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February 2015

Online at <https://mpra.ub.uni-muenchen.de/77596/>

MPRA Paper No. 77596, posted 20 Mar 2017 06:58 UTC

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**Fiscal Decentralization and Inflation in Central and Eastern Europe**

**Abstract**

Theoretical conceptions offer ambiguous suggestions about the precise sign of the association between decentralization and inflation (positive or negative). Given the different channels in which decentralization affects macroeconomic stability, this relationship becomes a matter of empirical research. This paper provides empirical evidence on the association between decentralization and inflation on a panel of 11 former transition economies from Central and Eastern Europe (CEE) over the 1991-2011 period. The main findings from our empirical study suggest that decentralizing government activities in CEE countries is conducive with lower inflation rates. Also, we show that not only the extent of fiscal decentralization, but the composition of local revenue, too, matters for macroeconomic stability. Finally, we show that the relationship between fiscal decentralization and inflation is non-linear, i.e. initially, decentralization has favourable effects on macroeconomic stability, but above some threshold, these effects disappear. In these regards, the result from our study are consistent with several theoretical explanations: the commitment theory, the theory of continuity, and the theory of collective action.

Key Words: Fiscal Decentralization, Inflation, Central and Eastern Europe, Panel Data Models

JEL Codes: E31, E63, H71, H72, H73, P35, P52.

## **I Introduction**

Traditionally, the theory of fiscal federalism has been preoccupied with the efficiency in the provision of public goods at subnational levels of government and the associated effects on the size of the general government (Buchanan and Wagner 1977, Tiebout 1956). In these regards, it is argued that decentralization should deliver both smaller and more efficient government due to the comparative advantage in the allocation of resources (Oates 1972) and/or by promoting the tax competition between the different levels of government (Brennan and Buchanan 1980). The empirical research in this field has been pioneered by Oates (1972, 1985), followed by a number of studies that have provided conflicting evidence on this issue, such as: Baskaran (2011), Cassette and Paty (2010), Fiva (2006), Forbes and Zampelli (1989), Grossman (1989), Grossman and West (1994), Heil (1991), Joulfaian and Marlow (1991), Marlow (1988), Martínez-Vázquez and Yao (2009), Prohl and Schneider (2009), Rodden (2003), Stein (1998).

Subsequently, the growing interest on the association between decentralization and government size has set another topic on the research agenda, which is closely related with the former: How does decentralization affect the overall fiscal performance? Following these lines, a large body of literature has accumulated on the effects of decentralization on the fiscal performance of general government as measured by budget deficits or public debt (For instance, see Afonso and Hauptmeier 2009, Baskaran 2010 and 2012, de Mello 2007, Ebel and Yilmaz 2002, Eyraud and Lusinyan 2013, Horváthová et al. 2012, Neyapti 2010, Rodden 2002, Rodden and Wibbels 2002, Thornton 2009).

As can be seen, although having emerged from very different initial position, the empirical literature in the area of fiscal federalism has gradually evolved towards dealing with some macroeconomic issues. In these regards, the finding that the intergovernmental fiscal relations have an important bearing on the overall fiscal discipline, quite naturally, has raised concerns about the potential effects of fiscal decentralization on the macroeconomic stability. The research interest in the effects of decentralization on macroeconomic stability has evolved only recently in both the theoretical and empirical literature in this field.

Undoubtedly, this has been a consequence of the widespread consensus that, in the long-run, inflation is a monetary phenomenon caused by the excessive money growth (Friedman, 1968).

In this paper we provide empirical evidence on the relationship between fiscal decentralization and inflation on a panel of 11 CEE countries during the period of 1991-2011 by employing three measures of fiscal decentralization: expenditure decentralization, revenue decentralization, and vertical fiscal imbalance. In our empirical investigation we test for the possible non-linear relationship between decentralization and inflation. In addition, the regression model includes several control variables capturing macroeconomic, and institutional factors affecting price stability, such as: the output growth, the trade openness, the budget balance, the existence of fiscal rules, the level of central bank independence, the exchange rate regime, and the arrangements with the IMF. To the best of our knowledge, this is the first attempt to investigate the association between fiscal decentralization and inflation focusing solely on the CEE region. Another contribution of our study is that it takes into account the potential non-linear relationship between these variables.

