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The macroeconomic implications of the European Social Fund: An impact assessment exercise using the RHOMOLO model

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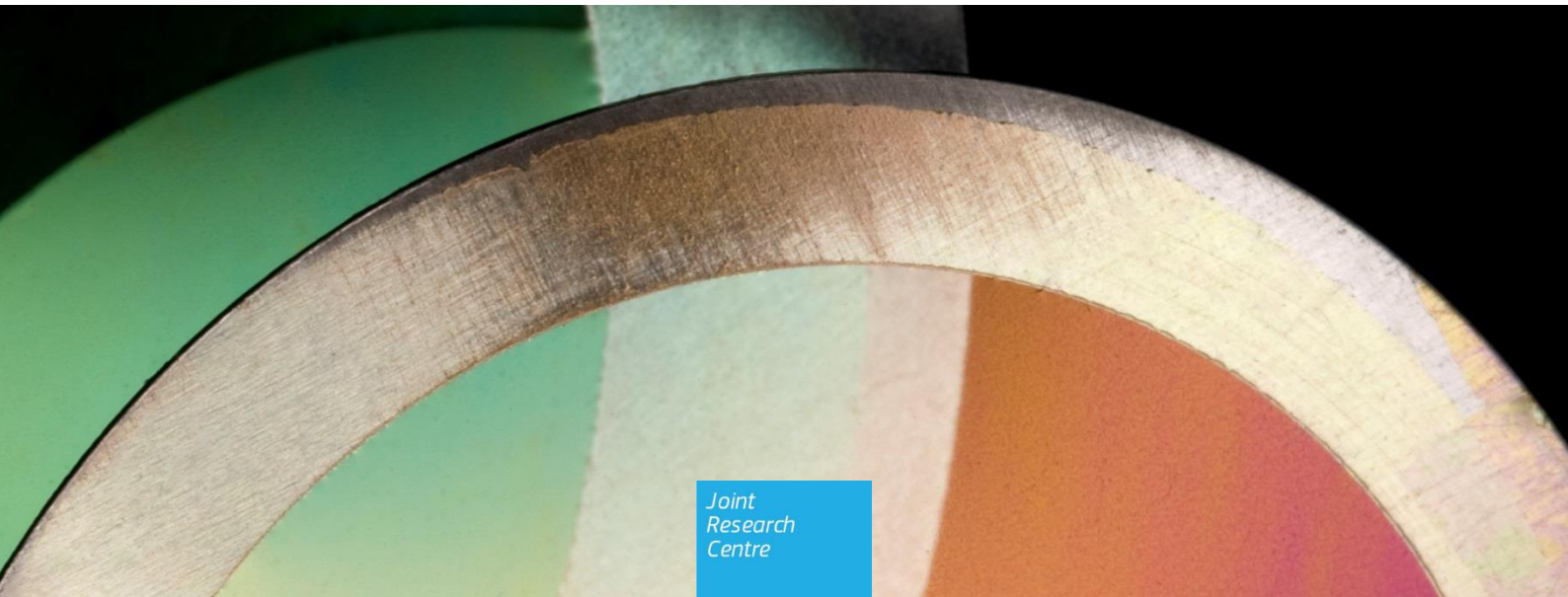

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The **JRC Working Papers on Territorial Modelling and Analysis** are published under the editorial supervision of Simone Salotti and Andrea Conte of JRC Seville, European Commission. This series addresses the economic analysis related to the regional and territorial policies carried out in the European Union. The Working Papers of the series are mainly targeted to policy analysts and to the academic community and are to be considered as early-stage scientific articles containing relevant policy implications. They are meant to communicate to a broad audience preliminary research findings and to generate a debate and attract feedback for further improvements.

Abstract

We evaluate the macroeconomic impacts of the European Social Fund (ESF) across the EU at both the national and the regional level. To this end, we use the RHOMOLO dynamic spatial Computable General Equilibrium model developed by the JRC for territorial impact assessment. We find out that the contribution of ESF funds is important for speeding up the economic recovery taking place in most European economies, with the ESF generating economic benefits which are higher than its costs by 2030. However, GDP and employment growth are not the main objectives of the policy. Given the wage benefits and productivity enhancing effects associated with the ESF, its distributional effects are also of interest.

The macroeconomic implications of the European Social Fund: An impact assessment exercise using the RHOMOLO model

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1 Introduction

The on-going 2014-2020 programming period has found most European Union (EU) member states and regions in a phase of recovery and improved labour market conditions. Despite the positive signs, the main priorities of the EU remain challenging and include addressing a number of issues such as, among others, speeding up job creation, wage growth and labour productivity, promote education and lifelong learning, fighting poverty and social exclusion.

This Technical Report is the first attempt at evaluating the likely *macro*-economic impacts of the European Social Fund (ESF) policy interventions across the EU at both the national and regional level. To this end, we use the dynamic spatial Computable General Equilibrium model RHOMOLO developed by the European Commission-JRC for territorial impact assessment (Lecca et al. 2018).

