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Fragmentation and Vertical Fiscal Imbalances: Lessons from Moldova

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Abstract

Using a novel municipality-level panel dataset, this paper investigates the empirical
characteristics of vertical fiscal imbalances (VFIs) in Moldova over the period 2005–13. The
results show that the extent of variation in VFIs across 898 municipalities can be explained by
the level of per capita income, fiscal capacity, and demographic characteristics, as well as the
central government's fiscal behavior that reflects fiscal constraints and policy preferences at
the national level. Political affiliation does not appear to be a significant factor, and the results
are inconclusive in terms of direction. While some model specifications show larger VFIs
when the mayor of a municipality belongs to the same party ruling the central government,
other models suggest better coordination and thus lower VFIs. Altogether, these findings
underscore the need for well-coordinated reforms to create economies of scale, enhance
revenue collection, and improve the composition of spending at the subnational level.

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I. INTRODUCTION

Fiscal decentralization—devolving some authority for fiscal policymaking to subnational governments (SNGs)—has become a global phenomenon in governance, rooted in the theoretical premise that SNGs are better positioned for the cost-effective provision of public goods and services that match local preferences (Tiebout, 1956; Musgrave, 1959; Oates, 1972, 1999; Brennan and Buchanan, 1980).[1] Fiscal decentralization based on financing of large vertical fiscal imbalances (VFIs) from a common pool of national resources, however, can undermine hard budget constraints and discourage SNGs from fully internalizing the cost of local expenditures.[2] Empirical studies have indeed found that fiscal decentralization with large VFIs tends to put concomitant pressures on the fiscal position across all layers of government (Fornasari and Webb, 2000; Rooden 2002, 2003; Eyraud and Lusinyan, 2013).

Moldova presents an interesting case to analyze the mismatch between the decentralization of expenditure functions and revenue sources, especially in view of the country's efforts for a greater degree of fiscal decentralization. The administrative-territorial structure of Moldova is extremely fragmented, with 33 regional governments and 898 municipalities covering 3.4 million people. There are 26.4 municipalities per 100,000 inhabitants, even higher than the most fragmented European countries. The sub-optimal size of municipalities results in large diseconomies scale in administrative capacity, revenue mobilization, and spending efficiency, making SNGs dependent on central government transfers. Although fiscal policy formulation remains centralized and SNGs have limited discretion in formulating expenditure and tax policy, VFIs are not simply dictated by the central government according to a hard budget constraint. First, while SNGs are required by law to have "balanced" budgets, the definition of "balanced budget" includes privatization revenues, the balance carried forward from the prior year, and borrowing. Second, there are no administrative and financial sanctions on SNGs for violating the "balanced budget" rule, and intergovernmental transfers remain open-ended without a predetermined limit. As a result, fiscal capacity and underlying economic and demographic characteristics at the subnational level are influential in determining the fiscal behavior of SNGs and thereby the level of VFIs.

There is a large body of empirical research investigating fiscal decentralization, but most of these studies overlook the determinants of VFIs at the subnational level and instead focus

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[1] Quantifying the economic impact of fiscal decentralization is beyond the scope of this paper, but cross-country studies have found mixed evidence (see, for example, Davoodi and Zou, 1998; Treisman, 2000; Fisman and Gatti, 2002; Martinez-Vasquez and McNab, 2006; Baskaran and Feld, 2009). This may partly be because of incomparable measures of decentralization across countries (Treisman, 2003), as well as structural and institutional conditions that affect the potential effectiveness of fiscal decentralization (De Mello, 2000; King and Ma, 2001; Neyapti, 2010; Zhang, 2006; Tanzi, 2008; Kyriacou and Sagales, 2009).

[2] There is no unambiguous definition of VFI, but the literature usually measures it as a mismatch between expenditure responsibilities and own-source revenues at the subnational level. Sharma (2012) provides an overview of the literature on VFIs.

exclusively on the impact on fiscal performance at the national level. There is also little empirical analysis on intergovernmental fiscal relations in Moldova. De Mello (2001) showed that fiscal decentralization is associated with larger SNGs, similar to cross-country empirical findings. This evidence, however, was based on the aggregated regional cross-sectional data that mask the extent of disparities in underlying fiscal positions across SNGs. Accordingly, this paper contributes to the literature by exploiting a novel panel dataset on 898 municipalities in Moldova—and a battery of econometric techniques including dynamic modeling—to analyze the empirical characteristics of VFIs defined as transfer dependency over the period from 2005 to 2013.

