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THE MACROECONOMIC IMPACT OF EU STRUCTURAL FUNDS ON THE PORTUGUESE ECONOMY

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Title: The Macroeconomic Impact of EU Structural Funds on the Portuguese Economy

Author: Ana Maria Dias

Editor: Department of Foresight and Planning and International Affairs
Av. D. Carlos I, 126
1249-073 Lisboa PORTUGAL
Fax: (351) 213935208
Telef: (351) 213935200
E-mail: dpp@dpp.pt

THE MACROECONOMIC IMPACT OF EU STRUCTURAL FUNDS ON THE PORTUGUESE ECONOMY

1. INTRODUCTION

This presentation concerns the evaluation of the macroeconomic impact on the Portuguese economy of EU structural funds, framed by Community Support Frameworks (CSF) I, II and III for the period 1989-2006 and by National Strategic Reference Framework (NSRF) for the period 2007-2013, carried out in the Department of Foresight and Planning (DPP).

Two models, developed in DPP for the Portuguese economy, have been used in these evaluations: an input-output based model (MODEM) and a macroeconometric model (HERPOR). The first one has a multi-regional extension which allows, in certain conditions, the evaluation of regional impacts, but it only considers demand-side effects, in a static way.

HERPOR is a national model and it doesn't allow the estimation of regional impacts, but on the other hand, it considers both supply and demand-side effects in a dynamic way.

I will refer first the evaluations of national impacts undertaken with HERPOR and later on I will make a brief reference to the evaluation of regional impacts using MODEM.

2. NATIONAL IMPACTS – EVALUATION WITH HERPOR MODEL

In 2005 we carried out an evaluation of CSF, for the update of CSF III interim evaluation. The results of this exercise are published in Dias and Lopes (2005c).

In 2007 we made an ex-ante evaluation of NSRF, which is presented in DPP (2007), section V.3.

These evaluations used as an instrument a macroeconometric model (HERPOR), described in Dias (2006), designed for policy evaluation, aiming at considering both supply and demand-side effects of policies.

HERPOR considers four sectors of activity: Tradable, Non-tradable, Agriculture and Non-Market services. In the short term output is mainly determined by demand and there is a trade-off between inflation and unemployment. In the long run, supply-side conditions, driven by the accumulation of physical and human capital, play a key role, with actual output converging to potential output.

Although inspired in the HERMIN[1] model, HERPOR presents several differences in specification and it was estimated with a new data basis, implying different results in terms of the evaluation of the impact of EU structural fund interventions on the Portuguese economy.

Each evaluation was done through the comparison of two scenarios (simulated from the begining of CSF (NSRF) to 2050):

- reference scenario (with CSF/NSRF), corresponding to the observed/projected path for the Portuguese economy, simulated with HERPOR;
- scenario "without CSF/NSRF", corresponding to what would happen if there was no CSF/NSRF. This scenario was obtained through model simulation after subtracting the direct exogenous effect of CSF (NSRF) to the various model variables.

The evaluations were performed in two different ways: 1) considering the effect of EC funds alone and 2) considering total public expenditure involved. In both cases a policy rule was used in order to equate public deficit (% of GDP), for each year in the scenarios with and without CSF (NSRF). Private expenditure was not considered in the evaluation as we assumed that it would be spent anyway (with or without CSF/NSRF), although with different applications.

To perform the evaluations it was necessary to estimate the breakdown of CSF (NSRF) expenditure by categories, in order to define the shocks to apply to the HERPOR variables. The main categories considered were investment in infrastructures, incentives to private investment and investment in human capital (including R&D).

The impact of CSF (NSRF) was measured by the difference (for each economic variable) between the scenarios "with" and "without" CSF (NSRF).

The cumulated impact on GDP per euro of CSF (NSRF) public expenditure was calculated[2] and it is presented in Graph 1 for CSF I+II+III and for NSRF. In the long-term this impact is estimated to be around 1.4 euros for CSF and 1.6 for NSRF.

