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# Do EU Funds Crowd Out Other Public Expenditures? Evidence on the Additionality Principle from the Detailed Czech Municipalities' Data

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## **Abstract:**

European Union funds flowing into budgets of public sector organisations of its member states should be additional to their nationally funded expenditures. To investigate this additionality principle systematically, we develop a new empirical method. Our main hypothesis is that some of the EU-funded projects are crowding out national public expenditures. Not being able to reject the hypothesis would be consistent with violating the additionality principle. To test the hypothesis we examine how EU funding translates into actual spending of relatively comparable municipalities of the Czech Republic. We innovatively match the municipal authorities' budgetary data on EU-funded expenditure projects with their other, nationally funded, expenditures. We find no systemic crowding out of national public expenditures by EU funds at the level of operational programmes in the Czech municipalities' data, which is consistent with no evidence of violating the additionality principle. Nonetheless, going down to the municipal level enable us to show how the results can pinpoint individual cases of EU fund's potential mismanagement in Czech municipalities. Overall, we provide the first evaluation of the additionality principle at the level of individual recipients of EU funds and in

doing so we develop a methodological approach potentially applicable to other fund recipients.

**Keywords:** European Union, EU Cohesion policy; EU funds; crowding out; additionality; municipalities

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## 1 Introduction

European Union funds flowing into budgets of public sector organisations should be additional to standard budgetary funds. Anecdotal evidence suggests violations of this additionality principle and our aim is to investigate this systematically. For example, a mayor of a mid-sized city in the Czech Republic, who prefers to remain anonymous, reports that they all repair roads and bridges, while pretending to build EU-funded bikeways. To investigate this additionality principle systematically, we develop a new empirical method. We aim to provide the first evaluation of the additionality principle at the level of individual recipients of EU funds and to develop a methodological approach applicable to other fund recipients.

Our main hypothesis is that some of the EU-funded projects are crowding out national public expenditures. Not being able to reject the hypothesis would be consistent with violating the additionality principle. To test the hypothesis we examine how EU funding translates into actual spending of relatively comparable municipalities of the Czech Republic. We innovatively match the municipal authorities' budgetary data on EU-funded expenditure projects with their national public expenditures. In addition to testing whether there is systemic crowding out inconsistent with the additionality principle, we aim to go down to the municipal authority-level to show how the results can be used to pinpoint any individual cases of EU fund's potential mismanagement.

We develop a new methodological approach and empirically apply it using the best available data on EU-funded projects and national public expenditures from the Czech Republic, a country that has experienced significant cash inflows from the European Union in the past few years and is therefore a good case study. In addition, we chose the Czech Republic because of the relatively good data availability. The data comes from a combination of open resources on funds awarded, public budgets and public accounting. According to European Commission (2014), the Czech Republic suffers from similar problems in drawing EU funds as other new EU member states. Therefore, this research could serve well as a proof-of-concept potentially applicable also in other countries, for which similarly detailed data are also increasingly available.

The hypothesis of crowding out is in theory equivalent to additionality, one of the main principles of EU funding. The principle of additionality demands that EU Structural Funds may not replace national expenditure by the Member State involved (Council of the European Union 2006). In this paper, we hypothesise that this principle may be violated on the microeconomic level, i.e. that some of the projects funded by the European Union are crowding out expenditure that would otherwise be made by the funding's recipient. In contrast with the rather aggregate, macroeconomic testing approach currently employed by the European Commission for additionality, we propose a recipient-level approach for crowding out that should allow us to better identify the relationship between EU funds and national expenditures.

As interpreted by European Commission (2009), additionality, or an absence of crowding out in our terms, is needed in order to ensure a genuine economic impact.<sup>1</sup> We investigate the possibility that the current official methodology might not be able to detect the failure to meet this goal. If this were to be the case, then the genuine impact of the funds provided might be less than believed. If EU funds crowd out other expenditure, EU funds do not have as much of a positive impact as they might seem, and the crowding out could be considered as having a negative overall effect. Furthermore, Dimitrova (2010) argues that the fate of additionality as well as other institutional rules adopted in response to the EU's conditions for membership is an important, under-researched part of the post enlargement research agenda. Consequently, we fill in some of this gap in research. Using the example of additionality we answer, in the words of Dimitrova (2010), the key question whether informal rules and practices will also change following the change in formal rules and lead to institutionalization, or alternatively, whether the imported rules will be reversed or remain empty shells.

The layout of the paper is as follows: Section 2 reviews the relevant literature; the data is introduced in Section 3; the methodology and hypotheses are discussed in Section 4; the results are presented in Section 5; Section 6 concludes.

## **2 Literature review**

We discuss various areas of existing literature relevant to our research. We begin with the European Commission's additionality and conclude with a brief overview of additionality of research and development spending, and of foreign aid's fungibility.

One of the principal conditions of the European funds provision is the principle of additionality. The core idea is that EU funds should not crowd out current investment policies, but rather add value. Formally, Council of the European Union (2006) defines additionality as the requirement that contributions from the structural funds shall not replace public or equivalent structural expenditure by a given member state. The methodology for the calculation of public or equivalent structural spending for the purposes of additionality is described in detail by European Commission (2006a) and European Commission (2009) also includes relevant information, and a report on the ex ante verification of additionality in the regions eligible under the Convergence objective for the period 2007-2013. Additionality is verified at national level for the regions covered by the convergence objective both ex ante (i.e. the level of eligible public spending to be maintained throughout the programming period is decided), and empirically in the middle and at the end of the period (i.e. in 2011 and in 2016). The Commission's objective is to set realistic but sufficiently ambitious targets for structural public expenditure in order to ensure the additional impact from the structural funds expenditure is felt (i.e. the average annual level of expenditure in real terms should be, as a general rule, at least equal to the level attained in the previous programming period). We discuss a more detailed exposition of additionality in the past two programming periods in the

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<sup>1</sup> We understand that according to (Council of the European Union 2006), if a Member State fails to prove by 30 June 2016 that it has complied with the principle of additionality, the Commission may make a financial correction, i.e. penalise the country for not complying with the principle. We believe that the reader understands that our intention is neither to make anyone pay penalties nor show whether the Czech Republic fails the additionality criterion formally (the EU has its own procedures described below for that) but to test a hypothesis that is related to additionality principle.