The empirical results show that municipality-level income per capita, proxied by electricity consumption per capita, is a statistically significant factor, with a corrective (negative) effect on the VFI, indicating that municipalities with higher per capita income have lower VFIs. A similarly negative relationship is found between subnational fiscal capacity, measured by relative revenue effort, and the level of VFIs, suggesting that higher revenue effort leads to a narrowing of VFIs. I also detect that the central government's fiscal behavior tends to influence the level of VFIs, reflecting fiscal constraints and policy preferences at the national level. Population is shown to have a significant negative effect on VFIs, indicating that municipalities with higher population have a considerably lower level of VFIs. On the other hand, the dependency ratio, as measured by the share of people aged less than 15 and over 62 in population, is found to have a worsening effect on the VFI, indicating that SNGs with a high dependency ratio tend to collect less own-source revenues and thereby have larger VFIs. Last but not least, political party affiliation appears to be an insignificant factor in determining VFIs, and the results are inconclusive in terms of direction. While some model specifications show larger VFIs when the mayor of a municipality belongs to the same party (or coalition of parties) ruling the central government, other models suggest better coordination and thus lower VFIs.

The findings presented in this paper have important policy implications and underscore the need for a range of well-coordinated complementary reforms, particularly as SNGs gain greater fiscal autonomy. First, administrative and territorial consolidation is necessary to create economies of scale, enhance revenue collection, and improve the composition of spending, which are currently heavily dependent on central government transfers and skewed towards current expenditures. Second, there is great scope to improve revenue mobilization at the subnational level by restructuring revenue administration and assignments. Third, developing a rule-based fiscal framework would strengthen fiscal oversight of SNGs and provide better guidance for setting fiscal policy objectives and medium-term planning across all levels of government.

The remainder of this paper is organized as follows. Section II outlines demographic characteristics and the institutional setting in Moldova. Section III describes data sources and definitions. Section IV describes the econometric specification, methodological

approaches, and key empirical findings. Section V provides recommendations to strengthen fiscal decentralization in Moldova. The paper ends with concluding remarks in Section VI.

II. DEMOGRAPHIC CHARACTERISTICS AND INSTITUTIONAL SETTING

Moldova is a unitary state, with a two-tier structure of SNGs. Excluding Transnistria, there are 32 *raions* (districts) plus the municipalities of Balti and Chisinau and the autonomous region of Gagauzia—forming (upper) Tier II—and 896 commune, town and village municipalities—forming (lower) Tier I.[3] Both levels of SNGs are governed by political representatives, who include elected mayors and council members.

About 60 percent of Moldova's population still lives in rural areas, and 844 municipalities— out of 898 including Balti and Chisinau—are rural settlements. Half of rural municipalities have fewer than 2,000 residents, and about 93 percent have fewer than 5,000 residents. As of 2013, population varies from a minimum of 215 to a maximum of 638,481, with an average of 3,766, resulting in a low level of population density and a high degree of jurisdictional fragmentation across the country. As a result, there are 26.4 municipalities per 100,000 inhabitants in Moldova, even higher than the most fragmented European countries like the Czech Republic (24), France (21) and Austria (21).

Each SNG has a separate budget and plays an important role in the delivery of public goods and services, ranging from general administrative services to education, healthcare, environmental services and public utilities. On an aggregate basis, SNGs account for 22 percent of general government spending (or 9.5 percent of GDP) as of 2013. Although this is a substantial amount, SNGs have limited discretion over expenditures—such as wages and education—that are determined by the central government. Across 898 municipalities, current expenditures account for 88 percent of total spending, with wages claiming 38 percent. Consequently, investment spending by SNGs is limited to 17 percent of total expenditures (or about 1.4 percent of GDP).

SNGs' own-source revenues excluding shared tax revenues account for 2.4 percent of general government revenues excluding grants—or about 0.8 percent of GDP. These local revenues are raised through property tax and various non-tax revenues in the form of fees, levies and royalties for the use of and exploitation of natural resources and user charges for goods and services provided locally. Own-source revenues recorded a marked decline from 1.2 percent of GDP in 2005, while shared revenues—including corporate and personal income taxes and the value-added tax—remained practically unchanged at about 2.9 percent of GDP. As a result, transfers from the central government remain one of the largest sources of funding at the subnational level.

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[3] Transnistria is a breakaway region of Moldova that has not been recognized internationally as an independent state, whereas Gagauzia has a special legal status with its own governor and local parliament.

Moldova has been through several waves of administrative-territorial reform. After independence in 1991, the administrative-territorial reform aimed at reducing the number of SNGs to the pre-Soviet structure of governance based on larger entities, but failed to provide adequate funding for the regionalized delivery of public goods and services. This reform initiative was later reversed following a change in government in the early 2000s, putting in place the country's current model of local public administration.

