



# EU funds macroeconomic impact assessment

## Second stage report

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# Executive Summary

This report offers an account of the second phase of the project on evaluating the macroeconomic impact of the EU funds in Latvia. The main activity of this phase of the project has been the development of a five sector macroeconomic model of Latvia. In the main text of the report there is an informal description of the model and a discussion of some of the crucial assumptions and issues of interpretation. A detailed technical description of the model is available in Annex 1.

The model was used to estimate the impacts for each of the two programming periods: the programming period 2004-2006 and the current one 2007-2013. In summary the model results indicate a quite substantial positive impact in both periods on output, the budget balance and on productivity and negative impacts on inflation and the trade balance. Under core assumptions of 30% crowding out and an output elasticity of 0.8 for public capital for the 2004-2006 period the cumulative impact on GDP for the five year period to 2008 was estimated at 21.3 percentage points and the cumulative impact on the price level was 8.5 percentage points, with an annual inflation impact ranging from a high of 3.4 percentage points to a low of minus 0.5 percentage points. Of the real growth of 48.8% experienced between 2004 and 2007 14.5 percentage points could be attributed to funds impact and about one quarter of the inflation. The effect on the budget balance was positive in all years but the effect on the trade balance was negative accounting for about one third of the deficit in 2007. It is argued that in and of themselves the funds were not destabilising but that in the economic circumstances of the last three or four years policy makers perhaps underestimated the combined impact of changes in the credit market combined with the funds. For the 2007-2013 both the output and inflation effects are of the same sign as for the earlier period but a little weaker and the long term productivity effect operates to mitigate the negative trade balance effect. Thus over the nine year period to 2015 the cumulative GDP effect is calculated as just over 30% and the cumulative price level effect as just over 9%. In this period the funds will come fully onstream during a period of slowdown in the Latvian economy and are thus likely to have a clearly stabilising effect.

Comparison with the first stage report shows no differences of substance – the modelling approach makes more systematic what was done in an ad hoc way in the first phase of the research.

Modelling should be a regular input to policy analysis and for updating of the model it is recommended that a dedicated unit is set up to provide ongoing updating. Though a new funds exercise is probably not useful until say 2010. In terms of extending the model we advise against increasing the number of sectors and regard a regional model as simply infeasible given data availability. On the other hand it might be useful to develop a three country QUEST type model for the three Baltic States.

We strongly recommend that evaluation of the impact of the funds should be developed at the enterprise level.

# 1 Introduction

Following the Technical Specifications (TS) and the Inception Report (IR) this final phase of the project involved:

1. Development of a mid-term model for macroeconomic forecasting for assessment of the impact of EU funds according to the specific situation in Latvia that would contain the interaction or several indicators, including breaking them down by types of investment;
2. Preparation of a technical description and user manual of the model;
3. Comparison of the results obtained in the mid-term model and the results obtained in the two previously prepared reports;
4. Organisation of an informative seminar for the representatives of the MoF of the Republic of Latvia and other institutions;
5. Organisation of a training seminar for representatives of the MoF of the Republic of Latvia;
6. Providing overall and specific conclusions and recommendations for promotion of more balanced development of the national economy;
7. Providing recommendations on further systematic and regular updating of the model.

The main activity of this phase of the project has been the development of a mid-term macro model according to point 1 above. This has been elaborated and discussed with representatives of the Ministry of Finance and experts at regular meetings since the beginning of 2008 and has gone through different iterations during that time. Results of the project and a description of the approach have been presented at two sessions of the EU Structural Funds Monitoring Committee on 06.11.2007 and 18.06.2008. These presentations can be regarded as fulfilling the informative workshop deliverable. A training seminar for representatives of the MoF of the Republic of Latvia (point 5) was held on 19.06.2008. Accordingly, this report focuses on a description of the model (point 2), a comparison of the results obtained using the model with those presented in the first stage report (point 3), provision of conclusions and recommendations for the promotion of more balanced development of the Latvian economy (point 6) and provision of recommendations for systematic updating of the model.

It should be said at once that the modelling exercises support the view that the EU funds have had a positive impact on key indicators such productivity and GDP for the 2004-2006 programming period and that the effect is expected to be positive for the 2007-2013 programming period. At the same time there is modest support for the view that the funds have been responsible for the imbalances that have emerged in Latvia in recent years or that they are likely to be a source of instability in the future. In fact, quite the opposite – the funds are likely to offset the decline of economic activity that has recently emerged in Latvia and in our Baltic neighbours. These conclusions are spelt out in detail in the results section below.

The report is organised as follows: the next section offers a relatively non technical account of the methodology of the modelling approach adopted, including a discussion of its strengths and limitations. Section 3 provides the main results and compares them with the analysis offered in the first stage report. Section 4 considers policy implications. Section 5 provides recommendations for updating the model as well as suggestions for future research that would improve our understanding of the impact of the funds.