Appendix, but it generally implies looking at a ratio of structural expenditure agreed beforehand and realised (and if this is higher than one, additionality is formally considered fulfilled).

Related studies by Centre for Industrial Studies (2010) and Del Bo et al. (2011) provide an excellent overview of existing literature on additionality and regional development with reference to the EU structural funds. Our focus on crowding out, and therefore the additionality of EU funds and its empirical analysis is relatively narrow, and we therefore refer to Centre for Industrial Studies (2010) as well as Wren (2007), and the referenced literature therein for more complex treatments of this topic.<sup>2</sup> They discuss whether the EU funds complement or substitute national public finances, and suggest the European Commission should move away from its current verification approach and adopt a new one that could assess more effectively the extent to which the structural funds complement national investments. In this paper, we believe that we provide one example of such an effective assessment method.

Most of the existing research into the spending of EU funds, such as Becker et al. (2010) as well as the more or less European Commission-backed research into additionality discussed above, has been carried out on a country-level aggregate basis. However, no research, as far as we know, has yet matched project-level information about EU funds with the budgets of the recipients of the EU funds, as we do here for municipalities in the Czech Republic. There are further differences between the official data used for verification of additionality and our data, which we try to describe below in detail. European Commission (2009) describes some shortcomings in its conclusions, and our analysis is bound to suffer from at least some of these as much as the European Commission's analysis does. As in the fourth section of European Commission (2009), we take the amounts of the Cohesion Fund into account so that the role of the European cohesion policy in total public investment is fully captured and understood, but also because it is difficult to distinguish the various types of EU funds in our otherwise very detailed data.

We use the data from the Czech Republic, but we believe the method and results are useful for other, new and old, EU member states as well. Hallet (1997) envisaged that there might be some specific problems in central and eastern European countries when it came to complying with the additionality principle and at the same time avoiding excessive deficits. However, some of the problems discussed, such as the low tax base or state-owned enterprises, were more timely back in the 1990s than they are now, when countries such as the Czech Republic are relatively similar in their spending structure to their Western neighbours. Dimitrova (2010) believes that it proved more difficult than ever to enforce the additionality principle in the new member states of the EU and that these countries' regional development programmes often consisted of little more than lists of planned capital expenditure. In the case of the European Social Fund (ESF) discussed by Gerven et al. (2014), the additionality principle has been found to affect national employment policies (Weishaupt 2010). For example, EU funds

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<sup>2</sup> We focus here only on the financial dimension of crowding out, although crowding out might also be taking place institutionally. Specifically, we hypothesise, but do not empirically test, that EU funds might lead to the creation of a parallel structure. Future empirical research should test whether EU funds can contribute to the development of a technocratic structure parallel to the national civil service, which focuses on the implementation of EU funds but substitutes or complements the rest of the (national) civil service in ways that might be harmful, especially in the long-term.

sometimes change institutional configurations (e.g., the push towards transparency and use of tendering procedures) and involve more actors in the formulation and implementation of policies (Verschraegen et al. 2011). Tosun (2014) focuses on absorption, and finds that the new Member States generally had higher absorption rates than old Member States during the European Regional Development Fund's (ERDF) 2000–06 programming period.

In addition to the verification of the additionality principle for EU funds, there is related literature focused on research and development policy. Buisseret et al. (1995) and David et al. (1995) were among the earliest studies of additionality of research and development spending and their impact on the economy. Furthermore, Luukkonen (2000) draws attention to problems inherent in the routine application of the concept of additionality in evaluation and exemplifies these problems by expressing them in a typology based on the perceived additionality of public R&D support and the strategic value of the R&D funded. Aerts & Schmidt (2008) use firm level data to test and reject the hypothesis of public R&D subsidies crowding out private R&D investment in Flanders and Germany. Georghiou (2002) describes the problem at hand as a comparison with the null hypothesis or counterfactual – what would have happened if no intervention had taken place. This can of course be generalised beyond the area of research and development, to assess whether additional public investments have a crowding in or crowding out effect on aggregate investment. Georghiou (2002) focuses on firms receiving research and development funding and discusses three dimensions of the application of the additionality principle. By comparison, in this paper we focus on government institutions and study one of the three channels in particular, input additionality, i.e. whether the additional funds received by institutions increase their expenditure. To a lesser extent, we also analyse output and behavioural additionality: we estimate their expenditure without the additional funds, look at changes in the internal allocation of funds, and examine differences in operative decisions within the institution after receiving the funds.

Furthermore, the hypothesis of crowding out is related to research literature on the fungibility of foreign aid or development assistance. Fungibility is the property of a good whose individual units are capable of mutual substitution and therefore is clearly related to crowding out and additionality. We investigate whether similar substitution is practised with EU funds. The question is whether the EU (or any donor) is able to ring-fence their donated funds. More specifically, the question is whether the EU (or rich-country donor) provides a member country (or a poor country) with funds for, for example, additional infrastructure projects, and the country can simply cut its own infrastructure funding by the amount of the funding and spend it on whatever it wants (not necessarily further infrastructure). In one of the first rigorous studies answering these questions on aid fungibility, Pack & Pack (1993) analyse whether the foreign assistance provided for specific categories of expenditure is shifted among them, contrary to the wishes of the donor. Their results for the Dominican Republic document the presence of the fungibility of aid. In a more recent contribution to the literature, Van de Sijpe (2013) adopts a new approach and, unlike most existing empirical studies, employs detailed panel data that contain information on the specific purposes for which aid was given. This approach enables him to link aid provided for education and health purposes to recipient public spending in these sectors. We adopt a similar approach and employ data on individual projects that enable us to differentiate between the different sectors and specific purposes of EU funds, and to link these with the national public spending.

### **3 Data**



We use several data sources, which together provide us with the best available detailed information on national public and EU-funded investment in the Czech Republic. We adopt municipalities as the basic units of analysis since they are relatively numerous and comparable. To make the sample even more homogeneous and to limit outliers, we include only Czech municipalities with more than 5000 inhabitants. We use data on EU-funded projects, tax revenues, municipality expenditures and debts.