The new decentralization reform brings about major changes in administrative organization, but without any territorial restructuring.[4] As outlined in the National Decentralization Strategy of 2012, the current reform initiative is more modest, focusing on granting greater fiscal autonomy to SNGs and encouraging them to enhance the collection of own-source revenues. Introducing a formula-based revenue sharing arrangement for SNGs, the amendment of the Law on Local Public Finance (LPF) in 2013 has effectively removed the disincentive for subnational revenue mobilization in the earlier law, which inversely linked own-source revenues and transfers provided from the central government—i.e. the more a SNG collected the less transfer it received. Revenue raising capacity will now be part of the transfer formula, alongside other parameters such as population and geographical size. Furthermore, the new formula-based regime eliminates fiscal subordination of municipalities to the *raion*-level governments. At the same time, the reform gives SNGs greater autonomy in setting local expenditure priorities and more discretion in formulating their own budgets.

III. DATA OVERVIEW

The foundation of this paper is a unique panel dataset on public finances of 898 SNGs in Moldova, which is, along with central government finance statistics, obtained from the Ministry of Finance. The corresponding demographic statistics and election results and political party affiliations are based on the data sourced from the National Bureau of Statistics and the Central Electoral Commission, respectively. Because municipality-level data on economic activity do not exist, I use electricity consumption per capita as a proxy indicator for the level of income per capita in each SNG. The data on annual electricity consumption—measured in kilowatt-hour (kWh) by municipality—are obtained from Gas Natural Fenosa Moldova and the National Energy Regulatory Agency (ANRE), and transformed into a per capita basis. Comprising of annual observations covering the period from 2005 to 2013, the panel dataset is balanced, except for electricity consumption, which is available for 876 out of 898 municipalities.

There is not a universally accepted definition of VFI. One of the most frequently used approaches calculates VFI as a share of SNG spending that is financed by own-source

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[4] The fiscal decentralization framework is being implemented on a pilot basis in 2014, with full implementation covering all SNGs planned from January 1, 2015.

revenues excluding shared tax revenues and transfers from the central government. Although it is common in the literature to exclude shared tax revenues in calculating own-source revenues, this may give a misleading picture of subnational finances, since it is more efficient to administer complex tax instruments at the national level. Accordingly, in this paper, I use two alternative VFI measures as the dependent variable: (1) the ratio of own-source revenues and shared tax revenues to spending; and (2) the share of central government transfers in total revenues.[5]

$$\text{VFI1} = 1 - [\frac{own\ revenues + shared\ revenues}{spending}]$$

$$\text{VFI2} = 1 - [\frac{central\ government\ transfers}{total\ revenues}]$$

Table 1 presents a summary of the descriptive statistics of all the variables used in the empirical analysis, along with their expected impact on the dependent variable. There is a great degree of dispersion across 898 municipalities in terms of VFIs and underlying characteristics. The mean value of the VFI1 is 81.1 percent over the sample period from 2005 to 2013, but it varies from a minimum of -20 percent to a maximum of 98.7 percent.[6] Similarly, the VFI2 has a mean value of 80 percent and ranges from a minimum of -47.9 percent to a maximum of 98.7 percent. A lower reading of VFI indicates a higher level of self-financing capacity.

Table 1. Descriptive Statistics

	Number of observations	Mean	Minimum	Maximum	Standard deviation	Expected impact
Dependent variables						
VFI1	8,082	81.1	-20.0	98.7	12.3	
VFI2	8,082	80.0	-47.9	98.7	13.4	
Independent variables						
Electricity consumption per capita (ELC)	6,796	434.5	2.5	15,064.6	604.8	Negative
Revenue effort (REV)	8,082	1.0	-0.1	16.0	0.6	Negative
Central government budget balance (CGBAL)	8,082	-1.3	-5.9	1.9	2.1	Negative
Political party affiliation	8,068	0.4	0.0	1.0	0.5	Positive
Population (POP)	8,082	3,775	215	638,481	21,504	Negative
Dependency ratio (DEP)	8,082	35.7	17.9	56.1	5.0	Positive

Source: Author's calculations based on data from the Ministry of Finance, the National Bureau of Statistics, the Central Election Commission, ANRE, and Gas Natural Fenosa Moldova.

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[5] While these VFI measures gauge the degree to which SNGs rely on central government transfers, they do not distinguish what proportion of central government transfers is conditional (specific) versus general purpose.

[6] A negative value for central government transfers is a result of reverse transfers to the central government by SNGs that have revenues in excess of 20 percent of per capita expenditure. Out of 898 municipalities, only three municipalities—Chisinau, Codru and Vatra—had reverse transfers during the sample period.

