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Maaike Beugelsdijk and
Sylvester C W Eijffinger

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Maaike Beugelsdijk, CentER, Tilburg University
Sylvester C W Eijffinger, CentER, Tilburg University and CEPR

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ABSTRACT

The Effectiveness of Structural Policy in the European Union: An Empirical Analysis for the EU-15 during the Period 1995-2001*

The main aim of Structural Policy is to decrease the regional disparities within the European Union. In 2004 it is expected that ten new member countries join the EU. It is expected that this enlargement will cause strong regional disparities within the Union. For this reason the distribution of the financial support by Structural Policy will undergo drastic changes. In this study we considered two main themes. First, convergence of the current EU member countries is empirically tested, for the period 1995-2002, and the effect of the Structural Funds in this context is identified. Structural Funds seem to have had a positive impact and poorer countries (like Greece) seem to have caught up with the richer countries. The importance of the Structural Funds in this respect can therefore not be neglected. Second, we touch upon the problem of moral hazard and the substitution effect. It may be expected that receivers of Structural Funds in some cases are not really eligible and may therefore use the Funds inefficiently. Our first and preliminary results seem to indicate that the less clean countries (or as we measure it, more 'corrupt' countries) of the current EU-15 do not gain less economic growth from the Structural Funds. The hypothesis that Structural Funds contributed to less interregional disparities within the current 15 European countries cannot be rejected. This might mean the intended plans of channelling a big share of the Funds to the candidate countries in 2007-13 will probably contribute to higher economic growth in these countries.

Maaike Beugelsdijk
Department of Economics
CentER, Tilburg University
PO Box 90153
5000 LE Tilburg
THE NETHERLANDS
Tel: (31 6) 4716 4960
Fax: (31 6) 466 3042
Email: maaikebeugelsdijk@raketnet.nl

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Sylvester C W Eijffinger
Department of Economics
CentER Tilburg University
PO Box 90153
5000 LE Tilburg
THE NETHERLANDS
Tel: (31 6) 466 2411
Fax: (31 6) 466 3042
Email: s.c.w.eijffinger@uvt.nl

For further Discussion Papers by this author see:
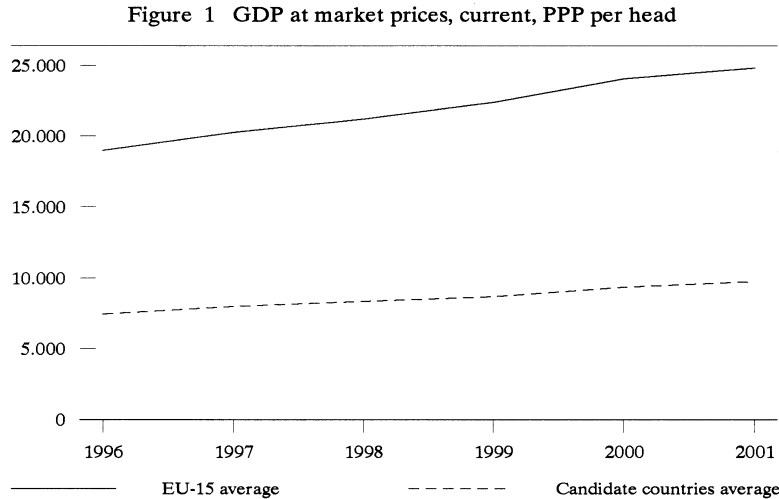www.cepr.org/pubs/new-dps/dplist.asp?authorid=120432

1. INTRODUCTION

In 1993 the European summit of the European Union (EU) gathering in Copenhagen made a historical promise in agreeing that the associated countries in Central and Eastern Europe are allowed to become a EU member if they want to. Accession is permitted under certain conditions, called the Copenhagen Conditions. Those candidate countries are expected to join the European Union in the forthcoming years. Originally the EU consisted of six members: Belgium, France, Germany, Italy, Luxembourg and the Netherlands. They started the European Commission of Steel and Coal (ECSC) in 1951. In 1973, the first enlargement took place, when Britain, Denmark and Ireland joined. In 1981, 1986, and 1995, other enlargements occurred. Since 1995 the EU consists of 15 member countries. The next enlargement is intended to contain the Czech Republic, the Baltic states (Estonia, Lithuania, and Latvia), Cyprus, Hungary, Malta, Poland, Slovakia and Slovenia. Next month the Union will make decisions about it, but they are expected to join in 2004. Bulgaria and Romania are also waiting in line. The forthcoming enlargement of the EU with the Central and Eastern European Countries (CEECs) is not an easy process. The numerous candidate countries are relatively less wealthy. According to the European Commission, the EU's landmass would increase by 34% and its population by 29%, but its GDP would only increase by 5% at current exchange rates. The average GDP per person in the EU would even decline by 16% in PPP terms (*The Economist*. May 19th 2001). Figure 1 shows the average GDP per capita in PPP of the candidate countries and the EU-15 average. It follows that there is a big gap between the EU-15 average and the accession countries. Moreover, the candidate countries face a wide range of internal regional problems and are economically and socially behind. This means that without fundamental changes to budgetary and other economic policies the accession of the candidate countries will cause fundamental financial losses for the present net contributors and beneficiaries of the EU. This may entail economic changes. Take for example the Netherlands. For the current budget period 2000 to 2006 the Netherlands has to pay € 8,833 million to the EU Structural Funds, while for the next budget period 2007 to 2013 the Dutch contribution may range from € 10,600 million to € 15,772 million. This is an increase of 20% to 79%.