# 2 The modelling approach adopted

The first stage report contains a discussion of different approaches to evaluating the impact of EU funds on the receiving economy or economies eg econometric analysis and different kinds of modelling. In the case of impact evaluation for a single country an econometric approach would require a long time series consisting of with and without funds experience in order to identify a funds impact and this is not available for the task at hand here in Latvia. Accordingly, the project team opted for a modelling approach and from the different modelling approaches available chose to work with a small, five sector, macroeconomic model.

**Model description**

A full technical description of the model is contained in Annex 1. Here is offered an informal description of the model and a discussion of its main properties.

The model consists of five sectors:

- Manufacturing (tradable goods)
- Private (market) services
- Construction
- Agriculture
- Public services (health, education)

Although manufacturing is regarded as the tradable goods sector (or the main tradable sector) in practice all sectors contain tradable sub-sectors as is clear from the input-output tables and this is taken into account in the modelling. For a technical explanation of how this is done see Annex 1.

The model is made up of two interacting 'sides' – a supply side and a demand side. For each sector apart from public services the supply side is described by a standard to input production function which also contains a total factor productivity term. The demand side of the model is Keynesian, where aggregate demand is decomposed into sectoral demands by a process that is based on empirical input-output relationships. The supply and demand sides interact through the relative prices of sectoral outputs and a wage

equation. Exports and imports are not directly modelled and external balance is defined as the difference between aggregate output and expenditure[1].

Thus in terms of basic structure our model is similar to that of the HERMIN class of models developed among others by John Bradley. See for example Bradley et al (2004). However, in a number of ways the model differs from HERMIN, in particular, a notable difference is that here we have examined the issue of whether in the long run the model converges to a steady state with the result that the model does indeed converge. A more detailed comparison with HERMIN is offered in Annex 2.

The technical specifications required assessment of both the 2004-2006 programming period and the 2007-2013 period. In each case in order to assess the impact of the funds it was necessary to model a benchmark and then to use it to compare 'with and without funds' scenarios. However, because for 2004-2006 we already know the actual outcome but for the future we do not the approach to constructing a 'counterfactual' was different for each period. For 2004-2006 the model was calibrated to actual data ie to data that included the funds and their impact. Thus the counterfactual of 'no funds' was constructed by subtracting the funds and their estimated indirect impact from the actual outturn. By contrast, in 2007-2013 period the no funds counterfactual was modelled first and the funds were then added[2]. For the no funds benchmark over 2007-2013 it was necessary to make assumptions about the external environment ie the development of total factor productivity and the development of GDP and prices in Latvia's main trade partners. The details of what is assumed are explained in Annex 1 but for total factor productivity we assume growth is 4% into the indefinite future while for GDP and external prices we make projections in the near future based on forecasts, eg IMF, but beyond the near future we assume convergence to 4%.

As noted in the first stage report the impact of the funds comes through on the one hand an aggregate demand effect and on the other hand a supply effect. Here, the multi-sector nature of the model complicates the analysis on both the demand and the supply side. On the demand side funds expenditures appear either in the form of wages or in the form of investment expenditures. Expenditure on wages are treated as resulting in consumption expenditures, so funds are in the first instance either consumption or investment expenditures and are then transformed through the input output based relationship into domestic sectoral expenditures[3].

On the supply side we again interpret expenditures in terms of their impact on a production function, ie:

$$Y = AF(K, L)$$

[1] Although imports and exports are not directly modeled they do appear implicitly at the sectoral level through the process of transforming aggregate demand into sectoral demand. For a detailed analysis see Annex 1.

[2] Actually the procedure was more complicated but the net effect was as described.

[3] This procedure 'filters out' the import component of aggregate expenditures. For more see Annex 1.

Where Y is output, F represents the technology, K is physical capital and L is labour measured in human capital augmented units, and A represents a total factor productivity term.

Expenditures that affect the production function are:

- *Investment in physical capital (K):* expenditures that augment the stock of capital either by generating more of the same kind of capital ie buildings, machinery or that improve the quality of the capital but which leave the basic technology unchanged.
- *Expenditures on human capital (L):* expenditures that augment the productive skills of people and that are embodied in people.
- *Expenditures that improve total factor productivity* (A) – are expenditures that affect A in (1) and are not embodied in either physical capital or people. Typically these would be expenditures on infrastructure eg roads but could also be productivity enhancing expenditures that are not physically embodied in anything eg expenditures to promote networks.
- *Technology expenditures* (F) – expenditures that change the way output is produced e.g. shift to wind power, and correspond to changes in F. Of course these are often embodied in physical objects but cannot be simply described in terms of more or more productive capital, they typically change the mix of inputs.

With multiple sectors the general problem is how to allocate expenditures by sector. With ordinary investment expenditures these can be interpreted as increasing the capital stock in the sector in which the investment occurs. Some infrastructure expenditures can also be interpreted in this way but the impact may spill over to other sectors, while in the case of the most general infrastructure expenditures, eg better road infrastructure, the impact is spread across all sectors. Expenditures that enhance human capital generate a similar problem – some training may be sector specific but more generally it takes the form enhancing skills that can be used in all sectors eg computer skills. A detailed account of how these issues were resolved may be found in Annex 1.