Independent variables show analogous patterns of significant variation across 898 municipalities. Income per capita—proxied by electricity consumption per capita—varies from a minimum of 2.5 kWh per year to 15,065 kWh, with a mean value of 435 kWh. Subnational revenue effort—measured by the ratio of a municipality's per capita own-source revenues relative to the average level of per capita own-source revenues across all municipalities—varies from a minimum of -0.1 to a maximum of 16, with a mean value of 1 during the period 2005–13. There is a substantial variation in population, which ranges from a minimum of 215 to a maximum of 638,481, with a mean value of 3,775 over the sample period. The dependency ratio—measured by the share of people aged less than 15 and over 62 in population—differs from a minimum of 17.9 percent to a maximum of 56.1 percent, with a mean value of 35.7 percent during the sample period. Finally, I include the central government budget balance as a measure of the fiscal policy stance at the national level. As a share of GDP, the central government budget balance moves from a deficit of 5.9 percent to a surplus of 1.9 percent, with the mean value turning out to be a deficit of 1.3 percent.

It is important to analyze the time-series properties of the data to avoid spurious results due to the presence of unit roots in the data. Even though the Im-Pesaran-Shin (2003) procedure is widely used in the empirical literature to conduct a panel unit root test, the dataset used in this paper has a short time dimension, which can produce incorrect inferences with unit root tests whose asymptotic properties are established by assuming that the time dimension tends to infinity. Accordingly, I use the Harris-Tsavalis (1999) test, which works better with short time series as it assumes that the time dimension is fixed. The results conclude that all the series, including the logarithm of electricity consumption per capita, population and dependency ratio, are stationary in levels.[7]

IV. EMPIRICAL STRATEGY AND ESTIMATIONS

Using disaggregated data covering 898 municipalities over the period 2005–13, I investigate the empirical characteristics of VFIs with the following model:

$$VFI_{i,t} = \alpha ELC_{i,t} + \beta REV_{i,t} + \gamma CGBAL_{t-1} + \delta POL_{i,t} + \theta POP_{i,t} + \vartheta DEP_{i,t} + \eta_i + v_t + \varepsilon_{i,t}$$

where $VFI_{i,t}$ is the vertical fiscal imbalance in SNG i at time t. $ELC_{i,t}$ is the logarithm of electricity consumption per capita, which is used as a proxy for municipality-level economic activity and expected to have a corrective (negative) effect on the VFI. $REV_{i,t}$ stands for subnational revenue effort as measured by the ratio of per capita own-source revenues in SNG i at time t relative to the average level of per capita own-source revenues across all SNGs at time t, which is expected to have a corrective (negative) effect. $CGBAL_{t-1}$ is the central government budget balance as a share of GDP at time $t-1$, which captures fiscal

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[7] The unit root test results are available upon request.

constraints and policy preferences at the national level and is expected to have a corrective (negative) effect on the VFI.[8] $POL_{i,t}$ represents a binary indicator of political affiliation of SNG i at time t that takes value 1 if the mayor of SNG belongs to the party (or coalition of parties) ruling the central government, and 0 if otherwise. A positive coefficient on $POL_{i,t}$ would indicate political favoritism, whereas a negative coefficient would suggest better policy coordination between the central government and mayors belonging to the same party (or coalition of parties). $POP_{i,t}$ is the logarithm of population, which captures demographic characteristics of each municipality and provides an indication economies of scale. Population is expected to have a corrective (negative) effect on the VFI. $DEP_{i,t}$ is the logarithm of the dependency ratio as measured by the share of people aged less than 15 and over 62 in population, and it is expected to a worsening (positive) effect on VFIs. The η_i and ν_t coefficients denote municipality and time specific effects, while $\varepsilon_{i,t}$ is the idiosyncratic error term that satisfies the standard assumptions of zero mean and constant variance.

A. Static Models

I employ three alternative estimation methods that control for municipality-specific and time-invariant unobservable factors that may affect both dependent and independent variables.[9] Since panel data tend to have complex error structures and the standard estimation techniques do not explicitly take care of temporally and spatially correlated errors, both the fixed effects and random effects models may yield inefficient coefficient estimates with biased standard errors. The Wooldridge-Drukker test indeed detects the presence of first-order serial correlation in the panel data used in this analysis.[10] Accordingly, I estimate the fixed effects and random effects models with AR(1) disturbances as developed by Baltagi and Wu (1999). I also employ an alternative estimator, based on a Prais-Winsten regression with panel-corrected standard errors (PCSE), which produces more accurate coefficient standard errors with insignificant loss in efficiency, as suggested by Beck and Katz (1995). An important advantage of the PCSE procedure is to correct for interdependence of the error terms across municipalities and across time.

