

WHERE THE EUROPEAN UNION SHOULD MULTIPLY ITS MONEY: STIMULATING MEASURES IN THE ECONOMIC MONETARY UNION

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Summary

The aim of this article is to investigate in which sectors and countries the European Union should invest to diminish the economic gap between different member states. It answers the question at which sectors and regions the European regional policy should be directed. In an attempt to indicate which regions and sectors have favourable investment opportunities, multipliers are calculated for all but three countries of the Economic Monetary Union. The multipliers are calculated using a technique described by Jensen et al. (1979) and Heijman and Schipper (2010). The highest multipliers are found within the Construction sector. To provide policy recommendations we focus on countries with high multiplier values and high unemployment rates. If we assume that multiplier values and unemployment rates are important, then the European Union should spend most in Slovakia, Estonia, Italy, Greece, and Spain. The spendings in Estonia, Slovakia, and Greece would fall under the Cohesion Funds.

Key words: *Multipliers, Regional Policy, Investment, Regions, Stimulating measures*

JEL: *R10, R15*

Introduction

There are considerable economic disparities between the members of the European Union. The Regional policy of the European Union and especially the Cohesion Funds, aim to diminish the economic gaps between the different member states. We aim to provide insights in investment strategies for the European Union. In an attempt to indicate which regions and sectors have favourable investment opportunities, multipliers were calculated for all but three countries of the Economic Monetary Union. The countries that are not taken into account in this paper are Cyprus, Malta, and Luxembourg. Our paper includes seven sectors in which the European Union could invest. These sectors are: Agriculture

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and fishing, Industry, Construction, Services, Wholesale and retail trade including hotels plus restaurants and transport, Financial intermediation including real estate, and Public administration including community services. Before we start our multiplier analysis we will perform an evaluation of the determinants of a favourable investment climate to supplement our findings. A brief overview of the instruments and stimulating measures that are available is presented. To give an insight in the validity of our results we present our expectations for the multiplier values. These expectations are based on existing literature. Next, we turn to the task of calculating the multipliers. Finally our results are presented and coupled with policy recommendations.

Determinants of a favourable investment climate

In the short run governments can try to stimulate their national economy. However, it is almost impossible to keep stimulating the national economy forever. An economy should be self-sufficient in the long run. Private investments are an important factor in achieving self-sufficiency. We focus here on situations that will attract foreign direct investments (FDI) and which will be advantageous for the state of the national economy. An open economy, a large domestic market, a similar language, similar institutions, and a positive economic growth attract FDI (Sharma, Bandara, 2010). A high GDP is assumed to result in better infrastructure, higher labour productivity, and more high quality institutions. Therefore GDP can be considered a determinant for FDI (Bellak et al., 2010). Other attractors for FDI are a low tax rate, high Research and Development spendings, a low inflation rate, and a low risk factor associated with the country. The existence of economic clusters, network and agglomeration effects, exchange rate stability, and low labour costs will also result in higher FDI (Procher, 2011). External economies of scale are often a crucial factor in the location decision of FDI (Mullen, Williams, 2005). The three main benefits of external economies of scale are the availability of specialized suppliers, labour market pooling, and knowledge spill overs (Krugman, Obstfeld, 2009).

Government instruments and stimulating measures

A common distinction in government instruments is the division in regulation, voluntary action, government expenditure, and market based instruments. Regulatory instruments are also known as “command and control” (Carter, 2007). It *“involves any attempt by the government to influence the behaviour of business and citizens whereby the government defines standards”* (Carter, 2007). Voluntary action is an action that *“involves individuals or organizations doing things that are neither required by law nor encouraged by financial incentives”* (Carter, 2007). Government expenditures can be used by the government in an attempt to steer behaviour of individuals by strategically spending its own budget. Market based instruments work by enlarging the price of a certain product or activity.

