t-1	2.6	3.6	2.8	4.1	2.7	3.7	2.3	4.1
t	2.3	2.7	3.6	4.3	1.5	3.6	1.9	3.3
t+1	2.6	3.0	4.2	4.4	1.7	4.0	2.0	3.6

Notes: <sup>1</sup>defined by gross fixed capital formation by the private sector net of construction and dwellings expenditures.

Looking at the contribution of different components of aggregate demand to GDP growth during fiscal consolidations (Table 5) it appears that business investment and the current account balance give a higher contribution to growth during expansionary consolidations irrespective of the criteria chosen to measure consolidation or expansion. However, t tests reveal that the difference in the contribution of the current account is never significantly different from zero. This is additional evidence that, overall, improvements in the current account (possibly related to exchange rate policies) are a relevant but not crucial factor in the characterisation of expansionary fiscal consolidations. Regarding the contribution to growth of private consumption, it is generally higher in expansionary consolidations but the difference is significantly different from zero only when using a criterion of expansion based on trend growth. The contribution of public consumption is instead generally weaker during expansionary consolidations, and this is consistent with the findings in the previous section pointing to larger cuts in public spending in the case of expansionary consolidations.

**Table 5. Contribution to growth of different aggregate demand components during fiscal consolidations**

Criteria	Consolidation: Size (benchmark)			Consolidation: Persistence			Consolidation: Size			Consolidation: Size		
	Expansion : Growth (benchmark)			Expansion: Growth			Expansion: Trend growth			Expansion: Actual minus EU growth		
	Average values		t test	Average values		T test	Average values		t test for	Average values		t test
(growth rates in real GDP attributable to different components of aggregate demand) <sup>1</sup>	Non exp. (1)	Exp. (2)	for (1)≠(2)	Non exp. (3)	Exp. (4)	for (3)≠(4)	Non exp. (5)	Exp. (6)	t test for (5)≠(6)	Non exp. (7)	Exp. (8)	for (7)≠(8)
<b>Private consumption</b>	1.0	1.2	-1.0	1.1	1.2	-0.2	0.9	1.4	-2.1**	1.2	1.1	0.4
<b>Government consumption</b>	0.5	0.2	2.1**	0.3	0.3	0.8	0.5	0.2	2.0**	0.5	0.2	1.8*
<b>Business investment</b>	-0.1	0.4	-2.3**	0.2	0.4	-1.5	-0.2	0.6	-3.8***	0.1	0.2	-0.5
<b>Trade balance</b>	0.2	0.4	-0.5	0.3	0.6	-0.9	0.2	0.4	-0.6	0.3	0.4	-0.3
<b>Stocks</b>	-0.2	0.0	-1.0	-0.1	0.1	-1.6	-0.1	-0.1	-0.1	-0.2	0.0	-1.4
<b>Other</b>	0.2	0.0	0.8	0.0	-0.1	0.7	0.0	0.1	-0.6	0.2	-0.1	1.2

Notes: <sup>1</sup> The contribution to GDP growth of component  $i$  of aggregate demand is defined by  $s_i g_i$ , where  $s_i$  is the share of component  $i$  in aggregate demand (GDP) and  $g_i$  is the growth rate of component  $i$ . The table reports sample averages of the average contribution to growth between  $t-1$  and  $t+1$ , where  $t$  refers to years in which fiscal consolidations take place. \*, \*\* and \*\*\* denote, respectively, significance at 90, 95, and 99% confidence.

### 3.2.4. The role of composition and initial conditions: Probit analysis

The evidence on the characteristics of consolidations reported in table 3 shows that fiscal consolidations by output expansions were generally based on expenditure cuts rather than on tax increases, whereas the size of the adjustment does not seem to differ significantly with respect to those consolidation which were not expansionary. The evidence in table 3 also indicates that expansionary consolidations are more likely to occur starting from a high level of public debt. Table 4 reports also that on average, expansionary fiscal consolidations started during periods characterised by relatively weak cyclical conditions, i.e., by lower output gaps compared with the case of non-expansionary consolidations. A natural question arises to what extent the acceleration in growth following expansionary consolidations was the product of improved households' and

businesses' expectations following the improvement in budget balances (according to the arguments outlined in section 2) or was simply the result of independent cyclical developments? In order to address this question properly it is necessary to assess simultaneously the impact of the composition of consolidations, initial debt levels and initial output gap levels on the probability of a fiscal consolidation to produce expansionary effects on output. This issue is investigated in this section by means of Probit analysis.

In doing the analysis, the sample is restricted to those country/year combinations in which fiscal consolidations took place (based on our alternative size and persistence definitions). The dependent variable is a binary variable with value equal to one when the consolidation is followed by increased growth, and zero otherwise. When the consolidation is defined on the basis of its size, all the definitions of expansion proposed (GDP growth, trend GDP growth, difference between actual and EU average GDP growth) are considered. The explanatory variables are the debt level (% of GDP), the variation in primary expenditures (as % points of GDP) and the initial output gap level (simple average between the value registered during the consolidation and the previous year). Based on the findings in the existing theoretical and empirical literature and the results in the analysis of the characteristics of expansionary fiscal consolidations we expect the sign of the debt variable to be positive, while that of the change in primary government expenditure (reflecting the composition of consolidation) to be negative. Concerning the impact of the initial output gap on the probability of consolidations producing expansionary effects on output, a negative sign may indicate that the growth acceleration following the fiscal consolidation is related to cyclical developments independent of the budgetary policy.