We use data about projects supported by EU funds, provided by the Czech Ministry of Regional Development. The data contains an identifier for the entity that received the subsidy, estimated start and end dates (which limit years when the funds can be spent), the name of the operational programme, and the financial amounts contributed by distinct entities. We can thus separate project finances coming in from EU funds, from the authority's own co-financing, or from other sources.<sup>3</sup> The data contains information on projects awarded in years 2007-2014. We treat any finances received by the municipality, which were connected with an EU-funded project and were not financed by the municipality itself, as EU funds. Essentially, this means that the EU funds variable contains all funds perceived as external by the recipient (and includes co-funding by the Czech government), because from perspective of the recipient these are the same – external money with pre-defined purpose and time frame of their use. In addition, these are the funds which should not be used, in theory at least, to cover the municipality's non-investment costs<sup>4</sup>, and which are thus subject of our crowding-out hypothesis. For example, under the Regional Operational Programmes (ROP, funds provided at the NUTS II-level regions) regulations, the region must pay a certain sum of money to the city receiving funding, which the region would not have paid to the city were it not participating in the project. We treat this money from the region as "EU funds" in the sense that it represents additional funding.

We use data about Czech cities' tax revenues in 2010-2014, provided by the Czech ministry of finance. Given the Czech system of allocating tax revenues to municipal budgets, these should be approximately proportional to the size and economic activity of the given city, and we use them to control for these characteristics. For this purpose, we use a mean annual tax revenue over this five years' data. Furthermore, we use the Czech cities' expenditures for the years 2010—2013, as provided by the Czech Ministry of Finance. These budgets are categorised according to specific items such as wages, services, electricity etc., and so we are

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<sup>3</sup> EU-funded projects mostly require co-financing from national budgets (and sometimes from private firms). We do not deal with the issues of co-financing in this current research, although we consider it an interesting matter for further research, including from the point of view of its possible negative effects. It should be interesting to estimate the extent of the co-financing required and to investigate its potential role as a risk factor for public budget debt (or debt in private firms). The co-financing also implies that the negative effects of EU funds might be greater than the funds themselves suggest, and that we could allow for their higher value due to the co-financing (however, the co-financing might also mitigate the negative effects by lowering the moral hazard). The co-financing could also contribute to the crowding-out (co-financing of mostly investment projects crowds out the other and wage expenditures). In addition, the need for co-financing can occur suddenly due to the complex nature of the evaluation of EU funding, and this puts additional pressure on public budgets (which can in turn result in low absorption of EU funds).

<sup>4</sup> Investment costs are meant in a broad sense, as defined by the European Union, i.e. they may include investment into human capital.

able to distinguish three groups of expenditure: investments<sup>5</sup>, operational costs<sup>6</sup> and human-resource costs. We also use data about the municipalities' debts, from the same source as expenditures, to construct a variable that depicts the change of the municipal debt, which we then use to control for increased or decreased indebtedness.

## 4 Methodology

We use the best available data for the Czech Republic and an empirical approach similar to Aerts & Schmidt (2008). Our main hypothesis is that some of the EU-funded projects are crowding out national public expenditures. Not being able to reject the hypothesis would be consistent with violating the additionality principle. There are a number of reasons why the crowding out and violation of additionality principle might be taking place. For example, public authorities might aim to use money drawn from EU funds to cover other incurred costs, which would happen regardless of EU funds provision. Anecdotally, this is well documented by Czech Supreme Audit Office's (2014) report for the Rural development programme, a 2007-2013 operational programme, that finds that there are no mechanisms in place to check whether procured buildings and equipment does in practice serve the goals of the programme. This implies that the recipients might have used money for their own planned investment. Desire for such use of EU funds might arguably have grown stronger, once economic crisis started hitting public and private budgets. The public authorities' incomes went below their previous expectations and did not suffice to cover planned expenditures. This might be the case not only for investments, which are easier to postpone, but, perhaps more importantly, for routine expenditures such as road maintenance or personnel wages. Therefore, we analyse three types of expenditures separately - investments, operational costs and human-resource costs - to observe whether and where there is evidence of crowding out.

We analyse the link between EU funds provided from the various operational programmes and the structure of the municipalities' budgets. We would like to see whether the provision of EU funds increases the municipality's actual spending, relative to the pre-funding period or to the similar municipalities with similar budget. If this is the case, then we are interested in how the funds are allocated into the three spending categories: investments, human resources and operational costs. Naturally, this could lead to difference in differences type of model. However, mainly because of deficiencies in time structure of the data, we opted for similar, yet simpler approach. Since EU-funded projects are typically realised over several years, and their distribution into annual budgets can be extremely unequal<sup>7</sup>, we accumulate the data across the years 2010 to 2013, and concentrate on estimating the total overall influence of the EU funds in the sample. Unfortunately, this means that we lose the panel dimension of the data, but we believe the overall credibility of our analysis improves.

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<sup>5</sup> Investments include total expenditure on IT, machinery, buildings and other durable property with a value above 1200 EUR.

<sup>6</sup> Operational costs include services, rent, non-durable property purchase, gas, electricity, heating.

<sup>7</sup> In addition, there might be substantial time inconsistency between the actual costs and funding provision (i.e. funds provided only after costs have been incurred), which objectively restricts the ability to study the effect in larger detail.

Moreover, for the same reasons, we are unable to identify precisely the effect in the sample, as some of project costs could be incurred before 2010 or after 2013. This is a problem particularly for projects with duration of multiple years, for which we do not know the year the funds are actually spent. Hence, we estimate the effects for two samples to produce a lower bound and an upper bound estimate of the effect. The first sample consists only of projects that had their entire duration between 2010 and 2013. This first estimate thus underestimates the effect of crowding out because the amount of funding considered is equal to or smaller than the true amount of funding (some projects do not fully fall within the time frame and are therefore excluded). The second sample does the opposite – it included all funded projects that overlapped by at least one year with the period 2010 to 2013. This latter estimate is thus bound to overestimate the crowding out effect. Together, the results of the lower and upper bounds provide us with an interval estimate of the effect.