Figure 1 GDP at market prices, current, PPP per head

Besides these higher fiscal costs for the current EU-members other macro-economic consequences also matter. This study intends to investigate possible macro-economic effects of the budgetary policies on the EU-15. We investigate whether there is evidence of convergence of the current EU-countries. In other words, the role of the EU Structural Funds is considered. We might say this is important to know as the next budget period is coming closer. And this new budget period will then involve the expanded Union. First, the *convergence* issue is considered. The main aim of the Structural Funds is to contribute to reducing the disparities on income per capita within the European Union. The upcoming accession of the poor CEECs will entail a redressing of Structural Funds into the direction of the accession countries, probably at the cost of some current EU-members. The broad question we try to answer is whether those Funds ensure a convergence-effect. Second, potential *moral hazard* problems and substitution effect problems in connection with the Structural Funds are discussed. The possibility of receiving Structural Funds may induce countries to change domestic policies such that the receipt of Funds is assured. Under these circumstances it might be expected that Structural Funds are inefficiently used. An attempt is made to analyse the existence and possible consequences of moral hazard.

The outline of the study is as follows. Section 2 presents a review of the convergence theories. Section 3 describes the system of Structural Policy in the past, present and future. Section 4 thereafter studies convergence effects in the current EU countries empirically. Different models are estimated to investigate whether poor EU-countries caught up –and in case this happened- whether catching up was a result of the received Structural Funds, and whether moral hazard and substitution effects may have occurred. Finally, section 5 summarises and concludes.

2. THE THEORETICAL CONCEPT OF CONVERGENCE

This paper investigates whether Structural Policy affects the European economies in such a way that poor regions catch up with the rich ones. In the literature more often attempts were done in order to test the relation of European Structural Policy and convergence of the member countries. This section reviews the theoretical concept of convergence and the empirical findings. Section 2.1 explains the often referred to ß- and s-convergence. Section 2.2 discusses the analyses of Canova, who was most critical vis-à-vis European Structural Policy. We intend to summarise the intuition behind the provocative conclusions of Canova. Section 2.3 summarises and concludes.

2.1. The concept of ß-convergence and s-convergence of Barro and Sala-i-Martin

The first convergence concept discussed here is called ß-convergence as introduced by Barro and Sala-i-Martin (1991,1992). It results from a neo-classical framework and can be split into conditional and unconditional convergence. Under unconditional ß-convergence a regression equation is considered as follows,

$$(\ln y_{T,i} - \ln y_{0,i}) / n_t = a + b \ln y_{t,i} + e_{t,i},$$

where $y_{t,i}$ represents each country's per capita income relative to the aggregate per capita income over all countries at each time t, T is the number of years run, n_t is the number of periods considered, a, b are parameters to be estimated and $e_{i,t}$ is a disturbance term that is independently and identically distributed. It is said that $ß$-convergence occurs in case there is a negative correlation between initial levels of real GDP per capita and its average annual growth rate. Conditional $ß$-convergence takes place in case the negative relationship still holds after conditioning for other variables.

Intuitively this implies the following. If a country starts with a lower income per capita compared to the average, it can have a higher income relative to other countries after T periods. In this case it catches up. To test whether poorer countries grow faster after conditioning for certain observed variables simply implies adding other country- and time-specific variables to the equation.

The second important concept is called s-convergence. This concept is about the various measures of dispersion or variation in the distribution of per capita income at time T. Conditional s-convergence applies if the value of log ($y_{t,i}$) – log (y_i^*) declines over time, where y_i^* represents the steady state level.

The difference between the two types of convergence is the following. In case the speed and extent of the catching up of per capita income of a particular economy to the average of per capita incomes across economies is of interest, ß-convergence is the appropriate concept. However, in case the interest concerns the development of the distribution of per capita income across economies, s-convergence matters. Evidently, ß-convergence is a necessary but insufficient condition for s-convergence. A positive b tends to reduce the dispersion of per capita income but another new shock is able to widen

the gap between the steady state and the 'current' per capita income. So, in case there is no b-convergence but divergence, it is not possible to have s-convergence.

2.2. European convergence according to Canova and others

According to most studies, like Barro and Sala-i-Martin (BS), differences in per capita income between economic areas will slowly disappear as time goes by as long as countries follow 'adequate' policies on e.g. human capital accumulation and the size of the government sector. They analyse the available data with cross-section regressions. Canova´s findings are the opposite of the findings by BS for the unconditional convergence of 2% per year across Europe and the US. In Canova and Marcet (1995), a model specification is used that is consistent with the standard neo-classical growth model. The only difference is that they provide an alternative definition of convergence that allows them to analyse the evolution over time of per capita income. They propose a Bayesian procedure [1] to estimate convergence rates and steady states and use the available information for all periods and all cross-sectional units. Most different from the neo-classical theory is dropping of the assumption that the steady states are the same across countries.

Their study shows that the average estimates of the convergence rate are much higher than in other studies, as for example BS´s 2% annual real GDP growth. As they studied the income convergence across countries and regions, which means that they used different sizes of economies in their study, the average estimates of the convergence rates for countries is about 11% and 23% for regions, with each unit converging to its own steady state. In other words, a country or region can expect that the gap between its initial level of income and the aggregate can be reduced faster in Canova and Marcet´s case than in BS´case. Another major finding is the fact that the initial income conditions are by far the most important determinant of the cross-sectional dispersion of steady states. This means poor regions and / or countries stay poor.

The last important conclusion of their research implies that there are high convergence rates to a distribution of steady state levels of per capita income where inequalities largely continue to exist. Consequently, current redistribution and development policies, such as EU Structural Policy, may not work. Rich regions can be taxed more heavily in favour of poor regions for solidarity reasons but not in the hope that these transfers will imply development of the poor regions. Poor regions can only become as well off as the rich ones if structural changes occur in the economic environment.

Next to this 'divergence' effect, Canova found that within each country, rich regions grow faster than poor ones and the rich regions of poor countries grow faster than those regions in 'above average' countries. This effect might result in 'convergence clubs'. Convergence clubs imply that 'above

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[1] They impose a Bayesian prior on the parameters and combine it with the sample information to construct posterior estimates. For more information see Canova and Marcet (1995) and Berger (1985).

average' regions tend to cluster around another pole of attraction than the less developed regions. Canova (1999) examined whether it is the distribution of income per capita that displays these convergence clubs. He found that the dispersion of steady states around each attraction base is significant. This implies that it is more obvious that the formation of a group happens than convergence of the poor regions to the rich.