The results are reported in table 6. The composition variable has the expected sign irrespective of the definition of consolidation and expansion used and is always significant except in the case in which the expansion is defined as differences with respect to the EU average growth. The debt variable has the expected sign in all the equation but is significant only when the expansion is defined as an acceleration in the difference between actual and average EU growth. Concerning the output gap variable, it appears to have a negative impact in all cases, but is significant only when the consolidation is defined on the basis of persistence and, in the case of consolidations based on the size definition, when the expansion is measured in terms of trend growth. Moreover, the impact is very small and not significant using as definition the difference of growth rate with respect to the EU average. Looking at the value of the Probit marginal effects, we see that in the case of an expansion definition based on GDP growth one additional percentage point of output gap (at sample mean) reduces the probability of expansion by almost 0.07 (over a total fitted probability of about 0.5), in case of a definition based on trend growth the impact is 0.16, while in the case of a definition based of actual minus EU average growth the impact is only 0.02 and not statistically significant from zero. When the consolidation is based on persistence the probability for a fiscal consolidation to be expansionary increase by 0.19 points for each additional point of output gap.

**Table 6. The probability of expansionary effects from fiscal consolidations (Probit analysis)**

	Consolidation: Size (benchmark)	Consolidation: Persistence	Consolidation: Size	Consolidation: Size
	Expansion: Growth (benchmark)	Expansion: Growth	Expansion: Trend growth	Expansion: Actual minus EU growth
<b>Probit marginal effects</b>				
OUTGAP	-0.07 (-1.22)	-0.19 (-2.49)**	-0.161 (-3.69)***	-0.02 (-0.63)
DEBT	0.0008 (0.39)	0.0006 (0.33)	0.002 (0.356)	0.005 (3.03)***
ΔPREXP	-0.098 (-2.48)**	-0.11 (-3.2)***	-0.09 (-2.3)**	-0.049 (-1.61)
N. obs	49	74	49	49
Log likelihood	-28	-33	-23	-29
Mcfadden's Pseudo R-squared	0.16	0.33	0.30	0.10
Observed probability	0.53	0.58	0.49	0.42
Predicted probability (at sample mean)	0.53	0.61	0.48	0.41

Notes:

- Probit regression on panel data, standard errors adjusted for clustering within countries
- Z tests for probit coefficients significance are reported in parenthesis. \*,\*\* and \*\*\* denote, respectively, significance at 90, 95, and 99% confidence.
- OUTGAP: Output gap (% of potential GDP), simple average at t and t-1.
- DEBT: Debt (% of GDP).
- ΔPREXP: Change in primary expenditure between t and t-1 as percentage points of GDP.

Summarising, the composition of fiscal consolidation is the most significant explanatory variable in shaping the probability of fiscal consolidations being followed by increased growth, while the debt level is generally not significant. As far as the role of the initial output gap is concerned, low levels of output gap increase the probability of consolidations to be expansionary but not always significantly. Overall, this evidence indicates that the expansion observed after the fiscal consolidations can be significantly attributable to independent cyclical developments only when the consolidations are defined on the basis of the persistence criterion or when, in the case of a size definition of consolidation, the expansions have an international character (i.e., it is common to other EU countries).

### 3.3. Summary of findings

The ex-post analysis carried out in this section leads to a number of findings that can be summarised as follows.

i) Fiscal consolidation episodes exhibiting non-Keynesian features can be found in Europe. This seems valid even relying upon alternative definitions of fiscal consolidation and on different criteria to identify expansionary fiscal adjustments. About half of the consolidation episodes are followed by an acceleration in growth. Moreover, when episodes where real interest rates diminish are excluded, we find that still roughly one fourth of all consolidation episodes are followed by an improvement in growth indicators. Hence, there is an indication that roughly half

of the expansionary fiscal consolidations are unlikely to be attributable to concomitant monetary policy easing (or devaluations). These findings suggest that monetary easing and devaluations are factors that may favour the emergence of expansionary fiscal consolidations, but are not necessary conditions for consolidations to exhibit non-Keynesian effects.

*ii)* Irrespective of the definition of fiscal consolidation or expansion employed, expansionary fiscal consolidations are more likely to be based on expenditure cuts than on tax increases. Expansionary fiscal adjustment periods also appear to be associated with initial high levels of debt, while the size of adjustment is not significantly different from that of non-expansionary consolidations. Consistent findings are found in previous studies (Alesina and Ardagna, 1998, Alesina et al., 2001). The result that expansionary consolidations are more likely to be based on cuts in wage expenditure is more sensitive to the definition of fiscal consolidation or expansion used.

*iii)* There is evidence that the acceleration in growth following fiscal consolidations may have either a cyclical nature or a structural one (trend growth is affected). During expansionary consolidations both consumption and investment accelerate. The behaviour of business investment seems especially helpful in distinguishing between expansionary and non-expansionary episodes. Irrespective of the definition of consolidation and expansion used, while in non-expansionary cases investment falls, in expansionary periods there is a strong acceleration in this component of aggregate demand. Moreover, the contribution to growth of business investment is on average higher during expansionary consolidations, irrespective to the criteria used to define consolidations and expansions.

*iv)* The macroeconomic environment preceding expansionary consolidation periods is characterised by slow growth and negative output gaps compared with that characterising non-expansionary consolidations. This finding appears robust with respect to the definition of consolidation used and the definition of expansion adopted. Probit analysis shows that initial low output gaps increase somehow the probability for fiscal consolidations to be expansionary, possibly as a result of independent cyclical developments. However, the impact does not appear to be relevant when the output expansion is measured in terms of the differential between the national and the EU average growth.

We need to recall that the above results are to be interpreted with caution. As mentioned in section 3.1., cross-country empirical analysis on fiscal consolidations is subject to a series of problems and limitations. In particular, when interpreting the results it is quite difficult to isolate the effect of structural factors (e.g., productivity dynamics,...) or policy conditions (e.g., monetary and exchange rate policies) that affect the links between fiscal consolidations and economic activity.