Using the approach described above the model was used to identify the impact of funds expenditures on key indicators such as GDP, productivity, budget balance, prices and external balance for each of the two programming periods – 2004-2006 and 2007-2013. The results of this exercise are reported and discussed in section 3 below.

**Interpretation and discussion**

Before moving on to the results it is important to be clear as to what meanings can be attached to them and what interpretations are misleading or just wrong.

The first and perhaps most important point is that the neither the model results nor the baseline scenario can be regarded as a forecast for 2007-2013 (or 2015)[4]. The impacts are to be interpreted simply as the difference between with and without funds scenarios

[4] Indeed if one was interested in forecasting one would be better off using a completely different approach eg atheoretic methods such a VAR.

where the without funds scenario has been chosen to reflect 'plausible' assumptions about the medium term development of Latvia's external environment. In practice many events can intervene that will result in an actual course of events that is very different from the dynamics generated by the model[5].

A second point is that the results of the modelling exercise are not amenable to statistical inference. Although some of the relationships of the model have been estimated others have been calibrated with the result that it is not possible to attach confidence intervals to the structural parameters of the model. This is also the reason why it is not possible to make a 'scientific' choice between alternative models.

A third point is that although this is a multi-sector model it is of limited use for making judgements about the effectiveness of or the return to the funds by sector or industry. That kind of analysis requires a micro or enterprise based approach.

Fourthly, the results depend on empirical assumptions that are difficult to be certain about. These include the following:

- The extent of crowding out
- The degree of rent seeking
- The productivity impact of expenditures on public infrastructure

*Crowding out*

The issue of crowding out has already been discussed in the first phase report. It is clear that in both the private and public sectors projects have and will be undertaken which would have been done even if the EU funds had not been available. The problem faced by the modeller is that we have very limited evidence on how much crowding out has occurred in the past and even less on how much might occur in the future. A study of 31 Objective 1 regions in Europe by Ederveen et al (2003) suggests that for the period 1989-1993 the average degree of crowding out was 17%, although the range of observations was -0.95 to 0.75. There the lower number represents 'almost perfect compliance' with the EU co-financing rules while the higher number represent 75% crowding out. We have no direct evidence for Latvia but anecdotal evidence suggests that crowding out has occurred[6][7].

[5] For example the steady state for our chosen set of parameters reproduces a long run sectoral structure that is very similar to what we observe today. This is not surprising because the parameters of the model reflect today's economic structure. In practice the future may be different from today in all sorts of unforeseen ways. Eg 30 years ago, a quite short period relative to long run convergence, the internet was non-existent and it would have been impossible to identify structural developments that have hinged on the availability of the internet.

[6] A temporary reduction of expenditures on active labour market policies by the State Employment Agency in the run up to accession might be explained by the desire to have a lower expenditure base on which apply subsequent ESF expenditures.

[7] There is an argument, often expressed by John Bradley, author of the HERMIN model, that crowding out is unlikely to occur in the transition economies because they have excess resources. This of course has not applied to Latvia in recent years.

*Rent seeking*

Another way in which the funds may be less effective than indicated by the size of nominal expenditures is rent-seeking. Rent-seeking occurs when economic agents use resources in directly-unproductive ways to compete for rents. The availability of structural funds clearly creates rents in many instances and hence agents have an incentive to compete for them. Casual evidence suggests that in Latvia many companies have emerged simply for the purpose of writing projects for securing funds financing for others. Unfortunately, we have no formal evidence on rent seeking either in Latvia or in comparable situations abroad.

Since, crowding out and rent seeking act in a similar way to dampen the effectiveness of the funds we have lumped them together into a single 'crowding out' effect and for our central calculations we have assumed 30% crowding out. This is at best an informed 'guesstimate' and if in practice there is more or less crowding out the reported results would be changed more or less in proportion.

*Public capital*

A large proportion of cohesion policy expenditures are aimed at improving public infrastructure and there has been a fairly long standing debate as to the productivity of investments in public infrastructure. See for example Bom and Ligthart (2008). The issue is: by how much does investment in public infrastructure increase private output? A priori, it is clear that this depends on the kind of investment and also on the existing stock of public capital. Thus expenditures on roads can be expected to have a bigger impact on private output than expenditures on, say, waste treatment. Similarly, in a country with a well developed road structure, the marginal impact of more expenditures on roads is likely to be less than in one where the road system is less adequate. These issues are very likely responsible for the wide range of results found in the literature. Thus Bom and Ligthard (2008) consider 76 studies which report a range of -0.175 to 0.917 for the output elasticity of public capital with a simple average of 0.193. In another study Ligthard (2002) reports an unweighted average of the output elasticity of public capital of 0.25 for OECD[8] countries. In the absence of conclusive evidence on this for Latvia, we have taken the view that the output elasticity of public capital in Latvia should certainly be somewhere above that of developed countries e.g. OECD. Moreover, we believe that especially in the 2004-2006 programming period the inadequacy of existing public infrastructure should imply rather high returns to investment in public capital. Accordingly for 2004-2006 we have adopted an elasticity of output of 0.8 which is at the high end of the range reported by Bom and Ligthard (2008). In the second programming period we have chosen to adopt an output elasticity of 0.5 to reflect the fact as public capital accumulates its impact on private output diminishes[9].