If we again regard the determinants of FDI, we can derive a number of stimulating measures that would improve the national economy. An open economy attracts FDI, therefore opening up borders or lowering trade tariffs might be an effective strategy. To enlarge the market demand, one could take this a step further and become part of a

cluster of countries. To prevent a high risk profile a stable political climate should be created. The uncertainty associated with a highly fluctuating exchange rate should be lowered by stabilizing the exchange rate regime. Creating clusters of companies and establishing economies of scale will have a positive effect on FDI. Finally, a country should try to promote moderate wages and high skilled workers to be attractive for FDI (Bellak et al., 2010).

Expectations for the multiplier values

Multiplier effects capture the fact that growth in one sector can lead to growth in another sector. One could also state that a multiplier value shows the return on spending one euro on investment. Underlying our analysis is the input-output theory. The focus is on seven main sectors. We consider the link between sectors and the overall economy. A multiplier represents the impact on the national economy if an investment impulse is given to only one sector (Domanski, Gwosdz, 2010). In this paragraph we form expectations of multiplier values based on the existing literature.

Roberts (2009) stresses the importance of the agricultural food sector for the whole economy. This sector is very stable, due to the fact that food is a necessity. Demand for agricultural products is quite stable. Agricultural production is still a relatively labour intensive sector. If more people are employed in this sector the consumption spendings will go up. The agriculture sector has both backward and forward linkages, which will spread the economic growth in this sector towards other sectors. The backward linkages contain the products and services needed for modern agriculture. In turn, products from the agricultural sector are often used as raw materials in production processes in other sectors (Roberts, 2009). Therefore it would be reasonable to expect high multiplier values in this sector.

Rim et al. (2005) focused on backward multiplier effects for several sectors. We are interested in multipliers that capture both the effect of backward and forward multipliers. Still, the results found by Rim et al. (2005) can help us in forming our expectations. The findings of Rim et al. (2005) show that the highest backward multiplier can be found in the manufacturing industry. This would suggest that we will find a high multiplier value for the industry sector as well.

The construction sector is expected to exhibit high multiplier values. An important subsector of the construction sector is infrastructure development. Infrastructure is essential for other sectors to transport their inputs and outputs. Transport costs will be lower if a good infrastructure system is available. Benvenuti and Marangoni (1999) analysed the impact of infrastructure developments in Italy. Their work proved that a lack of infrastructure hindered economic growth in Italy in 1999. They stated that developments in the construction sector influence economic growth in all other sectors. Investment in infrastructure will have a direct effect, an induced effect, and an indirect effect. The direct effect of investment is the growth of the sector that the investment was aimed at. The induced effect is the higher consumption by workers in this sector. Finally, the indirect effect is the effect on growth in other sectors through backward and forward linkages (Benvenuti, Marangoni, 1999). In the long run improvements in infrastructure will enhance the image of the region, thereby

attracting new investments. This means it is likely that we will encounter high multiplier values for the construction sector.

Forming expectations on the multiplier values in the service sector is less straight forward. Domanski and Gwosdz (2010) expect higher multipliers in the service sector than in the construction sector. Francois and Woerz (2008) found proof that the importance of services as inputs in the post-industrial economies has grown. The extent of intermediate linkages in the current service-based economies is larger than in the 1990s (Francois, Woerz, 2008). On the other hand, Mohnen and Ten Raa (2000) indicate that even though more and more resources are devoted to services, productivity gains are limited (Mohnen, Ten Raa, 2000).

The wholesale and retail trade, hotels, restaurants, and transport sector, is the most diverse sector, which makes it challenging to predict a multiplier value. According to O'Leary and Almond (2009) wholesale had a 4.5 % share in employment and a 4.9% share in GDP in the period 1990-2002. Retail had a much higher share in employment, 11.4%, but only a 5.6% share in GDP in the same period. Food and lodging accounted for 7.4% of the employment and 2.7% of the average GDP. The transport sector had the smallest share in employment and GDP, 3.2 and 3.3% respectively. If we put all these numbers together we arrive at a 26.5 % share in employment and a 16.5% share in the average GDP (O'Leary, Almond, 2009). Therefore it is reasonable to expect a high multiplier effect.