A way to overcome the above difficulties in interpreting empirical evidence is that of creating a policy experiment in which a fiscal policy shock occurs in isolation from other policies and from other types of shocks to macroeconomic variables. The use of applied macroeconomic models helps to understand how such hypothetical policy experiments would work in reality. The next section presents simulations on the effects of alternative types of fiscal consolidations from the Commission's QUEST model.

## 4. A model-based assessment of the effects of fiscal consolidations: simulation results from the QUEST model

### 4.1. Model description

In order to analyse the possible macroeconomic effects of fiscal consolidations, we present in this part various simulation experiments with the European Commission's QUEST model. The question we are interested in is whether a macroeconomic model like QUEST, with strong theoretical and empirical foundations, can support the hypothesis of expansionary fiscal consolidations. In particular we want to examine under what conditions these expansionary effects are most likely to occur. We look at alternative fiscal consolidations, all standardised to 1% of GDP, under different monetary policy assumptions and analyse how the results change when certain assumptions in the model are altered.

QUEST is a macroeconomic model whose foundations can be characterised as a modern version of the neoclassical-Keynesian synthesis. Behavioural equations in the model are based on intertemporal optimisation of households and firms with forward-looking expectations.<sup>18</sup> Prices adjust sluggishly and the nominal wages response is delayed because of overlapping wage contracts. The model has Keynesian features in the short run, but the effectiveness of fiscal policy is more limited than in the traditional econometric models because of the built-in intertemporal budget constraints. However, since planning horizons are finite there is no complete tax discounting and Ricardian equivalence does not hold. Total consumption at time  $t$ ,  $C_t$ , is obtained as

$$C_t = (1 - \lambda) * \delta[H_t + F_t] + \lambda * Ydis_t, \quad (1)$$

denoting by  $\lambda$  the share of liquidity constrained consumption, by  $H$  and  $F$  human wealth and financial wealth, respectively, and by  $Ydis$  current real disposable income.<sup>19</sup> Total consumption results from the aggregation of the responses of two groups of households, one forward-looking group that follows the optimal consumption rule given by the life cycle/permanent income hypothesis and a liquidity-constrained group whose consumption depends on current disposable income.

The first group of consumers determines consumption and savings each period by maximising the present discounted expected utility from the consumption stream subject to their intertemporal budget constraint. The second group of consumers is 'liquidity constrained' and cannot achieve intertemporal optimisation. Hence, their consumption is represented as a function of current real disposable income ('rule-of-thumb' consumers). The share of liquidity constrained consumers  $\lambda$  is set to 0.3 for the European countries in the default setting in the model.<sup>20</sup>

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<sup>18</sup> The model has a richer theoretical structure than most macroeconometric models, but allows for adjustment costs and nominal rigidities. For a presentation of QUEST II model, see Roeger and in 't Veld (1997 and 2002).

<sup>19</sup> Human wealth  $H$  is the present discounted value of the entire future stream of after-tax income, while financial wealth  $F$  equals the sum of total equity wealth, bonds, money and net foreign assets.

<sup>20</sup> Empirical studies using aggregate time series data have generally found evidence of "excess sensitivity" to income and concluded that a significant share of consumption is liquidity constrained (e.g. Campbell and Mankiw (1989 and 1991)). However, the range of estimates of the share of rule-of-thumb households vary widely and is sensitive to the assumed household utility function. For example, Weber (2002) finds the share of liquidity constraints never to be statistically significant when allowing for intertemporal non-separability in the utility function. There is also no consensus on the size of the elasticity of intertemporal substitution, which affects the interest sensitivity of consumption. On the one hand, studies using aggregate

Taxes are distortionary in the model and affect long term employment, capital formation and consumption decisions by private agents. Consolidations through tax increases have therefore long term negative consequences in the model. The only exception to this is lump-sum taxes, which do not create any distortions, but this is of limited practical relevance.

Many of the factors mentioned in the previous parts of the paper that could rationalise non-Keynesian effects are present in the model. A reduction in government expenditure in QUEST affects consumption of the liquidity-constrained households who see their current disposable income decline if wages and employment are falling. However, the non-liquidity-constrained households could increase their consumption as interest rates fall and if they anticipate a reduction in taxes in the future. The removal of distortions that this entails could boost employment and output and already affect life time income in the short run. Expansionary effects through the consumption channel may occur in the medium term, but if a sizeable share of households is liquidity constrained, it is unlikely that the boost to consumers' spending that might result from this will be strong enough to offset the negative impact of the reduction in government spending in the short run already. Thus, the emergence of non-Keynesian effects of fiscal consolidations through consumers' spending crucially depends on the severity of credit constraints and on the degree of distortions associated with public intervention.

Besides the consumption channel, QUEST allows also for the working of non-Keynesian effects through the investment channel. The investment specification in the QUEST model is based on profit maximisation by firms, assuming that investment is subject to adjustment costs, which are a convex function of the rate of change of the firm's capital stock. Profit maximisation yields the following investment rule

$$I_t = \frac{1}{\phi} \left( \frac{q_t}{(PI_t / P_t)} - 1 \right) K_t \quad (2)$$

where  $\phi$  is an adjustment cost parameter,  $K_t$  the capital stock at time  $t$  and  $PI_t/P_t$  denotes the relative price of investment goods relative to the GDP deflator. The shadow price of capital  $q_t$  is equal to the marginal product of capital plus any anticipated future events which are expected to influence the marginal product after period  $t$ . Therefore, it is a function of current and discounted future expected profitability, including adjustment costs, and adjusted for profit taxes.