The evaluation of policy interventions has now become a common practice in order to improve the transparency and effectiveness of public policy. In the general context of labor market programs and human capital policies' evaluations, Counterfactual Impact Evaluation (*CIE*) has been the main tool to assess the effectiveness of policy interventions, where the effectiveness is defined as the impact (either positive or negative) on the well-being of individuals that can be attributed to this particular policy.[1] In essence, the crucial policy question is whether or not these changes are achieved. Moreover, these policies can have effect on the untreated population as well (Meghir, 2006). Given the micro-founded partial equilibrium nature of CIE, as well as other issues like internal validity, such an approach cannot address aggregate policy impacts at the EU and country level, nor other life-cycle and long-run effects and their complex general equilibrium effects on welfare, price, wages, and employment. This is especially so in the case of large scale programs such as the ESF, where there exists considerable heterogeneity among the types of the implemented intervention and the type of treated groups. Overall, this kind of partial-equilibrium and treatment analysis in the evaluation of social programs can be misleading (Heckman, 2001), may lead to results substantially different from those obtained with general equilibrium approaches and consequently

Disclaimer: The views expressed are purely those of the authors and may not in any circumstances be regarded as stating an official position of the European Commission.
[1] See Card et al. (2017) for a meta-analysis of recent active labour market program evaluations.

provides poor guide to public policy.

However, at the macroeconomic level and especially in general equilibrium models, research on the effects of active labor market policies or education policies has been rather limited. Exceptions include Van der Linden (2005) and Cahuc and le Barbanchon (2010) who examine the general equilibrium effects of counselling programs for job seekers. Albrecht et al. (2009) employ a calibrated general equilibrium model for the Swedish economy to study the effects of the so-called Knowledge Lift (1997-2002) adult education program; Angelopoulos et al. (2017) study the aggregate and distributional implications of job-related training subsidies.

The RHOMOLO model contributes to this strand of research by providing sector-, region- and time-specific analysis to support EU policy making and investments. Thanks to its territorial granularity, RHOMOLO is particularly well-suited for assessing macroeconomic impacts of EU policies at the regional level. The current version of RHOMOLO covers all the 267 EU NUTS2 regions, each regional economy being disaggregated into ten economic sectors. Spatial interactions between regional economies are captured through trade of goods and services, income flows, factor mobility and knowledge spillovers, making RHOMOLO well suited for simulating human capital, transport infrastructure, and R&D and innovation policies. It captures the macroeconomic impacts of EU policies on regional economies, and notably on variables such as GDP, employment, income and wages, consumption, investment, and savings.

In order to assess the impact of the ESF on EU regions in RHOMOLO, a combination of policy shocks is required as an exogenous input in the model (see Section 3). The policy shocks roughly reflect the various ESF priorities defined in the context of the Cohesion Policy. Among the 11 Thematic Objectives (TOs) for the ongoing period, the main objectives for the ESF in the context of the Europe 2020 targets aim at enhancing human capital and social cohesion through the following: i) TO 8: Promoting sustainable, equitable employment and supporting labour mobility, ii) TO 9: Promoting social inclusion, combating poverty and discrimination, iii) TO 10: Investing in education, training and lifelong learning, iv) TO 11: Improving the efficiency of the public administration.[2]

This report is structured as follows. In Section 2 we present an overview of the building blocks of the RHOMOLO model and its theoretical foundation, while in Section 3 we outline the spatial and inter-temporal allocation of ESF funds. Section 4 explains how the

[2] In this exercise we do not assess the effects of TO 11 (Enhancing institutional capacity and efficient public administration) since it covers just a 5% of the total ESF budget and is not directly related to human capital and labour market policies.

ESF interventions are translated into policy scenarios in the RHOMOLO modelling framework. In Section 5 we analyse the simulations results focussing primarily on key economic variables and performing a multiplier analysis. Finally, policy conclusions and further steps are discussed in Section 6.

2 The building blocks of the RHOMOLO model

In this section we present an overview of the RHOMOLO-V3 model. A full model exposition can be found in Lecca *et al*. (2018). The theoretical structure of the model is common to other numerical general equilibrium model, with its key distinguishing feature being its geographical granularity. The economy consists of a set of 267 EU NUTS2 regions plus one single exogenous region representing the rest of the World.

The model has a set of different economic sectors (also called industries), with a subset of these operating under monopolistic competition à la Dixit and Stiglitz (1977). In each region and sector, identical firms produce a differentiated variety, which is considered as an imperfect substitute for the varieties produced within the same region and elsewhere. The number of varieties in the sectors is endogenous and determined from the zero-profit equilibrium condition (according to which profits must be equal to fixed costs). In turn, this means that in equilibrium prices equal average costs. In the rest of the sectors, firms operate under perfect competition in each sector. Currently, RHOMOLO is disaggregated into 267 EU regions and 10 NACE rev.2 economic sectors: A, B-E, C, F, G-I, J, K-L, M-N, O-Q, and R-U**.** Typically, we assume the following sectors under perfectly competitive market structure: A, O-Q and R-U. The rest are normally treated as imperfectly competitive sectors.

Final goods are consumed by households and government (in the form of private and public capital goods), whilst firms consume intermediate inputs. Regional goods are produced by combining value added (labour and capital) with domestic and imported intermediates, creating vertical linkages between firms. This means that the spatial configuration of the system of regions has a direct impact on the competitiveness of regions because firms located in more accessible regions can source their intermediate inputs at lower price and thus gain larger market shares in local markets.