The greater multiplier effect on GDP estimated for NSRF (compared to CSF) is related to the increase in the weight of expenditure in human capital (representing 28% of NSRF total public expenditure, compared to 17% for CSF). According to the simulations made

[1] The HERMIN modelling framework was designed in the 1990s to evaluate the economic impact of EC structural interventions in Objective 1 countries.

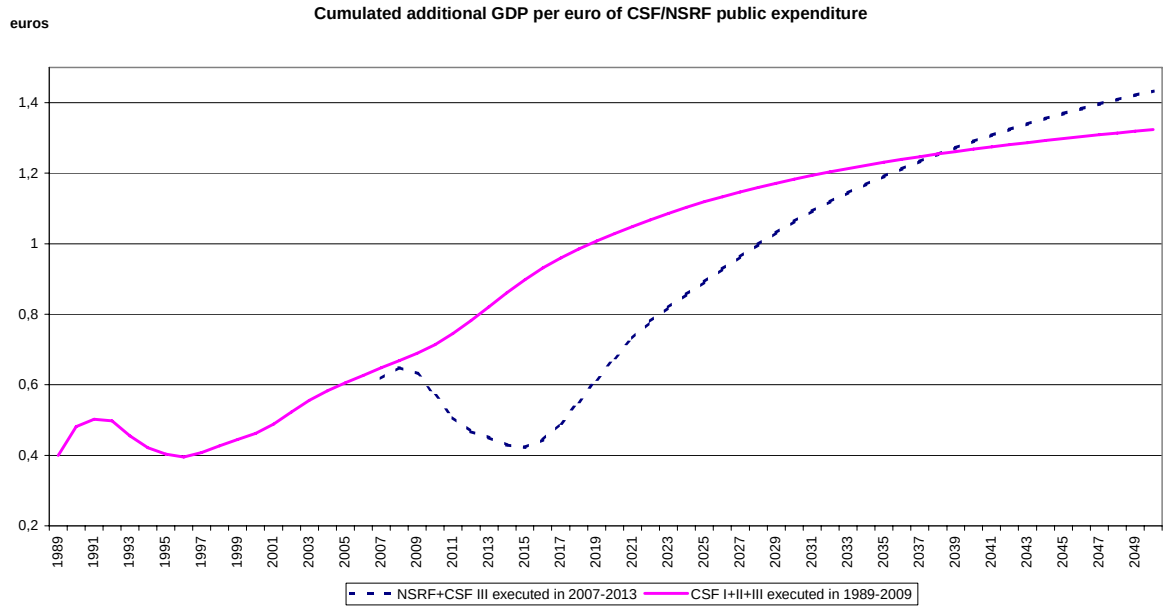
[2] The formula of calculation for this indicator (Z_t) is (all values at constant prices):

$Z_t = [\sum_{k=0}^{t}(YQCA_k/(1+i)^k)]/[\sum_{k=0}^{t}(DQCA_k/(1+i)^k)]$ where $YQCA_k$ is GDP attributable to CSF (NSRF) in year k

(difference between the values for the scenarios "with" and "without" CSF/NSRF), $DQCA_k$ is CSF (NSRF) total public expenditure in year k and i is a discount rate (3%), to account for inter-temporal preference. k=0 represents the initial year for CSF (NSRF). The long-term value for this indicator (for $t=\infty$) may be interpreted as a Benefit-to-Cost ratio for CSF (NSRF) (assuming that the benefits are measured by additional GDP) or as a total long-run (discounted) multiplier of GDP in relation to CSF (NSRF) public expenditure, a value above 1 representing a CSF (NSRF) real rate of return above the discount rate (and vice-versa).