With such specification of the investment equation, a fiscal consolidation affects investment in the following way. A reduction in public expenditure will lead to an increase in unemployment and exert downward pressure on wages. Lower wages tends to boost profits and raise investment spending. This investment channel of non-Keynesian effects, emphasised in Alesina *et al* (2002), operates in the model through the wage setting specification. The real wage negotiated in each period is the outcome of a Nash bargaining solution and depends on the reservation wage (value of leisure, unemployment benefits), labour productivity and a measure of labour market tightness (unemployment). If a fiscal consolidation affects the latter and puts downward pressure on wages, it will have a positive effect on investment by raising expected profitability.

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time series have tended to find small estimates of the elasticity of intertemporal substitution (e.g. Hall (1988)). On the other hand, studies based on micro household survey data have generally found much stronger support for the life cycle model, no strong evidence of liquidity-constrained consumption and relatively higher estimates for the elasticity of intertemporal substitution (e.g. Attanasio and Weber (1993 and 1995), DeJuan and Seater (1999) ). The estimates used in the QUEST model lie within the range found in the empirical literature: the share of consumption that is liquidity constrained is set at 0.3, while the elasticity of intertemporal substitution for the fraction of consumption that obeys the life cycle model is set at 0.5.

## 4.2. Model simulations

The question arises whether the non-Keynesian channels described above could prevail over the traditional Keynesian channels and lead to expansionary fiscal consolidations. Moreover, it is relevant to understand which type of fiscal consolidations is more likely to be non-Keynesian.<sup>21</sup> This question is addressed by simulating alternative fiscal consolidations in one country in the model, namely Germany. For comparability all scenarios are of equal *ex-ante* size and standardised to consolidations of 1 percentage points of (baseline) GDP, i.e. permanent increases in taxation or reductions in expenditure all amounting to 1 per cent of GDP<sup>22</sup>. This implies that two of the factors investigated in the previous sections, *i.e.* the size of the adjustment and the initial state of public finances, are not directly explored in the simulations.<sup>23</sup> The policy experiments are also applied to one country in isolation and no attention is paid to possible cross-country spill-over effects.<sup>24</sup>

The default monetary policy assumption is based on a forward looking Taylor-type rule. The monetary authorities are assumed to set short-term interest rates at a level that depends both on the deviation of the forecast of inflation from the target inflation rate and on the magnitude of the output gap. To evaluate the impact of the monetary policy stance on the effects of fiscal consolidations, an alternative monetary policy rule, leading to a looser policy stance, is also considered.

All the model simulations assume that the fiscal consolidations are *permanent and credible*, *i.e.* private agents fully and correctly anticipate the effects of fiscal consolidation and do not expect the fiscal policy stance to be reverted in the future.<sup>25</sup> The simulation results are presented as changes in levels of relevant macroeconomic variables. These results are equally interpretable as deviations from baseline steady-state levels.

### 4.2.1 A consolidation via tax increases

With distortionary taxes one would not expect to see positive output effects from tax increases in the model. This is confirmed by Table 7, which shows the simulation results for permanent tax increases of 1 per cent of GDP in labour income tax, corporate profit tax and VAT respectively. In each of these simulations the debt to GDP ratio gradually declines and is stabilised at a 10 percentage points lower level in the long run. All these simulations show negative GDP effects in the short run which become even more pronounced in the medium run. Higher tax rates increases the distortions in the economy and reduce employment, capital accumulation and output. Labour

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<sup>21</sup> Sault and Wallis (1998) perform a similar analysis on two global models, MSG2 (McKibbin and Sachs) and the NiGEM model. They conclude that there are positive consumption effects following fiscal contractions in these model but that these are generally not large enough to avoid output from falling. However, no distinction is made between different expenditure categories and only in the first model is there a role for expectational effects of future taxation.

<sup>22</sup> The simulated fiscal consolidations have an impact on the size and evolution of public debt. In the simulations the debt is stabilised at a 10 per cent lower level as a percentage of GDP through reductions over time in labour income taxes.

<sup>23</sup> The non-linearities in the model are not substantial enough to analyse the importance of larger versus smaller fiscal consolidations, and the model results are close to proportional for larger adjustments than the standardised consolidations of 1 percentage point considered here. Nor are we exploring here the significance of the initial state of public finances. Instead we focus our attention on the composition of fiscal adjustments and look at the effects for different tax and expenditure categories.

<sup>24</sup> Note that as the simulations are performed under an existing EMU framework, there is also no role for an exchange rate channel, a potentially important channel in some of the episodes studied in the previous section.

<sup>25</sup> Simulations of fiscal consolidations that are perceived as non-credible and temporary (so that agents rationally expect that the policy will be reversed in the future) show much larger contractionary effects (see European Commission (2003)).

income tax and VAT affect consumption more than investment, and they both reduce employment. In contrast, the consolidation through an increase in the corporate tax rate has the largest effect on capital formation, which falls sharply on impact, while the increase in unemployment is only of a temporary nature. On the whole, these negative output effects are consistent with the findings in the previous section that consolidations mainly based on revenue increases are not likely to yield expansionary effects on output.

