How does EU Cohesion Policy Work?
Evaluating its Effects on Various Outcome Variables

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Abstract

The impact of EU Cohesion Policy has mainly been evaluated with regard to its growth effects. We additionally investigate the impact of EU structural funds on employment, public investment, and budget deficits in order to learn more about the channels through which this policy works. Using a dataset for the EU-27 for the time period 1977-2006 we find that structural funds payments have positive effects on GDP growth, but only modest effects on employment. Furthermore, the payments do not cause public investments to increase significantly. Finally, the hypothesis that structural funds are used for the consolidation of public budgets cannot be completely rejected.

Keywords: EU structural funds, economic growth, employment, public investment, public deficits

JEL-Classification: R11, C23, H54, H62

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I. INTRODUCTION

The debate on the impact of EU Cohesion Policy has intensified over the last decade.[1] Many papers have investigated if the structural funds (SF) have promoted growth and convergence. Nevertheless, the results are not clear-cut: While some authors find evidence for a positive relation between SF and economic growth (Beugelsdijk and Eijffinger 2005), others find no (Dall'erba and Le Gallo 2007) or even negative (Eggert et al. 2007) support for this. The differences can be traced back, among others, to differences in the choice of units (countries versus regions), methodological approaches (panel versus cross-section; endogeneity problems), time horizons and to the lack of high quality SF data (e.g., some authors use SF commitments instead of payments). All in all, the discussion might be summarised by stating that EU SF are only conditionally effective. Given a good quality of the institutional setup (Ederveen, de Groot, and Nahuis 2006), decentralised governmental structures (Bähr 2008) or conditionally on which Objective is analysed (Mohl and Hagen 2008), the SF have a positive impact on growth.

However, the debate has focused mainly on the investigation of the impact of EU Cohesion Policy on growth and convergence, while other outcome variables have largely been ignored. For example, the employment effects are key to the understanding of regional income inequality (e.g., measured as GDP per capita), since per definition income differences may be based on differences in labour productivity and/or employment level. The number of papers analysing the employment impact seems to be limited. Dall'erba and Gallo (2007), using data from 145 regions and a spatial econometric approach, do not find positive employment effects over the period 1989-1999. The empirical results of Busch et al. (1998) indicate that the payments of the European Regional Development Fund (ERDF) decrease the unemployment growth rate in 122 regions for the period 1988-1993.[2]

Moreover, an essential condition for the effectiveness of the SF transfers is the degree to which they affect overall public investments, since a major part of Cohesion Policy is spent in the field of government investments (European Commission 2004). According

1 The terms "EU Cohesion Policy" and "EU Regional Policy" can be used synonymously. Both mean the policy of the EU to co-finance national projects mostly carried out at the regional level by payments from the so-called "Structural Funds" (see Ederveen, de Groot, and Nahuis 2006).

2 Apart from studies using regional or county level data, there are studies using firm-level data, see, e.g., Bondonio and Greenbaum (2006).

to the principle of additionality (see, e.g., European Commission 2007) the member states have to co-finance EU funded projects but must not cut investment spending elsewhere. However, the impact of SF payments on national investments has not yet been evaluated. One paper empirically analyses the principle of additionality in another way. Using a cross-section of European regions, Ederveen et al. (2002) investigate the impact of being an Objective 1 region (that is, being eligible for the highest transfers) on national regional support. They find that, on average, one euro cohesion support crowds out 17 cents of national regional policy.

Furthermore, instead of increasing future-orientated spending, SF payments may (indirectly) be used to reduce public deficits. This is possible if EU spending crowds out national spending, which is most likely in case of poorer countries. To the best of our knowledge, there has been no paper investigating the effects on public deficits.

Against this background, this paper analyses how the EU Cohesion Policy works by extending the current literature with regard to at least three aspects: First, we investigate the effects of EU Cohesion Policy on additional outcome variables. Apart from investigating growth effects, we analyse the impact of SF payments on employment growth, on public investment and on budget deficits. Second, we use a more comprehensive dataset for SF comprising total payments. Third, we extend both the time period of investigation to the period 1977-2007 and the number of countries to an EU-27 sample. We find only modest growth and employment effects, no significantly positive effects on national investments and some weak evidence in favour of the hypothesis that the SF payments are used for public budget consolidation.

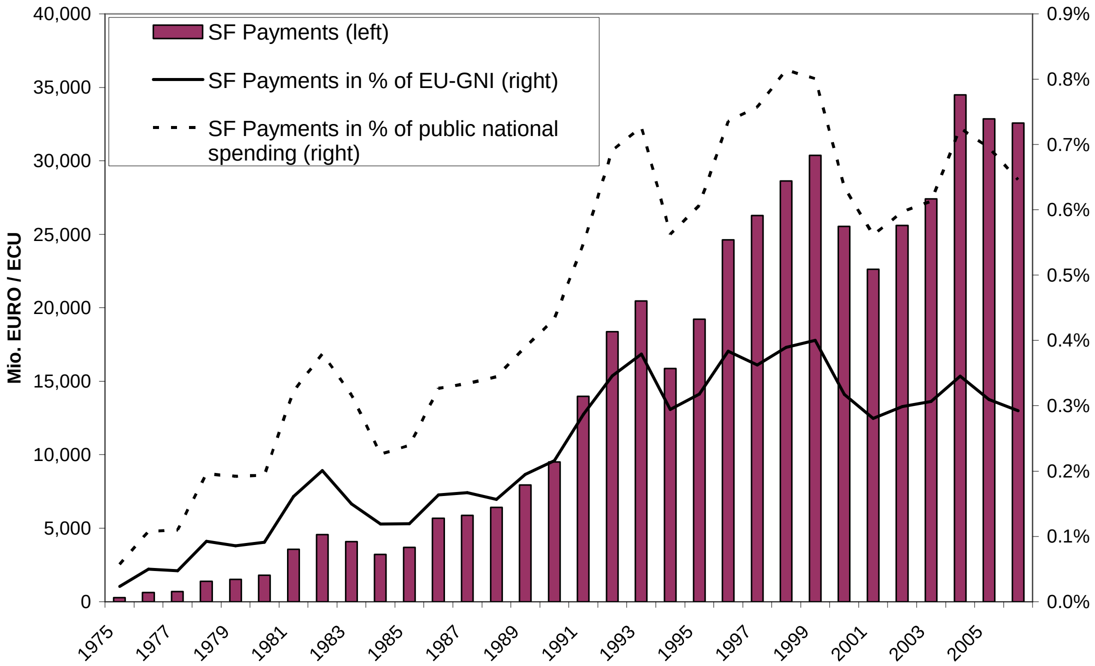
The paper is structured as follows. In section II we present our dataset used and discuss the main econometric challenges. Subsequently, section III presents the econometric approaches and the empirical results. Finally, section IV concludes.

II. DATABASE AND ECONOMETRIC APPROACHES

We investigate our research question using an EU-27 country dataset consisting of total SF payments for the time period 1976-2007 (European Commission 2008). It comprises the different structural funds[3] as well as the Cohesion Fund and the Instrument for Structural Policies for Pre-accession (ISPA) for the accession countries. A detailed description of the institutional setup can be found, among others, in Ederveen, de Groot, and Nahuis (2006) and in European Commission (2007).

Figure 1 shows the historical development of SF payments. It becomes clear that there is a long-term upward trend in payments when measured in absolute terms, which can be explained inter alia by the enlargement of the EU. In contrast, payments measured in percent of EU-GNI or public national spending have stagnated since 1993. Furthermore, Figure 1 shows that – on average – SF payments do not seem to be very large compared to total public spending. However, in section III.3 it will be shown that there are large differences between countries.

Figure 1: Development of Total SF Payments



Source: European Commission (2008); own calculations.