The results of three different estimation techniques, reported in Table 3, convey a similar story in terms of economic and statistical significance for both measures of the VFI. I find that electricity consumption per capita—the proxy indicator for municipality-level income

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[8] Instead of contemporaneous observations, the lagged values of *CGBAL* are used in the estimations to avoid the problem of endogeneity.

[9] Since the standard estimations may be sensitive to outliers, I also estimate the models excluding observations that are greater than the 97.5 percentile or less than the 2.5 percentile of the distribution. Omitting outliers, however, does not lead to major changes in the estimation results in terms of size and statistical significance.

[10] Implementing an idea originally proposed by Wooldridge (2002), Drukker (2003) developed an easy-to-use test for serial correlation in panel data based on the OLS residuals of the first-differenced model.

per capita—is a significant determinant of VFIs, with a corrective (negative) impact, across all model specifications. Similarly, the coefficient on subnational revenue effort is found to be highly significant with an economically substantial corrective effect on the VFI, even though the proxy measure used in the analysis may not reflect the full extent of underperformance relative to a jurisdiction's potential revenue capacity.[11] These findings confirm that the level of income per capita and subnational fiscal capacity are critical for sustainable fiscal decentralization, and therefore it is imperative to achieve greater economies of scale and to enhance subnational revenue mobilization.

Table 2. Determinants of VFIs: Static Model Estimations

	Fixed effects		Random effects		PCSE	
	VFI1	VFI2	VFI1	VFI2	VFI1	VFI2
Income per capita (ELC_t)	-5.33***	-7.71***	-4.04***	-5.43***	-3.59***	-4.90***
	(-6.59)	(-8.82)	(-9.96)	(-11.92)	(-4.57)	(-4.68)
Revenue effort (REV_t)	-4.12***	-4.77***	-5.36***	-5.87***	-6.64***	-6.76***
	(-12.51)	(-13.38)	(-19.59)	(-19.46)	(-9.27)	(-10.63)
Central government budget balance ($CGBAL_{t-1}$)	-0.99***	-1.19***	-0.94***	-1.10***	-0.62	-0.75
	(-17.24)	(-19.10)	(-17.91)	(-19.37)	(-1.19)	(-1.22)
Political party affiliation (POL_t)	-0.41	-0.29	-0.31	-0.20	0.05	0.11
	(-1.64)	(-1.08)	(-1.24)	(-0.74)	(0.28)	(0.75)
Population (POP_t)	-2.82	-5.07**	-4.65***	-5.54***	-4.73***	-5.42***
	(-1.30)	(-2.17)	(-10.90)	(-11.38)	(-11.69)	(-9.57)
Dependency ratio (DEP_t)	2.76	3.53	5.02***	6.14***	7.97***	9.57***
	(1.23)	(1.46)	(2.63)	(2.93)	(4.62)	(4.39)
F-statistic	79.76	93.86				
Prob	0.00	0.00				
Wald chi^2 statistic			1072.89	1182.98	212.39	165.30
Prob			0.00	0.00	0.00	0.00
Hausman statistic	70.62	71.48				
Prob	0.00	0.00				
Overall R^2	0.38	0.40	0.41	0.43	0.97	0.96
Number of SNGs	876	876	876	876	876	876
Number of observations	6146	6146	6146	6146	6146	6146

Notes: The dependent variable is the vertical fiscal imbalance as defined in Section III. The sample period is from 2005 to 2013. t-statistics for the fixed effects and random effects models and z-statistics for the PCSE using Prais-Winsten regression are reported in parenthesis. All regressions include a constant term, which is not displayed in the table. ***,**, and * denote significance at the levels of 1, 5, and 10 percent, respectively.

Source: Author's estimations based on data from the Ministry of Finance, the National Bureau of Statistics, the Central Election Commission, ANRE, and Gas Natural Fenosa Moldova.

Since Moldova is a unitary state with a centralized framework for fiscal policy, I include the lagged central government budget balance as an independent variable in the empirical

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[11] Ideally, a municipality's actual own-source revenues should be compared to the predicted value of its revenue potential (capacity) using a regression-based approach. Due to the lack of municipality-level data on tax base and rates, I proxy a municipality's revenue effort with the ratio of its per capita own-source revenues relative to the average level of per capita own-source revenues across all municipalities.

analysis. The results show that the central government's fiscal policy behavior has a statistically significant effect on the level of VFIs. This implies that fiscal consolidation, for example, at the central government level leads to a narrowing of VFIs at the subnational level. This relationship represents a number of dynamics, including fiscal constraints and policy preferences at the national level.