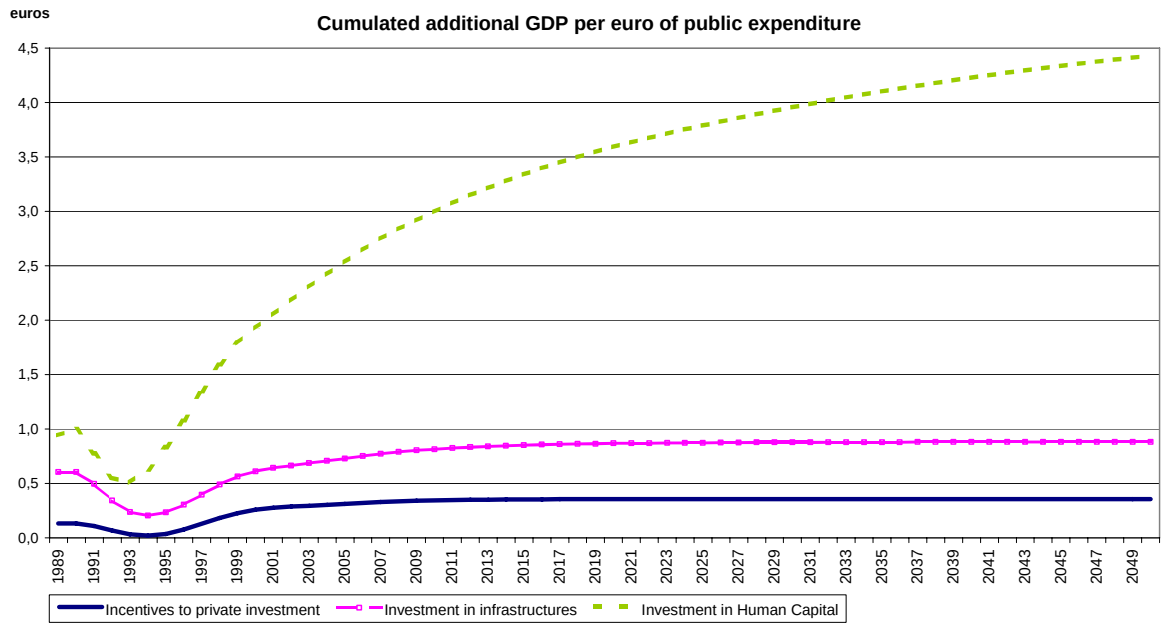
with HERPOR (presented in graph 2), this type of expenditure (where we also included R&D) is the one that presents the higher impact on GDP per euro spent.

Graph 1



The greater impact of Investment in Human Capital, compared to the other types of expenditure, results, in the short-term, from its lower import content (compared to investment in fixed capital), implying a direct increase in output (corresponding to the production of training courses and of R&D) and an indirect output increase to satisfy domestic demand boosted by the higher household disposable income associated to both scholarships and payments to instructors.