Depending on the research question, we use two different datasets. On the one hand, we are interested in the medium-term impact of structural policy. For example, investigating the impact of EU Cohesion Policy on GDP growth and employment growth, it

3 These are the European Regional Development Fund (ERDF), the European Social Fund (ESF), the European Agricultural Guidance and Guarantee Fund (EAGGF), and the Financial Instrument for

might be reasonable to expect that the impact of projects co-financed by the EU (e.g., infrastructure investments) occurs with a certain time lag. Hence, we generate five-year averages ranging from 1977-1981 to 2002-2006 resulting in six time periods.[4] Apart from the focus on the medium-term perspective, using 5-year averages has the advantage of yielding results which are more robust to business cycle effects. On the other hand, we are keen on the estimation of "policy reaction" functions. Since the level of SF commitments is decided for several years in advance within so called "financial frameworks", national governments can anticipate, and may react instantaneously to the SF payments. As a consequence, we use an annual dataset covering the period 1982-2007 to analyse the impact of EU Cohesion Policy on national governments' investments and government financial balances.

In order to render the empirical results as robust as possible, we use different samples and methodological approaches. Regarding the choice of the countries, we use two different samples. First, the regressions are estimated for the whole time period for which data is available ("all time periods"). Thus, countries are included even before their accession. For example, Austria and Finland are included even before 1994 and the Eastern European countries before 2004. Since the latter countries also received SF payments before their accession, it is (potentially) possible to distinguish between the "EU effect" and the "SF payments effect". Second, we only include those time periods in which the countries are members of the EU ("only EU members"). By definition, the second strategy reduces the number of observations significantly.

Concerning the econometric approaches, we start the estimation using a simple Fixed Effects estimator. We report standard errors being robust to serial and spatial correlation, following Driscoll and Kraay (1998). The error structure is then assumed to be heteroskedastic, autocorrelated, and possibly correlated between the countries (panels). Since Driscoll and Kraay (1998) standard errors have not been very common in applied work yet, we also report – as a kind of robustness check – the White-Huber robust standard errors.

Fisheries Guidance (FIFG).

4 The use of 5-year averages is widespread in literature dealing with economic growth and convergences (see, among others, Ederveen, de Groot, and Nahuis 2006; Bähr 2008). For a theoretical justification see Islam (1995).

Due to the structure of our dataset (depending on the specification *N* varies between 15 and 27, *T* varies in the annual dataset between 3 and 27 with an average of 17.1), simply applying a Fixed Effects estimator in a dynamic setup leads to the well-known Nickell bias (Nickell 1981). One way to control for it is to use the first-differenced GMM estimator proposed by Arellano and Bond (1991). Since this estimator has been found to have large finite sample bias and poor precisions when the time series are persistent, we use whenever possible the system GMM (SYS-GMM) estimator by Blundell and Bond (1998). In addition, using the SYS-GMM estimator has the advantage of being able to take into account potential endogeneity of some variables, i.e., there may be unobserved variables simultaneously affecting the independent and the dependent variables. The consistency of the SYS-GMM estimator is based on large *N*, which is obviously not given in our application. However, recent Monte Carlo simulations show that, given pre-determined variables in *X*, the SYS-GMM estimator has a lower bias and higher efficiency than the first-differenced GMM or the fixed-effects estimator (Soto 2006). The small *N* leads to a further problem: it is not possible to use the full set of instrumental variables since Windmeijer (2005) or Roodman (2008) show that using too many instruments might bias the results. For this reason, only recent values up to three lags (annual data set) or only two lags (five-years-averages panel) are used. For a small panel size, Soto (2006) shows that not using all potentially available instruments does not decrease the reliability of the SYS-GMM estimator. Furthermore, in order to mitigate the problem of too many instruments in case of the SYS-GMM specification using the annual dataset, we transform all our variables into deviations from time means, which is equivalent to the inclusion of time dummies. This decreases the total number of instruments and increases the degrees of freedom (see Bond et al. 2001). In addition, regarding the two-step SYS-GMM estimations, the standard errors are corrected following Windmeijer (2005).[5]

Another estimation strategy to deal with the Nickell bias is to apply the bias-corrected least square dummy variable (LSDVc) estimator proposed by Kiviet (1995) and extended by Bruno (2005a, 2005b) to unbalanced panel data,[6] which turns out to have

5 The Stata command *xtabond2* implemented by Roodman (2006) is applied.

6 The Stata command *xtlsdvc* implemented by Bruno (2005b) is applied. The SYS-GMM estimator (Blundell and Bond 1998) is used to initialize the bias correction. The accuracy of the approximation is up to $O(1/NT^2)$.

better properties in case of small *N* (Bruno 2005a; Judson and Owen 1999). An obvious drawback of this estimator is the assumption of strict exogeneity of all explanatory variables (except for the lagged dependent variable). The standard errors of the LSDVc are bootstrapped (500 replications).

III. EMPIRICAL RESULTS

3.1. The Impact on Economic Growth

The impact of EU Cohesion Policy on economic growth is analysed within a neoclassical growth model. Similarly to Ederveen, de Groot, and Nahuis (2006) and Bähr (2008), but extending it to an EU-18 sample,[7] we estimate the following equation:

$$\ln y_{it} - \ln y_{it-1} = \beta_0 + \beta_1 \ln y_{it-1} + \beta_2 \ln inv_{it-1} + \beta_3 \left(skill_{it-1}^{med}\right) + \beta_4 \ln\left(n_{it-1} + g + \delta\right) + \beta_5 \ln sf_{it-1} + \beta_6 EU_{it-1} + \mu_i + \lambda_t + \varepsilon_{it} \qquad (1)$$

The dependent variable is the growth rate of real GDP per capita over a five-year period of country *i*. The independent variables are lagged by one five-year period and defined as follows: y_{it-1} stands for the real GDP per capita in Dollar and inv_{it-1} is the average gross domestic saving rate (in percent of nominal GDP). Unfortunately, the classical human capital variables used by de la Fuente and Doménech (2006) or Barro and Lee (2001) are not available – neither for the time period after 2000, nor for the Eastern European countries included in our regression. As a consequence, $skill_{it-1}^{med}$ is a human capital variable collected by Cohen und Soto (2007), which indicates the share of the 25-year-old population having completed an education at the secondary level. We interpolate the variable to generate 5-year averages. n_{it-1} stands for the population growth rate. We follow Mankiw, Romer, and Weil (1992), assuming that the technological progress (g) and the time discount factor (δ) are common to all countries and periods and that they jointly amount to 5 percent. sf_{it-1} is defined as the share of total SF payments in percent of nominal GDP. The inclusion of the SF payments in the neoclassical growth framework seems to be justified because SF payments mainly correspond to investments which are endogenous in the neoclassical growth framework. EU_{it-1} is an

EU dummy. Finally, we include fixed country (μ_i) as well as fixed time effects (λ_t), with ε_{it} as the i.i.d. error term of our specification. If β_5 and β_6 are restricted to zero, equation (1) is equal to the neoclassical growth model.

The results are shown in Table 1 and they mainly correspond to the predictions of the neoclassical growth model. We find strong evidence for conditional beta convergence, i.e., the coefficient of the initial real GDP per capita variable has a negative sign, which is statistically significant in all specifications, implying that poorer economies have caught up with richer ones. Furthermore, the results indicate that increasing investments cause the economic growth rate to rise, even though this partial relation is not significant in case of the GMM estimation. Similarly, the skill variable has largely a positive, but not always significant impact on growth.[8] The sum of population growth, technological progress and time discount factor is – as expected – negative and significant in most cases. Moreover, the results are mainly robust to the application of different estimation approaches, which in many cases alter the level of the coefficients to a small extent only.[9]

Our main focus is on the analysis of the SF payments variable. Based on a simple fixed effects estimator with standard errors robust to heteroskedasticity, Table 1 reports a positive and significant impact of SF payments on economic growth (see angular parantheses of column (1)).