Trade between and within regions is costly, implying that the shipping of goods entails transport costs assumed to be of the iceberg type as in Krugman (1991). Transport costs are identical across varieties but specific to sectors and trading partners (region pairs).

Regarding the labour market setup, the model distinguishes three different labour categories which correspond to the level of skill or education; low, medium, high. For

each labour type, the default wage setting relationship is represented by a wage curve (Blanchflower and Oswald, 1995), whose implication is that lower levels of unemployment increase workers' bargaining power, thereby increasing real wages.

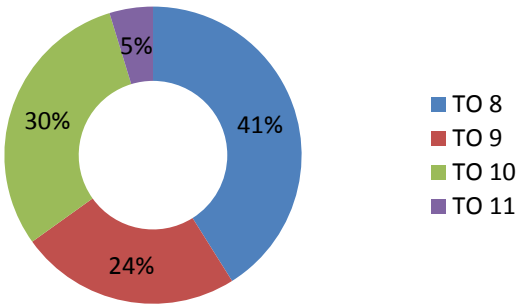
Government expenditure comprises of current consumption on goods and services, capital expenditures dedicated to public infrastructure and net transfers to households. Revenues are generated by labour and capital income taxes on household income and indirect taxes on production. In the simulations reported here, tax revenues and government spending are typically considered exogenous policy variables. However, since the government runs a balanced budget, and therefore the government deficit is fixed, either part of government spending or any of the income tax rates have to adjust endogenously in order to satisfy the government budget constraint.

Last thee model is recursively dynamic with myopic expectations, and it is solved sequentially with stocks being upgraded at the beginning of each year.

3 The allocation of the ESF

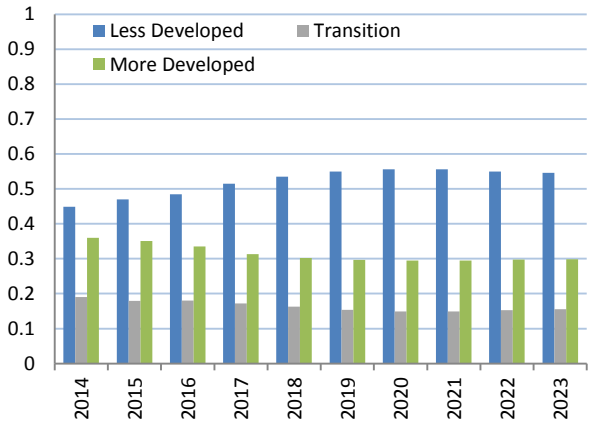
This section briefly describes the allocation of the ESF funds which is also used in the scenarios simulated with RHOMOLO. For the 2014-2020 programming period, the ESF resources amount to 89 billion euros, that is almost 25% of the 349 billion euros allocated for the European Cohesion Policy. Figure 1 shows a relatively homogeneous allocation of funds across the four TOs of the ESF, with TO8 receiving 41% of the total.

Figure 1: ESF allocation per Thematic Objective



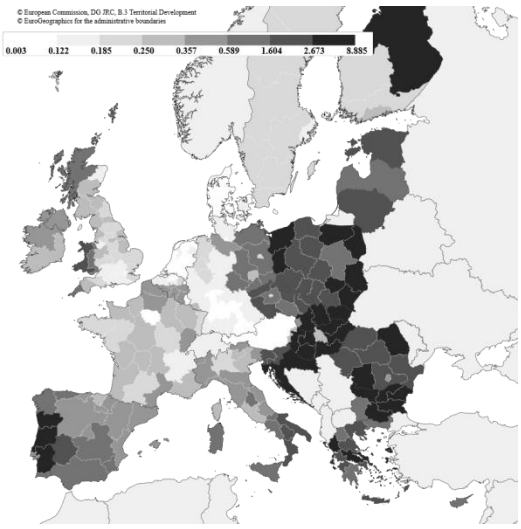
Policy funds are mainly targeted to less developed regions.[3] Over the 2014-2015 period, these regions will receive around 50% of the total ESF investments; while transition and more developed regions will receive 16% and 30% of the funds, respectively.

Figure 2: ESF allocation per region group



While ESF expenditures are unevenly spatially distributed across the three groups of regions, their time profile is rather similar. In all regions, the amount of allocated investments tends to peak in 2018 and slightly declines in the subsequent periods. Figure 3 shows the spatial distribution of the ESF for the whole programming period as a share of the baseline year regional GDP. Regions in new member states and in the South receive on average the highest amount of funds as a share of regional GDP. Hence, a bigger impact of ESF is expected in these regions in terms of macroeconomic aggregates.

Figure 3: ESF regional allocation (2014-2023) - % GDP



[3] Less developed regions are defined as those where GDP is less than the 75% of the EU average. Transition regions are whose GDP is between 75% and 90% of the average, and all the remaining regions are defined as the more developed ones.

4 Description of the policy shocks

In this section we describe the construction of the policy shocks required for simulations together with its underlying assumptions and the entailed limitations of the analysis.

The baseline year of our simulations is 2014. Regional economies are perturbed from their baseline equilibrium through a combination of policy shocks. In what follows we present the simulation path up to year 2030. For modelling purposes, the ESF policy interventions are assumed to shock the following two model variables: labour productivity and government consumption.