The main findings from our empirical study suggest that decentralizing government activities in CEE countries is conducive with lower inflation rates. Also, we show that not only the extent of fiscal decentralization, but the composition of local revenue, too, matters for macroeconomic stability. In these regards, providing local governments with higher autonomy in financing their activities by relying more on their “own” tax revenues instead of intergovernmental grants seems to promote macroeconomic stability. Finally, we show that the relationship between fiscal decentralization and inflation is non-linear, i.e. initially, decentralization has favourable effects on macroeconomic stability, but above some threshold, these effects disappear. In these regards, the result from our study are consistent with several theoretical explanations: Initially, decentralization provides for an effective mechanism preventing the central government to engage in excessive public expenditure (the commitment theory); however, increasing the scope and the extent of decentralization creates large complexities in the political decision-making process, which leads to inertia in fiscal and monetary arrangements (the theory of continuity) and/or enables local governments to pursue expansionary policies (the theory of collective action). As a result, above some critical point, the initial favourable effects of fiscal decentralization on macroeconomic stability tend to diminish.

As for the organization of the paper, the following section deals with the relationship between decentralization and macroeconomic stability in the theory of fiscal federalism; Section III

provides an overview of the empirical literature on the association between fiscal decentralization and macroeconomic stability; In section IV we provide some formal econometric evidence on the relationship between decentralization and inflation in the CEE countries, whereas the last section concludes.

## **II The decentralization-inflation link in the theory of fiscal federalism**

Treisman (2000) summarizes the theoretical views on the decentralization-inflation relationship in three groups: the commitment theory, the theory of collective action, and the theory of continuity. In what follows, we provide a brief overview on these alternative explanations about the possible association between decentralization and macroeconomic outcomes.

According to the commitment theory, inflation is a consequence of the lack of commitment mechanism that would force politicians to meet their promises for maintaining macroeconomic stability, including low inflation. Under these circumstance, when markets expect low inflation, the unanticipated increase in the money supply would result in larger output effects. On the other hand, when economic agents have already formed their inflation expectations, it would be easier and less costly for policymakers to accommodate to the prevailing inflation rate than to reverse the trend in the inflation dynamics. For these reasons, governments often tend to pursue expansionary policies (large public expenditure and high inflation rates), disregarding their high economic costs, because it is their ex post optimal strategy. Hence, the solution to the policymakers' inflationary bias is the enforcement mechanism that would make policymakers committed to low inflation (Barro and Gordon, 1983, Kydland and Prescott 1977). Within the framework of commitment theory, decentralization leads to an increase in the number of political agents making decisions on public expenditure at several levels of government. In this way, decentralization threatens the "comfortable" position of the central government and, thus, may serve as effective mechanism preventing the central government to engage in excessive public expenditure and to renege on their commitment for maintaining price stability (Qian and Roland, 1998). Therefore, this line of reasoning suggests that the higher degree of fiscal decentralization would be associated with lower inflation.

Fiscal decentralization can contribute to macroeconomic stability via another channel, too: the political independence of central bank. In decentralized political systems there are tight and well-defined rules that stipulate the relationship between fiscal authorities and central

banks, which provide a higher level of central bank independence and, hence, lower level of inflation (Shah, 2004). For instance, Lohman (1998) argues that decentralization is among the decisive factors in delivering low-inflation environment in Germany after the World War II. According to this view, the Bundesbank has been able to retain its high level of political independence due to the way the federal political system had been designed. Specifically, the majority of the members of the Executive Board are nominated by the upper house of the parliament (the Bundesrat), which represents the federal states. In addition, the Bundesrat has the power to impose veto on the legislative concerning the central bank. Therefore, this voting system prevents the central government to interfere in the central bank's activities or to engage in populist policies with inflationary effects.

The theory of collective action views inflation as a consequence of the joint action of multiple political and economic agents. According to this theory, price stability is a public good characterized by non-exclusivity in its consumption so that when the number of agents taking part in the supply of the public good, is large, the quantity supplied will be less than the optimal one (Olson 1965, Samuelson 1954). Within this framework, the larger the number of agents that make decisions on fiscal and monetary policies, the lower their motivation to maintain price stability so that inflation will be higher. Specifically, in contrast to the central government, local governments are less interested in macroeconomic stability because, due to the limited jurisdiction of local governments, the costs of inflation can be easily spilled over the boundaries of their jurisdiction while the benefits of excessive public expenditure remain within their boundaries. Therefore, local governments have higher preferences toward inflation in comparison to central government so that fiscal decentralization may lead to higher inflation (Treisman, 2000).

According to the theory of continuity, decentralization neither increases nor decreases inflation, but it "locks" the inflation rate at the existing level notwithstanding whether it is high or low. Specifically, in decentralized systems there are numerous agents involved in the decision-making process affecting fiscal and monetary policies, which makes the prevailing policy to be resistant to any changes (Tsebelis 1995). Therefore, unitary countries are able to introduce sharp changes of macroeconomic policies in any direction, whereas policy changes in federal countries are sluggish.