With this knowledge Canova decided to check whether EU policies, such as the Structural Policies, have any impact on the income disparities between countries and regions (Boldrin and Canova, 2001). Are those policies reducing the gap between the rich and the poor?

Boldrin and Canova investigate the behaviour of the distribution of the regional per capita income for the period 1980-1996 such that a good forecast can be constructed. A number of results emerged. First, in 1996 still no real tendency is shown that the regional per capita income grows to their central base of attraction. This tendency should have been consistent with the concept of s-convergence. Second, the gap between the upper and the lower part of the distribution did not really change over time, which means that there is no proof for systematic catching-up of poor regions. Third, it is only Spain, from the southern countries, that shows a small decline in regional income inequalities. Finally, research showed that some regions within the rich countries became less rich.

Canova (1999) found that four different convergence clubs will emerge in the long run, with the very rich and the very poor located far away from the EU average. Given all these results, Boldrin and Canova checked whether regions benefit from EU subsidies.

Growth models assume full employment and concentrate on an aggregate production function. In most cases these models show that low aggregate labour, capital and total factor productivity (TFP) result in a low income. Boldrin and Canova focus their attention on labour productivity and TFP to get an explanation for the result of using Structural Funds. If Structural Funds are effective in reducing the regional differences, TFP and labour productivity of the receiving regions should react positively to the variance in the received amount of the Structural Funds. The reaction to getting a subsidy could show the following path. The subsidy is spent on e.g. training and infrastructure that in turn raise labour productivity. If average labour productivity of the poorer regions increases, the attraction of private investment can be expanded, generating employment opportunities and increasing the per capita income in the long run.

Boldrin and Canova show that there is a small tendency to convergence for labour productivity. Although not clearly visible in their graphs, the performed unconditional ß-convergence type of regressions over the period 1980-1996 provides this evidence. As far as TFP is concerned, the variance in TFP across regions and over time is large but has –unfortunately- little relation to the flows of the Structural Funds. Also, micro-economists suggest that the convergence in labour productivity is caused by shifting away labour from the unproductive and inefficient sectors and by adopting more efficient production processes where it is allowed.

2.3. Conclusion

Barro and Sala-i-Martin (1991, 1992) found evidence for convergence in general. Canova and Marcet (1995) and, for instance Crespo-Cuaresma (2001) *et al.* investigated convergence of the EU-countries in particular. Canova is quite negative. He even argues that the Structural Funds may be seen as a bribe to the newcomer. On the other hand, the findings of Crespo-Cuaresma are positive. They conclude that EU membership has a convergence-stimulating effect on long term growth. In this paper we will study convergence within the EU and the role of the Structural Funds specifically.

3. STRUCTURAL POLICY OF THE EUROPEAN UNION

This section presents the system of Structural Policy of the European Union. First, the purpose and the start of this Policy are described. Thereafter, the financial framework for the budget periods 2000 to 2006 and 2007 to 2013 are discussed.

3.1. The purpose of Structural Policy

A fundamental objective of the EU is cohesion, the reduction of economic and social disparities between richer and poorer regions. To make sure the goal is reached the Treaty contains Article 158. According to article 158 (ex Article 130a), Structural Policy is defined as:

"In order to promote its overall harmonious development, the Community shall develop and pursue its actions leading to the strengthening of its economic and social cohesion."

"In particular, the Community shall aim at reducing disparities between the levels of development of the various regions and the backwardness of the least favoured regions or islands, including rural areas."
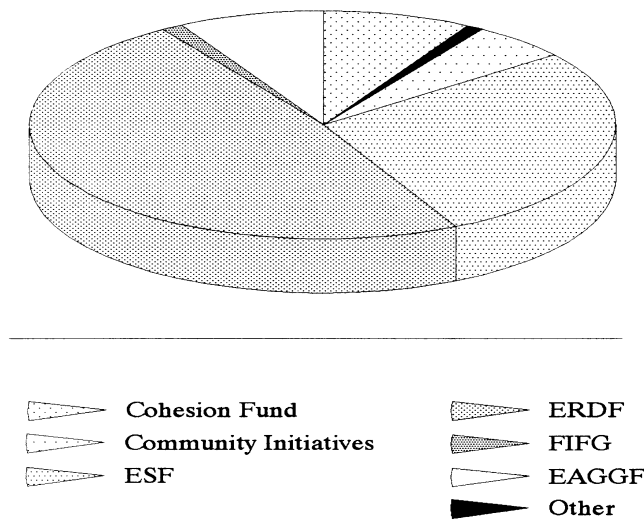
Structural Policy and the amounts of financial support are determined in advance for a fixed period. The financial report that contains these details is called the Financial Framework.

3.2. The background of Structural Policy

The predecessor of Structural Policy is Cohesion Policy, which has its origin in the Treaty of Rome, 1957. The Treaty of Rome included a few redistribute mechanisms that resulted in the establishment of the European Social Funds (ESF) and the European Investment Bank (EIB). Both were not intended primarily to promote cohesion but were nonetheless expected to help the EC´s poorer regions. Until the first enlargement in 1973 with Britain, Denmark, and Ireland, the regional disparities were not that striking. But Ireland's accession caused some regional imbalance within the EU. The European Regional Development Fund (ERDF) was established in 1975 but not with the intention to end the regional disparities in Ireland. The fund was to compensate Britain for its poor return from the Common Agricultural Policy. The Greek accession and later on the enlargement with Spain and Portugal in 1986 showed the need for revision and extension of the ERDF.