The fixed effects approach controls for unobserved time-invariant factors and assumes all independent variables to be strictly exogenous and the error term to be free of serial-correlation. The latter assumption is violated according to the Wooldridge test of serial correlation (Wooldridge 2002), which clearly rejects the null hypothesis of no first-order correlation of the error term (p-value 0.003). In addition, the estimated standard errors might be biased because our estimators do not control for spatial correlation between the countries. The countries in our sample may be influenced by common

7 As we have not data for all EU-27 countries, we have to restrict our analysis to the following countries: Austria, Belgium, Bulgaria, Cyprus, Denmark, Finland, France, Germany (after 1992), Greece, Hungary, Ireland, Italy, the Netherlands, Portugal, Romania, Spain, Sweden and the United Kingdom.

8 One explanation for this is that the skill variable is rather sluggish, i.e., it does not vary much over time, so that the use of fixed country effects wipes out the significance (Solow 2005).

9 There are only two exceptions: There is a sign switch of the population growth rate in case of the one-step difference GMM specification and there is a sign switch in case of the skill variable restricting the specifications to EU-18 members only.

(macro-)economic shocks. As a consequence, the standard errors are estimated using the non-parametric covariance matrix proposed by Driscoll and Kraay (1998) (see Hoechle 2007 for a discussion of this approach) so that we can control for heteroskedasticity, serial and spatial correlation (see round parentheses of column (1)). Nevertheless, the results are even strengthened by the use of this estimator implying higher *t*-values for all variables.[10]

Table 1: Estimated Effect of Structural Funds on Economic Growth Rates

	EU-18		**EU-14**	**EU-18 members only**
	FE	**Diff-GMM**	**FE**	**FE**
	(1)	(2)	(3)	(4)
$\ln y_{it-1}$	-0.302*** [-2.28] (-8.77)	-0.693** (-4.97)	-0.222*** [-1.69] (-5.78)	-0.132*** [-0.89] (-7.66)
$\ln inv_{it-1}$	0.091** [1.29] (2.17)	0.069 (1.01)	0.123*** [1.57] (4.54)	0.101** [1.15] (2.76)
$\ln skill_{it-1}^{med}$	0.085** [0.93] (2.12)	0.072 (0.83)	0.026** [0.46] (2.53)	-0.018 [-0.18] (-0.92)
$\ln(n_{it-1}+0.05)$	-0.018 [-0.54] (-0.98)	0.027 (0.94)	-0.059*** [-2.15] (-3.52)	-0.033*** [-1.14] (-5.75)
$\ln sf_{it-1}$	**0.008*** [3.24] (5.48)**	**0.003** (1.92)**	**0.002 [1.15] (1.43)**	**0.024* [0.76] (2.01)**
EU_{it-1}	-0.088** [-1.66] (-2.74)	-0.062 (-1.53)	-0.026 [-0.56] (-0.77)	-0.084** [-0.92] (-2.77)
Time dummies (p-values)	yes (0.006)	time trend (0.000)	yes (0.000)	yes (0.011)
Wooldridge Test AR	0.003		0.004	0.000
No. instruments		19		
Hansen (p-value)		0.236		
AR(2) test (p-value)		0.884		
R^2 (within)	0.513		0.499	0.480
No. of countries	18	18	14	14
No. of obs.	84	66	67	56

Notes: t-values or z-values in parentheses: FE: [White Robust S.E] / (Driscoll-Kraay S.E.); In the one-step difference GMM regressions the lagged initial GDP and the structural funds variable are instrumented with its second and third lag. Coefficient (based on Driscoll-Kraay S.E.): * significant at the 10 percent level; **significant at the 5 percent level; ***significant at the 1 percent level.

10 Furthermore, we re-estimate the regressions using two methods for controlling only for serial correlation. On the one hand, we adjust the error term as proposed by Newey and West (1987); on the other hand we use the Prais-Winsten method by including an AR(1) error term. Both approaches keep the main message untouched: SF payments have a positive and highly significant impact on economic growth. The results are available upon request.

Finally, one might argue that the results are biased due to the explanatory variables not being strictly exogenous. As discussed in section II, we try to control for this problem by using a GMM-estimator. As it is not possible to receive consistent results with the SYS-GMM estimator, we estimate the regression with the difference GMM estimator (DIFF-GMM) proposed by Arellano and Bond (1991). As the two-step version of this estimator results in downward bias results, we only report the results for the one-step version which leads to robust standard errors controlling for heteroscedasticity.[11] We assume that the real GDP per capita and the SF payments are endogenous and we instrument them using the second and third lag. Furthermore, we use a common linear time trend instead of annual dummies. Neither the Hansen-test (*p*-value 0.236), nor the tests on serial correlation (*p*-value AR(2): 0.884) reject the validity of our approach. The coefficient of the SF variable and the significance level have slightly decreased. However, SF payments do still positively impact economic growth. As our estimation approach is implicitly dynamic by nature, the quantitative interpretation should be based on the estimated long-term elasticities.[12] According to the long-term elasticity, an increase of SF by one percent leads to a rise of the GDP per capita by 0.3 percent (the corresponding p-value is 0.08).

We are well aware of the fact that our small sample requires profound sensitivity checks. Hence, we run the regressions changing the composition of our sample. One might criticise that our results presented above are biased because the predictions of the neoclassical growth model are only valid on the convergence paths of similar economies (Barro and Sala-i-Martin 1992). As the EU-18 sample contains a rather heterogeneous group of countries, this assumption might be violated. Consequently, we restrict our sample to an EU-15 sample excluding Luxembourg due to missing education data. The results are displayed in Table 1 (column (3)). We still find empirical evidence that the other independent variables follow the predictions of the Solow growth model. Most importantly, we still find a positive impact of the SF variable throughout of the regression. However, the coefficients for both the short- and the long-term elasticity are not statistically different from zero.

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11 We also use the two-step difference GMM estimator, but the results do not change substantially.

12 The long-term elasticity is calculated as $\hat{\beta}_5 / -\hat{\beta}_1$.

Finally, we include only those observations in which the country is a member of the EU. Thus, column (4) of Table 1 shows that the independent variables largely remain unchanged. Furthermore, the SF payments still have a positive sign, while it is only statistically significant using the standard errors of Driscoll and Kraay.

In sum, we conclude that we find SF payments to have a positive impact on growth. However, its statistical significance depends on the choice of the sample. There are strongly positive and significant results using an EU-18 sample. However, restricting the sample to a more homogenous EU-14 sample leads to positive but not significant results. Finally, focusing on only those years in which the countries are members of the EU the significance of the structural funds variable depends on the estimation approach used.

3.2. Employment Effects

In the following the effects of SF payments on the growth of the countries' employment rates are estimated. Here, we define the employment rate as the countries' total employment per population aged 15 to 65. Again, as in the previous subsection, we restrict our analysis to the use of the five-years-averaged dataset.

From a theoretical point of view, SF payments are not unambiguously associated with positive employment effects. If SF payments (for example, from the European Social Funds) lead to human capital investment, they will indeed be associated with positive employment effects. If SF payments are capital subsidies, the employment effects will be inconclusive. On the one hand, SF payments reduce capital costs, which lead to more output and employment (scale effect). On the other hand, reduced capital costs increase relative costs of labour, which may cause (low-skilled) labour to be substituted by capital (substitution effect). According to the so-called "capital-skill-complementary hypothesis" (Grilliches 1969), the demand for skilled labour increases with decreasing capital costs, while the demand for unskilled labour decreases with diminishing capital costs. As we cannot differentiate between different types of labour, we estimate the total employment effect.

