Beata Guziejewska*
Katarzyna Walerysiak-Grzechowska**

Financial and Administrative Decentralisation and the Leviathan Hypothesis for Poland: Multivariant Cointegration Analysis

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Introduction

The article uses empirical data to test the validity of the Leviathan hypothesis regarding fiscal and administrative decentralisation in Poland. It is based on the assumption that both fiscal and financial decentralisation limits the growth of public administration and public expenditures. Studying the effect of decentralisation is challenging because its nature and extent vary enormously among countries, even if their socio-economic history is similar (see the study on the Visegrad group countries and the Baltic States: Guziejewska, 2018; for studies with large samples of countries, see Swianiewicz, 2014, von Daniels, 2016, OECD, 1999, 2002, 2011). There is also the problem of unambiguously interpreting the outcomes of research in this field, as indicated by Brülhart and Jametti (2007). There are, therefore, solid grounds for undertaking an in-depth and less aggregated investigation of unitary countries such as Poland. Its local government system makes an interesting object of research for the following reasons:

- for almost three decades, there have been deep and dynamic decentralisation reforms involving public administration, policymaking, public services and public finances;

* University of Lodz, Lodz, Poland, e-mail: beata.guziejewska@uni.lodz.pl, ORCID 0000-0002-0814-5066.

** University of Lodz, Lodz, Poland, e-mail: katarzyna.walerysiak@uni.lodz.pl, ORCID 0000-0002-6221-6291.

- since Poland replaced its one-tier self-government system with a three-tier one in 1999, there have been repeated calls to reduce the number of counties that make up the middle-level of local government;
- the results of empirical studies confirm the presence of fiscal illusion across the Polish financial system (Guziejewska, 2016), which increases the risk of the Leviathan problem emerging;
- cross-country panel analyses of the problem of decentralisation and its qualitative aspects have been inconclusive because they are too general. Therefore, a more disaggregate analytical approach seems both needed and justified;
- studying a unitary country with less-aggregated data allows the dynamics of decentralisation processes and their qualitative aspects to be captured.

Below, selected aspects of the decentralisation of Poland's government sector between 1999 and 2020 are subjected to quantitative analysis. The measures used to evaluate the degree of decentralisation and the size of the government sector are explained in the following sections. Modelling of the aggregate government sector and the levels of local government was carried out as required by the art of econometrics. However, due to space constraints, some stages of the process are presented in a shortened form. All results are available from the authors upon request.

Literature review

Leviathan, a mythical sea monster, is mentioned several times in the Old Testament. An especially vivid description of it can be found in the Book of Job (chapters 40 and 41). Buchanan gave its name to a problem that he formulated in his book from 1975, "The Limits of Liberty: Between Anarchy and Leviathan". Five years later, in 1980, Buchanan and Brennan put forward the so-called Leviathan hypothesis, which can be summarised as follows: "Total government intrusion into the economy should be the smaller, ceteris paribus, the greater the extent to which taxes and expenditure are decentralised" (Brennan, Buchannan, 1980, p. 185). It was extended and tested after several years by Oates (1985) as well as the authors of multidirectional studies (Grossman, 1989; Grossman and West, 1994; Person and Tabellini, 1994, 2002; Stein, 1999; Jin and Zou, 2002; Rodden, 2003; Fiva, 2005; Blum and Voigt, 2011; Cincera, Estache and Wolf, 2012, Ashworth, Galli and Padovano, 2013; Patonov, 2013).

There is a long-standing belief that local authorities tend to excessively tax residents to maximise the revenues that they need to advance their particularistic interests. However, this self-centredness is naturally limited by a large number of competing local governments to which people can move if they find them more

resident-friendly. However, empirical evidence of systematic relationships between the size of the government sector as a whole and the number of local governments is yet to be found.

A major advancement in explaining problems relating to financial decentralisation in the framework of the Leviathan hypothesis was the longitudinal study by Ashworth, Galli, and Padovano (2013), which addressed several aspects of the existing knowledge. Firstly, they considered the consequences of the type and level of decentralisation separately for the revenue-raising autonomy (local taxes vs intergovernmental grants) and spending autonomy of local governments, which had been disregarded by many authors. Secondly, they used a cointegrated panel analysis to answer the critical question about the short- and long-term impacts of decentralisation on the growth of the public sector. The failure of many empirical studies to take account of the temporal aspect of the effects, relationships, and determinants of decentralisation frequently meant that their results were inconsistent and comparable, and that they lacked statistical significance (Oates 1985; Ashworth et al., 2013).