The Cohesion Fund was introduced in the Maastricht Treaty in 1993 to strengthen economic and social cohesion by helping the least developed member states to meet the criteria to participate in the Economic and Monetary Union (EMU). Member states whose GDP per capita in PPP is less than 90% of the EU average qualify for this support. Not only the distribution of the financial support differs from the way the Structural Funds work, but also the investment rules of the Cohesion Fund are different.

Figure 2 Distribution of the 2000 annual budget

Cohesion Fund	ERDF
Community Initiatives	FIFG
ESF	EAGGF
	Other

The main financial instruments to implement Structural Policies for the EU are presented in Figure 2. The proportion of each of the instruments in the total budget for Structural Policy is shown for the year 2000. Structural Policy can be divided in two parts. The first part is the Cohesion Fund and the second one is the Structural Funds. While the Structural Funds are for every sector, the Cohesion Fund only has projects in the environmental sector and the infrastructure in the four poorest countries of the Community. The Structural Funds are used for the Objective Programs, the Community Initiatives, innovative actions, and technical assistance. The Community Initiatives serve as a supplement to the Objectives and they take care of the economic and social coherence within the Union.

3.3. Financial framework period 2000-2006

During the Berlin summit in March 1999 the financial framework 2000-2006 was agreed and is shown in Table 1.

Table 1. Financial Framework EU-15 and transition countries 2000-2006 (€ million, prices 1999)

	2000	2001	2002	2003	2004	2005	2006
1.Agriculture	**40920**	**42800**	**43900**	**43770**	**42760**	**41930**	**41660**
Agriculture expenditure (excl.rural development)	36620	38480	39570	39430	38410	37570	37290
Rural development & accompanying measures	4300	4320	4330	4340	4350	4360	4370
2.Structural Operations	**32045**	**31455**	**30865**	**30285**	**29595**	**29595**	**29170**
Structural funds	29430	28840	28250	27670	27080	27080	26660
Cohesion fund	2615	2615	2615	2615	2515	2515	2510
3.Internal Policies	**5930**	**6040**	**6150**	**6260**	**6370**	**6480**	**6600**
4.External Action	**4550**	**4560**	**4570**	**4580**	**4590**	**4600**	**4610**
5.Administration	**4560**	**4600**	**4700**	**4800**	**4900**	**5000**	**5100**
6.Reserves	**900**	**900**	**650**	**400**	**400**	**400**	**400**
Monetary reserve	500	500	250				
Emergency aid reserve	200	200	200	200	200	200	200
Loan guarantee reserve	200	200	200	200	200	200	200
7.Pre-Accession Aid	**3120**	**3120**	**3120**	**3120**	**3120**	**3120**	**3120**
PHARE	1560	1560	1560	1560	1560	1560	1560
ISPA	1040	1040	1040	1040	1040	1040	1040
SAPARD	520	520	520	520	520	520	520
8.Enlargement			**6450**	**9030**	**11610**	**14200**	**16780**
Agriculture			1600	2030	2450	2930	3400
Structural operations			3750	5830	7920	10000	12080
Internal policies			730	760	790	820	850
Administration			370	410	450	450	450
Total	**92025**	**93475**	**100405**	**102245**	**103345**	**105325**	**107440**

The Structural Funds and the Cohesion Fund for the period 2000-2006 for the present EU-15 consist of respectively € 195 billion and € 18 billion. The candidate countries will receive a total amount of € 39.6 billion for Structural Policy when they join the Union. The pre-accession support of € 21.8 billion is included in the Financial Framework under category 7. There are three different pre-accession programs; the PHARE program aims to strengthen institutions and implement the Acquis Communautaire; the SAPARD program for the agricultural support; and the Instrument for Structural Policies for Pre-accession (ISPA) that resembles the Cohesion Fund. ISPA is an instrument, which has its focus on the environment and the infrastructure. The distribution of the subsidies to the candidate countries is based on national criteria: GDP per capita in PPPs, population, and size of the area. Table 1 shows that the three pre-accession aid programs have a constant annual budget. When the candidate countries join the Union, the countries are not eligible anymore for the pre-accession aid, but from that moment on they are qualified for category 8, Enlargement.

The Cohesion Fund for the EU-15 has enabled Greece, Ireland, Portugal, and Spain to meet the convergence criteria for the European Economic and Monetary Union and at the same time to continue to invest in infrastructure to improve their development. The total annual receipts from the Cohesion

Fund, in combination with assistance provided under the Structural Funds, is not allowed to exceed 4% of national GDP.

During the Berlin summit, the Commission decided to assume six countries (Cyprus, the Czech Republic, Estonia, Hungary, Poland, and Slovenia) will join the Union in 2002 and no other countries will join before the end of 2006. As Table 1 shows, the enlargement program starts in 2002 and the budget increases every year. The Structural Operations have the largest impact on this category.

However, during the Helsinki summit in December 1999 the Commission concluded that accession in 2002 was not realistic anymore. Not only the timing but also the number of countries had to change. The Commission decided 6 more countries should join the Union. These countries are the Helsinki-6 : Bulgaria, Latvia, Lithuania, Malta, Rumania, and the Slovak Republic. The timing of accession is still unknown. This means that the Financial Framework 2000-2006 adopted during the Berlin summit is no longer valid.

We willl assume that the first ten countries will participate in the European Union in 2004 and that Bulgaria and Rumania will join in 2007. As a consequence the Enlargement category will not start in 2002 but only in 2004. This saves money. The category Pre-accession aid will change too. There are four more new member states, which means four less candidate countries and thus more breathing space within this category. On the other hand more money is needed in 2004 because four more countries are involved.