Graph 2



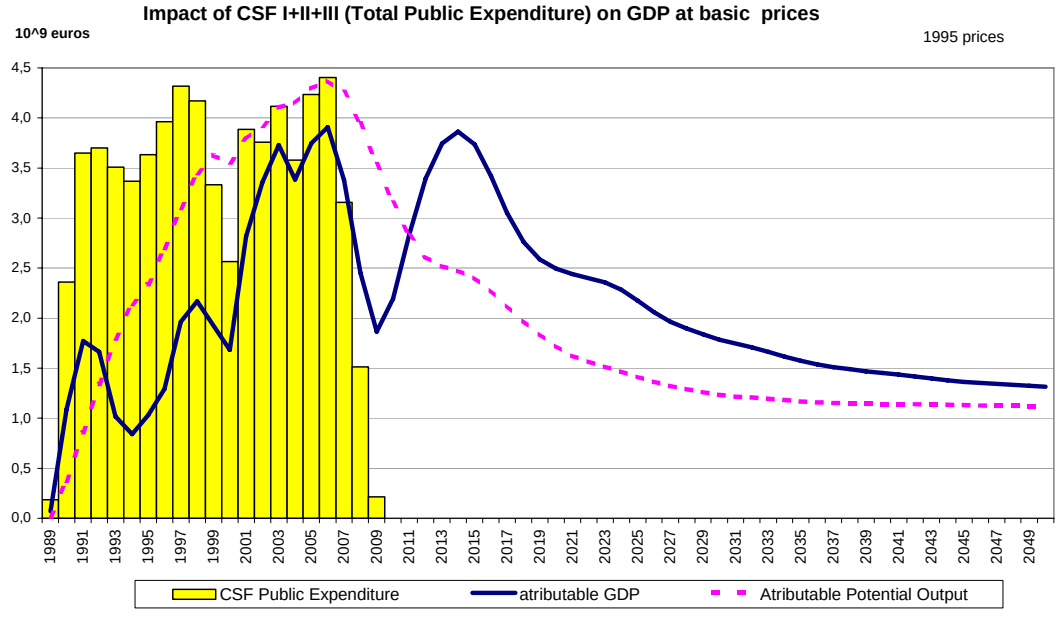
In the long-run, the greater impact of investment in human capital compared to the other types of expenditure results also from the estimated parameters for the global production function which imply a higher direct effect on potential output of one euro of investment in human capital, compared to investment in infra-structures or in private investment.

Looking at graph 1 we detect three stages of CSF (NSRF) impact in terms its multiplier effect on GDP:

- a first stage (corresponding to the first 3 to 4 years of CSF/NSRF implementation) where we observe a demand-driven expansionary effect on GDP;
- a second stage (during the next 4 to 6 years) in which there is a slow down of expansionary effects due to wage and price increases (pushed by demand pressure) implying a decrease in competitiveness;
- and, finally, a third stage (after 8 to 10 years since the beginning of CSF/NSRF), where the increase in both physical and human capital stock driven by CSF/NSRF allow a recovery and expansion of competitiveness due to increased factor productivity (supply-side expansionary effect on GDP).

Graphs 3 and 4 present the impact of CSF and NSRF on actual and potential output in constant euros. These graphs help to understand what happens in the three stages.