Before describing in detail the policy shocks, some limitations of the analysis related to the nature of the model should be highlighted. It should be kept in mind that RHOMOLO is a general equilibrium macroeconomic model with representative agents and therefore it can properly handle only a limited set of microeconomic issues. Unavoidably, a number of policy interventions targeting specific areas are aggregated under the same category, and therefore working through the same corresponding model variable. Moreover, the model simulations estimate the policy's potential effects in a controlled environment and are carried out assuming that there are no ex-post implementation inefficiencies (such as low absorption rates and rent seeking, to name a couple). Also, the construction of the exogenous shocks is done using data on provisional commitments (not actual payments) of the European Structural Investments Funds (ESIF) yearly/regional allocation for the period 2014-2020 (N+3).

The TOs related to the ESF are treated in RHOMOLO as follows: expenditure on human capital includes all spending on educational and vocational training (TO 10) as well as more generally defined labour market policies (TO 8) and spending on social inclusion (TO 9). Thus, in order to simulate the ESF interventions we use a combination of non-productive government consumption and direct transfers to households, while the long-run productivity-enhancing effects are captured through their effects on population skills (following closely the method by Varga and In't Veld, 2010 and 2011).

4.1 Labour productivity shocks

Policy interventions in human capital and other broad labour market policies include all spending on educational and vocational training, and lifelong learning activities either through the formal education system or through education and training programmes designed for the enhancement of the labour force. For instance, dating back to Mincer (1962) it is known that apart from formal education, other types of training such as on-the-job training can account for at least half of a worker’s human capital.

In the context of our simulation exercise, these interventions are assumed to be human capital-enhancing for each skill group (either separately or combined), and hence increase labour productivity. Most of the ESF funds devoted to human resources are spent on education targeting all skill levels, while smaller shares target more specifically certain skill categories.

Other types of labour market investment priorities such as active labour market policies (ALMP) like training subsidies paid by the government for the young or inactive, better matching of skills acquired with available jobs, modernization of labour market institutions, and active and healthy ageing initiatives are also gathered under the umbrella of labour productivity shocks (Calmfors et al. 2001).[4]

More analytically, the construction of human capital and education investment shocks in RHOMOLO consists of several steps. In general, we calculate how many additional school year-equivalents of training can be purchased with the ESF policy investment in education and training, per region and skill group. From this, we derive how much the average number of school years embedded in the labour force would change due to the policy intervention. Then, following the empirical literature on Mincer-type regressions (see, among others, Psacharopoulos and Patrinos, 2004, De La Fuente and Ciccone, 2003, and Canton et al., 2018), one additional school year is assumed to increase labour efficiency by a specific amount (we set this number equal to 7% according to that strand of literature). At the margin, increasing labour efficiency by *x%* increases wages by *x%*, since efficiency enters multiplicatively with labour in the production function. In our simulations, the resulting labour productivity change is on average 2% at the EU level.

For example, a policy that improves access to tertiary education in order to increase participation and attainment levels can be thought of as an increase in the school years embedded in the labour force of the medium skilled workers in the model. In the same vein an active labour market policy type that would motivate inactive or job-seekers to enhance or maintain their human capital through and having thus better prospects to find a job could be translated as labour productivity increase through the increase in the school years embedded in the labour force in the model.

[4] A more detailed approach on the construction of the shock related to TO 8 would entail modelling the effect of such policies on participation rates, since this kind of interventions has the potential to raise directly labour force participation and employment rates. However, in the current model version, such variables are exogenous. Thus, we rely only on labour productivity to model such policy interventions. This alternative treatment of the shocks would also require quite precise data on the efficacy/efficiency of the policies. For example, we would need data on the number of individuals which were not working or looking for a job and either found a job or started looking for a job after following some training. This kind of data can be found in the ESIF database (https://cohesiondata.ec.europa.eu/funds/esf). A second route would be to model labour market participation decisions endogenously, both at the intensive and at the extensive margin. In this case, policies affecting parameters such as labour productivity would result in changes in the participation rate.

A key piece of the required information is the cost per student of different levels of schooling. We obtain such information from Eurostat's Education and Training database and OECD Education at a Glance database. These data are used in order to estimate the cost of every year of additional training for one worker in each of the three skill groups. Another piece of information that we use is employment and education attainment data per NUTS2 region by skill level for the baseline year of our simulations, which is 2014. This is obtained from Eurostat regional database. Finally, we adjust for efficiency of the public administration and for quality of education issues using public sector efficiency indices (Canton et al., 2018).

To sum up, we calculate the additional years of schooling which can be purchased with ESF expenditures per each region and skill group and we translate such skill-improvement into a labour productivity shock.

4.2 Government consumption shocks

From a social point of view, social inclusion and mobility, poverty reduction etc. are closely related to human capital development, employment and participation. In RHOMOLO, due to its representative agent structure, it is not possible to model neither social inclusion nor poverty with human capital and employment/participation for specific targeted groups.