Ashworth, Galli, and Padovano examined data on 28 countries from 1976 to 2000, as well as many institutional, political and geographical factors to assess how robust the estimates and conclusions were to changes in variables, samples and model specifications. They found that increasing the own revenues of local governments' revenues reduced the size of the government sector in the long term, as did larger general grants, and that total public spending expanded as its decentralisation moved forward. At the same time granting more revenue-raising powers to local governments did not markedly or directly contribute to the growth of the public sector in the short term.

The belief that the mobility of community residents and a large number of competing local authorities can substantially limit the expansion of the government sector and mitigate the risk of the Leviathan problem occurring is challenged by unitary states. Notably, the fiscal federalism theory, the Tiebout hypothesis and the Leviathan hypothesis were created and elaborated in federal states. Therefore, it seems necessary to test the public finance decentralisation theory for unitary states not only to expand existing knowledge but also to work out guidelines for countries faced by practical problems while trying to define the directions of and barriers to fiscal decentralisation (Salmon, 1987; Gennes, 2014; Małkowska, Telega, Głuszak and Marona, 2018; Allers and Greef, 2018, Crowley and Sobel 2011; Bos, 2010, 2012; Feld, Kirchgässner and Schaltegger, 2003; Arzaghi and Henderson 2005). Both theoretical and empirical studies frequently point to differences between federal and unitary states in the context of decentralisation, but the latter is usually analysed from the fiscal federalism perspective because of the lack of relevant literature.

In modern democratic states the local government system is an integral part of federal and unitary systems of government. Local governments are not granted sovereign

rights to avoid potential conflicts with the interests of the state, but substantial financial and fiscal autonomy is necessary for them to carry out their responsibilities, deliver services, etc. The autonomy determines financial decision-making by local politicians and their accountability and it is a prerequisite to successful decentralisation of government and a safeguard against opportunistic tendencies among local politicians and decision-makers. This shows the importance of studying the relationships between decentralisation and the efficiency of the public sector (Adam, Delis and Kammas, 2008) and whether and how it supports entrepreneurship and economic growth (Sobel, Dutta, Roy 2013, Strumpf 2002). The results of studies in this field that suggest that decentralisation actually hinders economic growth and does not reduce the size of the public sector (Sagbas, Sen and Kar, 2005, pp. 3–19) are inconclusive as the authors used different sets of variables due to different availability of data and significant differences in the countries' institutional and legal systems.

A politically, socially, and economically efficient decentralisation must involve the transfer of certain taxation powers to lower levels of government. The devolution of taxes is one of the biggest challenges for public policymakers because of the wide gap between what local governments are expected to deliver and the taxes and fees they can use as sources of own revenue. This has emerged as a result of several decades of decentralisation and the rising costs of many public services.

The decentralisation of government *per se* does not offer special microeconomic or macroeconomic benefits to the economy and research shows that it has as many advantages as disadvantages (Prud'homme, 1995; Patrzałek, 2010, pp. 60-65; Eskeland, Litvack and Rodden, 2003; Arzaghi and Henderson, 2005; Swianiewicz and Łukomska, 2016). Opinions on the 'right' level of decentralisation and the financial tools it should involve have evolved over time. There is an abundance of studies in this field, but most of them are set in the framework of the first and second generations of the fiscal federalism theory (Oates 1972, 2005, pp. 349–373) created in federal states and adopted by decentralising unitary countries as a road map. The traditional fiscal federalism theory with its somewhat naïve assumption that public authorities, regardless of their level, only mean to maximize communities' wellbeing emerged in the 1950s and 1960. According to Oates its leading proponents are Arrow, Musgrave, and Samuelson.

A more realistic, normative attitude to fiscal decentralisation appeared with the creation of public choice theory, which takes account of politics and the self-interest of decision-makers and politicians who seek to retain power, control and high earnings by maximising rather than optimizing public budgets (Brenan and Buchanan, 1980, p. 18). This 'second generation' of the fiscal decentralisation theory also addresses the asymmetry of information in fiscal decision making and the effects of lobbying (Oates, 2005, pp. 349–373; Enikolopov, Zhuravskaya; 2007).