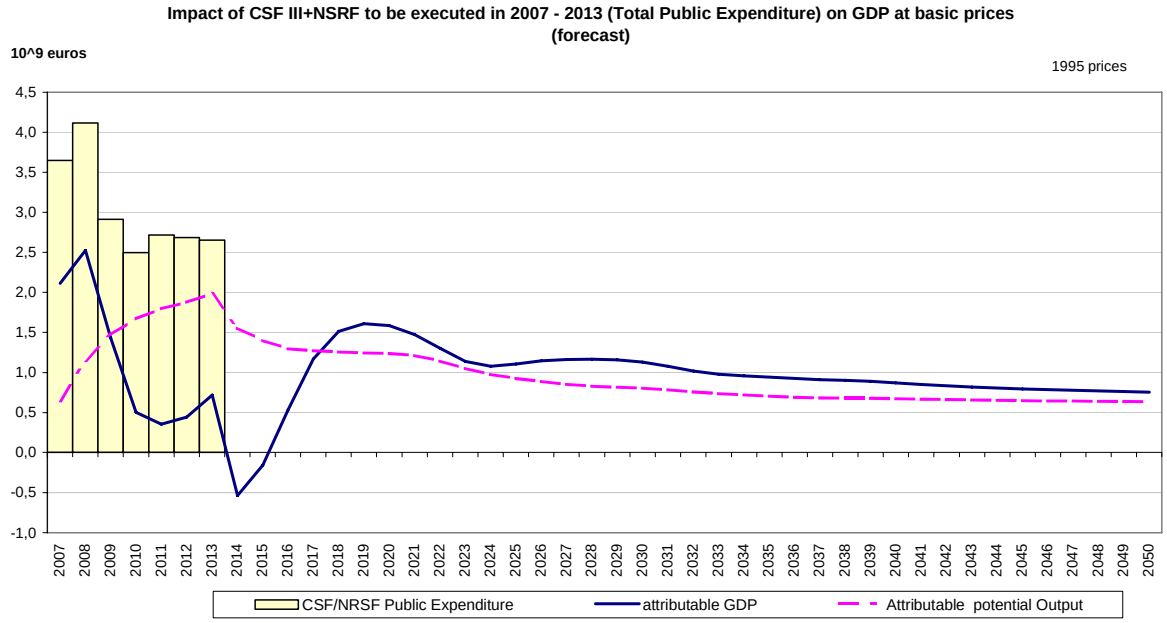
Graph 3



In the first stage both actual and potential output grow, but actual output grows faster, inducing inflationary pressures which imply reduced competitiveness and a GDP slowdown in the second stage. However, potential output continues to grow steadily due to CSF/NSRF investment in fixed and human capital, overcoming actual output, and increasing labour productivity, which imply a reduction in unit labour costs and prices

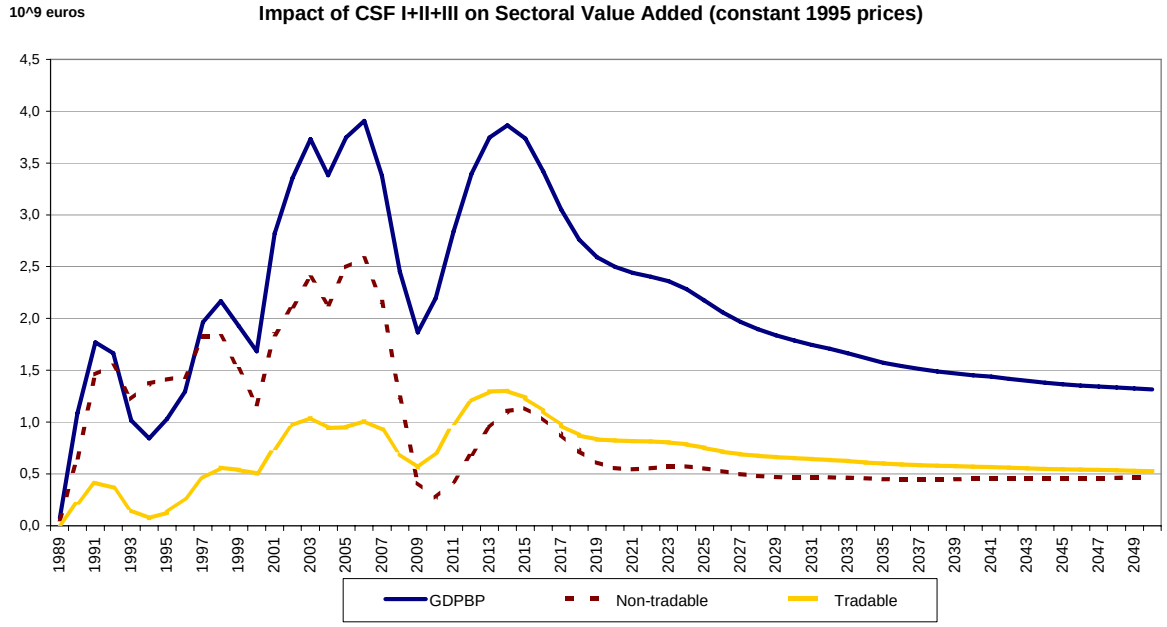
and, therefore a recovery of competitiveness. These effects lead to a new increase in actual output in the third stage. In the long-run actual and potential output (attributable to CSF/NSRF) converge to the same level.