[8] Organisation for Economic Cooperation and Development

[9] This of course is implicit in an elasticity that is less than 1. However, by assuming that the elasticity itself diminishes we implicitly assume that the productive impact of public capital diminishes at an increasing rate.

# 3 The results

The TS require that we report on the impact of the funds for each of the two programming periods with respect to a number of key indicators which include: GDP, productivity, employment, the price level, the government budget balance and the external balance. In each case we here report results only for an assumed 30% rate of crowding out and for output elasticities of 0.8 (which is our central assumption for the 2004-2006 programming period) and 0.5 (which is our central assumption for 2007-2013). The results on they key indicators for each period are reported in the next two subsections. A third subsection reports on the sectoral impact of the funds

### The 2004-2006 programming period[10]

Tables 3.1 and 3.2 report the impact of the funds in terms of the key indicators. For GDP, employment, labour productivity and the consumer price level[11] the results are reported in cumulative form. That is to say the entry for GDP in the 2006 cell says that GDP was 8.2 percentage points higher in 2006 as compared with 2003 than it would have been in the absence of the funds. Similarly, the 2007 entry for the price level is to be interpreted that the price level in 2007 was 9 percentage points higher as compared with 2003 than it would have been without the funds. On the other hand the entries for price inflation, budget balance, the trade balance and real wages show the impact in each year. Thus, the inflation entry for 2006 is to be interpreted as showing that inflation was 3.0 percentage points higher than it would have been without the funds. Similarly the budget balance entry for 2007 indicates that the impact of the funds was to improve the budget balance by 4.1 percentage points of GDP. Because the n+2 rule allows projects to be completed up to 2 years after the formal end of the project and also because the impact of the funds can take some time to have full effect the impact is reported for the years 2004 to 2008 inclusive.

[10] For the programming period 2004-2006, the impact is shown till the year 2008, in order to account for the n+2 principle. It should be noted, however, that for the Cohesion fund the n+4 principle applies, which means that the impact of Cohesion fund expenditures, which are expected to take place in 2009 and 2010, appears in the planning period 2007-2013.

[11] The consumer price level here is the GDP consumption deflator and is hence a little different from the consumer price index. However, typically the two indicators move very closely together.

**Table 3.1: Impact of the funds for the 2004-2006 programming period (30% crowding out and 0.8 output elasticity)**

| | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| GDP (cumulative) | 0.7 | 3.3 | 8.2 | 14.5 | 21.3 |
| Employment (cumulative) | 0.8 | 3.2 | 6.1 | 8.5 | 8.9 |
| Labour productivity(cumulative) | -0.5 | -0.9 | 0.5 | 3.7 | 9.9 |
| Consumer price level (cumulative) | 0.0 | 2.4 | 5.8 | 9.0 | 8.5 |
| Consumer price inflation (in each year) | 0.0 | 2.2 | 3.0 | 3.4 | -0.5 |
| Government budget balance, percentage points of GDP (in each year) | 0.7 | 1.9 | 3.1 | 4.1 | 4.1 |
| Trade balance, percentage points of GDP (in each year) | -2.1 | -6.1 | -8.4 | -7.3 | -3.5 |
| Real wage growth (in each year) | 0.7 | 2.4 | 2.6 | 3.4 | 3.1 |

It might be useful here to see how these figures compare with the actual indicators for the period 2004-2007. Thus between 2003 and 2007 actual real GDP increased by 48.8%, the price level rose by 34% and the trade balance in 2007 was just over -20% of GDP. Loosely, we can interpret that the figures reported in Table 3.1 as implying that just under 30% of cumulative real growth and one quarter of cumulative inflation can be attributed to the funds. It should be noted here that the inflation impact turns negative in 2008 and this is because by then the supply (productivity) effect of the 2004-2006 funds begins to dominate the demand impact.

At the same time the funds were 'responsible' for just over one third of the 2007 trade deficit. The impact of the funds on real wages is relatively modest and is more or less in line with the productivity impact of the funds. For comparison, over the period actual real wages grew by 2.4% in 2004, by nearly 10% in 2005, by more than 15% in 2006, and by nearly 20% in 2007.The question arises as to whether overall these 'impacts' should be interpreted as 'destabilising'. This is addressed in more detail below but a preliminary answer here is: no.