As can be seen, the commitment theory and the theory of collective action offer different explanations about what causes inflation. The former points to the central government as the ultimate driver of inflation pressures via the excessive public expenditure and the subsequent monetization of the public debt. In contrast, the latter theory argues that it is the local

government that creates the inflationary pressures as they have the possibility to internalize the benefits of public expenditure while externalizing the costs of them (higher inflation). As a result, the two theories produce different predictions on the effects of decentralization on inflation, i.e. the former assumes a negative relationship between decentralization and inflation while the latter suggests a positive association.

Yet, the above mentioned theoretical views could be seen as complementary in the following sense: In the decentralized countries, where the political power is dispersed across several levels of government, it is harder for the central government to renege on its commitment to price stability (the commitment theory). On the one hand, this leads to inertia in the changes of monetary and fiscal arrangements (the theory of continuity), but on the other hand, the local governments are able to exert stronger inflationary pressures (the theory of collective action). Hence, from a theoretical point of view, *a priori* it is difficult to provide any suggestions as to the precise sign of the association between decentralization and inflation (positive or negative). Given the different channels in which decentralization affects macroeconomic stability, probably it is fair to state that identifying the precise direction of this relationship becomes a matter of empirical research, which should take into account several other determinants of macroeconomic stability, such as: the level of economic development, the quality of governance and institutions, the openness of the economy, the monetary and exchange-rate arrangements etc.

### **III A brief review of the empirical literature**

Most of the empirical research on the relationship between inflation and fiscal decentralization has been done on a cross-country basis. A notable exception is Feltenstein and Iwata (2005), who provide evidence on the negative relationship between inflation and decentralization in China during 1952-1996. In what follows we provide a brief overview of the main findings from these studies. King and Ma (2001) replicate the study of Campillo and Miron (1997) on the central bank independence-inflation link controlling for the degree of decentralization. The basic finding from their study is that, excluding the countries with high inflation rates, central bank independence has stronger effects on price stability in the countries with a higher degree of decentralization. Working with the same sample as King and Ma (2001), Neyapti (2004) finds that, controlling for the level of central bank independence and for the local government autonomy, fiscal decentralization has statistically negative effects on inflation in both low-inflation and high-inflation countries.

Treisman (2000) explores the effects of decentralization on inflation on a sample of 87 industrialized and developing countries and finds a significant difference among the two groups of countries: In the OECD countries, the higher level of decentralization contributes to the central bank independence, thus, leading to lower average inflation. On the other hand, in the developing countries, decentralization is associated with higher inflation rates because it increases the governments' bias towards excessive public expenditure, creating a pressure on central banks to monetize the public debt. Martínez-Vázquez and McNab (2001, 2006), too, confirm that the effects of decentralization on macroeconomic stability differ among the developed and the developing countries. Specifically, they conclude that decentralization is more likely to result in macroeconomic instability in the developing countries, where local governments tend to borrow above their fiscal capacity with adverse consequences on the central government's fiscal discipline and inflation. Based on a sample of 62 countries during 1972-2001, Jalil et al. (2012) find a negative association between fiscal decentralization and inflation, controlling for various political and institutional features. King and Ma (2000) examine the relationship between macroeconomic performance and fiscal decentralization in the OECD countries, and show that this relationship has evolved over time as a result of the increased international policy co-ordination. Specifically, they find that, prior to 1985, decentralized countries had better macroeconomic performance, but by 1996 this relationship turned to be statistically insignificant.

Unlike the previous studies that use local revenues as a proxy for decentralization, Thornton (2007) draws on the data provided by Stegarescu (2005), making an explicit reference to the local government autonomy in determining tax rates and/or tax base. Based on these data on local governments' tax autonomy, Thornton (2007) concludes that the effects of decentralization on inflation are not as statistically significant as the previous studies usually find. According to him, this contrast in the results obtained is due to the different measures of the extent of fiscal decentralization. Baskaran (2012), too, employs "own" local government revenues as a measure of decentralization, but he takes into account the changes in the tax autonomy over time. Consequently, his main finding is in line with the rest of the empirical literature, i.e. decentralization has statistically significant negative effects on inflation. Finally, employing a qualitative index of fiscal decentralization, Shah (2006) runs a cross-country regression for 40 countries over the 1995-2000 period and finds a negative but insignificant relationship.