Nevertheless, RHOMOLO can be used to obtain an estimate of the aggregate impact of such policies, without considering the impact on the specific groups and conditional on a number of assumptions and on the availability of certain data. In the simplest approach, which requires few assumptions and no specific data, we assume that spending for social inclusion/mobility policies can be categorised as general public consumption. That said, we assume that in this case the policy intervention follows a more passive stance where the aim is to increase the welfare of certain population groups but not their labour market performance and outcomes per se. The consequence of this modelling choice is that there is no apparent long-run benefit from these investments (apart from the productivity effects mentioned above), but rather only direct demand effects. Note that this does not mean that these investments are not important for the welfare of consumers and of the society as a whole.

5 Simulation results

In this section we present the main simulation results for some key macroeconomic indicators. The main results at the EU level are illustrated in Figure 4. The RHOMOLO simulations suggest a permanent increase in the aggregate EU 28 GDP for the ongoing programming period and beyond, with long-lasting effects generated by the structural policies and the change in productivity. Figure 4 shows that by the end of the programming period in 2023, GDP will have increased by 0.1% from the base year value and by 0.15% in 2030. This amounts to around 10 and 16 billion of additional EU GDP, respectively. The vertical bars in Figure 4 report the contribution of ESF funds per TO relative to the total, while the blue line refers to the EU weighted average, the weights being each region's contribution to EU GDP. The highest impact is related to TO 8, as expected given that it is the highest expenditure category of the ESF, followed by TO 10.

Figure 5 plots the ESF effects on employment, and Figure 6 plots the most important macroeconomic variables of interest: exports, imports, the consumer price index (CPI), consumption, and investment. We observe that during the whole programming period the effects on employment are small but positive and increasing, but as ESF spending decreases (particularly after 2020), the demand effects fade away and are replaced by the labour productivity long-lasting effects. In other words, these findings suggest that the positive contemporaneous responses to government consumption are not permanent and vanish when they are stopped. Moreover, investments in human capital take time to materialize and its effects are only evident in the medium to long run.

Looking at Figures 5 and 6 together, we infer that the results on employment are driven mainly by competitiveness effects on the one hand, and by demand effects on the other. Positive demand effects are due to government consumption on social expenditures which affect positively employment during the short-run (programming period).

The changes in the CPI are a mirror of those in imports and exports, highlighting the crucial effects of the policy on competitiveness. Imports increase in the short-run due to direct demand effects (this is especially true for import-oriented regions such as less developed regions); while exports initially decrease but, as soon as the productivity effects materialize, start to increase. As far as investment is concerned, we report that it is increasing throughout the simulation period. It seems that the labour productivity effects from investments in human capital outweigh any potential crowding-out effect on private investment due to government consumption.

Figure 4: GDP Impact per ESF Thematic Objective (% deviations from baseline)

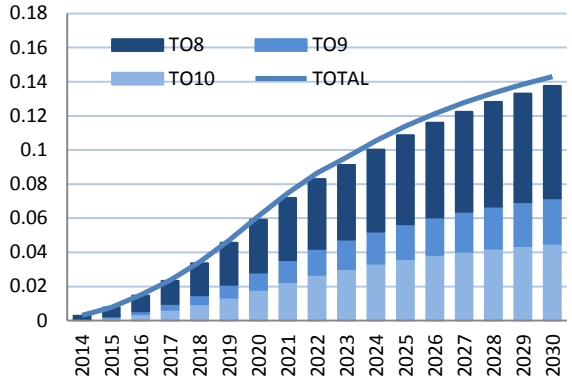


Figure 5: Employment Impact per ESF TO (% deviations from baseline)

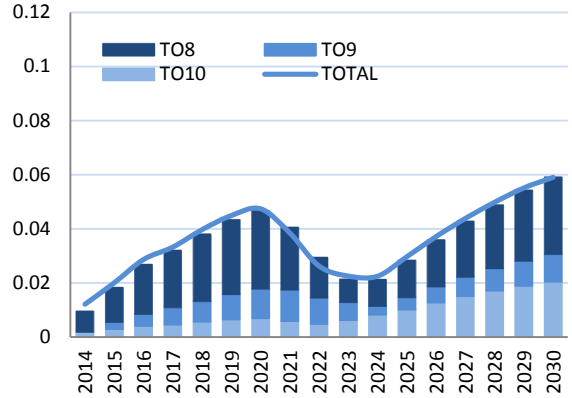
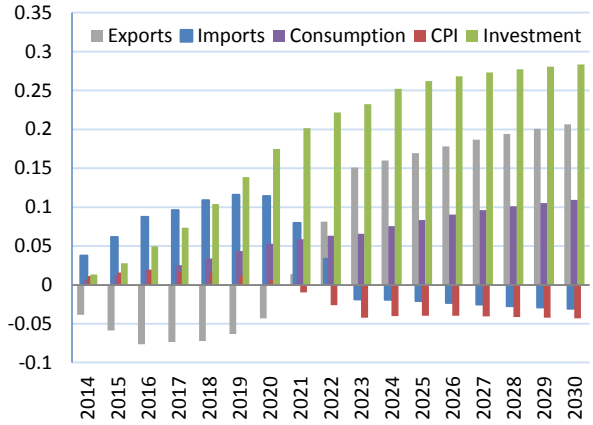


Figure 6: Impact on selected macroeconomic variables (% deviations from baseline)