To operationalise this empirical strategy in the view of the available data, we estimate the following regression model for each type of expenditure and for both lower and upper bound estimates:

$$Expenditure = \alpha + \beta Tax + \sum_{i=1}^I \gamma_i EU\ funds + \delta Debt_{positive} + \zeta Debt_{negative} + \varepsilon,$$

where *Expenditure* is a given expenditure item accumulated across all years (for example, total expenditure or its component such as investments), *Tax* is the average annual revenue that the city received from tax collections, *EU funds* are the amounts paid to the municipalities from EU funds. The debt variables control for changes in debt levels by indicating whether there was a positive or negative change in municipality's indebtedness. The model is in fact a very simplified version of budget, which assumes that expenditures are covered by tax revenues, EU funds, or loans.

If the additionality principle was fully working and no crowding out was present, the  $\gamma$  coefficient should be close to one for total expenditure and, analogically, the sum of  $\gamma$  coefficients across the three models with detailed types of expenditures should be close to one as well. This would imply that all the EU funds translated into new spending on top of usual levels or, vice versa, that no EU funds were used to cover regular spending that a municipality would have made even without EU funds. Results below one would then indicate presence of crowding out and violation of additionality. On the other hand, a  $\gamma$  coefficient above one would imply that funding actually causes an increase in the municipal authority's own investment, possibly by triggering greater expenditure (this further supports the inclusion of debt variables, since we want to control for municipalities getting into debt through participation in larger projects).

In principle, we use municipalities with small or zero level of subsidies as a control group or a benchmark of standard level of spending and investment, claiming that municipalities receiving additional EU money should spend more. If their spending does not increase proportionally to the inflow of EU funds, some regular spending is apparently being crowded out by EU funds. Furthermore, we expect to get additional insight into structure of actual spending made from individual programmes. For example, we expect major share of investment expenditures in the case of operational programmes focusing on investment goals (such as the Environmental and Integrated Operation Programmes). The tax revenue and debt variables are included to control for the economic importance of the municipality and changes in its level of debt, respectively. The  $\beta$  coefficient is expected to be slightly below four for the

total expenditures, as the annual tax revenue income translates into spending four times over four years period. The municipality's debt level might affect the expenditures in important ways that we want to control for so that we can focus on the relationship of the EU funds with other public expenditures. The coefficients for the debt variables are expected to be around zero, controlling for outlier municipalities with significant changes in debt levels.

## 5 Results

We estimate the regressions using two econometric procedures. First, we estimate the ordinary least squares (OLS) with robust errors, and use this in the text as the main set of results. Furthermore, we estimate median regressions as a robustness check, and present their results in the Appendix. Table 1 presents the OLS regression results. There are eight regressions in the table (the median regressions' table has an identical structure) – for the lower and upper bounds and for each of four definitions of expenditure. The estimates of the three regressions for investments, common expenditure, and personal expenditure added together form the coefficient for the total expenditure regression. This is a technical feature of OLS rather than a characteristic of the data. This technical regularity does not hold for the median regressions in the table 3 in the Appendix, so it is interesting to see this property approximately hold in many cases even in those estimates, which literally provide a robustness check for our OLS estimates.

The results indicate the model to be well specified – the explained variance is above 80 % in all regressions, and the coefficients for tax revenues of around 3 in the total expenditure regression make good sense. If the tax revenues equalled the total expenditures, we would expect the coefficient to be around 4 (since tax revenues are for one year only, whereas expenditures are for a period of 4 years). However, it is reasonable to expect the coefficient to be lower than that, both because of the intercept, and due to other sources of income. Furthermore, the municipality may have debt as an additional source of finance for expenditures; we control for this by including the debt variables, and find that the debt increase coefficient is large and significant for investment spending only, which shows that municipalities typically borrow to cover investments, and not to cover common expenditures. The debt decrease is insignificant, as during the period spanning the fiscal crisis, debt repayment was rare.

We include a number of variables for specific EU funds or their groups, which indicate how much finance each municipality received from these funds. There are a total of seven Regional Operational Programmes (ROP), the Education for Competitiveness Operational Programme (ECOP) and the Integrated Operational Programme (IOP). We observe differences in the budget impact of each of these – for example, the Operational Programme Environment (OPE) is focused on investment, and so it makes good sense that the lower and upper estimates are close to 1 in total expenditure and investment regressions, and around zero for the other two regressions. In a sense, this is an ideal result where we see 1:1 translation of EU funds into investment. Similarly, the result range for Regional Operational Programmes is a bit wider – indicating higher heterogeneity in project outcomes and the way in which they translate into actual spending. This is well understandable, since in this operational programme (OP) we aggregated multiple equivalent OPs with same goals yet different implementation in each region. For those two OPs, the results behave well even in robustness check.

For the remaining OPs the results are less neat, with their overall budget effect unclear and significant effects found only in the personal expenditure category. This most likely means that the high heterogeneity of the projects funded from those OPs does not enable us to measure the effect precisely, as it varies a lot for different projects. Higher granularity of the empirical analysis thus might be needed in order to obtain more precise results (for example, through grouping by individual calls rather than by operational programme). This should be particularly interesting, since the overall spending insignificance indicates, that for relevant portion of projects the subsidy has not fully translated into new spending – hence potentially crowding out might have occurred.

The most puzzling result are the total and personnel expenditure coefficients for the Human Resources and Employment Operational Programme (HREOP). For example, the not statistically significant personal expenditure coefficient indicates that most of HREOP funding ends up being spent on personal expenditure. Additionally the fact that it goes above 2 (as confirmed by robustness check), shows that personnel expenditure grow more than proportionally with the level of subsidy, pointing to possible reinforcement effect. However, since also the overall spending remains statistically insignificant, this rather implies that HREOP subsidy motivates to shift own spending between categories. Together with high variance for investment and common expenditure, this suggests that some municipalities might use HREOP funds for hiring additional personnel instead of outsourcing some types of spending. Whereas significant negative effect on some of other spending categories would be more convincing, the high variance (reflecting possibly high project heterogeneity) and no statistically significant results do prevent us from drawing stronger conclusions. If it was measured more precisely, this effect might actually indicate positive reaching of HREOP goals, which is capacity building inside of institutions that might lead to decreased need for outsourcing.