3.4. Financial framework period 2007-2013 in the case of current system of Structural Policy

What would happen in case Structural Policy does not change its rules? After enlargement has occurred the European Union consists of 27 members instead of 15. And those 12 new members all have a GDP per capita that is less than the EU-27 average. Enlargement of the Union with those countries results in a decline of the average GDP per capita of the enlarged Union. This decline results in another decline, the reduction of the 75%-limit for Objective 1 support (promoting the development and structural adjustment of regions whose development is lagging behind). With the exception of a few regions, almost the whole territory of the 12 candidate countries is eligible for Objective 1 support. That is why the assumption is made that the 10 first entrants will get full Objective 1 support since 2007, and the other two countries, Bulgaria and Rumania, will be phased in linearly in the Objective 1 support since 2007. This means that the amount they will get is half of the total amount meant for them when they got full Objective 1 support. Bulgaria and Rumania have a budget of € 27.9 billion (1999 prices) each for the period 2007-2013. For the other countries it is assumed that the support per capita is equal to the average support of the poorest EU-15 countries (Greece, Ireland, Portugal, and Spain). This average support per capita is € 257 per year (1999 prices). The total amount for this period for the ten candidate countries will be € 130.2 billion. The support for Bulgaria and Rumania will be half of € 55.8 billion, that is € 27.9 billion.

The decline of the average level of GDP per head in the Union caused by the enlargement reduces the population in the present EU-15 eligible for Objective 1 assistance. Consequently 27 regions with a total population of 49 million will lose that status. With an average support of € 220 per capita per year (see Eijffinger, 2001) this means a saving of € 75.5 billion. It can also be calculated how many regions will lose their Objective 1 aid, without a enlargement, as a result of the fact that their GDP per capita has a higher growth level than that of the EU average. The second Cohesion Report and the IBO Report assume 71 million inhabitants live in regions with a GDP per capita less than 75% of the average. During the period 2000-2006, the number of inhabitants eligible for Objective 1 aid was 83.3 million. With again an average of € 220 per capita this implies a saving of € 18.9 billion.

There are also regions that lost their Objective 1 status in 2000, and received a transitional aid of € 8.4 billion in the period 2000-2006. For the next period those countries will not get any transitional aid anymore. This means a saving of € 8.4 billion. The last saving concerns regions in Sweden, Finland and Ireland. These regions received a total amount of € 1.6 billion respectively € 1.3 billion, so the total saving will be € 2.9 billion. But, all those regions that lose their Objective 1 status are eligible for transitional aid. For the period 2000-2006, this aid was on average 60% of the amount they received during their Objective 1 support. Concerning period 2007-2013, it is assumed that the transitional aid will also be 60%. The costs of this aid are € 58.4 billion.

All in all, the Union needs € 110.8 billion more than in the period 2000-2006. As in the previous period the Objective 1 support amounted to € 136 billion, the amount must increase by more than 81%. Until now, only Objective 1 has been debated, but also Objective 2 (supporting the economic and social convergence of areas facing structural difficulties) and 3 (supporting the adaptation and modernisation of national policies and systems of education, training and employment) will change. As for Objective 2, some of the currently qualified regions will lose their eligibility if the criteria stay the same. The community averages, like the unemployment rate, change by enlargement, which means that some regions will not be qualified anymore for Objective 2 support. The transitional aid for these countries will be the same as in the previous period, € 2.7 billion. The new members are almost totally covered by Objective 1 aid, so the Objective 2 policy will almost only concern the EU-15 members. The amount for this policy will again be the same as for the period 2000-2006, i.e. € 19.7 billion.

Objective 3 will only apply to regions that are not covered by Objective 1 aid. So, only EU-15 can qualify for this policy. It is assumed that the amount is the same as in the previous period, € 24.0 billion. As far as the Community Initiatives are concerned, it is assumed that the amount will increase by the same percentage as the EU-population. It is expected that that growth will be 27.7%, resulting in a new budget of € 13.3 billion (prices 1999).

The last element of Structural Policy is the Cohesion Fund. Of the EU-15 countries only Greece and Portugal will qualify for this Fund. The GDP per capita of Spain and Ireland are above the 90% of the EU average when the EU is enlarged with 12 countries. It is assumed that the amount of the subsidy per capita will be the same as the amount per capita that the current Cohesion countries receive, which

is € 283. Bulgaria and Rumania will be phased in linearly in Cohesion support. This means that they receive half of the € 283 per capita. The total amount needed for the Cohesion Fund is € 31 billion. This is € 13 billion more than during the period 2000-2006.

Until now, it was not taken into account that the total annual amount that a member state can get may not exceed 4% of its own GDP. How the GDPs of the (new) member states will develop in the future is not known, but it is assumed that the new member states' growth will be 4% a year and that the current member states' GDP will grow by 2.5%. Without that constraint it would be € 186.2 billion, the total amount of funds granted to the new member states when taking care of the constraint will be € 144.5 billion in the budget period 2007–2013. Calculations show that in case of an unchanged policy and with application of the 4% constraint, expenditure on Structural Policy for the EU-27 will approximately amount to € 298 billion.

In the current system, wealthy member states also receive EU support for regional policy. Those countries should, however, be able to solve their own regional inequalities. It is even the case that less wealthy countries, aiming at greater regional equality, get less structural support than those wealthy countries. This system leads to an unjust allocation of funding, and it may get worse after enlargement, when poorer countries join the Union (see also the discussion on moral hazard in section 4).

Another negative point in the current system is that policies are insufficiently co-ordinated with other instruments of the Union that also pursue a strengthening of the economic structure. Those instruments are for example the Common Agricultural Policy, and the activities of the European Investment Bank. This insufficient co-ordination may lead to inconsistency and double support, which also might encourage some interested parties to do some 'subsidy shopping'. As the current system shows deficiencies the IBO working group presents four different scenarios in the IBO-report (see Eijffinger, 2001).