Table 3.2 reports on the same indicators on the assumption that the output elasticity is somewhat lower at 0.5. It can be seen that this would reduce the impact of the funds on GDP and increases the impact on inflation and the external balance. This is not surprising – if public capital is believed to be less effective in promoting private sector productivity, then on the whole the beneficial macroeconomic effects of the funds are reduced.

**Table 3.2: Impact of the funds for 2004-2006 programming period (30% crowding out and 0.5 output elasticity)**

| | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| GDP at market prices (cumulative effect) | 0.7 | 3.4 | 8.0 | 13.3 | 18.2 |
| Employment (cumulative) | 0.8 | 3.3 | 6.6 | 9.2 | 9.7 |
| Labour productivity (cumulative) | -0.5 | -0.9 | -0.1 | 2.0 | 6.3 |
| Consumer price level (cumulative) | 0.0 | 2.4 | 6.5 | 11.4 | 13.3 |
| Consumer price inflation (in each year) | 0.0 | 2.2 | 3.7 | 5.0 | 1.8 |
| Government budget balance, percentage points of GDP (in each year) | 0.7 | 1.9 | 3.2 | 4.2 | 4.1 |
| Trade balance, percentage points of GDP (in each year) | -2.1 | -6.1 | -8.9 | -8.5 | -5.9 |

**The 2007-2013 programming period**

Tables 3.3 and 3.4 below report the developments in the main indicators from 2007 to 2015 to take into account the n+2 rule. As before GDP, employment, productivity and price level impacts are reported in cumulative form, while inflation rate, budget balance, trade balance and real wage impacts are reported by year. Here the core assumptions are that the output elasticity is 0.5 and crowding out is 30%. We also report results for an output elasticity of 0.3. One particular point of interest is that towards the end of the period the inflation and trade balance impacts start to decline. This is because the productivity impact begins to fully kick in only towards the second part of the period.

**Table 3.3: Impact of the funds for 2007-2013 programming period (30% crowding out and 0.5 output elasticity)**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|
| GDP | 0.0 | 1.0 | 4.4 | 8.9 | 13.0 | 17.6 | 22.5 | 27.4 | 31.2 |
| Employment | 0.0 | 1.1 | 4.6 | 7.7 | 9.4 | 10.5 | 11.2 | 11.8 | 11.3 |
| Labour productivity | 0.0 | -0.7 | -1.4 | -0.3 | 1.8 | 4.9 | 8.6 | 12.3 | 16.5 |
| Consumer price level | 0.0 | 0.1 | 2.9 | 5.7 | 7.4 | 8.1 | 8.5 | 8.7 | 9.3 |
| Consumer price inflation | 0.0 | 0.1 | 2.8 | 2.8 | 1.6 | 0.6 | 0.4 | 0.3 | 0.5 |
| Government budget balance, percentage points of GDP | 0.0 | 1.0 | 2.5 | 3.4 | 3.9 | 4.2 | 4.5 | 4.7 | 4.2 |
| Trade balance, percentage points of GDP | 0.0 | -3.2 | -6.9 | -6.9 | -6.6 | -6.1 | -5.5 | -5.2 | -3.1 |
| Real wage growth | 0.0 | 1.0 | 1.2 | 1.5 | 2.2 | 2.8 | 3.2 | 3.4 | 2.8 |

We can see that the GDP, employment and productivity effects are positive throughout the simulation period, with productivity in particular growing strongly at the end of the period. On the other hand the inflation impact[12] is modest for most years and cumulatively is expected to add just over 9% to the price level over the nine year period. The impact on the budget balance is positive throughout but on external balance is negative throughout but declining towards the end of the period as supply effects work more strongly.

**Table 3.4: Funds for 2007-2013 programming period (30% crowding out and output elasticity of 0.3)**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|
| GDP | 0.0 | 1.0 | 4.5 | 8.8 | 12.2 | 15.7 | 19.1 | 22.3 | 24.4 |
| Employment | 0.0 | 1.1 | 4.7 | 8.1 | 9.9 | 10.8 | 11.2 | 11.4 | 10.5 |
| Labour productivity | 0.0 | -0.7 | -1.4 | -0.7 | 0.8 | 3.0 | 5.6 | 8.3 | 11.4 |
| Consumer price level | 0.0 | 0.1 | 2.8 | 6.3 | 8.9 | 10.9 | 12.6 | 14.0 | 15.4 |
| Consumer price inflation | 0.0 | 0.1 | 2.8 | 3.4 | 2.4 | 1.8 | 1.5 | 1.2 | 1.2 |
| Government budget balance, percentage points of GDP | 0.0 | 1.0 | 2.5 | 3.4 | 3.9 | 4.2 | 4.4 | 4.5 | 3.9 |
| Trade balance, percentage points of GDP | 0.0 | -3.2 | -6.9 | -7.3 | -7.4 | -7.5 | -7.3 | -7.3 | -5.5 |

Table 3.4 above shows the impacts under the assumption of smaller output elasticity, and as before, this has the effect of reducing the GDP and productivity impacts but the inflation and trade balance impacts are slightly increased.