Research methodology

The Leviathan hypothesis is tested below for: 1) the aggregate government sector; 2) the central government sector; and 3) the local levels of government, including municipalities, towns with county status, counties, and voivodeships. To this end, a model is built on the assumption that there is a negative relationship between the size of the public sector and the degree of decentralisation, *ceteris paribus*. In keeping with Ehdaie (1994, pp. 6–7), it also accounts for the role of fiscal collusion, i.e., the transfer of part of central budget revenues and spending powers to subnational governments. Following previous empirical studies and key theories in this field, the model also includes control variables that are likely to influence the size of the government sector. Assuming that model relationships are additive, the above can be written as:

a) the aggregate government sector model:

$$PS_t = \sum_{i=1}^{b} \beta_i \cdot D_{it} + \sum_{i=1}^{g} \gamma_i \cdot FC_{it} + \sum_{i=1}^{h} \delta_i \cdot Z_{it} + \varepsilon_t \quad (1)$$

Formula (1) and the same variables will also be used to determine the effect of decentralisation, fiscal collusion, and the control variables on the size of the central government sector (PS_t^N).

b) the j-th level of subnational government model (see Grossman and West, 1994, pp. 14–15):

$$PS_t^j = \sum_{i=1}^{p} \eta_i^j \cdot D_{it}^j + \sum_{i=1}^{s} \theta_i^j \cdot FC_{it}^j + \sum_{i=1}^{w} \vartheta_i^j \cdot Z_{it}^j + u_t^j \quad (2)$$

where:

PS_t – the measure of the size of the government sector,

PS_t^j – the measure of the size of the j-th sector of local government,

D_{it}, D_{it}^j – the measure of decentralisation in the model,

FC_{it}, FC_{it}^j – the measure of fiscal collusion in the model,

Z_{it} – control variables,

β_i, γ_i, δ_i, η_i^j, θ_i^j, ϑ_i^j – the parameters to be estimated,

ε_t^j, u_t^j – random error terms,

b, p – the number of decentralisation measures in the model,

g, s – the number of fiscal collusion measures in the model,

h, w – the number of control variables in the model,

$j = V, C, T$ or M – denote voivodeships, counties, towns with county status, and municipalities, respectively.

The condition for the Leviathan hypothesis being accepted as true is, $\beta_i < 0$ meaning that there is a negative relationship between a given measure of decentralisation and a given measure of the size of the aggregate government sector. An additional argument in support of it will be $\gamma_i > 0$. The relationship between a given measure of decentralisation of the j-th level of subnational government and a given measure of its size will be considered positive for $\eta_i^j > 0$.

Despite long-standing research interest in decentralisation, there is still no consensus on how decentralisation and the size of the public sector should be measured. While the literature offers a variety of measures, the revenues and expenditures of the general government sector are usually preferred (for a review of measures, see, for instance, Golem, 2010, pp. 64–67). In this study, the growth of budgets following decentralisation is analysed separately from the growth of government administration (in respect of employment, spending, and the costs of its functioning). In keeping with Ehdaie (1994, pp. 7-8), Grossman and West (1994, pp. 14–15), Martinez-Vazquez and Yao (2009, pp. 23), and Makreshanska-Mladenovska and Petrevski (2019, pp. 39–40, p. 45), several measures are established to assess the sizes of the aggregate, central, and local government sectors in the context of decentralisation (see Table 1). The data used in the analysis span the period from 1999 through 2020. Their sources and the model variables are listed in Appendix 1.

Table 1.
Measures of the size of the government sector, decentralisation, and fiscal collusion

Size of government sectors (PS)	
Measure	Formula
PS_E, PS_EN[1], PS_EV, PS_EC, PS_ET, PS_EM	(TET+TEL)/GDP, TET/GDP, TELV/GDP, TELC/GDP, TELT/GDP, TELM/GDP, respectively
PS_AW, PS_AWN, PS_AWV, PS_AWC, PS_AWT, PS_AWM	(EC+EL)/PW, EC/PW, ELV/PW, ELC/PW, ELT/PW, ELM/PW, respectively
PS_AP, PS_APN, PS_APV, PS_APC, PS_APT, PS_APM	(EC+EL)/P, EC/P, ELV/P, ELC/P, ELT/P, ELM/P, respectively
PS_AEV, PS_AEC, PS_AET, PS_AEM	TEAV/ GDP, TEAC/ GDP, TEAT/ GDP, TEAM/ GDP, respectively
PS_S, PS_SN, PS_SV, PS_SC, PS_ST, PS_SM	(SC+SL)/GDP, SC/GDP, SLV/ GDP, SLC/ GDP, SLT/ GDP, SLM/ GDP, respectively

[1] N stands for the national (central) government sector.