Financial intermediation and real estate should be less important according to the article by O'Leary and Almond (2009). It accounts for 5.8% of the employment and 15.9 % of the average GDP (O'Leary, Almond, 2009). Mohnen and Ten Raa (2000) are concerned with the sluggish growth in the financial and real estate sector. They relate this sluggish growth to low productivity gains after investment in (financial) services (Mohnen, Ten Raa, 2000). Our expectation is a low multiplier value for this sector.

Finally we consider the public sector. It is often stated that the public sector is less productive than the private sector. The reasoning behind this statement is captured by Baumol's law. The processes in the public sector are mainly labour intensive and do often not allow for substitution between labour and capital. Competition on the labour market guarantees that wages are the same for the public and the private sector. Capital for labour substitution is easier in the private sector. Technical advances lead to higher productivity levels in this sector. Higher labour productivity increases the marginal revenue and this in turn leads to higher wages. These higher wages increase the labour costs in the public sector without an increase in productivity (Hindriks, Miles, 2006). If this is the case we would expect low multipliers in this sector.

Methodology: Calculating the regional input output tables

We focused on multipliers for each country in the Economic Monetary Union (EMU). We deliberately made the choice not to include multipliers for the complete European Union. The countries within the EMU all have the same currency, and are therefore easier to compare. We divided each country into NUTS regions to capture regional differences. Multipliers were determined for NUTS 1 regions unless information on this scale level was

unavailable; in that case NUTS 2 regions were applied. Cyprus, Malta, and Luxembourg did not provide, or provided only very limited, input output tables. Therefore these countries were excluded from our dataset. We used data from 2000, unless another year is indicated.

Our data have been gathered from the Eurostat (2009) database. This database is freely accessible online. The Eurostat database contained too many sectors for our research. Therefore we compressed the input output tables provided by Eurostat into seven broad key sectors. These sectors were created by combining the information of the subsectors into larger sectors. The seven sectors for which multipliers were calculated are: Agriculture and fishing, Industry, Construction, Services, Wholesale and retail trade including hotels plus restaurants and transport, Financial intermediation including real estate, and lastly Public administration including community services. The sectors were grouped in this way, because this is conform the classification Eurostat uses for the data concerning employment. We needed these data to calculate the Location Quotients.

We needed regional input output tables to calculate regional and sectorial multipliers. Eurostat only provided national input output tables. Therefore we derived the regional input output tables based on the compressed national input output tables. The regional input output tables were formed using the procedure described by Heijman and Schipper (2010). First we calculated the location coefficient using the following formula by Heijman and Schipper (2010):

$$LQ = [X_i^r / \sum_{i=1}^n X_i^r] / [X_i^N / \sum_{i=1}^n X_i^N]$$

Whereby X_i^r denotes the output of sector i in region r , $\sum_{i=1}^n X_i^r$ denotes the total output in region r , X_i^N is the national output of sector i and $\sum_{i=1}^n X_i^N$ is the national output. In all cases $i=1 \dots n$. This formula states that the location quotient is the result of dividing the relative share of a certain sector in the regional economy by the relative share of the same sector in the national economy (Heijman, Schipper, 2010; Jensen et al., 1979).

The regional sectorial input output data were not readily available, so we used a proxy in calculating the location quotient. The proxy we used was the employment rate at regional and national level. A comparison between the sectorial employment in a region and the sectorial employment on national level resulted in a good estimation of the extent of localization of a sector in the region. The employment rates for each sector and each region were extracted from the Eurostat (2011) database (European commission, 2011). This enabled us to determine the relative share of each sector in each region. Dividing the employment share of the sector in the region by the employment share of the sector on national level resulted in a location quotient. A sector is localized when the location quotient is equal to or larger than one.

To derive the regional input output table there is one more piece of information that we required. This was the national technical coefficient. The national technical coefficients could be derived by dividing the inter-sector and intra-sector deliverances for each sector by the total supply at basic prices for this sector.