**Sectoral impacts**

The sectoral nature of the model means that it is possible to provide calculations of impact of the funds by sector. Table 3.5 shows the distribution of funds by sector for 2001-2007[13]. It can be seen that relative to its size agriculture appears to be relatively the biggest beneficiary sector. However, much of the support in this sector is for rural development rather than agriculture as such[14]. Also, it was not possible to find a definite sectoral allocation for something like 40% of the funds and these have been attributed to sectors by a formula that reflects the shares of different expenditure categories in different sectoral funds expenditures.

[12] There is a jump in consumer price inflation in 2008. This appears to be a consequence of a jump in assumed external inflation to a long run 4%. This change will be smoothed in the next iteration.
[13] The data on funds include: EU structural funds (ERDF, ESF, EAGGF, FIFG), Cohesion fund, ISPA (hereafter under Cohesion fund), SAPARD (till 2006) and Phare.
[14] Agriculture of course benefits from the Common Agricultural Policy which is not considered here.

**Table 3.5: EU funds as a share of actual gross value added by sector (%)**

| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|---|---|
| Manufacturing | 0.0 | 0.0 | 0.0 | 0.4 | 2.4 | 4.2 | 4.0 |
| Private services | 0.0 | 0.0 | 0.0 | 0.2 | 0.8 | 1.3 | 2.0 |
| Construction | 0.0 | 0.0 | 0.0 | 0.1 | 3.9 | 5.0 | 4.3 |
| Agriculture | 3.2 | 6.6 | 18.8 | 25.0 | 30.7 | 18.1 | 2.0 |
| Public services | 0.1 | 0.1 | 1.1 | 3.2 | 8.0 | 7.2 | 8.9 |

Tables 3.6 and 3.7 show the changes in shares of different sectors as a consequence of the EU funds for, respectively, the 2004-2006 and 2007-2013 programming periods. The figures represent the difference over time between the 'with funds shares' and the 'no funds shares' ie the counterfactual no funds shares have been subtracted from the actually observed shares over 2004-2008[15]. So, for example the 2007 entry for manufacturing represents the percentage points by which the share of manufacturing is lower with the funds (in this case the actual outturn) than would have been the case without ie in 2007 the actual share of manufacturing in gross value added was 11.2% but in the absence of the funds it would have been 12.5%.

**Table 3.6: Changes over 2004-2006 in the sectoral shares of GDP as a result of the EU funds**

| | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Manufacturing | 0.0 | -0.3 | -0.8 | -1.3 | -1.4 |
| Private services | 0.0 | 0.7 | 1.8 | 3.0 | 3.5 |
| Construction | 0.0 | -0.2 | -0.6 | -0.8 | -0.9 |
| Agriculture | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Public services | 0.0 | -0.2 | -0.6 | -0.9 | -1.3 |

Note: The figures assume values of 0.8 for the output elasticity and 30% for crowding out

In contrast to manufacturing, the impact of the funds on private services has been to increase their share in 2007 by 3.0 percentage points as compared with a no-funds scenario. In 2008 the impact is expected to increase to 3.5 percentage points. Why have private services done so well even though they received relatively little of the funds? The answer seems to be that the income growth generated by the funds generates consumption expenditures that are disproportionately spent on private services. Here it should be noted that all sectors actually benefit in absolute terms from the funds. See Tables 3.8 and 3.9 below. The share impact represents only a relative decline in manufacturing. Over the period 2007-2013 manufacturing is expected to continue to lose ground and private services are expected to continue to gain ground as a result of the funds (see Table 3.7).

[15] Except for 2008 where both with and without funds are modeled.

**Table 3.7: Changes over 2007-2013 in the sectoral shares of GDP as a result of the EU funds**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|
| Manufacturing | 0.0 | 0.0 | -0.5 | -1.1 | -1.4 | -1.5 | -1.7 | -1.9 | -2.1 |
| Private services | 0.0 | 0.0 | 1.0 | 2.2 | 2.8 | 3.2 | 3.6 | 4.0 | 4.4 |
| Construction | 0.0 | 0.0 | -0.3 | -0.6 | -0.8 | -0.9 | -1.1 | -1.2 | -1.3 |
| Agriculture | 0.0 | 0.1 | 0.2 | 0.2 | 0.3 | 0.4 | 0.5 | 0.5 | 0.4 |
| Public services | 0.0 | -0.1 | -0.3 | -0.7 | -1.0 | -1.2 | -1.3 | -1.4 | -1.4 |

Note: The figures assume values of 0.5 for the output elasticity and 30% for crowding out

**Table 3.8: Changes in value added by sector as compared with no funds (2004-2006)**

| | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Manufacturing | 0.3 | 0.8 | 2.4 | 5.2 | 8.6 |
| Private services | 0.2 | 2.8 | 8.7 | 17.3 | 27.9 |
| Construction | 0.0 | 0.9 | 3.9 | 8.2 | 14.1 |
| Agriculture | 2.0 | 7.2 | 14.4 | 21.8 | 27.2 |
| Public services | 0.2 | 1.1 | 2.9 | 4.6 | 6.2 |