In addition to interpreting the regression results above, we now employ the total expenditure regressions to test our main hypothesis directly. We hypothesise that EU funds crowd out other expenditure by Czech municipalities, i.e. that EU funds inflows translate more than proportionally to municipalities' total expenditures. Therefore we statistically test whether  $\gamma$  is higher than 1. A rejection of this test would imply that crowding out is taking place and the additionally principle might be violated. We present the results of the one-sided t-tests in Table 2. In most cases, we cannot reject the hypothesis. This implies that there is no evidence that crowding out is present and the additionality principle is violated. Of course, a crowding out effect might still be present and additionality principle might still be violated, but it is not reliably detected by our estimates.

In the following, additional section we focus on a residual analysis that might shed more light on crowding out and additionality principle in specific municipalities. Even though no systemic crowding out is detected at the level of individual OPs, this does not mean a crowding out effect is not present at the level of the municipalities. Individual municipalities in specific OPs can still misuse the funds to replace own expenditures, which might be especially likely in times of fiscal crisis. The model presented above is well suited for examining this possibility. Most notably, it can be used to find irregularities in the use of funding from ROP and OPE, for which it produced particularly neat results.

We use the residuals from our model to identify the biggest negative outliers, which might be candidates for a detailed audit. This analysis can potentially be useful for identifying cases with non-standard patterns of spending, where the observed investment was far below what

the model had expected. We create the residual values at the municipality level in the following way. We use the above model's estimated parameters and the underlying data to predict the total expenditure for individual municipalities. We then subtract this total expenditure predicted by the model from actual total expenditure in the data to arrive at the absolute difference between these, or, what we call, a residual. To arrive at the relative difference, we further need to divide the absolute difference by the actual total expenditure.

In Table A4 in the Appendix, we list the residuals corresponding to cases in which overall spending rose much less than expected based on the external funding. Table A4 lists the municipalities with high residuals (i.e. negative deviation of actual spending). That means that the EU funds might not have been spent in line with the additionality principle (i.e. on top of the receiver's standard budget), but might instead have crowded out common budgetary expenditures. Such residuals might thus serve as a potential lead for selection of audit samples, as they point to receivers with more risky behaviour. In this case, it is likely the receivers of the funding violated the original allocation purpose of the funding and the additionality principle. To arrive at table A4 methodologically, since we have two overlapping models estimating lower and upper bounds, we first set how many potential residuals we would like to select from the models. In these results, we set the constant to be 40. A municipality's residual is selected as high if it belongs among the 40 highest (absolute) residuals in both underestimating and overestimating models, which results into 28 municipalities listed in Table A4. The reported residuals come from the underestimating model. Moreover, we report relative residual to the original budget. In the Table A4, we also report another set of values of the relative differences.

These results might have immediate use in identifying possible crowding out risks on level of individual municipalities. The observations with negative residuals of our model point to those, where spending rose less than expected, given the level of subsidy. For example, the city of Třebíč has spent by 259 mil. CZK less than predicted by our model, while receiving about 196 mil. CZK in EU funds. Some of the subsidies might thus have been used to cover some investments that other municipalities make from own budget, such as weatherproofing of several schools, or schooling employees, which Třebíč actually did cover from the EU funds.

## **6 Conclusion**

By innovatively investigating testing the crowding out hypothesis and thus the possible violation of the additionality principle, this paper sheds light on these under-researched issues and contributes to the debate on the future of European Union cohesion policy. If perfected further, this research has the potential to be useful for further application by the audit institutions, the European Commission as well as other interested parties and professions, including by economists and other academics interested in the European Union and public finance more generally.

We found no evidence of systemic crowding-out on a level of operational programme in the Czech municipalities' data. However, the results do indicate substantive differences between these, pointing out potential risks in several programmes. Whereas results for Operational Programme Environment show neat 1:1 relation between EU funds and investment, for others the evidence is much more mixed. This is likely driven by higher variability of results, implying that projects differ widely in their effects on budget. Arguably, these programmes'

projects are heterogeneous, with at least some portion of projects vulnerable to crowding out and we propose how to identify these at municipal level. For more precise identification of these, further research may go into more detailed classification of projects, taking into account individual calls or priorities.

Our methodological approach has implications for the testing of the additionality principle. We argue that the current macroeconomic definition of additionality is crude, and is limited in its scope for capturing crowding out effects on the microeconomic level, even when they may be systemic (as in the case of several Operational Programmes). In this light, our methodology proposes a novel method for the examination of the additionality principle on a recipient level, which is likely more accurate, yet potentially broadly applicable if sufficient data are available. We consider this the first evaluation of the additionality principle at the level of individual recipients of EU funds as well as the first step to develop a methodological approach. Further steps should make it readier for a more reliable application to a wide range of fund recipients, for which similarly detailed data are also increasingly available. Indeed, more research, with newer data or in other countries, is needed for the methodological approach to be perfected.

Further research, directly continuing where our current efforts ended, is clearly desirable. Although we have developed and applied new methodology and indicated the effects of EU funding on its recipients' expenditures, and have largely rejected the hypothesis of crowding out for Czech municipalities, we feel that confidence in these results and in our methods could improve with the elimination of a number of mostly data related limitations. Further research should strive to overcome these limitations more effectively than we succeeded in doing. As discussed in the relevant parts of this article, we used very detailed project and municipality level data for Czech municipalities. However, the time spans are short, information is often not comparable across years and knowing the year-specific cash flows of the individual projects could be much more useful than the currently available information about allocated amounts of funding and project duration. We are confident that when these data are available, the methodological approach applied here will yield accordingly better results.

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## 8 Appendix

### 8.1 Additionality and the European Commission: new member states in 2004 - 06

There has been a verification process for the new EU member states for the period 2004 to 2006, which is summed up in the report (European Commission 2007), with further details on the methodology available in a report on the older member states, (European Commission 2006b). Structural Funds (the Cohesion Fund is excluded from the additionality tables) accounted for only a small part of the total structural expenditure in the new Member States studied during this period, thanks to (a) the gradual introduction of financial support under the European cohesion policy and (b) the higher share of the Cohesion Fund in these countries. The Structural Funds accounted for barely 1 billion EUR out of around 17 billion EUR spent overall in the eligible areas.