Summarizing the above results, we can conclude that, generally, the empirical literature seems to be supportive to the hypothesis that the higher degree of fiscal decentralization is



associated with lower inflation (Baskaran, 2012, Feltenstein and Iwata 2005, Jalil et al. 2012, King and Ma 2001, Neyapti 2004) though the relationship may differ among developed and developing countries (Martínez-Vázquez and McNab 2001, Martínez-Vázquez and McNab 2006, Treisman, 2000). In fact, these differences suggest that decentralization affects macroeconomic stability indirectly, usually through its effects on the overall fiscal discipline and the subsequent monetization of the public debt. In these regards, the effects of decentralization on inflation are heavily determined by the level of central bank independence. Accordingly, in the countries with weak institutions, decentralization may deteriorate fiscal discipline, which, provided that central banks are not independent, leads to increased pressures towards monetization of budget deficits, resulting in higher inflation.

#### **IV. The relationship between inflation and decentralization in CEE countries – Empirical evidence**

##### *Data issues*

In this section we provide formal econometric evidence on the relationship between fiscal decentralization and inflation on a sample consisting of the former CEE transition countries. In these regards, we regress the inflation rate on the two widely used measures of fiscal decentralization: the share of local government expenditure in total public expenditure (as a proxy of expenditure decentralization) and the share of local government revenue in total public revenue (revenue decentralization). As these measures may overstate the true extent of fiscal decentralization, as they disregard the true fiscal autonomy of subnational governments, we also employ an alternative measure of decentralization – the vertical fiscal imbalance, represented by the share of intergovernmental fiscal transfers in total subnational revenue. In this way, we are able to check whether the composition of local financing, i.e. the reliance on “own” revenues versus fiscal transfers, has any effect on inflation in these countries.

Our empirical investigation is based on annual data for a panel of 11 CEE countries during the period of 1991-2011. Besides providing larger samples, panel data models enable us to deal with the unobserved heterogeneity, something that is not possible when working with pure cross-section or time-series models. Due to the data availability we work with an unbalanced panel, i.e. the time dimension is not equal for all the cross-sections. Specifically, the panel consists of the following countries with the respective time periods given in the

parentheses: Bulgaria (1991-2011), Croatia (1996-2011), Czech Republic (1993-2011), Estonia (1994-2011), Hungary (1992-2011), Latvia (1994-2011), Lithuania (1993-2011), Poland (1994-2011), Romania (1992-2011), Slovakia (1996-2011), and Slovenia (1992-2011).

Given the aims of our paper, the Consumer Price Index inflation rate is stated as a dependent variable in the empirical model. However, instead of working with the actual inflation, we use the transformed inflation rates, i.e. the rate of real depreciation of money, which is a common approach in the empirical studies comprising high-inflation episodes (For instance, see Baskaran 2011, Cukierman et al. 1992; Cukierman et al. 2002, Maliszewski, 2000, and Neyapti 2004). The transformed inflation rate (*inflt*) is obtained by applying the following formula:

$$inflt = infl / (1 + infl) \quad (1)$$

where *inflt* is the transformed inflation rate, and *infl* is the inflation rate expressed in decimal points. The data of inflation rates are obtained from the International Monetary Fund's (IMF's) World Economic Outlook database.

As mentioned above, due to the complex nature of the decentralization process, we employ three measures of the extent of fiscal decentralization: expenditure decentralization (*edec*), i.e. the percentage share of subnational government expenditure in total government expenditure (general government); revenue decentralization (*rdec*), i.e. the share of subnational government revenue in total government revenue (general government); and the vertical fiscal imbalance (*vfi*), i.e. the percentage share of intergovernmental grants in local government revenue. The theoretical arguments presented in Section II suggest several different channels through which fiscal decentralization might affect macroeconomic stability. Reflecting the presence of these countervailing forces, the relationship between decentralization and inflation need not be linear. Hence, in order to test the validity of the quadratic function we include the square of the decentralization variable in the regression model (*edecsq*, *rdecsq*, and *vfisq*, respectively). The data on the three decentralization variables (*edec*, *rdec*, and *vfi*) are taken from the from the March 2014 issue of the World Bank's Fiscal Decentralization Indicators Database, which is derived from the IMF's Government Finance Statistics.

Further on, we have introduced the following control variables in the empirical model: output growth (*gdp*), the budget balance (*budget*), trade openness (*open*), central bank independence (*cbi*), fiscal rules (*rule*), a dummy variables for fixed exchange-rate regimes (*fix*), and a dummy variable for the arrangements with the IMF (*imf*). In what follows, we give a brief

justification for including the explanatory variables in the empirical model and their *a priori* expected sign.