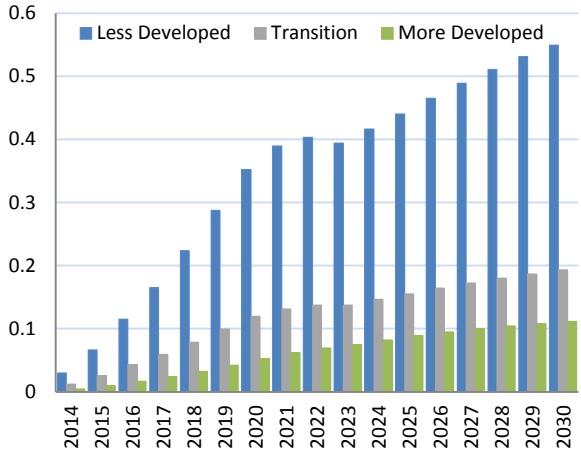
5.1 Regional economic impact

Less developed regions receive a larger share of ESF funds with respect to their per capita GDP (see Figure 3). Thus, we expect this group of regions to experience a greater positive impact on economic activities and a higher capacity to create jobs in the long run. In order to facilitate the tractability of simulation results, we plot the average impact on GDP in terms of percentage deviations from its baseline value, by regrouping

all regions according to their level of the economic development: less developed regions, transition regions, and more developed regions.

Unsurprisingly, the results depicted in Figure 7, are consistent with the regional allocation of the ESF funding. According to our simulations results, less developed regions enjoy the highest increase in GDP by the end of the programming period: in 2023, their GDP is around 0.4% above the base year values. The long-run impact is significantly lower for the other two groups of regions: around 0.14% and 0.09% for regions in transition and more developed regions, respectively.

Figure 7: GDP Impact per region group



So, while the ESF is expected to generate a positive, although relatively small, impact for the whole EU, the uneven allocation of its funds (Figure 3) among regions could determine different geographical patterns. Namely, some regions (even those pertaining to the same group of those identified above) could in principle gain less than others. Figure 8 reports the spatial distribution of the GDP impact by the end of the programming period (2023) and in the long-run (2030). Note that darker colours denote higher regional changes in GDP with respect to the base year values. Table 1 summarizes the top 10 and bottom 10 affected regions, with Portuguese, Hungarian, Romanian, and Croatian regions all appearing in the list of the top 10 winners.

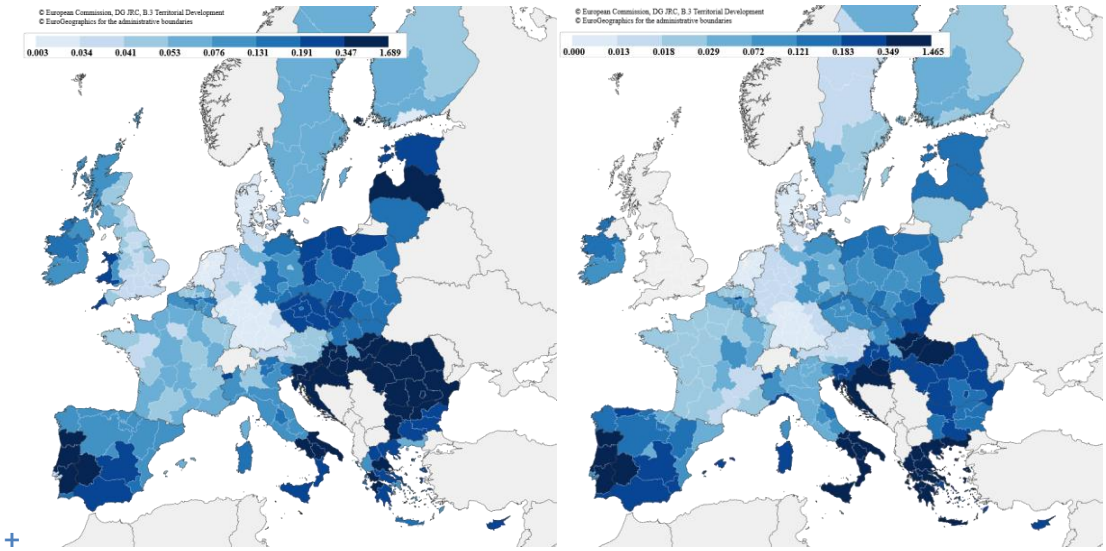
More in general, according to these results, several regions located in Eastern Europe and in the Balkans (RO12, RO42, HR, HU21, HU22, HU31, HU32), as well as in Portugal (PT11, PT16, PT20), Southern Italy, Latvia and Central and Western Greece, would benefit significantly from the ESF interventions in terms of GDP growth. This result is due to spatial linkages across regional economies, such as trade of goods and services, income flows, factor mobility (capital and labour) and knowledge spillovers. In the more developed EU regions like those of the Netherlands, Denmark, Luxemburg, Finland, and Germany, the impact is much smaller but still positive despite these regions being

generally net contributors to the policy. In fact, the 10 regions which benefit the least from the policy belong to the group of more developed regions.