Using the location quotients and the national technical coefficients we filled in the regional

input output table. If the location quotient is larger than one the sector is localized in the region and the production in the own region will be large enough to satisfy the regional demand. In this case the regional input output coefficient is supposed to be equal to the national input output coefficient. If the location quotient is smaller than one, the sector is not localized and supply from outside the region is necessary to cover the regional demand. The regional technical coefficient could be computed by multiplying the national technical coefficient with the location quotient.

In this way the regional technical coefficient table was constructed. The regional inter-sector deliverances were determined by the multiplication of the regional technical coefficient with the output per sector in the regions. Since the output per sector for each region was not readily available, we deducted the data using the relative shares of each sector. Finally we calculated the intermediate output, imports plus value added, and final demand plus exports. The intermediate output is the sum of all the rows of the regional inter-sectorial deliverances. The imports plus value added are then equal to the total output minus the intermediate output. We aggregated the columns and subtracted the imports plus value added from the total output to calculate the final demand plus exports (Heijman, Schipper, 2010).

Methodology: Calculating multipliers

From the regional input output tables derived in the previous paragraph we deducted the multipliers for each sector and region. The method we applied is the Leontief equation as presented in Heijman and Schipper (2010) and Jensen et al. (1979). The Leontief equation could be inferred in the following way:

$$AX + F = X$$

$$X = (I - A)^{-1}F$$

$$\Delta X = (I - A)^{-1}\Delta F$$

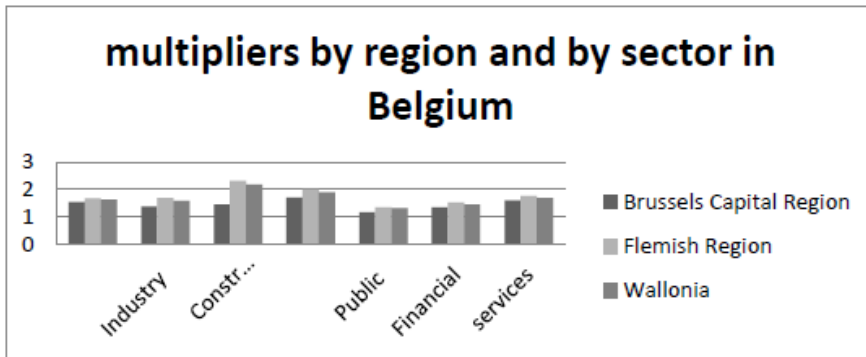
In this equation A represents the matrix of technical coefficients, X denotes the vector of regional production (output), F is the vector of final demand and exports, and I represent the matrix of unity. The term $(I-A)^{-1}$ is referred to as the Leontief inverse (Jensen et al., 1979). All matrixes required for the multiplier calculations were available, so we changed the final demand as a way of simulating an investment impulse. Finally the multiplier was found by dividing the effect of the impulse by the initial impulse.

Results and Discussion

Using the methodology described in the previous paragraph we calculated the multipliers for seven broad key sectors in the regions of the EMU countries. This results in a total of 448 multipliers. Due to the limited length of this article we are not able to discuss all of these multipliers in detail. However, we will provide an example region and stress the main trends that are visible in our results. We choose to show the results for Belgium as an example since they give a reasonable idea of the more general results.

The figure (Figure 1) illustrates the multiplier values for the seven sectors and three regions in Belgium.

Figure 1. Regional and sectorial multiplier values Belgium



Source: Multipliers calculated based on data from European Commission (2009) and European Commission (2011)

The figure (Figure 1) shows that the construction multiplier has the highest value for the Flemish and the Walloon region. The highest multiplier in the Brussels Capital Region can be found in the Wholesale sector. The lowest multipliers are encountered in the Public sector for all three Belgian regions. We expected high multipliers for the agricultural, industry, construction and the wholesale sector. This is correct for the Construction and Wholesale sector. The multipliers for the agricultural and the industry sector are still considerable, but not as high as for the other two sectors. We expected low multiplier values for the public and the financial sector, this is reflected in the graph.

To determine how the multiplier values for the different sectors are related in a more general sense we compare the average multipliers for the different sectors. The table (Table 1) demonstrates the average multipliers for the seven sectors.