**Table 7. Impact of a budgetary consolidation through an increase in various items of public revenue**

<b>Increase in labour income tax of 1% of GDP</b>						
<b>% change from baseline</b>	<b>1<sup>st</sup> year</b>	<b>2<sup>nd</sup> year</b>	<b>3<sup>rd</sup> year</b>	<b>4<sup>th</sup> year</b>	<b>5<sup>th</sup> year</b>	<b>10<sup>th</sup> year</b>
GDP	-0.36	-0.47	-0.6	-0.71	-0.80	-1.09
Consumption	-0.90	-1.10	-1.19	-1.25	-1.31	-1.42
Investment	-0.29	-0.57	-0.86	-1.09	-1.29	-1.91
Real wage costs	0.70	0.94	0.71	0.56	0.58	0.19
Real effective exch. rate	0.14	0.08	-0.01	-0.10	-0.16	-0.42
<b>Absolute change from baseline</b>						
Short term interest rate	-0.08	-0.06	-0.05	-0.05	-0.05	0.01
Real short term int. rate	-0.04	-0.09	-0.09	-0.07	-0.07	0.00
Unemployment rate	0.28	0.75	0.98	1.07	1.15	1.38
Debt (% of GDP)	-0.37	-1.21	-1.92	-2.59	-3.29	-7.63
Deficit (% of GDP)	-1.00	-0.83	-0.74	-0.73	-0.82	-0.86
<b>Increase in corporate tax of 1% of GDP</b>						
<b>% change from baseline</b>	<b>1<sup>st</sup> year</b>	<b>2<sup>nd</sup> year</b>	<b>3<sup>rd</sup> year</b>	<b>4<sup>th</sup> year</b>	<b>5<sup>th</sup> year</b>	<b>10<sup>th</sup> year</b>
GDP	-0.34	-0.23	-0.23	-0.27	-0.31	-0.09
Consumption	0.85	1.38	1.37	1.30	1.25	1.47
Investment	-4.24	-5.29	-5.18	-5.01	-4.96	-3.96
Real wage costs	-0.13	-0.25	-0.25	-0.29	-0.40	-1.32
Real effective exch. rate	0.10	0.11	0.07	0.03	-0.01	0.03
<b>Absolute change from baseline</b>						
Short term interest rate	-0.05	-0.04	-0.03	-0.03	-0.01	0.03
Real short term int. rate	0.01	-0.03	-0.04	-0.05	-0.04	0.05
Unemployment rate	0.08	0.05	0.02	0.01	-0.01	-0.81
Debt (% of GDP)	-0.44	-1.63	-2.8	-3.95	-5.11	-9.56
Deficit (% of GDP)	-1.12	-1.16	-1.18	-1.22	-1.21	-0.66
<b>Increase in VAT of 1% of GDP</b>						
<b>% change from baseline</b>	<b>1<sup>st</sup> year</b>	<b>2<sup>nd</sup> year</b>	<b>3<sup>rd</sup> year</b>	<b>4<sup>th</sup> year</b>	<b>5<sup>th</sup> year</b>	<b>10<sup>th</sup> year</b>
GDP	-0.14	-0.21	-0.34	-0.44	-0.51	-0.63
Consumption	-0.68	-0.23	-0.29	-0.36	-0.44	-0.51
Investment	-0.15	-0.51	-0.80	-0.97	-1.12	-1.33
Real wage costs	0.49	0.69	0.50	0.37	0.38	-0.06
Real effective exch. rate	-0.08	-0.18	-0.26	-0.31	-0.35	-0.43
<b>Absolute change from baseline</b>						
Short term interest rate	-0.06	-0.03	-0.02	-0.02	-0.02	0.03
Real short term int. rate	-0.09	-0.08	-0.06	-0.04	-0.04	0.03
Unemployment rate	0.16	0.46	0.61	0.68	0.73	0.74
Debt (% of GDP)	-0.49	-1.37	-2.15	-2.91	-3.71	-8.05
Deficit (% of GDP)	-0.93	-0.87	-0.82	-0.83	-0.90	-0.81

#### 4.2.2. *A consolidation via expenditure cuts*

As increases in government revenues by themselves appear to have a low probability to produce expansionary effects in QUEST, in the remaining analysis we focus our attention on cuts in expenditure. The simulations presented in Table 8 are fiscal consolidations through alternative types of expenditure reductions: cuts in government purchases, in government transfers to households (social security payments, like e.g. pensions, and excluding unemployment benefits) and in government employment respectively, all amounting to 1 per cent of (baseline) GDP.

All these three policy experiments show negative GDP effects on impact, but the contractionary effects are generally small and short-lived and followed by a relatively fast reversal in following years. In all cases GDP converges to a higher level compared with baseline, and in the case of cuts to government employment there is an increase in growth already in the medium/short run (3 years after consolidation), although at the cost of a stronger output contraction on impact.

Depending on the consolidation considered the consumption and the investment channel play a different role in shaping the results. Concerning the consumption channel, results confirm that this channel conveys non-Keynesian effects in the QUEST model as expected: after consolidations households anticipate higher future expected incomes associated with lower tax distortions, thereby increasing private consumption expenditure.<sup>26</sup> These non-Keynesian effects on consumption are not big enough to increase GDP immediately after the occurrence of fiscal consolidations but are conducive to higher growth in the medium-long run. In the cases of cuts in government purchases and government employment, aggregate consumption spending increases already in the short-run. However, in the case of cuts to government transfers to households, where there is a direct reduction in resources (transfers) devoted to consumption, the ‘expectation effect’ is not strong enough to offset the direct reduction in aggregate consumption associated with the cut in transfers.

As far as investment expenditure is concerned, simulations show that there is a reduction in the short run after all the types of consolidations considered. This finding may seem at odds with the conclusions of the existing analyses (e.g., Alesina et al, 2002) emphasising the role of the investment channel in explaining the emergence of non-Keynesian effects of fiscal consolidations. There are two reasons for this. First, investment is negatively affected by the impact of the cut in government spending on GDP. Second, higher consumption implies lower savings and higher real interest rates. Hence, the stronger the consumption effect, the weaker the positive impact on investment will be. However, in the case of cuts in government employment there is an investment boost starting from the third year after the consolidation. The mechanism through which this increase in investment takes place is the same as that emphasised in the literature. The short-term rise in unemployment puts downward pressure on real wages in the private sector. This improves profits and firms respond by increasing their investment spending. Lower real wage costs also boost private sector employment again in the medium term and total employment recovers gradually. This scenario also displays the largest potential gains in terms of higher growth after the initial decline in the first year. Much of the existing ex-post empirical evidence on expansionary consolidations broadly supports this view (see section 2).