Table 1: Impact on GDP (% deviations for selected regions)

2023				2030			
Top 10		**Bottom 10**		**Top 10**		**Bottom 10**	
PT20	1.2741	**FI1B**	-0.0003	**PT20**	1.7466	**FI1B**	0.0105
RO12	0.8918	**LU**	0.0132	**RO12**	1.4419	**LU**	0.0256
RO42	0.8438	**DK04**	0.0214	**HU31**	1.2422	**DK04**	0.0362
HU31	0.8414	**NL32**	0.0218	**HR**	1.1967	**DK01**	0.0390
HR	0.8015	**DK01**	0.0220	**RO42**	1.1816	**NL31**	0.0391
HU32	0.8006	**NL33**	0.0221	**HU32**	1.1330	**NL32**	0.0398
HU21	0.7991	**DK05**	0.0223	**HU21**	1.1019	**DK05**	0.0400
PT11	0.7929	**NL31**	0.0225	**HU23**	1.0934	**DE26**	0.0414
HU22	0.7927	**NL34**	0.0231	**PT11**	1.0745	**NL33**	0.0415
HU23	0.7587	**NL11**	0.0234	**HU22**	1.0564	**DE25**	0.0416

Figure 8: GDP Impact per region 2023 (left) and 2030(right)

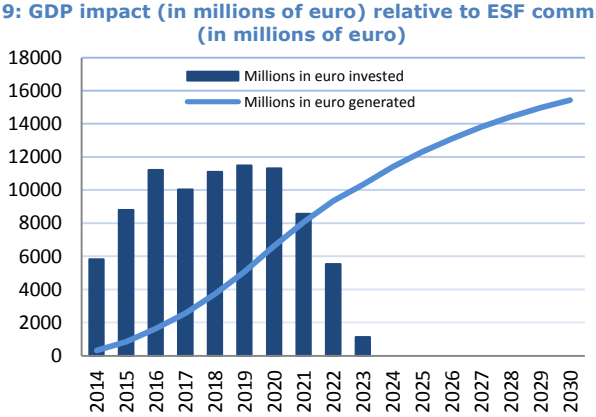


5.2 Impact per euro spent: Instant and cumulative multipliers

In the preceding sections we discussed the results by reporting and analysing the period by period percentage deviation from base year values of some key macroeconomic variables. In this section we investigate the so-called multiplier that is by how much GDP increases for each euro spent through the ESF. We calculate such multiplier for each region and we report it as the ratio of absolute changes in output to the additional expenditure introduced exogenously into the economy. For instance, if the multiplier is equal to 1.2, this means that 1 additional euro introduced into the economy generates a rise in output of 1.2 euro.

Our simulations suggest that, by the end of the programming period, the impact of the ESF is higher than its expenditure, that is the multiplier is larger than 1 (Figure 9). For instance, by 2022, GDP will be higher by 10 billion euro relative to the baseline year, whereas ESF spending will be around 6 billion euro. Such a measure is very useful for any policymaker interested in quantifying the capacity of the economy to generate indirect economic effects derived from the policy intervention. However, only looking at the immediate impact of a policy can be misleading as it ignores the cumulated impact of the policy on the economy over time. In order to give a more complete picture, we also report the cumulative spending multiplier which is defined as the discounted cumulative change of output relative to the discounted cumulative change in ESF receipts.[5] The measure of cumulative multiplier is obtained by dividing the cumulative absolute changes in output resulting from model simulation to the cumulative changes in expenditures (the policy intervention) for a given time interval. In particular, we focus on the multiplier effects in 2023 and in 2030 obtained by summing up changes in output and expenditure.

Figure 9: GDP impact (in millions of euro) relative to ESF commitments (in millions of euro)



[5] This is given by the formula: $Mult_r = \frac{\sum_{t=0}^{T} \beta^t (GDP_{r,t} - GDP_{r,0})}{\sum_{t=0}^{T} \beta^t (ESF_{r,t} - ESF_{r,0})}$ where β^t is the discount factor which is set equal to the inverse of the real world interest rate, around 4%, the term $(GDP_{r,t} - GDP_{r,0})$ denotes the yearly change in GDP in region r,relative to its baseyear value and term $(ESF_{r,t} - ESF_{r,0})$ denotes the change in ESF receipts.

The size and the sign of the multiplier calculated are affected by a number of factors. One of the elements determining the magnitude of the multiplier is whether the region is net receiver or net contributor. Secondly, the structure of the economy (labour intensity, export orientation among others) is crucial to understand whether a region is capable to generate additional impacts. For instance, a labour productivity shock is able to generate large macroeconomic effects if the share of labour in the region is relatively high. The multiplier effects in this case will expand further if the region is also export intensive with low import shares which happens to be the case with regard to ESF regional effects.

Focusing for the moment on 2023, we observe that for all of the 267 regions populating the EU the sign of the multiplier is positive, with an EU average of 0.48, indicating that the ESF intervention is effective in terms of its GDP impact. However, it is worth noticing that among those regions with positive multiplier effects, only 27 regions (see Figure 1) are able to generate additional effects that are greater than the direct injections, that is to say with multiplier greater than 1. The size and the magnitude of the multiplier are expected: the ESF is small in magnitude, and its primary aim is not to enhance directly production, investment or firm creation, but rather to support employment and inclusion. The ESF acts as a complement to other funds and policies and should therefore not be considered as a funding instrument in isolation of other funds and policies. However, as shown in Figure 10 when we take into account the long-lasting effects of ESF interventions, the simulations indicate that at the EU level the average discounted cumulative multiplier more than doubles, reaching the value of 1.33.by 2030. In this case (see the right panel of Figure 11), is four times higher and 97 regions experience multipliers which are larger than 1.