4. THE EMPIRICAL RESEARCH

In this section we investigate empirically whether there is evidence of convergence of the current EU-countries. Crucially, in this context the role of Structural Funds is considered. An issue that further arises in the context of the Structural Funds is the potential presence of moral hazard. Regions receiving EU-funds only below a certain welfare level, such as the Cohesion Funds, might be inclined not to raise their welfare if their welfare level is around the critical level as this would possibly imply a reduction in future financial EU support. This 'moral hazard' effect might lead to an inappropriate use of the Structural Funds. Another effect that might arise is the ´substitution´ effect. If a country already had plans to invest in A and the country receives money for extra investment it pays investment A with that support and not another extra investment. In order to analyse these convergence, Structural

Funds, moral hazard and substitution effects panel analyses of the current fifteen EU-countries are presented and discussed.

The outline is as follows. Subsection 4.1 goes into the details of the data. Subsection 4.2 presents the econometric models that are estimated. Subsections 4.3 present the econometric results. Finally, 4.4 summarises and concludes.

4.1. Data issues

Most annual data, covering 1984-2002, for the current EU-countries are extracted from NiGEM[2]. Preliminary regressions were also carried out for the accession countries (though estimation results are not further presented here). Table 2 reports the data used here, their means and standard deviation of the main variables used in the econometric analyses.

Table 2. Descriptive statistics in case of annual panel EU-15

		Mean	Standard deviation
GDPgrowth	Annual GDP-growth	0.035	0.062
GcRate	Government consumption as part of GD	0.209	0.036
GiRate	Government investment as part of GDP	0.028	0.008
InfRate	Inflation rate	0.045	0.039
LnGdppc	Natural logarithm of GPD per capita	8.534	0.385
PsiRate	Private sector investment as part of GDP	0.171	0.023
R3mRate	Three months interest rate	0.056	0.026
SFRate	Structural Funds as part of GDP	0.007	0.025
CorruptionIndex	An index relating the perceptions of the degree of corruption as seen by business people, risk analysists and the general public that ranges between 10 (highly clean) and 0 (highly corrupt)	7.420	1.750
CorruptionSFrate	Corruption index multiplied by the SFRate	0.039	0.150
YearEu	Number of years a country is a EU-member	18.26	14.36

4.2. The econometric models

In order to test for convergence the concept of Crespo-Cuaresma *et al.* (2001) was used first. Crespo-Cuaresma used a subperiod panel where data are split in four periods, namely 1961-70, 1971-80, 1981-90, and 1991-98. They distinguished those four periods because a minimum amount of five to ten years seemed reasonable for studying medium to long-term growth features. Our experience with this 'Fixed Effects subperiod' model was that the error terms highly correlate with the explanatory variables. For this reason we use the GMM model in our research instead. GMM estimators use more orthogonality conditions and take the covariance structure of the disturbances into account. We further no longer distinguish four subperiods but take the individual annual data.

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[2] The macroeconometric multi-country world model developed by the National Institute of Economic and Social Research

The first model we estimate by GMM for the current EU-countries for the period 1995-2001 is specified as follows:

$$GDPgrowth_{i,t} = b_0 + b_1 GDPgrowth_{i,t-1} + b_2 GDPgrowth_{i,t-2} + b_3 \ln y_{i,t-1} + u_{i,t} \qquad (1)$$

GDP growth is explained by its growth one and two years in the past and the initial GDP. The β's are parameters to be estimated, u is a disturbance term, subscript i indicates the country (so i ranges from 1 to 15) and t time. In order to achieve β-convergence, β_3 should be negative.

In a following regression more explanatory variables are included to study the determinants of growth. Several variables were added but the econometric specification of the model presented below is:

$$GDPgrowth_{i,t} = b_0 + b_1 GDPgrowth_{i,t-1} + b_2 GDPgrowth_{i,t-2} + b_3 \ln y_{i,t-1} + b_4 GcRate_{i,t-1} +$$
$$b_5 R3MRate_{i,t} + b_6 PsiRate_{i,t-2} + u_{i,t}$$

$$(2)$$

In order to find out whether Structural Funds have made a significant contribution to GDP-growth we include these Funds also in a regression:

$$GDPgrowth_{i,t} = b_0 + b_1 GDPgrowth_{i,t-1} + b_2 GDPgrowth_{i,t-2} + b_3 \ln y_{i,t-1} + b_4 SFRate_{i,t-3} + u_{i,t}$$

$$(3)$$

An interesting and important issue that arises when considering the impact of the Structural Funds is the potential presence of moral hazard. If regions only below a certain welfare level receive EU funds, like in case of the Cohesion Funds, they might be inclined not to raise their welfare if their welfare level is around the critical level as this would possibly imply a reduction in future financial EU support. This 'moral hazard' effect might lead to an inappropriate use of the Structural Funds. Another effect that might arise is the ´substitution´ effect. If a country already had plans to invest in A and the country receives money for extra investment it pays investment A with that support and not another extra investment. In case they do so and Structural Funds are received, these Funds may even be inefficiently used. Testing for moral hazard and substitution effects is of course difficult. We argue that there are two ways to find out whether these effects influence the growth effect of the Structural Funds. Firstly, two different regressions could be analysed, one for 'clean' and one for '(highly) corrupt' countries. Clean countries use Structural Funds in a proper way and corrupt countries use these Funds for other purposes than their (by the EU defined) intended purposes. A clean country would thus have different impacts on their growth than a corrupt country. To explain it in econometric terms we can define the relations as

$$GDPgrowth_{i,t} = b_0 + b_1 StructuralFunds_{i,t} + u_{i,t} \quad \text{for 'clean' countries}$$

$$GDPgrowth_{i,t} = g_0 + g_1 StructuralFunds_{i,t} + u_{i,t} \quad \text{for 'corrupt' countries}$$

The constant term for the clean countries is assumed to be bigger than the one for the corrupt countries, so $b_0 > g_0$, because it represents everything apart from the Structural Funds that affects growth. It is thus expected that the more corruption occur within a country, the more moral hazard and substitution that negatively influences growth.

In order to tentatively test for the influence of moral hazard and substitution in combination with the Structural Funds the corruption index is used. The corruption variable varies in time. As explained in the previous subsection, it relates to perceptions of the degree of corruption as seen by business people, risk analysts and the general public and ranges between 10 (highly clean) and 0 (highly corrupt). So, the higher the index the less corrupt a country.