The output growth variable (*gdp*) is included in order to control for the effects of aggregate demand pressures, i.e. economic expansion is associated with upward pressures on the aggregate price level. However, note that this textbook argument may be questionable in the case of the transition economies, especially during the initial transition stage spanning through the 1990s. For example, in many CEE economies the pre-transition output level had been reached as late as in the 2000s. Hence, for much of the sample period one may raise doubts whether higher output growth has indeed signaled an 'overheated' economy. As a consequence, although the expected sign of the output growth variable is expected to be positive, in the case of the transition economies its significance and sign cannot be clearly determined due to the afore-mentioned issues. The real GDP growth data are taken from the IMF's World Economic Outlook Database

As for the association between the budget balance and inflation, the standard textbook arguments suggest that budget deficits, especially in case they are monetised, i.e. financed through direct central bank credit to the government, increase aggregate demand, thus fuelling inflation. Indeed, this explanation may be relevant for transition economies for several reasons: initially, they were characterised by underdeveloped securities markets, and thus, governments relied heavily on central bank financing; during the high inflation period, most of these countries have recorded large budget deficits; at least initially, these countries have been characterised by inefficient tax systems, i.e. poor tax collection procedures. The expected sign of the budget balance variable (*budget*) is negative. As for the construction of this variable, the budget balance refers to the general government and it is expressed as a percent of GDP. The data on the budget balance are taken from the IMF's World Economic Outlook Database.

Trade openness is included in the regression following Romer (1993), who argues that incentives to inflate are lower in open economies for two reasons: first, monetary expansion leads to real exchange rate depreciation, and second, openness worsens the output-inflation trade-off. Again, the case for the negative relationship between openness and inflation may not be very strong. For instance, Temple (2002) challenges the argument that the Phillips curve is steeper in open economies, while Terra (1998) shows that Romer's findings have been affected by the debt crisis in the 1980s. Therefore, the expected sign of trade openness variable (*open*) is ambiguous. The data on trade openness are taken from the IMF's World Economic Outlook database.

Overtime a substantial body of theoretical (Barro and Gordon 1983, Kydland and Prescott 1977, Rogoff 1985, Walsh 1995) and empirical literature (Bogoev et al. 2012, Campillo and Miron 1996, Cukierman et al. 1992, Cukierman et al. 2002, Loungani and Sheets 1997, Maliszewski, 2000, Petrevski et al. 2012) has accumulated, suggesting that greater central bank independence is an effective institutional mechanism in providing price stability (for a comprehensive review see Bogoev and Petrevski 2015). Hence, the expected sign of this variable (*cbi*) is negative. As for the measurement of central bank independence, we use the Cukierman weighted index (Cukierman 1992) obtained from Cukierman et al. (2002), and Bogoev et al. (2012).

Recently, a number of fiscal rules have been introduced in the EU countries as an institutional mechanism aimed at ensuring fiscal discipline. In order to test for the presumed beneficial effects of fiscal rules we employ the Fiscal Rule Index (FRI) as calculated by the European Commission. It is based on the standardized Fiscal Rule Strength Index (FRSI), which is calculated taking account several criteria, such as: the legal basis, the room for revising objectives, the monitoring and enforcement mechanisms, and media visibility. Then, the FRSIs are aggregated to a single comprehensive score per country per year. Finally, the time-varying FRI is obtained by multiplying the aggregate FRSIs by the coverage of government finances at various levels (central, regional and local government). The data on FRIs are taken from the European Commission Fiscal Rule Index Database, available at: [http://ec.europa.eu/economy\\_finance/db\\_indicators/fiscal\\_governance/fiscal\\_rules/index\\_en.htm](http://ec.europa.eu/economy_finance/db_indicators/fiscal_governance/fiscal_rules/index_en.htm). Also, this Database provides for more details on the FRIs calculation procedure. As the existence of fiscal rules are presumed to provide fiscal discipline and to prevent “soft” budget constraints, the expected sign of the regression coefficient of this variable (*rule*) is negative.

It is often argued that fixed exchange rates provide nominal anchor for controlling inflation in several ways, such as: tying the prices of domestically produced tradable goods to those in the anchor country; breaking the inflation inertia; providing an automatic rule for the money supply that eliminates the time-inconsistency problem and imposing discipline on the fiscal policy. These advantages seem to be appealing especially for the countries with weak political, economic and cultural institutions to pursue discretionary monetary policy (Cottarelli et al., 1998; Edwards, 1995; Ghosh et al. 1997; Mishkin, 1997, 1998, and 1999; Mishkin and Savastano, 2001; and Obstfeld and Rogoff, 1995). In order to control for the presumed beneficial impact of the fixed exchange rate regime on inflation we introduce a dummy variable (*fix*), which is expected to have a negative sign. Since the IMF classification of the official exchange rate regimes can be misleading, when constructing the dummy we

have used the *de facto* classification of the exchange rate regimes as defined by Reinhart and Rogoff (2004).