Figure 10: Discounted Cumulative Multiplier (2014-2030)
EU 27 weighted average

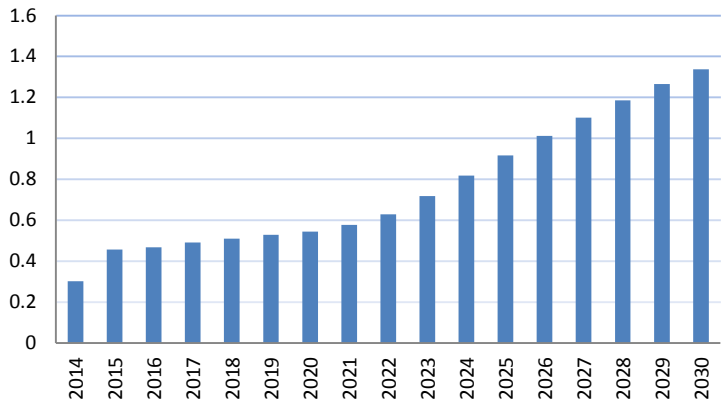
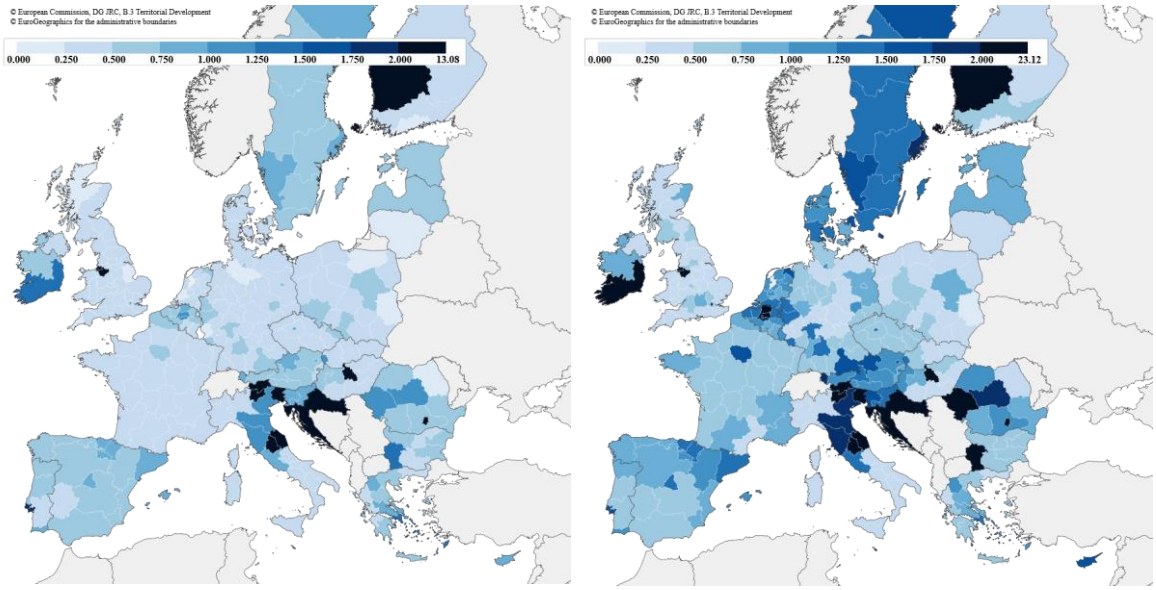


Figure 11: Discounted Cumulative Multiplier Effects in 2023(left) and 2030 (right)



6 Conclusions and possible extensions

The purpose of this paper is to report the *potential* macroeconomic impacts of the ESF 2014-2020, using the latest available data and the provisional regional allocation of funds. To this end, we have employed the RHOMOMO model to carry out the analysis. Our results suggest that the ESF shall contribute positively in terms of GDP growth and employment. The results are driven by enhanced competitiveness which stems from the increase in labour productivity with long-lasting effects, while demand side effects also contribute positively in the short-run.

The contribution of ESF funds is important for speeding up the economic recovery which takes place in most European economies, but GDP and employment growth should not be only the main issues of interest. Given the wage benefits and productivity enhancing effects associated with ESF interventions, it should be interesting to assess not only the aggregate macroeconomic impacts, but also the distributional ones of such interventions.

Indeed, a key fact relating to most European labour markets is the existence of pronounced earnings inequality. Inequality typically hinges on the heterogeneity of households, which can differ in many aspects such as educational background, family background, and wealth. For instance, there is ample empirical evidence of an increasing earnings and wealth differential between university and non-university educated workers. Thus, a natural question that arises is how ESF interventions could improve

economic and social outcomes for the lower parts of the income and skills distribution. For instance, interventions improving participation in education and training of the less skilled is of crucial importance for assessing the aggregate and distributional implications of the ESF interventions. We leave these interesting questions for future work.

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