Table 1. Average multipliers for each sector

Sector	Average multiplier
Construction	1.897
Agriculture	1.660
Industry	1.654
Wholesale	1.652
Services	1.498
Financial	1.438
Public	1.406

Source: Multipliers calculated based on data from European Commission (2009) and European Commission (2011)

The sectors in the table (Table 1) are sorted from the highest to the lowest average multiplier value. The construction sector exhibits the highest average multiplier. This is in accordance with our expectations. The Agricultural, Industry, and Wholesale multipliers are of the same order of magnitude. These multipliers are quite large, but notably lower than the construction multiplier. The lower multipliers are found in the services, financial, and public sector. All multipliers are larger than one, indicating that a one euro investment in all sectors will always result in benefits larger than one euro. Investing in all sectors is profitable, but the highest returns are found in the construction sector.

The first figure (Figure 1) presented us with an insight in the differences between the regions in one country. The first table (Table 1) showed the relationship between the multipliers encountered for the different sectors. Comparing the individual member states will enhance our insight in the differences between the countries. The next tables (Table 2) and (Table 3) demonstrate the average multiplier value for each sector in each country.

Table 2. Average multipliers by country and by sector

Country Sector	Austria	Belgium	Estonia	Finland	France	Germany	Greece
Agriculture	1.613	1.606	1.889	1.691	1.767	1.624	1.513
Industry	1.535	1.545	1.637	1.680	1.769	1.649	1.386
Construction	1.650	1.984	2.138	1.813	1.885	1.776	1.632
Wholesale	1.545	1.861	2.002	1.547	1.667	1.593	1.441
Public	1.427	1.275	1.670	1.493	1.415	1.361	1.452
Financial	1.767	1.435	1.372	1.478	1.370	1.488	1.434
Services	1.466	1.682	1.658	1.442	1.517	1.430	1.333

Source: Multipliers calculated based on data from European Commission (2009) and European Commission (2011)

Table 3. Average multipliers by country and by sectors

Country Sector	Ireland	Italy	Netherlands	Portugal	Slovakia	Slovenia	Spain
Agriculture	1.869	1.684	1.597	1.720	1.561	1.669	1.691
Industry	1.593	1.838	1.533	1.534	1.786	1.635	1.717
Construction	2.045	1.949	2.069	1.958	2.050	2.223	2.009
Wholesale	1.449	1.808	1.617	1.649	1.921	1.814	1.597
Public	1.517	1.385	1.523	1.212	1.567	1.596	1.315
Financial	1.406	1.269	1.435	1.365	1.456	1.344	1.422
Services	1.372	1.533	1.607	1.506	1.639	1.735	1.487

Source: Multipliers calculated based on data from European Commission (2009) and European Commission (2011)

The highest average multiplier value we come across applies to the construction sector in Slovenia. This multiplier value is larger than two, indicating that an investment in the construction sector will on average result in more than a doubling of the initial investment. The lowest average multiplier value emerges in the public sector in Portugal. Still this multiplier is larger than one. Therefore an investment in this sector will result in a higher return than

the initial investment. For all countries except Austria the average multiplier value is highest for the construction sector. The highest average multiplier value in Austria is realized in the financial sector. The lowest average multiplier in the different member states shows more variation. In Austria, Belgium, Germany, Portugal, and Spain the lowest multiplier values are exhibited by the public sector. The Financial sector displays the lowest multiplier values for Estonia, France, Italy, The Netherlands, Slovakia, and Slovenia. Finland, Greece, and Ireland realized the lowest multiplier values in the services sector. The 50 highest multipliers in the total database are shown in the next table (Table 4).