The rationale for including the IMF dummy variable is that in the initial period of transition most of the CEE economies have supported their stabilisation programmes by signing arrangements with the IMF (Maliszewski, 2000). Alongside the financial support, these arrangements serve an important role of enabling the countries to ‘borrow’ the credibility from the IMF (Cottarelli and Giannini, 1998). Moreover, the vital contribution of the IMF arrangements is reflected in the surveillance on the adequacy of macroeconomic policies pursued by the country - a function that has become a central role in the IMF activities (Gutián, 1992). Consequently, the expected sign of this variable (*imf*) is negative. The information on the countries’ arrangements is taken from the IMF’s web site.

### *Methodology*

The empirical model has the following general specification:

$$y_{it} = \alpha_i + \gamma z_{it} + x_{it} \beta' + u_{it} \quad (2)$$

where:  $y$  is the dependent variable (*infl*);  $z$  represents the various alternative measures of fiscal decentralization (*edec*, *rdec*, and *vfi*);  $x$  is a  $k$ -dimensional vector of the control variables (*gdp*, *budget*, *open*, *cbi*, *rule*, *fix*, *imf*);  $\alpha$ ,  $\gamma$  and  $\beta$  are the constant, the parameter before the fiscal decentralization variable and the  $k$ -dimensional vector of parameters of the control variables, respectively;  $u$  are the residuals; while  $i$  and  $t$  are the country and time subscripts, respectively.

When estimating a panel data model the researcher is confronted with the choice between the fixed and the random effects model. Our preferred choice is the fixed effects panel data model, which seems to be more appropriate when working with macro panels, especially when the cross-sections are not sampled randomly and when the research focuses on the behaviour of the specific sample without drawing inferences about the whole population. In addition, the fixed effects estimator is consistent even when individual effects are correlated with the regressors (Baltagi, 2008). Consequently, the assumption that the regressors are not correlated with the disturbance term, which is critical for employing the random effects model, should be considered the exception rather than the rule since many of the regressors included in the model may be correlated with the unobserved country-specific effects (Wooldridge, 2002). Formally, the choice between the fixed effects vis-à-vis the random

effects model is based on the Hausman-test (Hausman, 1978), which investigates whether there is a systematic difference between the estimated coefficients from the fixed and the random effects models. As shown in the bottom of Table 1, the Hausman-test rejects the null-hypothesis that the regressors and the disturbances are not correlated only in the model specification with *vfi* as a regressor, thus, favoring the fixed effects model. However, in the specifications with *edec* and *rdec* the test statistic is not significant, implying that the random effects model seems to be appropriate. At the same time, when the empirical model is estimated by the fixed effects, the results of the F-test for the joint significance of the fixed effects is always significant, thus providing a support for the fixed effects method.

Given this conflicting evidence, in Table 1 we provide the estimates from both the fixed and the random effects model. As can be seen, it turns out that neither the parameter estimates nor their statistical significance is affected by the choice between the fixed and the random effects models, because in both cases we obtain similar results. Both the fixed and the random effects models have been estimated by the feasible Generalized Least Squares technique with panel corrected standard errors as a way to correct for the presence of cross-section heteroskedasticity and contemporaneous correlation.

### *Main findings and discussion*

Table 1 presents the results of the empirical model estimated by the fixed effects (regressions 1 to 3) and the random effects model (regressions 4 to 6). In both cases, the regressions differ only by the fiscal decentralization variable employed (*edec*, *rdec*, and *vfi*, respectively). In what follows we comment the main findings from the empirical investigation.

Table 1 approximately here

Regressions 1 and 4 show the estimates with the expenditure decentralization variable. As can be seen, the coefficient of *edec* has a negative sign and it is both statistically significant (at 1% and 5%, respectively) and economically important. Also, the magnitude of the regression coefficient is quite similar in both the fixed effects and the random effects models. Hence, this finding implies that fiscal decentralization in the CEE region exerts favourable effects on macroeconomic stability by contributing to lower inflation rates. However, this

result does not show up with revenue decentralization as a proxy for fiscal decentralization (regressions 2 and 5). As can be seen in Table 1, in the two regression models, although the coefficient before *reddec* is negative, it is not statistically significant. Also, in comparison to the regressions with expenditure decentralization, the magnitude of this variable is much smaller (from 0.51 to 0.53), suggesting that revenue decentralization does not matter for price stability. Further on, the favourable influence of fiscal decentralization on inflation is confirmed by regressions 3 and 6, which show the estimates with vertical fiscal imbalance (*vfi*) as a proxy for decentralization. Here, the regression coefficient is positive, statistically significant and with comparable magnitude across the two models. These results are in line with those obtained with *edec* as a measure of fiscal decentralization, suggesting that providing local governments with higher autonomy in financing their activities, by relying more on their “own” tax revenues instead of intergovernmental grants (lower *vfi*), seems to be conducive with macroeconomic stability. Also, the results obtained with *vfi* support the view that not only the extent of fiscal decentralization, but the composition of local revenue, too, matters for macroeconomic stability. In these regards, this result is consistent with the above findings of statistically insignificant coefficient before *revdec* as this variable may not represent the true tax autonomy of subnational governments.