Based on the growth specification of the last section, two different employment growth equations are specified, where the dependent variable is defined as the growth rate from period t-1 to t of the ratio of total employment to the population aged 15 to 65 in country i ($\ln e_{it} - \ln e_{it-1}$). In analogy to a long-run conditional labour demand model,[13] equation (2) includes, besides real labour costs (w_{it-1}), the output (y_{it-1}):

$$\ln e_{it} - \ln e_{it-1} = \beta_0 + \beta_1 \ln e_{it-1} + \beta_2 \ln y_{it-1} + \beta_3 \ln w_{it-1} + \beta_4 skill_{it-1}^{high} + \beta_5 skill_{it-1}^{low} + \beta_6 S_{it-1}^{agri} + \beta_7 S_{it-1}^{serv} + \beta_8 \ln sf_{it-1} + \beta_8 EU_{it-1} + \mu_i + \lambda_t + \varepsilon_{it} \quad (2)$$

μ_i, λ_t, ε_{it} are defined just as in the last subsection.

In equation (3), in analogy to a long-run unconditional labour demand model, output (y_{it-1}) is dropped and the output price (p_{it-1}) (here GDP deflator) is included.[14]

$$\ln e_{it} - \ln e_{it-1} = \beta_0 + \beta_1 \ln e_{it-1} + \beta_2 \ln p_{it-1} + \beta_3 \ln w_{it-1} + \beta_4 skill_{it-1}^{high} + \beta_5 skill_{it-1}^{low} + \beta_6 S_{it-1}^{agri} + \beta_7 S_{it-1}^{serv} + \beta_8 \ln sf_{it-1} + \beta_8 EU_{it-1} + \mu_i + \lambda_t + \varepsilon_{it} \quad (3)$$

The distinction between equation (2) and equation (3) may be essential. The isolated substitution effect (effect on labour intensity) is estimated by equation (2); the total effect including the scale effect (production gains) is estimated by equation (3).

Both equations are augmented by control variables for the skill mix of the population (proportion of low-skilled ($skill_{it-1}^{low}$) and high-skilled ($skill_{it-1}^{low}$)), the industry structure of the initial employment rate (proportion of employment in agricultural sector S_{it-1}^{agri} and the service sector S_{it-1}^{serv}), a dummy variable for EU membership and a set of fixed time effects (λ_t). All variables are defined in the Appendix.

Just like in the case of the growth regressions in the last subsection, the equations are estimated by OLS (fixed-effects), assuming strict exogeneity of all explanatory variables (including sf_{it-1}). Furthermore, a SYS-GMM assuming endogeneity of sf_{it-1} and further control variables (e_{it-1}, y_{it-1}, w_{it-1}, p_{it-1}) is estimated.

13 In a conditional labour demand model the profit-maximising labour demand results from minimising the costs of production conditional on output (Hamermesh 1993). Here it is assumed that the production costs of a country are a function of factor prices of variable factors (labour) and output. The partial derivative of the cost function with respect to the wage variable leads to the labour demand. “Long-run” refers to a variable capital stock. Therefore, capital is not included. Usually, in this case, the user cost of capital should be included. However, using possible proxies, such as the interest rate, leads to a significant reduction of observations. Therefore, we omit this variable.

14 In an unconditional labour demand model, it is assumed that firms maximise profits by choosing the optimal mix of inputs and the level of output given input and output prices (Hamermesh 1993). The profit optimum is given at the employment level at which the partial derivative of the profit function with respect to labour equals zero, implying that real wage equals marginal product.

Table 2: Estimated Effects on Employment Growth

	FE, Conditional model		FE, Unconditional model	
	All Time Periods	Only EU members	All Time Periods	Only EU members
	(1)	(2)	(3)	(4)
$\ln e_{it-1}$	-77.524***	-71.265***	-20.492**	-21.619**
	[-2.09]	[-2.82]	[-1.21]	[-1.56]
	(-3.70)	(-5.23)	(-2.39)	(-2.33)
$\ln w_{it-1}$	-53.852**	-31.114**	3.905	17.053***
	[-1.76]	[-1.38]	[0.37]	[1.46]
	(-2.51)	(-2.37)	(0.72)	(4.33)
$\ln p_{it-1}$			-18.578**	-23.583***
			[-1.64]	[-2.37]
			(-2.41)	(-4.94)
$\ln y_{it-1}$	52.230***	41.900***		
	[2.28]	[2.62]		
	(3.20)	(3.82)		
$skill_{it-1}^{low}$	-0.276**	-0.001	-0.416***	-0.126
	[-1.97]	[-0.00]	[-1.11]	[-0.29]
	(-2.07)	(-0.00)	(-5.30)	(-1.01)
$skill_{it-1}^{high}$	0.851***	1.784**	0.130	1.112***
	[0.92]	[2.15]	[0.13]	[1.40]
	(3.78)	(3.47)	(0.22)	(3.88)
S_{it-1}^{agri}	0.316	0.095	0.197	-0.134
	[0.87]	[0.22]	[0.58]	[-0.34]
	(1.03)	(0.36)	(0.71)	(-0.47)
S_{it-1}^{servi}	0.673*	0.802**	1.159**	1.310**
	[1.21]	[1.51]	[2.26]	[2.48]
	(1.76)	(2.04)	(2.00)	(2.44)
$\ln sf_{it-1}$	**0.016**	**0.062**	**0.097****	**0.067**
	[0.20]	**[0.62]**	**[1.43]**	**[0.70]**
	(0.47)	**(1.32)**	**(2.22)**	**(1.28)**
EU_{it-1}	0.533		-2.319	
	[0.14]		[-0.65]	
	(0.19)		(-0.77)	
Time dummies	yes	yes	yes	yes
(*p*-value)	(0.000)	(0.000)	(0.000)	(0.000)
R^2 (within)	0.6533	0.7603	0.6199	0.7613
No. of countries	16	15	16	15
No. of observations	70	62	70	62

Notes: *t*-values and *z*-values are in parantheses: FE: [White Robust S.E] / (Driscoll-Kraay S.E.); Coefficient (based on Driscoll-Kraay S.E.): * Significant at the 10 percent level, **significant at the 5 percent level, ***significant at the 1 percent level.

However, it turns out to be impossible to obtain consistent estimates, which obviously results from the small number of cross sections here (16).[15] We check a whole range of different specifications. Either the Hansen test and/or the test on second-order serial correlation indicate a misspecification. Hence, we do not report those results. The estimated results of the fixed-effects estimator are shown in Table 2 (conditional model and unconditional model). The t-values based on the White-Huber robust standard errors as well as the t-values based on Driscoll-Kraay standard errors are reported. The latter seem to be smaller. Again we distinguish between two samples: “all time periods”, i.e., all countries that are at any time members of the EU, and “only EU members”, which only include countries during their actual membership in the EU.

Most estimated coefficients of control variables have their expected sign (except for $\ln p_{it-1}$) and are statistically significant. The estimated coefficients of $\ln e_{it-1}$ are mostly negative and statistically significant, indicating a conditional beta-convergence process of European employment rates. The estimated coefficient of $\ln sf_{it-1}$ is always positive (for both samples and models), but it is only statistically significant in case of the unconditional model applied to all time periods. Hence, we conclude that there is some evidence in favour of a positive employment effect, which is likely to be based on the scale effect (output growth). However, the result is far from being robust.