Graph 4

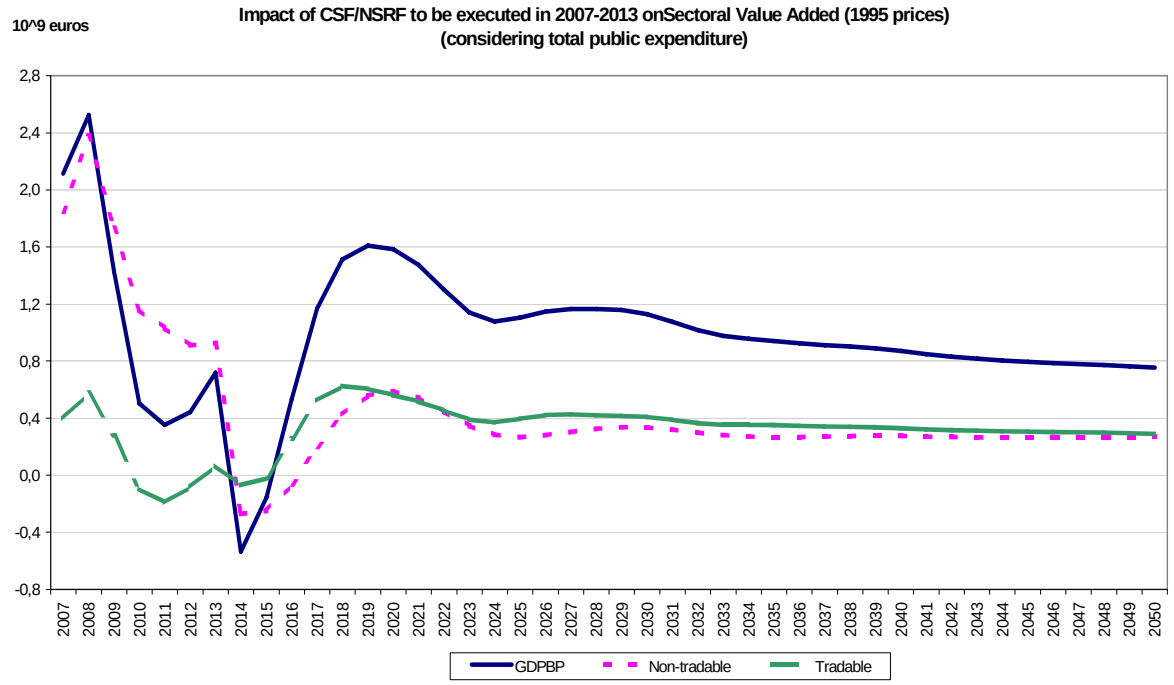


Graphs 5 and 6 present the impact of CSF and NSRF on sectoral output. In the first and second stages CSF (NSRF) induce a greater increase in the Non-tradable (N) sector, pushed by the construction of infra-structures and by the increase in domestic demand. However, in the third stage, as competitiveness improves, the impact on the Tradable (T) sector becomes more important than the effect on the N sector.

Graph 5



Graph 6



Tables 1 and 2 summarise the estimated macroeconomic impact of CSF and NSRF in terms of percent deviations between scenarios with and without CSF/NSRF for a number of macroeconomic variables and periods.

Table 1 – Impact of CSF I+II+III (executed in 1989-2009) (a)

	1989-1992	1993-1996	1997-2020	1989-2008	2009-2020	1989-2020
percent deviation between scenarios with and without CSF						
GDP	1,7	1,5	3,0	**2,6**	**2,7**	**2,7**
Potential output	1,0	3,3	3,6	**3,7**	**2,4**	**3,3**
GDP per capita (ppp)	1,4	1,5	2,8	**2,5**	**2,5**	**2,5**
Value Added Tradable sector	1,7	1,0	4,5	3,2	4,6	3,7
Values Added Non-Tradable sector	2,6	3,6	2,5	3,6	1,0	2,6
Private Consumption	0,9	1,1	2,0	1,8	1,7	1,7
Private Consumption Deflator	1,0	2,3	-3,4	-0,3	-5,2	-2,2
Total Employment	0,8	0,3	-1,4	-0,3	-1,8	-0,9
Labour Productivity	0,9	1,2	4,6	**3,1**	**4,8**	**3,7**
Unit Labour Costs	1,2	3,4	-8,3	-2,3	-11,3	-5,7
Stock of Capital in Infrastructures	6,1	27,0	35,3	33,5	25,8	30,6
Stock of Human Capital	0,6	1,7	2,7	2,1	2,6	2,3

(a) Considering total public expenditure (1989-2004: actual expenditure; 2005-2009: projected) associated to all structural funds and the Cohesion Fund.