As mentioned in the variable description, the various channels in which decentralization might affect macroeconomic stability imply that the relationship between fiscal decentralization and inflation need not be linear. In order to test this proposition, we included the squared values of the decentralization variables among the list of regressors. As can be seen from Table 1, in most of the regressions the coefficients before the quadratic terms are statistically significant, thus, confirming the non-linear relationship between decentralization and inflation. Specifically, when working with *edec*, the coefficient of the quadratic term is positive, implying a convex relationship, i.e. higher expenditure decentralization contributes to lower inflation rates. However, above a certain threshold these effects begin to vanish, i.e. the further increase in decentralization appears to be detrimental to maintaining price stability. The same conclusion can be reached when working with *vfi*: once again, the coefficient of the quadratic term is statistically significant, thus suggesting a non-linear effects of decentralization on inflation rates. In accordance with the different interpretation of *vfi* (higher values of this variable mean lower level of decentralization), here the quadratic term is negative, thus, implying that the relationship between this measure of decentralization and inflation has the inverted “U” form. In other words, higher vertical fiscal imbalance (lower tax autonomy of local governments) worsens macroeconomic stability up to a certain

critical point. Finally, note that the results obtained with *reded* as a measure of decentralization suggest a convex relationship, too, but they are not statistically significant.

As for the control variables included in the regression, we obtain mixed findings. For instance, we provide strong evidence that central bank independence, fiscal rules and fixed exchange rate regimes exert negative effects on inflation, which is in line with the *a priori* expectations. In all the six regressions these variables are statistically significant at 1%, and the magnitudes of the regression coefficients point to their economic importance. However, this is not true for the dummy variable for the arrangements with the IMF, which, although with the expected negative sign, is both statistically insignificant and with low values of the regression coefficients (close to zero). In addition, we obtain counterintuitive results for the *gdp* and *budget* variables: the former is statistically significant at 1%, but with a “wrong” (negative) sign, while the latter is both statistically insignificant and with the “wrong” (positive) sign. As already mentioned in the variable description, the counterintuitive results for the *gdp* variable can be justified on the grounds that output growth may not be associated with upward inflationary pressures in the CEE economies, at least during the initial transition period. Indeed, during the first half of the 1990s many transition countries were faced with high inflation rates and low output growth. As for the counterintuitive results for the *budget* variable, they remain a puzzle. Finally, our estimates of the *open* variable do not provide support to the argument raised by Romer (1993) that trade openness is associated with lower inflation. In fact, this variable has a positive sign across all the regressions and it is statistically significant only in the first two regressions.

In sum, we provide empirical support to the advocates of decentralization, who claim that it contributes to macroeconomic stability by delivering more efficient government and eliminating the “soft” budget constraints. This result may be especially relevant for the former communist countries, which began the economic transition with high level of centralization coupled with large and highly inefficient public sector. Under these conditions, decentralizing government activities (accompanied by widespread reforms towards democratization of the society and introducing market economy) may have led to an increase in the efficiency in the provision of public goods with the resulting favourable effects on macroeconomic stability (Shah, 2004). In addition, we provide evidence that, to some extent, the effects of decentralization on inflation depends on the measure of fiscal decentralization, i.e. the revenue decentralization is not associated with price stability. However, the findings that both the expenditure decentralization and the vertical fiscal imbalance are statistically significant imply that, besides the extent of decentralization, the composition of local



government finance matters, too. Specifically, we show that the higher local governments' reliance on intergovernmental transfers worsens macroeconomic stability, which is line with Rodden (2003), Rodden et al. (2003), and Stein (1998). Finally, we show that the relationship between fiscal decentralization and inflation is non-linear, i.e. initially, decentralization has favourable effects on macroeconomic stability, but above some threshold, these effects disappear. In these regards, the result from our study are consistent with several theoretical explanations: Initially, decentralization provides for an effective mechanism preventing the central government to engage in excessive public expenditure (the commitment theory); however, increasing the scope and the extent of decentralization creates large complexities in the political decision-making process, which leads to inertia in fiscal and monetary arrangements (the theory of continuity) and/or enables local governments to pursue expansionary policies (the theory of collective action). As a result, above some critical point, the initial favourable effects of fiscal decentralization on macroeconomic stability tend to diminish.