Note: The figures assume values of 0.8 for the output elasticity and 30% for crowding out

**Table 3.9: Changes in value added by sector as compared with no funds (2007-2013)**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|
| Manufacturing | 0.0 | 0.5 | 0.9 | 1.6 | 2.8 | 4.6 | 6.4 | 8.1 | 9.3 |
| Private services | 0.0 | 0.2 | 4.1 | 10.1 | 15.5 | 21.6 | 28.4 | 35.2 | 41.8 |
| Construction | 0.0 | 0.0 | 1.0 | 3.9 | 7.1 | 10.8 | 14.6 | 18.3 | 22.1 |
| Agriculture | 0.0 | 2.8 | 9.1 | 16.7 | 24.5 | 33.1 | 41.6 | 50.0 | 54.9 |
| Public services | 0.0 | 0.2 | 1.4 | 2.8 | 3.9 | 4.9 | 5.8 | 6.5 | 6.7 |

Note: The figures assume values of 0.5 for the output elasticity and 30% for crowding out

**Comparison with first stage report**

There are no differences of substance between the first stage report which was based on a partial equilibrium single sector approach and this second one based on an explicit multi-sector modeling approach. The modeling makes the analysis more coherent and internally consistent. It also allows us to do some things which were not possible in the first stage report ie it allows

- Integration of demand and supply effects into a single GDP impact
- Explicit calculation of the funds impact on inflation
- Explicit calculation of the funds impact on the external balance
- Explicit calculation of the funds impact on the budget balance

The modeling approach adopted for the second phase of the project also enables us to explore more fully the impact of the funds on different sectors of the economy. In the first phase it was possible to identify which sectors received which funds. Now with the

model it is possible to explore how sectors interact and how the impact of the funds is transmitted through the economy. In particular, it turns out that private services is the biggest gainer from the funds in terms of GDP share and manufacturing is a loser in terms of GDP share even though manufacturing has received substantially more support in relation to value added as compared with private services. This result is a good illustration of how it is necessary to look at the general equilibrium impacts of policy interventions.

# 4 Policy discussion

In the technical specifications the key policy issues concerned the possible role of the EU funds in destabilizing the Latvian economy and in contributing to the emergence of imbalances. This will be discussed at two levels. Firstly, what does the evidence on funds indicate regarding the 'responsibility' of the funds for Latvia's recent economic imbalances? And secondly, what are the lessons for the future?

**Have the funds contributed to destabilizing the Latvian economy?**

In the first phase report we suggested that the impact on the funds of key economic indicators such as output (GDP), inflation, and external balance depends on the balance between demand effects and supply effects. The model permits these two effects to be put together and from Table 3.1 we see that the main positive effects for the programming period 2004-2006 as of 2008 are as follows:

| | |
|---|---|
| Cumulative GDP growth: | 21.3% |
| Cumulative productivity growth | 9.9% |
| Cumulative employment growth | 8.9% |

However, the 'negative' effects were:

| | |
|---|---|
| Cumulative inflation | 8.5% |
| Negative trade balance impact | 2.1% to 8.4% of GDP per year |

An additional positive effect was on the budget balance and a 'neutral' effect was modest real wage growth.

There is a saying that there is no free lunch in economics and our results indicate that this has been exactly the case with the EU funds – the beneficial growth and productivity effects have come at the expense of some inflation and a worsened trade balance.

In 'normal' times the extra inflation induced by the funds – between -0.5 percentage points and +3.4 percentage points for the years 2004-2008 – could easily have been 'absorbed', however, in the circumstances of an overheated economy and of the structural changes in the credit market experienced in recent years, the extra inflation, was clearly unwelcome. The trade balance effect was arguably also unwelcome but is something that diminishes as Latvia experiences a productivity induced increased supply.

For the 2007-2013 programming period macroeconomic circumstances are likely to be very different and the EU funds will represent a welcome boost to demand while the inflation impact, mostly at less than a 1% point addition to annual inflation rates, is expected to be modest.

**Lessons for the future**

Should macroeconomic policy have been conducted differently? Here it is difficult to disentangle the various influences on the macro economy. Arguably, the major impact on the Latvian economy in recent years has been the property/credit boom which has very little to do with the EU funds. However, the funds impulse to economic activity is something that was fixed and known – at least in principle – and policy could have taken this into account. It is not clear whether this was the case in practice. Only the policy-makers themselves really know. However, for the current programming period the funds impact model will be available to the Ministry of Finance and there will be little excuse for a policy of what might be called 'benign neglect', which arguably was the stance of macroeconomic policy in the much of the two years from 2005.