Table 2 – Impact of NSRF/CSF to be executed in 2007-2013 – ex-ante evaluation (a)

	2007-2009	2010-2016	2017-2030	2007-2013	2014-2030	2007-2030
percent deviation between scenarios with and without NSRF/CSF						
GDP	2,2	0,3	0,9	**1,2**	**0,8**	**0,9**
Potential output	1,2	1,7	0,8	**1,6**	**0,9**	**1,1**
GDP per capita (ppp)	1,8	0,3	0,8	1,0	0,7	0,8
Value Added Tradable sector	2,2	-0,1	1,7	0,7	1,5	1,3
Values Added Non-Tradable sector	3,5	0,8	0,4	2,4	0,3	0,9
Private Consumption	1,5	0,6	0,6	1,2	0,5	0,7
Private Consumption Deflator	0,8	0,9	-1,7	1,3	-1,4	-0,6
Total Employment	1,2	-0,3	-0,6	0,6	-0,6	-0,3
Labour Productivity	1,1	0,6	1,6	**0,6**	**1,4**	**1,2**
Unit Labour Costs	1,5	1,1	-3,7	2,3	-3,3	-1,7
Stock of Capital in Infrastructures	6,4	10,0	4,8	8,7	5,6	6,5
Stock of Human Capital	0,5	1,2	1,0	0,9	1,1	1,0

(a) Considering total public expenditure (projected) associated to structural funds and the Cohesion Fund, excluding funds for Agriculture and Fishing and the Programme for Territorial Cooperation.

3. REGIONAL IMPACTS – EVALUATION OF CSF III REGIONAL OPERATIONAL PROGRAMMES WITH MODEM

For the evaluation of regional impacts we have used an input-output based model (MODEM[3]) with a multi-regional extension.

The evaluation of regional impacts with this methodology is only possible when we have regionalised data regarding the policy variables to be evaluated.

In which concerns CSF, we didn't succeed in obtaining regionalised information on CSF execution for the all the programmes or funds and so we only made the evaluation of the seven Regional Operation Programmes (ROP, by NUTS 2), the expenditure of which is, by nature, regionalised. An ex-ante exercise was made in 2000, for the period 2000-2006 (described in Dias and Lopes, 2001) and an ex-post evaluation was carried out in 2005, covering the period 2000-2003 (presented in Dias and Lopes, 2005b).