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<sup>26</sup> The rise in future disposable incomes is due to lower future taxes as following the consolidation the debt ratio is stabilised at a 10 per cent of GDP lower level.

**Table 8. Impact of a budgetary consolidation through a reduction in various items of public expenditure**

<b>Reduction in government purchases of 1% of GDP</b>						
<b>% change from baseline</b>	<b>1<sup>st</sup> year</b>	<b>2<sup>nd</sup> year</b>	<b>3<sup>rd</sup> year</b>	<b>4<sup>th</sup> year</b>	<b>5<sup>th</sup> year</b>	<b>10<sup>th</sup> year</b>
GDP	-0.33	-0.06	-0.04	-0.05	-0.04	0.41
Consumption	1.40	2.11	2.14	2.12	2.12	2.55
Investment	-0.63	-0.85	-0.86	-0.84	-0.81	0.15
Real wage costs	-0.07	-0.10	-0.05	-0.05	-0.10	-0.79
Real effective exch. rate	0.02	0.01	0.02	0.04	0.05	0.37
<b>Absolute change from baseline</b>						
Short term interest rate	0.00	0.02	0.02	0.03	0.04	0.07
Real short term int. rate	-0.04	0.01	0.02	0.02	0.03	0.10
Unemployment rate	0.11	0.05	0.02	0.01	-0.01	-0.82
Debt (% of GDP)	-0.47	-1.79	-2.97	-4.15	-5.34	-9.70
Deficit (% of GDP)	-1.13	-1.17	-1.2	-1.23	-1.22	-0.61
<b>Reduction in government transfers to households of 1% of GDP</b>						
<b>% change from baseline</b>	<b>1<sup>st</sup> year</b>	<b>2<sup>nd</sup> year</b>	<b>3<sup>rd</sup> year</b>	<b>4<sup>th</sup> year</b>	<b>5<sup>th</sup> year</b>	<b>10<sup>th</sup> year</b>
GDP	-0.20	-0.15	-0.08	-0.06	-0.06	0.19
Consumption	-0.27	-0.27	-0.23	-0.22	-0.22	0.13
Investment	-0.65	-0.60	-0.49	-0.47	-0.48	-0.02
Real wage costs	-0.09	-0.14	-0.07	-0.04	-0.03	-0.58
Real effective exch. rate	0.08	0.15	0.18	0.19	0.19	0.34
<b>Absolute change from baseline</b>						
Short term interest rate	0.01	0.01	0.00	0.00	0.01	0.04
Real short term int. rate	0.08	0.04	0.01	0.00	0.00	0.07
Unemployment rate	0.04	0.04	0.03	0.03	0.03	-0.46
Debt (% of GDP)	-0.47	-1.48	-2.52	-3.54	-4.58	-9.00
Deficit (% of GDP)	-1.00	-1.02	-1.03	-1.07	-1.09	-0.71
<b>Reduction in government employment of 1% of GDP</b>						
<b>% change from baseline</b>	<b>1<sup>st</sup> year</b>	<b>2<sup>nd</sup> year</b>	<b>3<sup>rd</sup> year</b>	<b>4<sup>th</sup> year</b>	<b>5<sup>th</sup> year</b>	<b>10<sup>th</sup> year</b>
GDP	-0.93	-0.59	-0.2	0.02	0.16	0.63
Consumption	0.87	1.21	1.46	1.59	1.66	2.06
Investment	-1.00	-0.31	0.49	0.93	1.16	1.93
Real wage costs	-1.41	-1.97	-1.40	-1.04	-0.84	-1.12
Real effective exch. rate	0.01	0.29	0.53	0.69	0.79	1.20
<b>Absolute change from baseline</b>						
Short term interest rate	0.14	0.10	0.07	0.05	0.04	0.07
Real short term int. rate	0.28	0.26	0.17	0.12	0.08	0.11
Unemployment rate	1.48	0.65	0.23	0.07	0.02	-0.50
Debt (% of GDP)	0.28	-0.55	-1.64	-2.77	-3.92	-8.80
Deficit (% of GDP)	-0.52	-0.81	-1.01	-1.10	-1.16	-0.76

#### 4.2.3. Budgetary consolidation when there is an accommodating monetary stance

An expansionary monetary policy may be a factor facilitating the emergence of expansionary fiscal consolidations. The finding in our empirical analysis was that half the expansionary fiscal consolidations appeared to have been accompanied by an effective monetary relaxation (i.e., falling real interest rates). The simulations described in the previous section are instead characterised by a small rise in real interest rates and hence they would be qualified as ‘pure’ expansionary fiscal consolidations in the episode analysis in the previous part if they were associated with an increase in output.

To investigate the importance of the monetary policy assumption in the simulations, we now show the results under a more accommodating policy rule consistent with a small fall in real interest rates on impact.<sup>27</sup> Table 9 shows the results for the simulations of expenditure reductions once an accommodating monetary policy is modelled.

They indicate that falling real interest rates unambiguously help to reduce the negative impact of the fiscal consolidations and boost growth in all three cases considered. Households increase their consumption by more in case of cuts in purchases and government employment or reduce it by less in the case of a cut in transfers. Investment is also boosted further because of lower real interest rates. Interestingly, in two of the three cases considered, cuts in government purchases and transfers, fiscal consolidations accompanied by a looser monetary stance have expansionary output effects already on impact in the first year. Overall, results show that, despite monetary policy is not a necessary factor for the emergence of non-Keynesian effects, it matters both for their size and their timing.