Table 4. The fifty highest multipliers

Ranking	Sector, region, country	Multiplier value
1	Construction, Flemish region, Belgium	2.32
2	Construction, Vzodna Slovenija, Slovenia	2.28
3	Construction, Noroeste, Spain	2.21
4	Construction, Continente, Portugal	2.21
5	Construction, Stredne Slovensko, Slovakia	2.20
6	Construction, Zapadne Slovensko, Slovakia	2.20
7	Construction, Wallonia, Belgium	2.18
8	Construction, Este, Spain	2.17
9	Construction, Zahodna Slovenija, Slovenia	2.16
10	Construction, NorthEast, Italy	2.16
11	Construction, Vychodne Slovensko, Slovakia	2.15
12	Construction, Centro, Spain	2.15
13	Construction, Oost-Nederland, the Netherlands	2.14
14	Construction, Estonia	2.14
15	Construction, Zuid-Nederland, the Netherlands	2.13
16	Construction, Noord-Nederland, the Netherlands	2.12
17	Construction, Nord-Ovest, Italy	2.11
18	Construction, Noreste, Spain	2.10
19	Industry, Nord-Est, Italy	2.08
20	Construction, Border Midland and Western, Ireland	2.05
21	Construction, Southern and Eastern, Ireland	2.04
22	Wholesale, Vychodne Slovensko, Slovakia	2.01
23	Wholesale, Estonia	2.00
24	Wholesale, Zapadne Slovensko, Slovakia	2.00
25	Wholesale, Stredne Slovensko, Slovakia	2.00
26	Industry, Nord-Ovest, Italy	2.00
27	Wholesale, Flemish region, Belgium	1.99
28	Construction, Centre-est, France	1.99
29	Construction, Centro, Italy	1.98

Ranking	Sector, region, country	Multiplier value
30	Agriculture, Border Midland and Western, Ireland	1.97
31	Construction, Ouest, France	1.97
32	Construction, Bassin Parisien, France	1.97
33	Construction, Manner Suomi, Finland	1.95
34	Construction, Nord-pas-de-Calais, France	1.95
35	Construction, Bayern, Germany	1.95
36	Construction, Est, France	1.94
37	Agriculture, Centre-Est, France	1.94
38	Wholesale, North-East, Italy	1.94
39	Construction, Rheinland-Pfalz, Germany	1.94
40	Construction, Nordrhein-Westfalen, Germany	1.93
41	Agriculture, Ouest, France	1.92
42	Construction, Sur, Spain	1.92
43	Agriculture, Bassin Parisien, France	1.92
44	Construction, Saarland, Germany	1.92
45	Agriculture, Noroeste, Spain	1.92
46	Industry, Stredne Slovensko, Slovakia	1.91
47	Industry, Zapadne Slovensko, Slovakia	1.91
48	Industry, Vychodne Slovensko, Slovakia	1.91
49	Construction, Baden Wurtemberg, Germany	1.91
50	Industry, Noroeste, Spain	1.90

Source: Multipliers calculated based on data from European Commission (2009) and European Commission (2011)

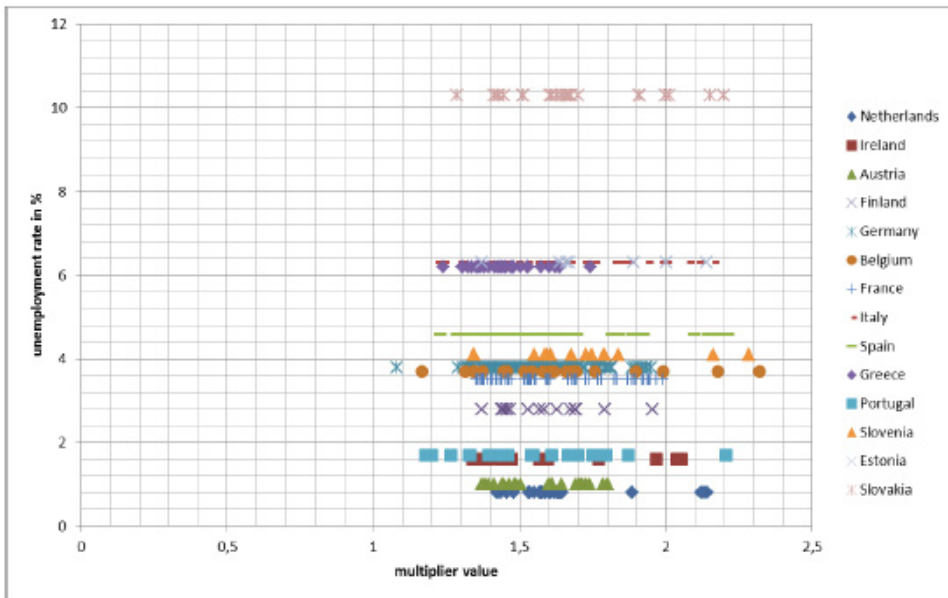
The first eighteen highest multipliers are all formed in the construction sector in different countries and different regions. The highest multiplier for the industry sector is the multiplier ranking nineteenth place. The first multiplier for the wholesale sector takes up the 22nd place. For the agriculture sector the highest multiplier can be found on the 30th place. There are no multipliers concerning the services, financial, or public sector within the fifty highest multipliers.