3.3. *Effects on Government Investments*

Having found that SF payments only have modest growth and employment effects, we try to shed light on the reasons for these results by analysing whether and to which extent SF payments lead to higher national investments. Put differently, we evaluate if SF payments are “additional”, or if they only lead to a displacement of national investments. Actually, the member states’ obligation to co-finance projects by the principle of additionality[16] should ensure that an increase in European payments causes domestically-financed investments and thus total public investments to increase as well. Gener-

15 The countries are: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, The Netherlands, Portugal, Romania, Spain, Sweden and UK. In contrast to the growth regression of the previous section, Cyprus and Malta are not included due to missing data.

16 According to the principle of additionality, the EU transfer complements the contributions of the Member States rather than reducing them. Disregarding special exceptions, the Member States must maintain public spending at no less than the level reached in the preceding period (see European Commission 2007).

ally, the principle of additionality implies that EU funds can only be paid in addition to the member states' investments and not instead of it. However, in practice, additionality is hard to control and, more importantly, it has not been sanctioned in the past. This leads to the suspicion that SF payments displace at least part of the domestic public investments.

Table 3: Structural Funds Payments, Public Investments and Primary Budgets in Percent of GDP

	SF Payments (in % of GDP)	**Public Investments** (in % of GDP)	**Primary Surplus** (in % of GDP)	**Time period from … until 2007**
	(1)	(2)	(3)	(4)
Austria	0.129	1.587	1.174	1995
Belgium	0.102	2.122	3.382	1982
Bulgaria	0.998	3.615	3.404	2000
Czech Republic	0.074	3.258	0.764	2000
Cyprus	0.342	4.391	-3.096	2002
Denmark	0.078	1.841	5.030	1982
Estonia	0.930	4.134	1.606	2000
Finland	0.211	2.713	4.595	1995
France	0.128	3.205	-0.327	1982
Germany	0.116	2.159	0.776	1982
Greece	1.533	2.996	0.573	1982
Hungary	0.537	3.852	-2.192	2000
Ireland	1.336	3.116	3.252	1982
Italy	0.243	2.688	0.961	1982
Latvia	1.690	2.865	-0.592	2000
Lithuania	1.093	3.340	-0.576	2000
Luxembourg	0.093	4.165	2.575	1990
Malta	0.252	4.312	-0.995	2002
Poland	0.577	3.409	-1.553	2000
Portugal	2.188	3.449	0.308	1986
Romania	0.590	3.523	-0.354	2000
Slovak Republic	0.593	2.530	-2.461	2000
Slovenia	0.274	3.372	-0.386	2000
Spain	0.842	3.759	1.851	1986
Sweden	0.103	3.127	3.674	1995
Netherlands	0.062	3.282	2.001	1982
UK	0.150	1.831	0.833	1982

Notes: Own calculations based on European Commission (2008). We restrict the statistics to those years where positive SF payments are observable; the earliest year is 1982.

Table 3 shows that SF payments per GDP are quite important compared to total public investments in the so-called old "cohesion countries" (Spain, Greece, Ireland, and Portugal) as well as the new Eastern European member states. This indicates that it may indeed be hard for some countries to absorb the transfers and to co-finance European projects without cutting expenses elsewhere (see European Commission 2004).

The econometric analysis of public investments is based on the specification by Mehrotra and Välilä (2006). An obvious problem may arise from the fact that we do not observe all possibly relevant variables determining the scale and timing of public investments. For example, not only macroeconomic variables are relevant, but also unobserved variables such as government programmes and country specific peculiarities (e.g. natural disasters, etc.). Since these variables may simultaneously affect SF payments, their omission may lead to biased estimates.

In order to deal with this problem, we follow, inter alia, Nunziata (2005) by using a very flexible specification, where not only fixed country effects (μ_i) and fixed (annual) time effects (λ_t) are included, but also country-specific linear time trends (t_i). By doing this, we assume to control for unobserved fixed and time varying heterogeneity affecting public investments ($pinv_{it}$) as well as SF payments. The following model is estimated:

$$\begin{aligned} pinv_{it} = {} & \alpha pinv_{it-1} + \beta_1 d_{it-1} + \beta_2 g_{it-1} + \beta_3 gdppc_{it-1} + \beta_4 EU_{it} + \beta_5 sf_{it} \\ & + \beta_6 li_{it} + \beta_7 open_{it-1} + \gamma_i t_i + \lambda_t + \mu_i + \varepsilon_{it} \end{aligned} \quad (4)$$

The motivation for this specification is as follows. Since public debt (d_{it-1}) indicates the need for consolidating public finance, it should have a negative impact on public investments. The growth rate of real GDP per capita (g_{it}) serves as a business cycle indicator.[17] The level of real GDP per capita ($gdppc_{it-1}$) shows that demand for public investments may depend on income. Moreover, the long-term interest rate (li_{it}) is a proxy for the opportunity costs of public investments, while $open_{it}$ (export plus imports per GDP) controls for the possibility that the demand for public investments may de-

17 On the one hand, it has a positive effect on public investments if the amount of public investment depends on tax revenues. On the other hand, the government may conduct an anti-cyclical policy which leads to a negative effect.

pend on the openness of the economy. Eventually, the lagged dependent variable ($pinv_{it-1}$) controls for the path dependency of public investment.

Table 4: Determinants of National Public Investments

	All time periods					Only EU members		
	FE	**FE dyn**	**LSDVc**	**LSDVc** without country specific time trend	**SYS-GMM**	**FE**	**LSDVc**	**SYS-GMM**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$pinv_{it-1}$		0.512*** [5.69] (6.02)	0.678*** (15.54)	0.825*** (25.19)	0.770*** (8.42)		0.691*** (11.68)	0.723*** (6.62)
d_{it-1}	-0.034*** [-4.09] (-10.57)	-0.016*** [-4.57] (-5.26)	-0.011*** (-3.50)	-0.007** (-3.37)	-0.010*** (-2.89)	-0.038*** [-4.72] (-11.27)	-0.012*** (-3.14)	-0.012*** (-2.49)
li_{it}	-0.020 [-0.73] (-0.87)	-0.017 [-1.30] (-1.25)	-0.018*** (-3.50)	-0.139 (-1.11)	0.007 (0.68)	-0.023 [-0.54] (-0.80)	-0.016 (-0.52)	0.017 (0.98)
$open_{it-1}$	-0.001 [-0.23] (-0.16)	-0.002 [-0.65] (-0.49)	-0.002 (-0.73)	0.001 (0.61)	-0.001 (-0.18)	-0.002 [-0.49] (-0.37)	-0.003 (-0.88)	-0.001 (-0.11)
g_{it-1}	0.022** [1.26] (2.32)	0.024*** [2.58] (2.71)	0.026** (1.96)	0.025** (2.11)	0.017* (1.79)	0.008 [0.28] (0.49)	0.016 (0.93)	0.014 (0.92)
$gdppc_{it-1}$ /1,000	-0.022*** [-2.19] (-2.73)	-0.012** [-2.65] (-2.05)	-0.009 (-0.58)	-0.003 (-0.55)	0.007 (0.97)	-0.023*** [-1.56] (-2.22)	-0.006 (-0.32)	0.009 (1.19)
sf_{it}	**-0.134** **[-0.59]** **(-1.36)**	**-0.047** **[-0.38]** **(-0.84)**	**-0.037** **(-0.48)**	**0.043** **(0.64)**	**0.010** **(0.08)**	**-0.079** **[-0.30]** **(-0.67)**	**0.022** **(0.26)**	**-0.074** **(-0.48)**
EU_{it}	0.367* [1.18] (1.93)	0.063 [0.44] (0.67)	0.015 (0.12)	-0.042 (-0.55)	0.029 (0.52)			
Time dummies (*p*-values)	yes (0.000)	yes (0.000)	yes (0.6930)	yes (0.869)	yes (time demean)	yes (0.000)	yes (0.798)	yes (time de-mean)
Time Trend (*p*-values)	country-specific (0.000)	country-specific (0.000)	country-specific (0.000)	no	no	country-specific (0.000)	country-specific (0.955)	no
No. instrum.					33			32
Hansen (*p*-value)					0.777			0.923
AR(2) test (*p*-value)					0.270			0.999
R^2 (within)	0.689	0.779				0.647		
No. of countries	27	27	27	27	27	27	25	27
No. of obs.	466	463	463	463	435	374	356	362

Notes: *t*-values and *p*-values are in parentheses: FE: [White Robust S.E] / (Driscoll-Kraay S.E.); * Significant at the 10 percent level; **significant at the 5 percent level; ***significant at the 1 percent level. LDVc: 500 bootstrap replications.