Demographic characteristics play a critical role in determining the level of VFIs across 898 municipalities. First, population is found to have a statistically significant and economically large negative effect on the level of VFIs across all specifications, indicating that municipalities with higher population have a significantly lower level of VFI.[12] This is largely a reflection of greater revenue-raising capacity as well as economies of scale in the provision of public goods and services. Second, the dependency ratio has an economically substantial positive—worsening—effect on VFIs, as expected. Municipalities with a high rate of youth and/or ageing population collect less own-source revenues per capita than a municipality with a more favorable age group structure. Thereby, these findings demonstrate the need for administrative and territorial consolidation in Moldova to strengthen fiscal decentralization.

Political party affiliation does not appear to be a statistically significant factor in determining the level of VFIs across municipalities, and the results are inconclusive in terms of direction. The PCSE model yields a positive coefficient on political party affiliation, indicating that VFIs tend to be larger when the mayor of a municipality belongs to the same party (or coalition of parties) ruling the central government. This may be a reflection of the problem of moral hazard, arising because politically-affiliated SNGs might believe that the central government would provide fiscal assistance. On the other hand, other models yield a negative coefficient on the political party affiliation variable, suggesting better policy coordination between the central government and mayors belonging to the same party (or coalition of parties) and thereby lower VFIs.

B. Dynamic Models

It is well documented in the literature that the conventional panel estimations are subject to a number of problems such as outliers, unobservable heterogeneity, measurement errors, and omitted variables. This is particularly the case when subnational expenditures include both autonomous spending and spending on behalf of the central government. Even after introducing a variety of corrective procedures, the potential endogeneity (reverse causality) in the relationship between the VFI and subnational revenue effort remains a concern. One way to deal with this issue is to find an instrumental variable for subnational revenue effort

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[12] I also estimate the models including the squared term of population to test if population has a non-linear threshold effect on the VFI. The results are not robust, but indicate an inverted U-shaped relationship, with a positive coefficient on population and a negative coefficient on its square term.

that would be independent of the VFI measures, but the lack of data with time and municipal variations prevents the implementation of an instrumental variable approach in this case. In a rudimentary attempt, I estimate the model omitting the subnational revenue effort variable and reach similar results with no change in the sign and significance of other explanatory variables. More importantly, however, I estimate a dynamic panel specification with the lagged VFI as an explanatory variable, which addresses the potential endogeneity of the regressors as well as measurement errors.

From a methodological point of view, since the lagged dependent variable is correlated with the error term in a dynamic model of panel data, a possible solution is the Generalized Method of Moments (GMM) estimator developed by Holtz-Eakin, Newey, and Rosen (1988) and Arellano and Bond (1991). This technique transforms the data into first differences and corrects for biases associated with endogenous regressors and unobserved heterogeneity. One drawback of the difference GMM technique, however, is that the estimation tends to have low precision in samples with small time dimension and high persistence. Alternatively, Arellano and Bover (1995) and Blundell and Bond (1998) augmented the difference GMM estimator by combining the regression in first differences with the regression in levels in a system in which the two equations are separately instrumented. The system GMM estimator performs well with panels that have a large cross-sectional dimension but smaller time dimension, as is the case with the dataset used in this paper (898 municipalities over a period of 9 years). I apply both the one-step and two-step versions of the system GMM estimator, with the Windmeijer (2005) finite sample correction for standard errors, to ensure the robustness of the results.[13]

The results of the system GMM estimations, presented in Table 3, are broadly consistent with the findings based on the fixed effects, random effects and PCSE models. The lagged VFIs have a positive and statistically significant coefficient, exhibiting a high degree of inertia. This finding also suggests that SNGs do not appear to take into account long-run solvency concerns arising from a sustained buildup of VFIs. The level of income per capita, as proxied by electricity consumption, remains a significant factor in determining both measures of the VFI, albeit with a smaller coefficient and somewhat less significant in the two-step estimation. The dynamic models also yield similar, statistically highly significant coefficients on the subnational revenue effort variable, especially compared to the PCSE model. Likewise, I find that the central government budget balance, population, and the dependency ratio have coefficients that are broadly consistent with those based on the standard estimation results in terms of magnitude, sign and statistical significance. One notable difference in the system GMM estimations is that political party affiliation appears to have a small negative coefficient across all versions of the model. Although it is still statistically insignificant, this

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[13] To avoid the problem of instrument proliferation in the GMM estimations, I follow the best practice and use the minimal number of instruments by collapsing the instrument set as suggested by Roodman (2009).

result suggests lower VFIs—through better coordination—when the mayor of a municipality belongs to the same party (or coalition of parties) ruling the central government.