Our results give a clear indication as to where the European Union should invest. We like to point out a few issues that should be threated carefully. Sometimes no data were available for the NUTS 1 regions in a country. In this case we use information on the NUTS 2 regions. This inevitably creates a slight bias in scale. On one occasion we had to use the 2001 data in calculating the location quotients, for the data on the year 2000 was absent. Finally, in following up our policy recommendations a careful analysis of the actual situation should be performed.

Policy Recommendations

The multiplier values derived in the previous paragraph can be used to form policy recommendations. These recommendations might provide the answer to the question in which sectors and regions the European Union should invest to diminish the economic gap between its member's states. If one assumes that a high multiplier effect indicates favourable possibilities for stimulating the economy, then one could look at which regions and sectors have high multiplier values. However, we should keep in mind that other factors are likely to play a role in determining the effect of an investment as well. One of these factors might be the unemployment rate in a region. One could doubt the wisdom of stimulating the economy in a region where a labour shortage will be a limiting factor to economic growth. To take the employment rates into account we plotted the unemployment rate against the multiplier values that resulted from our work. The next figure (Figure 2) represents this plot.

Figure 2. Scatterplot unemployment rate and multiplier value



Source: Figure based on data from European Commission (2009) and European Commission (2011)

If one assumes that high multiplier values and high unemployment rates are important in the investment decision, then one should invest in the countries in the upper right quadrant. The countries that can be found within this quadrant are Slovakia, Estonia, Italy, Greece, and Spain. The highest multipliers for these regions can be found in the construction sector. The European Union included Estonia, Greece, Portugal, Slovakia, and Slovenia in the Cohesion Fund for the 2007-2013 period (European Commission, 2008). Therefore we make the following recommendations. If we assume that multiplier values and unemployment rates are important, then the European Union should invest most in Slovakia, next in Estonia, Italy, Greece, and Spain. These are the investments

that will most likely result in the highest returns. The investments in Estonia, Slovakia, and Greece fall under the Cohesion Funds. The sector with the highest returns is the construction sector. The fact that the European Union often invests in infrastructure aligns with this finding.

Conclusions and discussion

There are ample opportunities for the European Union to advantageously invest in member states. Especially investments in the construction sector are expected to result in high returns. This is indicated by the high multiplier values in this sector. Even the lowest multiplier in this sector is still larger than 1.5. Investments in the agriculture, industry, and wholesale sector are likewise expected to result in high returns. The service, financial, and public sector demonstrate considerably lower multiplier values, although their value on average still exceeds the value of one.

The multiplier value is not the only factor of importance when considering in which region to invest, but it is a good indicator. Another factor that might be relevant is the unemployment rate in a region. If there is a limiting factor to economic growth in a region, such as labour shortage, directing more money towards that region might not result in the desired effect. Therefore we plotted the unemployment rate against the multiplier values that were determined in this paper. The countries that exhibited both a high multiplier and a high unemployment rate seem the best investment option. The countries demonstrating these characteristics are Slovakia, Estonia, Italy, Greece, and Spain. Estonia, Slovakia, and Greece are included in the Cohesion Fund of the European Union. Therefore investing in these countries is possibly the best choice for diminishing the economic gap between the member states.

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