**Table 9. Impact of a budgetary consolidation through a reduction by 1% of GDP in various items of public expenditure, with an accommodating monetary stance**

	1 <sup>st</sup> year	2 <sup>nd</sup> year	3 <sup>rd</sup> year	4 <sup>th</sup> year	5 <sup>th</sup> year	10 <sup>th</sup> year
<b>Reduction in government purchases</b>						
GDP	0.26	0.40	0.25	0.16	0.09	0.32
Consumption	1.54	2.36	2.27	2.22	2.18	2.51
Investment	1.00	0.05	-0.22	-0.42	-0.57	-0.10
Real short term interest rate	-0.54	-0.04	-0.03	-0.02	-0.01	0.08
<b>Reduction in government transfers</b>						
GDP	0.35	0.30	0.21	0.17	0.11	0.17
Consumption	-0.15	-0.04	-0.10	-0.11	-0.14	0.11
Investment	0.84	0.26	0.17	-0.01	-0.16	-0.14
Real short term interest rate	-0.37	0.01	-0.02	-0.03	-0.02	0.05
<b>Reduction in government employment</b>						
GDP	-0.50	-0.36	-0.12	0.07	0.17	0.53
Consumption	0.95	1.31	1.47	1.58	1.63	1.97
Investment	0.17	0.05	0.68	1.00	1.18	1.66
Real short term interest rate	-0.20	0.22	0.15	0.10	0.07	0.10

<sup>27</sup> The relaxation of monetary policy is simulated here by a money targeting rule with an increase in the money base target of 1 per cent.

#### 4.2.4. *Relaxing liquidity constraints*

The extent to which consumption decisions are forward-looking in the model depends to a large degree on the share of liquidity constrained consumers. The assumption in the simulations above is that 30 per cent of total consumption is not based on intertemporal optimisation, but on current real disposable income alone, due to the existence of credit constraints. While this estimate lies within the range found in empirical studies, it is surrounded by a substantial degree of uncertainty. It is therefore worth investigating the robustness of results with respect to perturbations in the parameter  $\lambda$  capturing the share of households affected by liquidity constraints. Since setting  $\lambda$  sufficiently close to one would trivially imply transforming QUEST into a standard Keynesian model, we only assess the implications of further reducing the value of parameter  $\lambda$  from the default value of 0.3.

Table 10 reports the simulation results for different types of reductions in government expenditure when  $\lambda$  is set to zero and consumption is set fully optimally and no households face liquidity constraints. The effect of lower expected future tax liabilities is now much stronger than with liquidity-constrained households. As a result, in the case where government purchases are reduced, the positive effect on consumption is much larger. However, despite this strong positive effect on consumption, investment spending is still negatively affected in the short run. This again illustrates the short-run trade-off between the consumption channel and the investment channel. A stronger consumption response implies lower savings and higher interest rates and this has a negative impact on investment. Overall, the immediate impact on GDP is slightly negative, although now the negative impact is nearly ten times smaller compared to the default case with liquidity constraints. In case of a reduction in transfers, the first year output effect can already be positive. Instead, when the reduction in expenditure is done through a reduction in public employment, the positive consumption effect is again not strong enough to offset the direct negative effect on output. Hence, we see that the assumed share of liquidity-constrained households appears to be an important factor in determining the likelihood of non-Keynesian effects, and that the way it affects results is not trivial. On the one hand, reducing the share of liquidity-constrained consumers reinforces the consumption channel of the model. This can be sufficient to yield higher growth already at impact in the case of consolidation types (like cuts in government transfers to households) where the consumption channel is expected to play a major role in conveying non-Keynesian effects. On the other hand, stronger effects through the consumption channel are associated with weaker effects through the investment channel, due to the fact that a stronger reduction in savings will take place after consolidation, with a consequent increase in real interest rates.

**Table 10. Impact of a budgetary consolidation through a reduction by 1% of GDP in various items of public expenditure, without liquidity constraints**

	1 <sup>st</sup> year	2 <sup>nd</sup> year	3 <sup>rd</sup> year	4 <sup>th</sup> year	5 <sup>th</sup> year	10 <sup>th</sup> year
<b>Reduction in government purchases</b>						
GDP	-0.04	0.18	0.10	0.03	0.03	0.44
Consumption	2.15	3.15	3.15	3.12	3.10	3.15
Investment	-0.44	-1.08	-1.38	-1.47	-1.50	-0.22
<b>Reduction in government transfers</b>						
GDP	0.06	0.01	-0.01	-0.02	-0.02	0.24
Consumption	0.44	0.44	0.45	0.46	0.47	0.61
Investment	-0.62	-0.86	-0.93	-0.98	-1.03	-0.41
<b>Reduction in government employment</b>						
GDP	-0.57	-0.32	-0.08	0.08	0.21	0.71
Consumption	1.82	2.36	2.47	2.53	2.57	2.71
Investment	-0.83	-0.61	-0.08	0.30	0.51	1.55

#### 4.2.5. *Reduction in risk premia*

One rationale for possible non-Keynesian effects that is often mentioned in the literature is the effect on risk premia. Fiscal consolidations, if perceived credible and permanent, could, by lowering the risk of government insolvency, be associated with a reduction in risk premia on interest rates, which would then imply a reduction in interest rates even when monetary policy is neutral. Private demand would be boosted by lower interest rates and this could generate positive overall GDP effects already in the short run.