Finally, in columns (5) and (8) the results of the SYS-GMM specifications are shown, which allow for endogeneity of d_{it-1}, $gdppc_{it-1}$, and sf_{it} (besides $pinv_{it-1}$). The estimation results can be found in Table 4. Again we differentiate between two samples ("all time periods" and "only EU members"). Furthermore, different estimators are applied. Columns (1) and (6) include static fixed-effects estimators restricting α to zero. Column (2) shows the results of fixed-effects estimators applied to a dynamic specification. Since the latter strategy leads to the Nickell bias,[18] we also present the results of the bias-corrected dummy variable estimator (LSDVc) in columns (3), (4) and (7).

Again, instead of using all possible instruments for each available time period, we "collapse" the matrix of instruments and only use the lags up to *t*-2 which leads to a smaller set of instruments. It turns out that it is difficult to obtain consistent estimates even though we check a whole range of different specifications. The consistent SYS-GMM specifications found are reported in Table 4.

Focussing, first of all, on the columns (1), (2) and (3), it can be seen that the estimated coefficients have the expected signs. In order to obtain an idea about the effect of the country specific linear time trend, column (4) shows the estimated effect if these country effects are dropped. The coefficient of sf_{it} is still far from being significant. The same is true if we apply the SYS-GMM (columns (5) and (8)) or if we use the restricted sample ("only EU members").

Summarising the results, no statistically significant positive effect of SF payments for total public investments can be detected, irrespective of which sample and method is used. As a consequence, it cannot be ruled out, that SF simply serve as a substitute for domestically-financed investment projects. These resources could be used for budget consolidation, which is analysed in the next subsection.

3.4. Effects on National Primary Surplus

After having found that, on average, SF payments do not have any measurable positive impact on public investments, we now analyse how member states make use of their increased financial scope. One possibility is that the resources are used for reducing public deficits.

In order to analyse this hypothesis we use the primary surplus as the dependent variable. The primary budget balance is the difference between non-interest spending and

18 Since *T* varies between 3 and 31 with an average of 16.3, the bias may still be substantial (Judson and Owen 1999).

total revenues. It can be affected by the government in a much faster way than the total budget surplus, since it excludes interest payments which are exogenous for the government in the short-run. Furthermore, by using this variable, a clear-cut theoretical foundation is available (see Bohn 1998).

One would expect the SF payments, ceteris paribus, to have a negative impact on primary surplus if countries co-finance projects by additional means without altering the structure of public spending (consumption versus investment). In contrast, if national spending were cut, SF payments would have a positive impact. The mean primary surpluses in percentage of GDP of the EU countries can be found in Table 3.

A framework for explaining public debt policy is formulated by Bohn (1998). This approach explains the primary budget balance in percent of GDP (bal_{it}) by the public debt stock (in percent of GDP) at the beginning of the period (d_{it-1}) as well as further variables in a time series context. In the following, this concept is applied to our panel of countries and the research goal at hand:

$$\begin{aligned} bal_{it} &= \alpha bal_{it-1} + \beta_1 d_{it-1} + \beta_2 g_{it-1} + \beta_2\, gdppc_{it-1} + \beta_3 EU_{it} + \beta_4 sf_{it} \\ &+ \beta_5 li_{it} + \beta_7 open_{it-1} + \gamma_i t_i + \lambda_t + \mu_i + \varepsilon_{it} \end{aligned} \quad (5)$$

In fact, this specification is rather similar to the one applied to the public investment decision above. Again, a very flexible specification of country specific time effects is assumed in order to control for unobserved specific effects affecting the primary budget balance as well as SF payments. A description of the variables used can be found in Table 6 in the Appendix.

The results are shown in Table 5. Again, different samples and various econometric techniques are applied. Columns (1) and (6) show the results of static fixed-effects models restricting α to zero and assuming strict exogeneity of all regressors. Furthermore, ignoring the "Nickell bias", column (2) includes the results of a dynamic fixed-effects specification. Columns (3), (5) and (8) display the results of the LSDVc (see last subsection). In column (4) a SYS-GMM model additionally allows for endogeneity of d_{it-1}, g_{it-1}, $gdppc_{it-1}$ and sf_{it}, whilst omitting country-specific time trends (t_i).[19]

19 Again the results hardly change if we apply a SYS-GMM, whilst only treating sf_{it} (besides the lagged dependent variable) as endogenous (results are not reported).

With regard to the estimated coefficients of sf_{it}, it can be seen that SF payments have a significantly positive impact on primary surplus in case of the fixed-effects specifications. However, the significances vanish in case of the LSDVc and the SYS-GMM. Nevertheless, the hypothesis that countries use the SF payments to indirectly lower budgetary deficits, cannot be rejected since otherwise we would have expected to find a negative effect.

Table 5: Effects of Structural Funds Payments on Primary Balances

	All time periods					**Only EU members**		
	FE	**FE dyn**	**LSDVc**	**LSDVc** without country specific time trend	**SYS-GMM**	**FE**	**LSDVc**	**SYS-GMM**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
bal_{it-1}		0.551^{***} [6.46] (7.20)	0.708^{***} (15.67)	0.756^{***} (19.56)	0.779^{***} (10.78)		0.732^{***} (13.29)	0.730^{***} (8.03)
d_{it-1}	0.088^{***} [2.28] (5.03)	0.067^{***} [3.41] (4.59)	0.056^{***} (3.62)	0.024^{***} (2.89)	0.030 (1.30)	0.119^{***} [7.08] (9.80)	0.059^{***} (3.83)	0.063^{*} (1.78)
li_{it}	0.104 [0.95] (0.96)	0.110 [0.94] (1.13)	0.144 (1.51)	0.091 (1.53)	0.024 (0.52)	0.198 [1.61] (0.28)	0.302^{**} (2.41)	-0.031 (-0.40)
$open_{it-1}$	-0.024 [-0.78] (-1.16)	-0.011 [-0.72] (-0.79)	-0.013 (-1.00)	0.001 (0.05)	0.011 (0.95)	0.004 [0.28] (0.28)	0.001 (0.04)	0.007 (0.45)
g_{it-1}	0.286^{***} [2.28] (4.42)	0.199^{***} [2.46] (3.52)	0.190^{***} (3.29)	0.157^{*} (3.08)	0.171 (1.63)	0.092 [1.05] (1.33)	0.116 (1.57)	0.150 (1.41)
$gdppc_{it-1}$ /1,000	-0.014 [-0.11] (-0.20)	-0.012 [-0.15] (-0.16)	-0.050 (-0.51)	-0.021 (-0.40)	-0.114 (-1.22)	-0.105 [-1.77] (-1.51)	-0.103 (-0.92)	-0.001 (-0.01)
sf_{it}	**1.537^{***}** **[3.78]** **(6.58)**	**0.711^{***}** **[3.40]** **(2.92)**	**0.528^{*}** **(1.68)**	**0.209** **(0.80)**	**-1.291** **(-1.48)**	**1.250^{***}** **(4.32)** **(5.74)**	**0.182** **(0.53)**	**-0.509** **(-0.48)**
EU_{it}	0.656 [1.12] (1.02)	0.258 [0.46] (0.64)	0.150 (0.29)	0.275 (0.85)	1.450 (1.55)			
Time dummies (*p*-values)	yes (0.000)	yes (0.000)	yes (0.000)	yes (0.000)	yes (time demean)	yes (0.000)	yes (0.000)	yes (time demean)
Time Trend (*p*-values)	country specific (0.000)	country specific (0.000)	country specific (0.248)	no	no	country specific (0.000)	country specific (0.929)	no
No. instruments					29			28
Hansen (*p*-value)					0.503			0.343
AR(2) test (*p*-value)					0.743			0.629
R^2 (within)	0.570	0.717				0.641		
No. of countries	27	27	27	27	27	27	25	27
No. of obs.	433	427	427	427	400	356	336	325

Notes: *t*-values and *z*-values are in parentheses: FE: [White Robust S.E] / (Driscoll-Kraay S.E.); S.E.: * Significant at the 10 percent level; **significant at the 5 percent level; ***significant at the 1 percent level. LDVc: 500 bootstrap replication.