The goodness-of-fit statistics for the standard models are satisfactory in general and relatively high in the case of the PCSE estimations. Similarly, the diagnostics of the system GMM estimations reject the presence of serial correlation and confirm the validity of the set of instruments used in the analysis. Taken as a whole, the findings indicate that the level of per capita income, subnational fiscal capacity and demographic characteristics are significant determinants of municipality-level VFIs in Moldova. I also show that the central government's fiscal policy stance influences the evolution of VFIs, reflecting fiscal constraints and policy preferences at the national level. Last but not least, while political party affiliation does not appear to be a significant factor, the findings suggest that VFIs tend to be larger when the mayor of a municipality belongs to the same party (or coalition of parties) ruling the central government.

Table 3. Determinants of VFIs: Dynamic Model Estimations

	One-step System GMM		Two-step System GMM	
	VFI1	VFI2	VFI1	VFI2
Lagged VFI (VFI$_{t-1}$)	0.39***	0.32***	0.40***	0.36***
	(7.30)	(7.71)	(5.40)	(6.04)
Income per capita (ELC$_t$)	-1.85***	-2.63***	-1.68*	-2.59**
	(-3.67)	(-4.16)	(-1.87)	(-2.29)
Revenue effort (REV$_t$)	-4.57***	-5.61***	-5.60**	-6.75***
	(-4.27)	(-5.47)	(-2.22)	(-2.70)
Central government budget balance (CGBAL$_{t-1}$)	-0.37***	-0.53***	-0.35***	-0.50***
	(-5.89)	(-10.59)	(-5.08)	(-8.94)
Political party affiliation (POL$_t$)	-0.16	-0.07	-0.12	-0.20
	(-0.74)	(-0.32)	(-0.32)	(-0.51)
Population (POP$_t$)	-3.20***	-4.23**	-3.19***	-4.47***
	(-5.26)	(-7.24)	(-3.17)	(-4.51)
Dependency ratio (DEP$_t$)	4.30**	6.75**	5.82*	8.54**
	(2.25)	(3.21)	(1.70)	(2.40)
Specification tests (p-values)				
AR(1)	0.00	0.00	0.00	0.00
AR(2)	0.67	0.38	0.68	0.49
Hansen	0.29	0.26	0.27	0.25
Difference-in-Hansen	0.40	0.49	0.40	0.43
Number of instruments	15	15	15	15
Number of SNGs	876	876	876	876
Number of observations	6146	6146	6146	6146

Notes: The dependent variable is the vertical fiscal imbalance as defined in Section III. The sample period is from 2005 to 2013. Estimations are carried out using the "xtabond2" package in Stata. Robust t-statistics, with standard errors clustered at the municipality level, are reported in parenthesis. All regressions include a constant term, which is not displayed in the table. ***,**, and * denote significance at the levels of 1, 5, and 10 percent, respectively.

Source: Author's estimations based on data from the Ministry of Finance, the National Bureau of Statistics, the Central Election Commission, ANRE, and Gas Natural Fenosa Moldova.

V. STRENGTHENING FISCAL DECENTRALIZATION

As SNGs gain greater fiscal autonomy, their fiscal behavior will become critical to fiscal performance at the national level. The empirical analysis presented in this paper indicates that realizing the potential efficiency gains of fiscal decentralization in Moldova—and beyond—requires a range of well-coordinated complementary reforms.

- First, territorial consolidation is necessary to create economies of scale in revenue mobilization and spending efficiency to make SNGs less transfer dependent, in view of a robust relationship between the size of SNG and its fiscal capacity. Accordingly, rationalizing the administrative-territorial structure would help enhance revenue collection and improve the composition of spending, which are heavily dependent on central government transfers and skewed towards current expenditures.[14]

- Second, there is great scope to boost subnational revenues by restructuring revenue administration and assignments. Local sources of revenue, such as property tax and various fees and levies, are grossly underutilized in Moldova because of low rates and understated valuations, as well as shortcomings in administration and enforcement.