According to European Commission (2007), additionality is considered to be respected if the average annual national structural expenditure<sup>8</sup> incurred by a Member State during the funded period (i.e. 2004-2006) reaches or exceeds the level of structural expenditure agreed beforehand<sup>9</sup>. As European Commission (2007) and Table 1A below show, seven out of the nine Member States concerned were found to comply with the principle of additionality. Only Malta and Poland failed to fulfil the additionality requirements by a small margin. The Czech Republic achieved 60 % more than the expected level of public national investment in the eligible areas. European Commission (2007) notes that fulfilment of the additionality

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<sup>8</sup> Structural expenditure includes all sources of finance at national, regional and local level, as well as spending undertaken by other public service bodies that are not part of those sources. In addition, public enterprises' expenditure can be included, though Member States were not obliged to include it. In any event, Member States needed to state explicitly which administrative levels and public enterprises were included in or excluded from the calculations; the national co-financing of Cohesion Fund projects was eligible expenditure and had to be included.

<sup>9</sup> The reference years according to which the additionality targets for the period 2004-2006 were set were individually agreed by the Commission and the Member State concerned, but were always two or three subsequent years selected from the period 1999-2002.

requirement is largely determined by the economic performance of the country in the period concerned.<sup>10</sup>

The detailed assessment of the Czech Republic by European Commission (2007) follows:

“The annual average of national structural expenditure in the reference period exceeded by 61% the ex-ante reference level. The main reason for this significant difference was the robust economic growth of the Czech economy during the reference period. Therefore, the Czech Republic complied with the principle of additionality in the programming period 2004-2006. The expenditure taken into account to construct the additionality tables includes the state budget, all local budgets and the relevant state funds. It was decided not to include the relevant expenditure of state-owned enterprises. As the Prague region was not eligible to Objective 1 in the period 2004-2006, expenditure incurred in this region was excluded using some estimations.”

Although the main assessment by European Commission (2007) is based on country-level aggregate data, it does look at some further details, such as the composition of structural expenditure (and the difference between national structural expenditure and structural fund aid).

## **8.2 Additionality and the European Commission: 2007-13 ex ante**

European Commission (2009) is a report on the ex ante verification of additionality in the regions eligible under the Convergence objective for the period 2007–2013. In addition to this ex ante verification (similar to that for 2004-2006), the 2009 report analyses additionality from a wider perspective focusing on the synergies between national investment policies and European cohesion policy, in relation to the macroeconomic conjuncture. While this analysis is not supposed to be a part of the additionality verification, the amounts of the Cohesion Fund are taken into account in this section so that the role of the European cohesion policy in total public investment is fully captured and understood. This shows that Member States invest, on average, EUR 3 for every EUR 1 invested as part of the European cohesion policy. The total public investment planned in the eligible areas will account for some 5.6 % of the aggregate projected GDP of these regions. In some cases, notably in some of the new Member States, this proportion is considerably higher.

The methodology for verification is quite straightforward. (European Commission 2009) explains that compliance with additionality is verified at the national level. The national funds are considered to be additional if the average annual structural expenditure maintained in the period 2007-2013 is at least equal to the average annual structural expenditure incurred in the period 2000-2005 (for Member States that joined the EU in 2004, the reference period is 2004-2005). Eligible structural expenditure covers three main categories (basic infrastructure,

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<sup>10</sup> More specifically, the report states that, “indeed, the target level of national structural expenditure is set on the basis of the forecasts on GDP growth available ex-ante. Member States, which expect higher GDP growth rates, tend to envisage higher investments as their economy leaves more room for additional structural expenditure. Over the period 2004-2006, the real GDP growth exceeded the initial forecasts in all the Member States concerned by this document. Higher GDP growth meant additional financial resources available for the public sector and, therefore, more room to undertake new investments not planned when the target level of expenditure was set.”

human resources and productive environment) as well as total national structural expenditure in both budget and off-budget expenditure.

The additionality verification is only carried out for regions eligible under the Convergence objective for the period 2007–2013; this covers 7 out of 8 NUTS2 Czech regions – all except for the capital city Prague. In those Member States where not all the national territory is eligible under the Convergence objective, geographical corrections were made in order to exclude structural expenditure in non-eligible regions. In some cases, this was done using assumptions or estimation methods (including for the Czech Republic and the Slovak Republic).

The first part of Table 2A shows the level of average annual structural expenditure to be maintained by each Member State throughout the period 2007-2013. The Commission and the Member State concerned agreed these amounts during negotiations for the NSRF (National Strategic Reference Framework). For the Czech Republic, Table 2 implies that the country agreed to maintain structural expenditure of at least 2549 million EUR per year (in 2006 prices). As for the expenditure categories (not shown here and only in some detail in European Commission (2009)), investment funded by the Structural Funds, which is additional to the national investment according to the requirements of the principle of additionality, helps to balance the composition of public investment to the benefit of expenditure in support of the productive environment (innovation, support to entrepreneurship, tourism services, etc.). These conclusions need to be taken with a degree of caution, as national nomenclatures underlying the additionality tables are not fully aligned. Moreover, these tables do not take account of payments made from the Cohesion Fund.

The second part of Table 2A, adapted from the fourth section of (European Commission 2009), includes Cohesion Fund in addition to the Structural Funds, and shows that the Czech Republic has some of the lowest levels (indeed, the second lowest after Slovakia) of national expenditure per euro of Community co-financing (which might be associated with a relatively high allocation of EU funds to the Czech Republic in that period, or with relatively low national expenditure). As table 3 in European Commission (2009) shows, the Czech Republic's expected average annual public investment 2007-2013 was 4,91% of GDP, half (2,44%) of this from national investment and the other half from Community investment (2,47%).