To some extent, this result may be explained by the so-called "Cohesion Fund" for the poorer EU countries. Its establishment in 1994 was motivated, inter alia, by the necessity of meeting the convergence criteria for the monetary union. In line with this motivation, the compliance with the principle of additionality is not checked in case of spending from the Cohesion Fund.

IV. CONCLUSION

The previous studies regarding the impact of EU Cohesion Policy have mainly focused on the investigation of economic growth and they have delivered rather mixed results. In this paper we broaden the perspective by analysing through which channels the EU Cohesion Policy works or does not work. Apart from investigating growth effects, we analyse the impact of SF payments on employment growth, on public investment, and on budget deficits. In doing so, we use more appropriate data in a greater time span applying advanced panel data methods.

In line with the previous literature, we only find modest growth and employment effects. This can partly be explained by another result: SF payments do not seem to increase public investments in the EU countries, indicating a crowding out process of national spending. The hypothesis that EU funds are used for the consolidation of public budgets cannot be rejected in all econometric specifications.

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Appendix I

Table 6: Definition of the Variables

Variable	Definition	Source
y_{it}	Real GDP (at 2000 constant prices) per capita in Dollar	WDI
inv_{it}	Gross domestic saving in percent of GDP	WDI
n_{it}	Growth rate of population from *t*-1 to *t*	WDI
e_{it}	Employment in percent of the population age 15 to 64 years	AMECO
p_{it-1}	GDP deflator (Index of output prices)	WEO
w_{it-1}	Real wage: Average nominal compensation per employees deflated with the GDP deflator	WDI
$skill_{it}^{high}$	Percentage of population aged 25 or over with higher education (complete and incomplete) as provided by Cohen and Sotos (2007), interpolated	Cohen and Sotos (2007)
$skill_{it}^{med}$	Percentage of population aged 25 or over with secondary education as provided by Cohen and Sotos (2007), interpolated	Cohen and Sotos (2007)
$skill_{it}^{low}$	Percentage of population aged 25 or over without schooling, provided by Cohen and Sotos (2007), interpolated	Cohen and Sotos (2007)
S_{it}^{agri}	Percentage of agricultural employment in total employment	WDI
S_{it}^{serv}	Percentage of service employment in total employment	WDI
EU_{it}	Dummy for membership in the EU	
sf_{it}	Structural funds payments in percent of nominal GDP	European Commission (2008) and WDI
$pinv_{it}$	Gross fixed capital formation of the general government in percent of GDP	AMECO
d_{it}	General government gross financial liability per GDP in percent	WEO
g_{it-1}	Growth of real GDP per capita from *t*-2 to *t-1*	WDI
$gdppc_{it}$	Level of real GDP per capita in Dollar in PPP	WDI
li_{it}	Real long-term interest rate in percent	AMECO
$open_{it}$	Openness of the economy (imports plus exports in percent of GDP)	WEO
bal_{it}	General government primary balance in percent of GDP	OECD

Notes: WDI = World Development Indicators (Worldbank)
WEO = World Economic Outlook (IMF)
AMECO = Annual Macro-Economic Database of the European Commission, DG ECFIN
OECD = OECD Economic Outlook Database

Table 7: Descriptive Statistics for the Estimation Sample (5-year average sample)

Variable	Number of Observations	Mean	Std. Dev.	Min.	Max.
$\ln y_{it} - \ln y_{it-1}$	84	0.095	0.084	-0.177	0.384
y_{it-1}	84	14309.290	7149.051	1488.926	29107.260
inv_{it-1}	84	21.974	4.801	11.632	37.351
$skill_{it-1}^{med}$	84	28.443	12.839	4.056	53.317
n_{it-1}	84	0.022	0.035	-0.044	0.241
sf_{it-1}	84	0.354	0.645	0.000	3.046
EU_{it-1}	84	0.617	0.474	0.000	1.000
e_{it}	70	63.725	7.847	47.725	77.473
$\ln e_{it} - \ln e_{it-1}$	70	0.446	5.799	-17.922	16.064
w_{it-1}	70	19274.240	9406.401	925.175	38587.510
$skill_{it-1}^{low}$	70	3.604	6.585	0.000	29.249
$skill_{it-1}^{high}$	70	12.569	5.317	3.274	23.749
S_{it-1}^{agri}	70	10.942	8.758	1.191	39.798
S_{it-1}^{serv}	70	59.976	11.309	29.336	77.683
sf_{it-1}	70	0.489	0.710	0.000	3.046
EU_{it-1}	70	0.754	0.413	0.000	1.000

Table 8: Descriptive Statistics for the Estimation Sample (annual sample)

Variable	Number of Observations	Mean	Std. Dev.	Min.	Max.
$pinv_{it}$	463	3.013	0.917	0.674	5.689
d_{it-1}	463	55.994	28.555	4.056	134.160
li_{it}	463	7.634	3.808	3.303	27.532
$open_{it-1}$	463	92.863	53.454	35.889	369.673
g_{it-1}	463	2.702	-2.561	6.755	12.503
$gdppc_{it-1}$ / 1,000	463	23727.890	10981.230	430.075	112814.400
sf_{it-1}	463	0.482	0.701	0.000	3.496
bal_{it}	427	1.419	2.908	-8.165	11.621

APPENDIX II: ADDITIONAL DESCRIPTIVE ANALYSES (for the Referees)

In the following, there are some simple descriptive analyses for the SF payments and the outcome variables. Figure 2-5 are based on the 5-year average sample; the remaining figures are based on the annual sample. All figures are simple scatterplots augmented by non-parametric (bivariate locally weighted) regressions. All figures only consider observations with positive SF payments.

Figure 2 indicates a positive relationship between log SF payments and GDP growth. However, this may result from the fact that poorer countries receive higher payments and – at least in many cases – have a higher GDP growth, which is called unconditional beta-convergence (Figure 3). Therefore, without further econometric analyses, the positive relationship in Figure 2 should not be interpreted as causal.