Finally, an interaction term (see Aiken and West, 1991) can be added to the model to test the explicit hypothesis that corruption controls the effect of Structural Funds on growth. That is, while the Structural Funds that a country receives are positively related to the country's growth level, the strength of this relationship may change in case the corruption level increases. Expectations are that the relationship is weakened by the interaction term; the more corrupt a country is, the less impact the Structural Funds have on growth. The final extension of the general model is defined as:

$$GDPgrowth_{i,t} = b_0 + b_1 GDPgrowth_{i,t-1} + b_2 GDPgrowth_{i,t-2} + b_3 \ln y_{i,t-1} + b_4 SF_{i,t-3} +$$
$$b_5 CorruptionSFRate_{i,t-3} + b_6 CorruptionIndex_{i,t} + u_{i,t} \tag{4}$$

The higher the corruption index is, the lower the corruption in a country. So, one might expect that in case corruption matters, b_5 and b_6 have positive signs.

4.3. Empirical results of the GMM-model

Tables 3-6 present the GMM estimation results for the panel regression of the 15 current EU-countries for the period 1995-2001 of the four models specified and discussed in the previous subsection.

In the following parts β-convergence within the EU is investigated. In case of β-convergence the relatively poorer countries are catching up with the relatively richer countries. One may expect that financial help from the EU, the so-called EU Structural Funds, to these poorer countries have a positive effect on economic growth. This result would contradict Canova´s findings, but be in line with Crespo-Cuaresma et al. (2001). Furthermore it is investigated here what happens if some specific countries are excluded from the sample.

Table 3 presents the results of the basic model where only GDP and GDP-growth are included. The first and second columns show the one- and two-step GMM estimates, respectively. It follows that the total effect of the initial GDP per capita is significantly negative in both cases. This can be interpreted as evidence that β-convergence exists. The two-step estimator tends to have a large efficiency gain. So, the fact that the first-step estimates are significant is sufficient for having significant two-step estimates. The Sargan test tests for over-identified restrictions (see Arellano and Bond, 1991). Under the H_0–hypothesis the instruments are valid. Rejection of the Sargan test can be evidence that the (instrumental) variables might not have been exogenous. While the coefficients of the two regressions are almost the same, the regressions in Table 3 show that with the one-step estimator the null hypothesis is rejected and the two-step estimator is accepted. According to the Arellano- Bond tests there is no serious autocorrelation.

Table 3. GMM-results for EU-15

Explanatory Variables	One-Step Estimation	Two-Step Estimation
Constant	**0.03** (0.01)	**0.03** (0.00)
Δ Growth$_{i,t-1}$	-0.09 (0.25)	-.010 (0.08)
Δ Growth $_{i,t-2}$	**-1.73** (0.83)	**-1.83** (0.17)
Δ Ln $y_{i,t-1}$	**-0.56** (0.25)	**-0.54** (0.07)
Sargan test	0.00	0.84
Arellano-Bond test of order 1	0.00	0.16
Arellano-Bond test of order 2	0.18	0.36

Notes: Figures within brackets are standard errors. P-values are shown for the Sargan and Arellano-Bond tests. The added variable is ln GDPpc.

The estimation results for the first extension of the general model are presented in Table 4. Government consumption, the short-term interest rate and private sector investment are included. The signs of the coefficients for initial GDP per capita are negative and significant, so β-convergence is not rejected. Government consumption is significantly negative in the two-step estimation. This negative sign implies that there is a negative relationship between the government consumption and growth. This may indicate that higher debt levels occurring through excessive government spending damage growth and bureaucracy. The private sector investment rate adds, as expected, positively to growth.

Table 4. GMM estimation results for EU-15 with additional variables

Explanatory variables	One-Step estimation	Two-Step estimation
Constant	0.02 (0.01)	**0.02** (0.00)
Δ Growth $_{,t-1}$	0.04 (0.28)	0.38 (0.20)
Δ Growth $_{,t-2}$	**-1.74** (0.86)	-0.64 (0.57)
Δ Ln $y_{i,t-1}$	**-0.59** (0.28)	**-0.99** (0.23)
Δ GcRate$_{i,t-1}$	-0.96 (2.46)	**-2.60** (1.28)
Δ R3MRate$_{i,t}$	1.47 (0.76)	0.36 (0.49)
Δ PsiRate$_{i,t-2}$	2.06 (1.32)	**1.93** (0.39)
Sargan test	0.02	1.00
Arellano-Bond test of order 1	0.00	0.22
Arellano-Bond test of order 2	0.73	0.52

Notes: Figures within brackets are standard errors. P-values are shown for the Sargan and Arellano-Bond tests. Additional instrumental variables are ln GDPpc, YearEu, InfRate, r3mrate(-1), GiRate(-2), GcRate and PsiRate, PsiRate(-1).

The Sargan test in the two-step estimation method is precisely 1. This is an indication that there are too many instrumental variables. This has however no serious implications for the estimation result.

In a second extension of the general model Structural Funds are included. Table 5 shows that in both the one-step and the two-step estimation models the poorer countries catch up with the rich ones. The one-step estimator gives an insignificant coefficient for the impact of the Structural Policy on economic growth. But the two-step estimator shows a significant positive sign. According to these results Structural Funds Policy has a positive impact on growth three years ahead. One might say that if the change in the rate between the Structural Funds and the GDP changes with 1%-point the GDP growth will increase with 0.32%-point in case of two step estimation method.