Tables 4.1 and 4.2 illustrate what kind of macroeconomic expenditure patterns were induced in the 2004-2006 programming period and what is expected in 2007-2013. A somewhat surprising result is the very large growth of private consumption. This can be explained by two factors. Firstly a large proportion of the funds accrued initially in the form of wages and wages have largely been spent on consumption expenditures. However, the wage bill itself grew by only about 20% over the period and the extraordinary increase in consumption was the result of a marginal propensity to consume well in excess of unity. This was permitted by developments in the credit markets which meant that household experienced a rapid decrease in credit and liquidity constraints. This latter effect is of course not attributable to the funds. Perhaps if it had been understood that the funds would indirectly end up with such a large consumption impact policy measures could have been adopted to promote more saving and investment.

**Table 4.1: Cumulative changes in expenditure components 2004-2008**

| | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| Private consumption | 4.2 | 13.0 | 24.4 | 34.3 | 39.2 |
| Investment | 1.7 | 4.3 | 7.4 | 11.0 | 13.7 |
| Public consumption | 0.0 | 0.2 | 1.0 | 2.7 | 4.6 |

Note: The calculations assume values of 0.8 for the output elasticity and 30% for crowding out

For the 2007-2013 programming period there is also a relatively large consumption impact, though smaller in relation to investment than in the earlier period. In these calculations we have assumed a more normal marginal propensity to consume in the belief that the relaxation of credit and liquidity constraints is a one-off effect.

**Table 4.2: Cumulative changes in expenditure components 2007-2015**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|
| Private consumption | 0.0 | 6.3 | 15.6 | 22.0 | 27.6 | 33.8 | 40.2 | 46.7 | 46.6 |
| Investment | 0.0 | 1.9 | 5.1 | 8.4 | 12.3 | 16.0 | 19.2 | 22.3 | 24.2 |
| Public consumption | 0.0 | 0.0 | 0.2 | 1.5 | 3.3 | 4.6 | 5.9 | 7.0 | 7.8 |

Note: The figures assume values of 0.5 for the output elasticity and 30% for crowding out

Apart from the macroeconomic implications of the model there is one general policy lesson: most of the good effects of the funds come from their impact on productivity and hence if Latvia is to improve its use of the funds in the future the focus should be on projects that increase productivity. Generally, we believe that public infrastructure will continue to generate a good return but perhaps there should be more monitoring of individual projects to see what kind of productivity impact they have.

# 5 Updating the model and further research

### A dedicated modeling team

Our central recommendation for updating the model is that it should be undertaken by a dedicated team of perhaps two qualified people working on the model on a permanent basis and while full-time work on the model may not be required, work on the model should be regular. Neither the model nor the world that it represents stands still and the model is not a simple tool into which some data can be inputted and which then generates a useful output. The usefulness of the model depends on a team that in the first place understands the model and in the second place apply the same skills to its ongoing development as were used in its construction. The need for ongoing updating is well illustrated by ECFIN's QUEST model for which a third version is currently in the process of development. If modeling is to be taken seriously then updating of the model should not be left to a junior member of say the Macroeconomics and Fiscal Policy Department of the Ministry of Finance.

One area in which a fairly straightforward updating could be implemented is incorporation of the latest input-output tables which are expected to become available this year.

In terms of timing of an update and revised simulations for 2007-2015 we would recommend that is next done when we have a clearer idea of how the expenditures of the current programming period are actually turning out. This might perhaps be in two years time. In the meantime the team running the model would familiarize themselves with the model and hopefully fine tune and improve it on the basis of existing data. Running the model on new funds data requires the creation of a new fund data set from detailed administrative data and this in itself would be a task that takes several months.

**What should not be done!**

Experience with development of the model leads us to believe that there are at least three directions which should *not* be followed:

*More sectors*: This would not be a very productive or rewarding exercise. The existing model with five sectors, four of which have estimated or calibrated relationships, already stretches information availability at the sectoral level to the limit.

*A regional model*: Even more than is the case with many sectors information is lacking to develop a meaningful regional model

*Forecasting and other policy analysis*: Although in principle the model could be used for a number of different policy experiments its design is focused on an analysis of the funds. In general it is impossible to develop a one-size-fits-all model. For example we would regard a single sector model as more suitable for basic macroeconomic forecasting while for analysis of say tax policy we would recommend micro-simulation based on household and enterprise data.

**Future research**

*Enterprise level research*: Our understanding of the impact of cohesion policy in Latvia would be enhanced by research at the enterprise level[16]. From Lursoft and survey data we have good information on enterprise characteristics and this can be linked up with the receipt of funds to offer the possibility of examining the impact of funds at the enterprise level. Not only would this be revealing in its own right but such analysis would be amenable to econometric analysis and hence we could subject tests of funds impact to statistical inference. We would expect this approach to yield stronger positive impacts from the funds than has been the case with cross-country econometric analysis.

*A Baltic model?* Given the strong and growing integration of the three Baltic economies it might be interesting to develop a three country model on the lines of QUEST. This would represent an improvement on a single country model because of better integration of links and spillovers.

[16] From comments at the May29-30 conference such an approach is already being tried in Hungary.

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