**Table 1. Regression (OLS) results**

	Total expenditure		Common expenditure		Personal expenditure		Investment	
	Lower	Higher	Lower	Higher	Lower	Higher	Lower	Higher
<b>Intercept (*10<sup>6</sup>)</b>	12.898 (1272764)	12.156 (6867162)	2.622 (9677195)	2.363 (2803105)	2.721 (3739545)	2.253 (946813)	7.554 (994262)	7.54 (11475933)
<b>Integrated Operational Programme (IOP)</b>	0.49*** (0.05)	2.27 (1.62)	0.16*** (0.01)	-0.02 (0.39)	0.04*** (0)	0.01 (0.05)	0.30*** (0.07)	2.28 (1.23)
<b>Human Resources and Employment Operational Programme (HREOP)</b>	3.2 (2.48)	2.85 (6.21)	1.07 (0.79)	0.76 (1.75)	1.94*** (0.21)	2.79*** (0.45)	0.18 (2.42)	-0.7 (5.57)
<b>Education for Competitiveness Operational Programme (ECOP)</b>	-1.88 (47.63)	-14.86 (72.41)	0.03 (30.67)	-0.82 (58.3)	2.91*** (0.69)	3.70** (1.43)	-4.83 (17.34)	-17.74 (45.78)
<b>Operational Programme Environment (OPE)</b>	0.98*** (0.05)	1.22** *	0.16*** (0.01)	0.01 (0.02)	-0.03*** (0)	0 (0)	0.85*** (0.05)	1.20*** (0.05)
<b>Regional Operational Programmes (ROP)</b>	0.99*** (0.01)	1.53** *	0.10*** (0.01)	0.26*** (0.02)	0.02*** (0)	0.10*** (0.01)	0.87*** (0.01)	1.17*** (0.04)
<b>Tax income</b>	3.18*** (0.01)	3.40** *	1.13*** (0)	1.21*** (0)	0.92*** (0)	0.92*** (0)	1.13*** (0.01)	1.27*** (0.01)
<b>Debt increase</b>	0.78*** (0.07)	0.44** *	0.01 (0.07)	-0.01 (0.08)	0.09*** (0)	0.04*** (0)	0.68*** (0.09)	0.41*** (0.06)
<b>Debt decrease</b>	0.57*** (0.02)	0.62** *	-0.03*** (0)	0.06*** (0)	0.04*** (0)	0.03*** (0)	0.56*** (0.02)	0.53*** (0.03)
<b>R<sup>2</sup></b>	0.94	0.94	0.85	0.85	0.92	0.92	0.82	0.81
<b>Adj. R<sup>2</sup></b>	0.94	0.94	0.85	0.85	0.92	0.92	0.81	0.81
<b>Num. obs.</b>	786	786	786	786	786	786	786	786

*Source: Authors on the basis of the data sources discussed in the text.*

**Table 2. T-tests for the crowding out hypothesis using results from Table 1 on relevant coefficients (t-statistics, p-values and significance \*\*\* for a one-sided t-test H0: coef>1)**

	Total expenditure		Common expenditure		Personal expenditure		Investment	
	Lower	Higher	Lower	Higher	Lower	Higher	Lower	Higher
<b>Integrated Operational Programme (IOP)</b>	0.49*** (0.05)	2.27 (1.62)	0.16*** (0.01)	-0.02** (0.39)	0.04*** (0)	0.01*** (0.05)	0.30*** (0.07)	2.28 (1.23)
<b>Human Resources and Employment Operational Programme (HREOP)</b>	3.2 (2.48)	2.85 (6.21)	1.07 (0.79)	0.76 (1.75)	1.94 (0.21)	2.79 (0.45)	0.18 (2.42)	-0.7 (5.57)
<b>Education for Competitiveness Operational Programme (ECOP)</b>	-1.88 (47.63)	-14.86 (72.41)	0.03 (30.67)	-0.82 (58.3)	2.91 (0.69)	3.7 (1.43)	-4.83 (17.34)	-17.74 (45.78)
<b>Operational Programme Environment (OPE)</b>	0.98 (0.05)	1.22 (0.05)	0.16*** (0.01)	0.01*** (0.02)	-0.03*** (0)	-0.00*** (0)	0.85** (0.05)	1.2 (0.05)
<b>Regional Operational Programmes (ROP)</b>	0.99 (0.01)	1.53 (0.07)	0.10*** (0.01)	0.26*** (0.02)	0.02*** (0)	0.10*** (0.01)	0.87*** (0.01)	1.17 (0.04)

*Source: Authors on the basis of the data sources discussed in the text.*

**Table 1A: Results of the ex-post assessment of additionality (annual average, million EUR, 1999 prices)**

Country	Target	Actual Level	Variation
CZ	1314.5	2119.7	61.3%
EE	374.9	886.5	136.5%
HU	2991.7	3974.4	32.8%
LT	382.6	584.4	52.7%
LV	258.2	596.7	131.1%
MT	164.8	163	-1.1%
PL	6279.9	6207.4	-1.2%
SK	522.6	643.1	23.0%
SI	582	750.1	28.9%

*Source: European Commission (2007)*

**Table 2A. Report on ex ante verification of additionality in the regions eligible under the Convergence objective for the period 2007–2013**

Country	Amounts resulting from the verification of the principle of additionality by MS (in million EUR, 2006 prices)			Average annual national public investment per EUR of Community funding (2006 prices) and eligible population			
	2000-2005	2007-2013	Difference	EUR of national expenditure per EUR of Community co-financing (with Cohesion Fund)	EUR of national expenditure per EUR of Community co-financing (without Cohesion Fund)	Population of Convergence regions (in thousands)	Population of Convergence regions (in % of national populations)
Austria	139	139	0.0%	5.9	5.9	277	3.4%
Belgium	1.12	1.128	0.6%	16.9	16.9	1.284	12.3%
Bulgaria	782	919	17.6%	1.3	2.0	7.781	100.0%
Czech Republic	2.549	2.549	0.0%	1.0	1.4	9.04	88.6%
Estonia	1.213	1.316	8.4%	3.4	4.9	1.356	100.0%
France	1.749	1.815	3.8%	5.7	5.7	1.798	2.9%
Germany	22.601	16.504	-27.0%	7.8	7.8	15.176	18.4%
Greece	8.339	8.661	3.9%	3.6	4.3	10.202	92.2%
Hungary	3.33	3.33	0.0%	1.7	2.4	7.272	72.0%
Italy	17.871	20.613	15.3%	7.6	7.6	17.445	30.0%
Latvia	595	971	63.2%	1.6	2.1	2.313	100.0%
Lithuania	755	755	0.0%	1.1	1.7	3.436	100.0%
Malta	103	107	3.4%	1.2	1.9	401	100.0%
Poland	6.502	7.94	22.1%	1.1	1.6	38.13	100.0%
Portugal	3.898	3.946	1.2%	1.6	1.7	7.507	71.5%
Romania	3.475	4.773	37.3%	2.8	4.7	21.673	100.0%
Slovakia	875	876	0.1%	0.7	0.9	4.782	88.9%
Slovenia	844	957	13.3%	2.3	3.5	1.997	100.0%
Spain	12.251	13.973	14.1%	4.4	4.6	15.709	36.8%
United Kingdom	3.126	3.465	10.8%	9.2	9.2	2.762	4.6%
Total / Average	92.118	94.735	2.8%	3.0	3.8	170.341	34.8%