## **V. Conclusion**

In this paper we provide empirical evidence on the relationship between fiscal decentralization and inflation on a panel of 11 CEE countries during the period of 1991-2011 by employing three measures of fiscal decentralization: expenditure decentralization, revenue decentralization, and vertical fiscal imbalance. In our empirical investigation we test for the possible non-linear relationship between decentralization and inflation. In addition, the regression model includes several control variables capturing macroeconomic, and institutional factors affecting price stability, such as: the output growth, the trade openness, the budget balance, the existence of fiscal rules, the level of central bank independence, the exchange rate regime, and the arrangements with the IMF.

The main findings from our empirical study imply that decentralizing government activities in CEE countries is conducive with lower inflation rates. Also, we show that not only the extent of fiscal decentralization, but the composition of local revenue, too, matters for price stability. In these regards, providing local governments with higher autonomy in financing their activities by relying more on their "own" tax revenues instead of intergovernmental grants seems to promote macroeconomic stability. Finally, we show that the relationship between fiscal decentralization and inflation is non-linear, i.e. initially, decentralization has favourable effects on macroeconomic stability, but above some threshold, these effects

disappear. In these regards, the result from our study are consistent with several theoretical explanations: Initially, decentralization provides for an effective mechanism preventing the central government to engage in excessive public expenditure (the commitment theory); however, increasing the scope and the extent of decentralization creates large complexities in the political decision-making process, which leads to inertia in fiscal and monetary arrangements (the theory of continuity) and/or enables local governments to pursue expansionary policies (the theory of collective action). As a result, above some critical point, the initial favourable effects of fiscal decentralization on macroeconomic stability tend to diminish.

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Table 1: Regression output for the CEE countries (1996-2012)

Variables	Fixed effects			Random effects		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>const</i>	0.4453*** (0.0693)	0.4043*** (0.0707)	0.2622*** (0.0516)	0.5087*** (0.0820)	0.4859*** (0.0921)	0.3632*** (0.0669)
<i>edec</i>	-1.3120** (0.5576)			-1.2689* (0.7102)		
<i>rdec</i>		-0.5068 (0.4719)			-0.5281 (0.6822)	
<i>vfi</i>			0.5973*** (0.1970)			0.4507** (0.2269)
<i>edecsq</i>	3.4969** (1.4483)			3.4161* (1.9245)		
<i>rdecsq</i>		0.9712 (1.1020)			0.8829 (1.6036)	
<i>vfisq</i>			-0.6831*** (0.2434)			-0.4952* (0.2941)
<i>gdp</i>	-0.5874*** (0.1293)	-0.7016*** (0.1383)	-0.7046*** (0.1332)	-0.7054*** (0.1894)	-0.7724*** (0.1990)	-0.7865*** (0.1901)
<i>budget</i>	0.2245 (0.1798)	0.2863 (0.1838)	0.2482 (0.1630)	0.2540 (0.2502)	0.3000 (0.2475)	0.4101* (0.2472)
<i>open</i>	0.0589* (0.0334)	0.0632* (0.0344)	0.0367 (0.0342)	0.0308 (0.0333)	0.0325 (0.0350)	0.0086 (0.0313)
<i>cbi</i>	-0.3128*** (0.0412)	-0.3198*** (0.0420)	0.3298*** (0.0396)	-0.3143*** (0.0466)	-0.3268*** (0.0491)	-0.3398*** (0.0511)
<i>rule</i>	-0.0493*** (0.0129)	-0.0537*** (0.0132)	-0.0548*** (0.0119)	-0.0595*** (0.0152)	-0.0617*** (0.0150)	-0.0617*** (0.0133)
<i>fix</i>	-0.0417*** (0.0136)	-0.0421*** (0.0141)	-0.0284** (0.0127)	-0.0920*** (0.0191)	-0.0935*** (0.0193)	-0.0807*** (0.0187)
<i>imf</i>	-0.0025 (0.0132)	-0.0105 (0.0139)	-0.0083 (0.0133)	-0.0021 (0.0173)	-0.0080 (0.0178)	0.0006 (0.0185)
<i>R</i> <sup>2</sup>	0.6049	0.5897	0.6043	0.5461	0.5396	0.5411
<i>F-stat.</i>	6.1383***	6.2809***	6.5511***			
<i>Hausman-test</i>				10.6050	11.3060	18.3439**
<i>Obs.</i>	202	204	205	202	204	205

Notes:

1. \*\*\*/\*\*/\* denotes significance at 1%, 5% and 10% level of significance, respectively.
2. Panel corrected standard-errors in the parentheses below the regression coefficients.