Table 5. GMM estimation results including Structural Funds

	One-Step estimation	Two-Step estimation
Constant	**0.03** (0.01)	**0.03** (0.00)
Δ Growth$_{i,t-1}$	0.16 (0.37)	0.10 (0.07)
Δ Growth$_{i,t-2}$	**-2.19** (1.03)	**-1.68** (0.46)
Δ Ln $y_{i,t-1}$	**-0.71** (0.37)	**-0.65** (0.09)
Δ SFRate$_{i,t-3}$	0.27 (0.85)	**0.32** (0.10)
Sargan test	0.02	0.97
Arellano-Bond test of order 1	0.00	0.16
Arellano-Bond test of order 2	0.16	0.21

Notes: Figures in brackets are standard errors. P-values are shown for the Sargan and Arellano-Bond tests. Additional instrumental variables are YearEu, SFRate, ln GDPpc.

In the models so far only the full sample of fifteen EU-countries is considered. It is also interesting to get some insights into the individual countries. For this purpose we eliminate first Greece from the sample. One would expect that the catching up effect of the other fourteen EU-countries would decrease. The estimation results -not shown here- indicate that the one- and the two-step estimations for the convergence parameter are smaller (and significant). So, Greece indeed seems to catch up strongly to the richer countries.

Finally, we test for moral hazard and substitution effect as explained in the previous subsection. Table 6 presents the GMM-estimation results for including the corruption index and the interaction term of corruption and Structural Policy. Both added variables turn out to be insignificant in both estimation procedures. So on the basis of these results one cannot conclude that for the more 'corrupt' countries the relationship of Structural Funds to growth is weaker.

Table 6. GMM estimations results including Structural Funds and corruption index

	One-Step Estimation	Two-Step estimation
Constant	**0.05** (0.01)	**0.03** (0.01)
Δ Growth$_{i,t-1}$	0.41 (0.41)	0.14 (0.21)
Δ Growth$_{i,t-2}$	**-2.38** (1.04)	**-2.19** (0.82)
Δ Ln y$_{i,t-1}$	**-0.97** (0.42)	**-0.67** (0.26)
Δ SFRate$_{i,t-3}$	16.08 (9.93)	4.04 (7.10)
Δ CorruptionSFRate$_{i,t-3}$	-2.36 (1.48)	-0.57 (1.06)
Δ CorruptionIndex$_{i,t}$	-0.03 (0.06)	-0.02 (0.02)
Sargan test	0.04	0.99
Arellano-Bond test of order 1	0.00	0.13
Arellano-Bond test of order 2	0.12	0.21

Notes: Figures in brackets are standard errors. P-values are shown for the Sargan and Arellano-Bond tests.

Additional instrumental variables are YearEu, SFRate, ln GDPpc.

4.6. Summary of the econometric results

Some econometric models were estimated to analyse whether there has been a convergence of the poorer to the richer countries within the European Union. The estimation results show that convergence indeed occurs, so there is so called ß-convergence. Even the one-step estimation results seem to confirm this. Also, the inclusion of additional explanatory macroeconomic variables does not lead to a rejection of the hypothesis of this catching up process. Private sector investment rate has a positive impact on economic growth (see Levine and Renelt, 1992). Government consumption seems to have a negative effect on growth, implying that debt levels seem to damage growth and bureaucracy.

The impact of the Structural Funds is investigated too. Inclusion of the Funds does not change the signs of the variables in the general model. So, we can still speak of β-convergence. Countries

receiving Funds catch up with the rich countries. These findings are in line with the findings of Crespo-Cuaresma *et al.* (2001) but contradict the findings of Canova and Marcet (1995), who critically assessed the Structural Policy of the European Union.

In order to gain more insights some countries were excluded from the data set. Greece, for instance, was consecutively excluded. Here, the β-convergence coefficient becomes lower, indicating that Greece seems to catch up quickly with the richer EU-countries.

Intriguing is the issue of moral hazard and the substitution effect. Moral hazard may occur in case an EU country does not invest in certain regions with the purpose of keeping the welfare level low, while the substitution effect might occur when no additional investments take place but the planned investments are paid with the received Funds. Funds from the EU would therefore be received in an inappropriate way. This moral hazard effect is evidently difficult to test because it is not easy to measure and identify. It may happen at regional level and is hard to disentangle from other (unforeseen) types of inefficient use of Funds. In order to test it tentatively a corruption index is included in the regressions that aims to represent the corruption level of a country. The results do not seem to indicate that the more corrupt countries use their Structural Funds in a more inefficient way.

5. CONCLUSION

The main aim of Structural Policy is to decrease the regional disparities within the European Union. In 2004 it is expected that ten new member countries join the EU (Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovak Republic, Slovenia) and Bulgaria and Rumania are waiting in line too. It is expected that this enlargement will cause strong regional disparities within the Union. For this reason the distribution of the financial support by Structural Policy will undergo drastic changes. The current members of the Union will by and large become net contributors to the Funds whereas the candidate countries will become net receivers.

In this study we considered two main themes. First, convergence of the current EU-member countries is empirically tested, for the period 1995-2002, and the effect of the Structural Funds in this context is identified. Structural Funds seem to have had a positive impact indeed and poorer countries (like Greece) seems to have caught up with the richer countries. The importance of the Structural Funds in this respect can therefore not be neglected. Second, we touched upon the problem of moral hazard and the substitution effect. It may be expected that receivers of Structural Funds in some cases are not really eligible and may therefore use the Funds inefficiently. Our first and preliminary results seem to indicate that the less clean countries (or as we measure it, more 'corrupt' countries) of the current EU-15 do not gain less economic growth from the Structural Funds.

General though tentative conclusions that we would like to draw from the analyses are the following. The hypothesis that Structural Funds contributed to less interregional disparities within the current

fifteen European countries cannot be rejected. For this reason we take the view, in contrast to Canova and Marcet (1995), that continuation of Structural Policy is to be encouraged. This might mean the intended plans of channelling a big share of the Funds to the candidate countries in 2007-2013 will probably contribute to higher economic growth in these countries. The results in this paper do not seem to indicate that the more corrupt countries use their Structural Funds in a more inefficient way, so no conclusions about this subject can be drawn.

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