*Source: European Commission's DG REGIO calculations (based on the Commission projections available at the time the expenditure targets were set, i.e. autumn 2006) on the basis of European Commission (2009) (specifically, tables 1 and 2)*

**Table A3. Median regression results**

	Total expenditure		Common expenditure		Personal expenditure		Investment	
	Lower	Lower	Higher	Lower	Higher	Lower	Higher	Lower
Intercept	2695717.75	472147.9	269113	91310.63	-	-	2455537	13763.9
	(1858138)	(1690025)	(749574)	(637534)	(607102)	(602783)	(1524412)	(1372175)
Integrated Operational Programme Environment (OPE)rational Programme (IOP)	0.61	2.06	0.15	0.01	0.03	0.15	0.35	1.29
	(0.42)	(2.31)	(0.2)	(0.83)	(0.12)	(0.39)	(0.67)	(1.38)
Human Resources and Employment Operational Programme Environment (OPE)rational Programme (HREOP)	4.39***	2.43	0.41	1.29	2.02***	2.15	0	-1.04
	(1.25)	(2.97)	(0.6)	(1.04)	(0.62)	(1.22)	(1.18)	(2.22)
Education for Competitiveness Operational Programme Environment (OPE)rational Programme (ECOP)	-5.71	-21.94	4.48	4.33	2.68	1.9	-4.14	-8.95
	(9.29)	(31.68)	(4.52)	(18.27)	(1.64)	(3.04)	(6.53)	(15.92)
Operational Programme Environment (OPE)	1.12***	1.14***	0.03	0.02	-0.03	-0.04	1.01***	1.24***
	(0.16)	(0.15)	(0.04)	(0.05)	(0.03)	(0.03)	(0.16)	(0.12)
Regional Operational Programmes (ROP)	0.96***	1.46***	0.09*	0.15	0.03	0.07	0.90***	1.31***
	(0.09)	(0.26)	(0.04)	(0.12)	(0.04)	(0.09)	(0.09)	(0.21)
Tax income	3.17***	3.54***	1.21***	1.23***	0.95***	0.97***	1.02***	1.21***
	(0.13)	(0.14)	(0.05)	(0.05)	(0.05)	(0.05)	(0.09)	(0.09)
Debt decrease	0.64**	0.58	-0.04	-0.12	0.11	0.09	0.87***	0.01
	(0.23)	(0.31)	(0.16)	(0.15)	(0.09)	(0.09)	(0.25)	(0.25)
Debt increase	0.38*	0.55	-0.01	-0.01	0.02	0.05	0.48*	0.74**
	(0.16)	(0.31)	(0.06)	(0.06)	(0.05)	(0.04)	(0.21)	(0.23)
Num. obs.	786	786	786	786	786	786	786	786

*Source: Authors on the basis of the data sources discussed in the text.*



**Table A4. Municipalities with high residuals (negative absolute differences between actual total expenditure and total expenditure predicted by the model) in CZK**

<b>ID (IČO)</b>	<b>Municipality</b>	<b>Actual total expenditure (2010-2013)</b>	<b>Total expenditure predicted by the model</b>	<b>Absolute difference (residual)</b>	<b>Relative difference</b>
263958	Město Litoměřice	775.93	1104.46	-328.53	-0.42
290629	Město Třebíč	1325.71	1584.31	-258.6	-0.2
278360	Město Trutnov	1044.46	1302.81	-258.35	-0.25
243132	Město Příbram	1029.38	1279.58	-250.2	-0.24
263141	Město Raspenava	585.52	815.88	-230.36	-0.39
248801	Město Pelhřimov	467.21	658.8	-191.59	-0.41
304387	Město Valašské Meziříčí	1003.15	1172.08	-168.93	-0.17
260428	Město Česká Lípa	1075.78	1241.79	-166.01	-0.15
261939	Město Klášterec nad Ohří	447.99	609.97	-161.98	-0.36
264334	Město Roudnice nad Labem	431.05	581.1	-150.05	-0.35
266027	Město Litvínov	968.05	1113.52	-145.47	-0.15
298212	Město Nový Jičín	760.17	901.03	-140.86	-0.19
304271	Město Rožnov pod Radhoštěm	470.25	607.62	-137.37	-0.29
255661	Město Klatovy	677.6	813.61	-136.01	-0.2
283061	Město Břeclav	826.75	961.09	-134.34	-0.16
304450	Město Vsetín	862.87	996.8	-133.93	-0.16
295671	Město Velké Meziříčí	363.23	485.13	-121.9	-0.34
241636	Město Řevnice	93.11	209.87	-116.76	-1.25
301311	Město Hranice	610.16	711.33	-101.17	-0.17
297313	Město Třinec	1252.07	1349.11	-97.04	-0.08
277037	Město Moravská Třebová	618.16	713.82	-95.66	-0.15
278955	Město Choceň	202.24	294.54	-92.3	-0.46
298441	Město Studénka	414.06	504.5	-90.44	-0.22
287351	Město Kroměříž	898.85	988.89	-90.04	-0.1
281859	Město Ivančice	296.16	385.94	-89.78	-0.3
252859	Město Sezimovo Ústí	152.73	237.46	-84.73	-0.55
277444	Město Svitavy	710.65	787.55	-76.9	-0.11
300144	Město Hradec nad Moravicí	153.78	228.94	-75.16	-0.49

*Source: Authors on the basis of the data sources discussed in the text.*

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