Figure 2: GDP Growth and log SF Payments in *t*-1 (non-parametric regression)

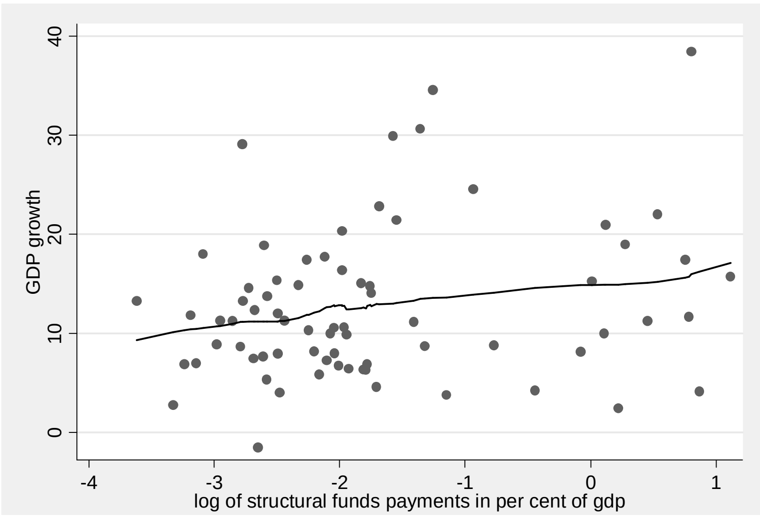

Figure 3: GDP Growth and log GDP in *t*-1 (non-parametric regression)

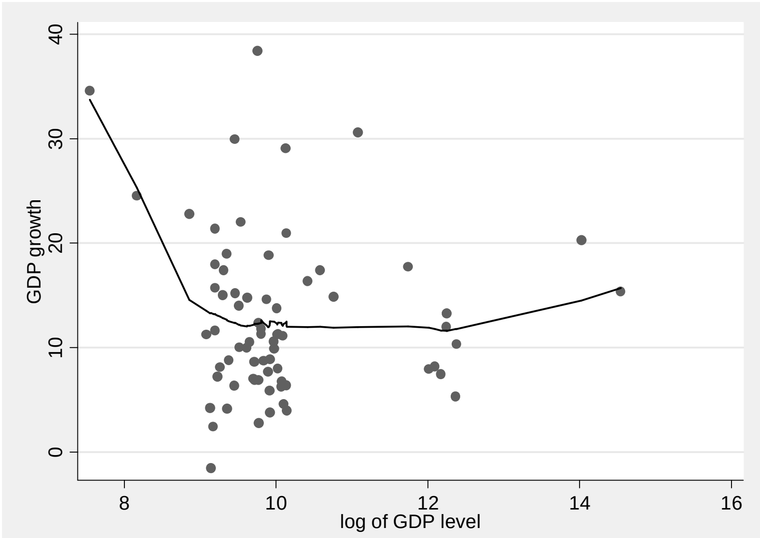

Figure 4 shows a positive correlation between the growth of the employment rate and the log of SF payments per GDP in *t*–1. However, in Figure 5 employment growth is plotted against the employment level. The higher the countries' initial employment rate, the lower the countries' employment growth, again indicating an unconditional beta-convergence of employment rates. Usually regions with lower employment rates receive higher SF payments. Hence, the same conclusion as above applies: econometric analyses are required.

Figure 4: Growth of the Employment Rate and log SF Payments in *t*-1 (non-parametric regression)

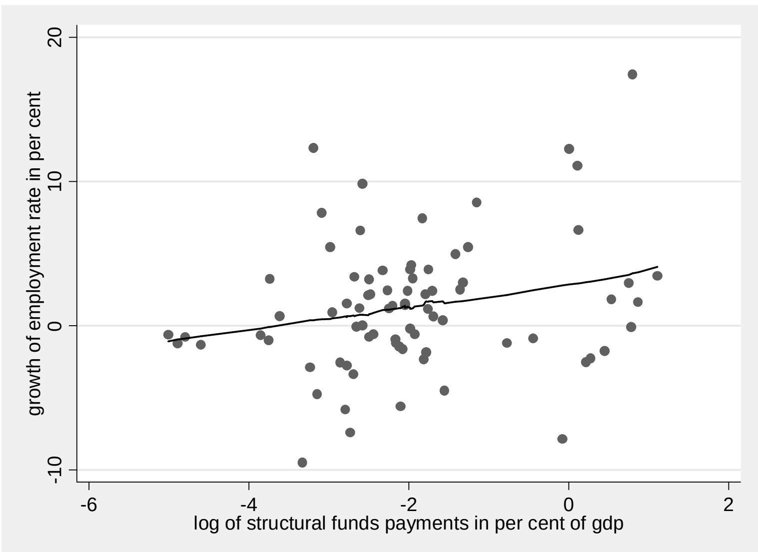

Figure 5: Growth of the Employment Rate and (log) Level of Employment in *t*-1 (non-parametric regression)

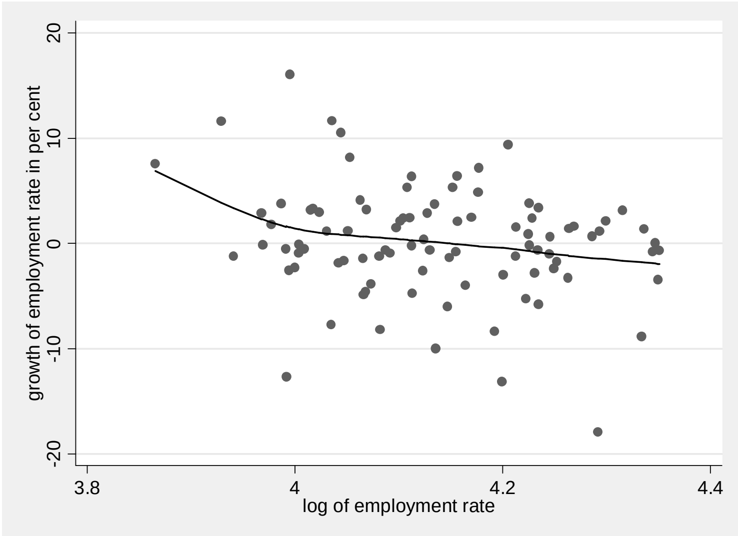

Figure 6 reveals that, from a descriptive point of view, there is no clear-cut contemporaneous relationship – neither positive nor negative – between SF payments and public investment. The same is true for the last outcome variable Primary Budget in Figure 7.

Figure 6: Public Investment in percent of GDP and (log) SF Payments in percent of GDP (non-parametric regression)

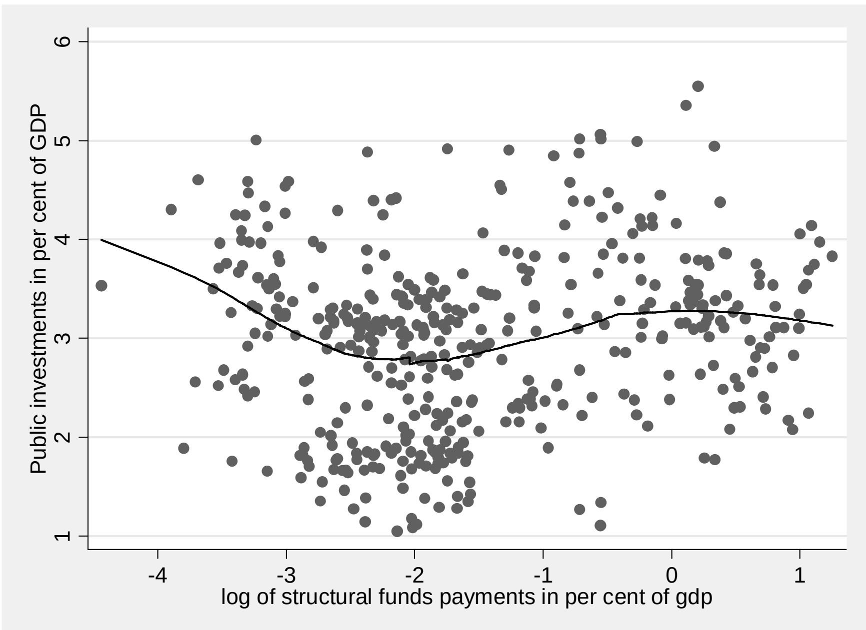

Figure 7: Primary Budgets in percent of GDP and (log) SF Payments in percent of GDP (non-parametric regression)