There is no consensus in the literature on the effect of public debt on interest rates. Evidence from the literature testing for Ricardian equivalence is mixed. Some studies have found support for the notion that Ricardian equivalence describes the data quite well and find no correlation between public debt and interest rates. However, Tanzi and Chalk (2000), looking at the EU aggregate, find that for the period 1970-98 a 10 percent of GDP increase in the average EU debt-GDP ratio leads to an increase in real interest rates by 0.6 percentage points. However, the size of the effect they find for the 1980-98 subsample is much smaller, at 0.1 percentage points. Simulations with the QUEST model, in which Ricardian equivalence does not fully hold in the long run, suggest that a permanent increase in the debt to GDP ratio of 10 percentage point can raise real interest rates in the long term by between 0.2 and 0.3 percentage points.

In the scenario below, it is assumed that a reduction in government debt as a percent of GDP by 10 percentage points induced over ten years by a permanent consolidation by 1% of GDP in the first year affects expectations and therefore reduces the risk premium on interest rates by 0.1 percentage point already from the first year. This estimate is on the conservative side and chosen for purely illustrative reasons to show the possible effect this could have on the simulation results. As Table 11 shows, consumption and investment are now immediately boosted by the lower interest rates and this increase in private demand is almost strong enough to offset the direct impact of the reduction in government purchases on output. Obviously, if the effect of a

lower anticipated public indebtedness on the risk premium is assumed to be larger, then the overall output effect would become positive and GDP would increase in response to a fiscal consolidation already in the short run. The potential effect of fiscal consolidations on risk premia is, like the monetary policy stance, a relevant factor in shaping the size and characteristics of non-Keynesian effects. This issue may deserve further exploration.

**Table 11. Impact of a budgetary consolidation through a reduction by 1% of GDP in various items of public expenditure, with a reduction in the interest rate risk premium**

	1 <sup>st</sup> year	2 <sup>nd</sup> year	3 <sup>rd</sup> year	4 <sup>th</sup> year	5 <sup>th</sup> year	10 <sup>th</sup> year
<b>Reduction in government purchases</b>						
GDP	-0.02	0.25	0.10	0.02	0.01	0.45
Consumption	1.47	2.36	2.30	2.23	2.21	2.62
Investment	0.55	-0.06	-0.46	-0.57	-0.58	0.40
<b>Reduction in government transfers</b>						
GDP	0.10	0.16	0.05	0.00	-0.01	0.25
Consumption	-0.20	-0.03	-0.09	-0.12	-0.13	0.19
Investment	0.49	0.16	-0.11	-0.22	-0.26	0.25
<b>Reduction in government employment</b>						
GDP	-0.62	-0.27	-0.05	0.11	0.22	0.70
Consumption	0.95	1.46	1.62	1.70	1.76	2.13
Investment	0.16	0.48	0.91	1.21	1.42	2.22

### 4.3. Summary of findings

From the simulations performed with the QUEST model presented in this section a number of results emerge:

- i) While tax increases per-se are unlikely to increase growth, expenditure cuts may exhibit non-Keynesian features already in the short or medium run.
- ii) The consumption channel is a major offsetting force to the standard Keynesian effects, but the investment channel can also be of great relevance for consolidations occurring through cuts in the government wage bill. Moreover, there is evidence of a trade-off between the role of the consumption and the investment channel in conveying non-Keynesian effects.
- iii) The expansionary effects of fiscal consolidations occurring both through the consumption or the investment channel are likely to be reinforced when the fiscal consolidations are associated with a favourable monetary stance and/or have an effect on risk premia on interest rates.

## 5. Conclusions

This paper has provided an ex-post empirical analysis on the emergence of expansionary effects of fiscal consolidations together with an ex-ante assessment of the likelihood of non-Keynesian effects through the QUEST model.

Overall, the results obtained from ex-post cross-country data analysis and model simulations are broadly consistent. We show in this paper that roughly half of the episodes of fiscal consolidations that have been undertaken in EU countries in the past three decades exhibit non-Keynesian features, i.e. are followed by an immediate acceleration in growth. Moreover, roughly half of these consolidations that turned out to be expansionary were what we label ‘pure expansionary’, meaning that the expansionary effect on output cannot be attributed to concomitant expansionary monetary policies or exchange rate devaluations. These results seem to be quite robust with respect to both the criteria used to identify the consolidation episodes and to classify such episodes as expansionary. As for the distinguishing features of expansionary consolidations, it is found that consolidations started in low phases of the cycle and based on expenditure cuts are more likely to be followed by higher growth.

Simulations with the QUEST model show that consolidations may be expansionary in the short/medium run provided that they are obtained through expenditure cuts rather than revenue increases. Although these positive ‘non-Keynesian’ effects on private demand are not always strong enough to offset the negative impact of the fiscal consolidation on GDP, they become to dominate in consecutive years. One interesting finding in the simulation analysis is that there appears to be evidence of a potential trade-off between the role of the consumption and the investment channel in conveying non-Keynesian in the short-run. The increase in consumption in anticipation of higher expected future households’ income is matched by lower aggregate savings and by an immediate increase in the real interest rate. This interest rate increase has an offsetting effect on non-Keynesian effects taking place through the investment channel, i.e., associated with a boost in investment in anticipation of expected future business profits.

Overall, the message from our analysis is that budget consolidations producing expansionary effects are more than intellectual curiosa and their eventuality should be taken into account also in policy-making. Our findings have a series of implications for the current and perspective situation in EMU. In the coming years, several EU countries may need to carry out budgetary consolidations to dispose of room for manoeuvre against the backdrop of the looming budgetary implications of ageing populations: this will not necessarily mean compromising short-term growth prospects.

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