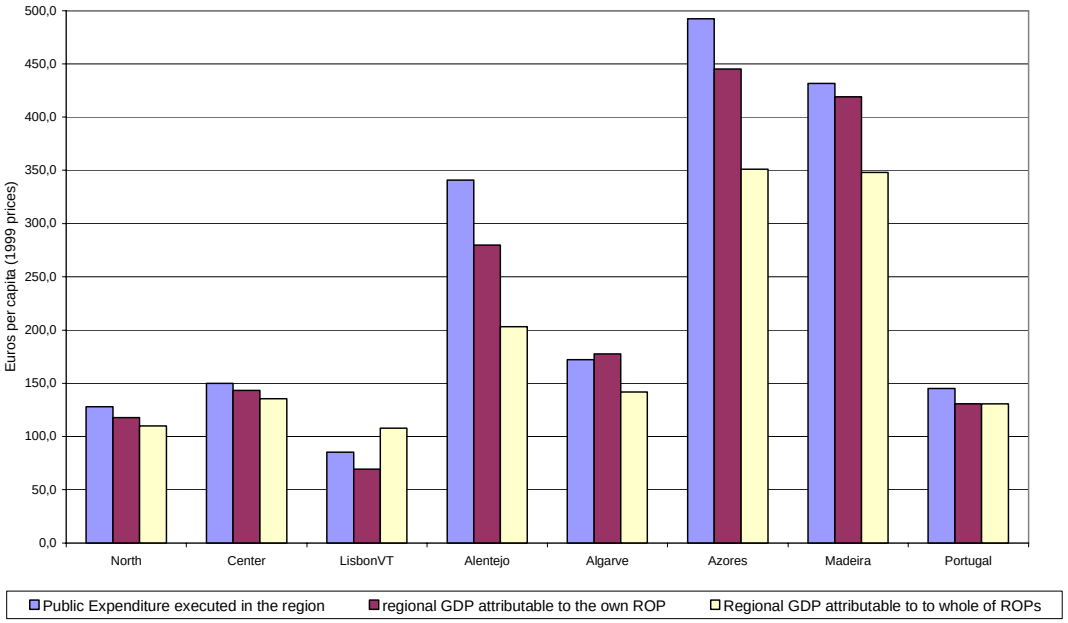
We didn't perform yet any exercise concerning the macroeconomic regional impact of NSRF.

In graph 7 and in table 3 we present some of the results of ROP evaluation for 2000-2003.

[3] The latest version of this model is described in Dias and Lopes (2005a). The initial version of the regional block is presented (in English) in Dias (2000).

Graph 7

ROP public expenditure and attributable regional gdp
(per capita annual average 2000-2003)



As we may see from graph 7 the region that benefited from the highest per capita public expenditure of ROPs in 2000-2003 was Azores, followed by Madeira and Alentejo. The region with the lowest per capita expenditure was Lisbon, which is natural since it was the most developed region (evaluated from per capita GDP in 1999 – see table 3).

Additional regional GDP generated by ROPs is not always proportional to the corresponding public expenditure executed in the region as there are other factors explaining the size of the regional economic impact of these programmes. For example, in the Lisbon region the impact on GDP is higher than the level of ROP public expenditure executed in this region, contrarily to what happens in all other regions. This result is associated to the larger economic size (and dynamism) of this region, allowing it to capture a greater share of additional value added (induced by ROPs) generated in the tradable sector. Another factor explaining the level of induced regional GDP is the structure of the corresponding public expenditure: a larger share of non-tradables in the executed ROP expenditure induces a higher impact on GDP of the own ROP region.

From table 3 we can have some insight on the contribution of ROPs to regional convergence. We can say that there is a positive contribution to regional convergence if larger benefits (in terms of additional GDP) go to poorer regions (evaluated by per capita GDP in 1999, just before the beginning of CSF III ROPs) and vice-versa. The region of Azores, which was, in 1999, the poorest region, had the largest benefit and Lisbon (the richest region) had the lowest impact so for these two regions, ROPs' execution in 2000-2003 contributed for regional convergence. For Alentejo and the Center there was also

some positive contribution to regional convergence as they were initially below average in GDP per capita and benefited from an above average impact on GDP. Algarve is in a relatively neutral situation as it was initially close to national average in terems of economic development and it benefited from a close to average impact on GDP. On the other hand, the impacts estimated for the North and for Madeira did not represent a contribution to regional convergence.

Considering the whole of the Portuguese regions we may say that there was a slight contribution of ROPs to regional convergence during the 2000-2003 execution period.

Table 3 – Impact of ROPs on regional GDP

Region (NUTS 2)	GDP per capita (Portugal=100) 1999	Impact of the whole of ROPs on regional GDP (average 2000-2003) %
North	82	1,3
Center	80	1,5
Lisbon and Tagus Valley	133	0,8
Alentejo	80	2,3
Algarve	99	1,3
Azores	76	4,2
Madeira	105	2,9
Portugal	100	1,2

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