The lack of data does not allow an empirical assessment of the role of municipal-level fiscal institutions in determining VFIs in Moldova, but international evidence indicates that developing a rule-based fiscal framework would provide better guidance for setting fiscal policy objectives and medium-term planning across all levels of government. Albeit strengthening fiscal management, Moldova's Fiscal Responsibility Law (FRL) does not explicitly provide guidance for coordination and shared responsibility between SNGs and the central government, especially in terms of bringing subnational fiscal performance in line with the national fiscal rule. Although the FRL requires SNGs to have their budgets in line with the national fiscal rule, it is silent on how this is to be achieved and monitored. It also does not require SNGs to report to the Ministry of Finance, which is responsible for the overall implementation of the FRL. Furthermore, this is not a strict constraint, since the existing regime allows SNGs to run budget deficits that are financed by privatization revenues, the balance carried forward from the prior year, and borrowing. There are also no administrative and financial sanctions on SNGs for violating the "balanced budget" rule. To address these weaknesses, the FRL should include the following set of fiscal rules for SNGs:

- Maintaining a balanced budget over a rolling three-year period;

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[14] Administrative-territorial rationalization is not just a matter of economic considerations. There are political and social considerations. In this context, the fiscal decentralization strategy can provide incentives for voluntary amalgamation and greater cooperation among SNGs by adjusting the transfer formulas according to the population size.

- Keeping the annual growth rate of expenditures below the average annual growth rate of revenue excluding central government transfers over the previous five years; and

- Sustaining the annual growth rate of current expenditure below the average annual growth rate of potential GDP over the previous five years.

With greater fiscal decentralization, the proper management of subnational debt becomes a critical issue to fiscal sustainability in particular. Currently, the LPF imposes limits on short- and long-term debt service of SNGs —defined as 5 percent and 20 percent of revenues including transfers from the central government, respectively. Even though the current level of SNG debt stock is low—standing at 0.7 percent of GDP as of end-2013, imposing a loose limit on debt service alone would not have any disciplining effect on fiscal behavior of SNGs and could potentially lead to an unsustainable accumulation of debt at the subnational level. Accordingly, debt ceilings should be on the stock of debt including guarantees provided to local public enterprises, as well as on debt service—and defined as a ratio to own-source revenues excluding transfers from the central government. Since most SNGs provide services through a number of local public enterprises, the definition of debt needs to cover local public enterprises, along with SNGs and local budget institutions.

VI. CONCLUSION

Fiscal decentralization has become a global phenomenon in governance, rooted in a theoretical premise that SNGs are better positioned for the cost-effective provision of public goods and services that match local preferences. Moldova is an interesting case to analyze the mismatch between expenditure and revenue decentralization, especially in view of the country's ambitious effort to achieve a greater degree of fiscal decentralization. The administrative-territorial structure of Moldova is extremely fragmented, with 898 municipalities covering 3.4 million people. There are 26.4 municipalities per 100,000 inhabitants in Moldova, even higher than the most fragmented European countries. The sub-optimal size of municipalities results in large diseconomies scale in administrative capacity, revenue mobilization, and spending efficiency, making SNGs highly dependent on transfers from the central government. Moreover, fiscal policy formulation remains highly centralized and SNGs have little discretion over expenditure and tax policy.

The empirical results, based on a novel municipality-level dataset, indicate that the level of income per capita—proxied by electricity consumption per capita—and subnational fiscal capacity are statistically significant determinants of the level of VFIs, with corrective (negative) effects. I also detect that the central government's fiscal behavior influences the level of VFIs across municipalities, reflecting fiscal constraints and policy preferences at the national level. Population is shown to have a significant negative effect on the VFI, indicating that municipalities with higher population have a considerably lower level of VFIs. On the other hand, the dependency ratio, as measured by the share of people aged less than 15 and over 62 in population, is found to have a worsening effect on the VFI, indicating that SNGs with a high dependency ratio tend to collect less own-source revenues and thereby

have larger VFIs. Last but not least, political party affiliation appears to be an insignificant factor in determining VFIs, and the results are inconclusive in terms of direction. While some model specifications show larger VFIs when the mayor of a municipality belongs to the same party (or coalition of parties) ruling the central government, other models suggest better coordination and thus lower VFIs.

As SNGs gain greater fiscal autonomy, subnational behavior will become critical to fiscal performance at the national level. In this context, Moldova needs to strike the right balance between potential efficiency gains and macroeconomic constraints, and to adjust the pace of fiscal decentralization according to the capacity of SNGs in carrying out effectively the functions assigned to them. Furthermore, to realize the potential efficiency gains of fiscal decentralization, Moldova needs to implement a range of well-coordinated complementary reforms. First, administrative and territorial consolidation is necessary to create economies of scale, enhance revenue collection, and improve the composition of spending, which are currently heavily dependent on central government transfers and skewed towards current expenditures. Second, there is great scope to improve revenue mobilization at the subnational level by restructuring revenue administration and assignments. Third, developing a rule-based fiscal framework would provide better guidance for setting fiscal policy objectives and medium-term planning across all levels of government.

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