Size of government sectors (PS)	
Decentralisation (D)	
Measure	Formula
FD_RR, FD_RRV, FD_RRC, FD_RRT, FD_RRM	OR/(TR+OR), ORV/(TR+OR), ORC/(TR+OR), ORT/(TR+OR), ORM/(TR+OR), respectively
FD_EE, FD_EEV, FD_EEC, FD_EET, FD_EEM	TEL/(TET+TEL), TELV/(TET+TEL), TELC/(TET+TEL), TELT/(TET+TEL), TELM/(TET+TEL), respectively
FD_LT, FD_LTT, FD_LTM	(LTT+LTM)/(TR+OR), LTT/(TR+OR), LTM/(TR+OR), respectively
FD_PT, FD_PTT, FD_PTM	(PTT+PTM)/(TR+OR), PTT/(TR+OR), PTM/(TR+OR), respectively
FD_A, FD_AV, FD_AC, FD_AT, FD_AM	EL/(EC+EL), ELV/(EC+EL), ELC/(EC+EL), ELT/(EC+EL), ELM/(EC+EL), respectively
FD_AE, FD_AEV, FD_AEC, FD_AET, FD_AEM	TEA/(TET+TEL), TEAV/(TET+TEL), TEAC/(TET+TEL), TEAT/(TET+TEL), TEAM/(TET+TEL), respectively
FD_S, FD_SV, FD_SC, FD_ST, FD_SM	SL/(TET+TEL), SLV/(TET+TEL), SLC/(TET+TEL), SLT/(TET+TEL), SLM/(TET+TEL), respectively
Fiscal collusion (FC)	
Measure	Formula
FC_T, FC_TV, FC_TC, FC_TT, FC_TM	T/(TET+TEL), TV/(TET+TEL), TC/(TET+TEL), TT/(TET+TEL), TM/(TET+TEL), respectively
FC_GG, FC_GGV, FC_GGC, FC_GGT, FC_GGM	GG/(TET+TEL), GGV/(TET+TEL), GGC/(TET+TEL), GGT/(TET+TEL), GGM/(TET+TEL), respectively
FC_SG, FC_SGV, FC_SGC, FC_SGT, FC_SGM	SG/(TET+TEL), SGV/(TET+TEL), SGC/(TET+TEL), SGT/(TET+TEL), SGM/(TET+TEL), respectively

Source: created by the authors.

The majority of previous empirical studies used the GDP share of public expenditure (variables PS_E/PS_EN/PS_Ej) as the measure of the size of the government sector. Golem observed (2010, p. 57) that public expenditures are a better measure than revenues because they can be financed directly and/or indirectly, as well as from several sources. Thus, they give a better insight into public authorities' activities. In this study, the question of whether decentralisation influences employment in government administration is answered using measures of public sector size employed by Martinez-Vazquez and Yao (2009, p. 23), namely, the average number of government administration employees in relation to the total population and the working-age population (variables PS_AP/ PS_APN/PS_APj and PS_AW/ PS_AWN/PS_AWj).

The few empirical studies that analyse the relationships between decentralisation and employment in government administration (a list can be found in Martinez-Vazquez and Yao (2009, p. 34)) suggest that decentralisation contributes to a greater increase in employment at subnational levels of government than it decreases employment at the central government level.

This study also examines which sectors, central or subnational, are more influenced by decentralisation.

Administrative decentralisation is analysed below regarding employment in administration (FD_A/FD_Aj), expenditure on administration (FD_AE/FD_AEj), and gross salary expenditure in administration (FD_S/FD_Sj). As the latter is one of the biggest expenditures on government administration (ca. 60–70%)[2], it provides a fairly good estimate of its cost. Expenditures on public administration and administration staff salaries are also used to develop measures of the public sector size (PS_AEj and PS_S/PS_SN/PS_Sj, respectively).

The Leviathan hypothesis assumes that the decentralisation of tax revenues and expenditures is an integrated process, but only Switzerland (Muller 2003, pp. 532-533) appears to have decentralised both areas simultaneously. According to some, e.g., Rodden (2003), Stein (1999), and Ehdaie (1994), the area that undergoes decentralisation (revenues or expenditures) is significant for the size of the government sector. This study uses measures of the decentralisation of own revenues[3] (FD_RR/FD_RRj) and expenditures (FD_EE/FD_EEj). Following Fiva (2006), it also uses a 'purified' measure of revenue decentralisation,[4] represented by the share of local taxes of all government sector revenues, and, separately, by the share of the property tax[5], represented by variables FD_LT/FD_LTT/FD_LTM and FD_PT/FD_PTT/FD_PTM, respectively. According to Stegarescu (2005), a government sector that allows local authorities to freely decide about their revenues and expenditures is more decentralised than one where local revenues and expenditures are governed by parliamentary statutes. The 'purified' measure of revenues reduces the risk of overestimating local tax autonomy. In Poland, of all levels of subnational government, only municipalities and towns with county status have been granted some (however limited) tax powers.

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2 Calculated based on Statistics Poland (SP) data and budget execution reports 1999-2020.

3 In Poland, local shares of national taxes (personal income tax (PIT)) and corporate income tax (CIT)) are classified as local own revenues.

4 In municipalities and towns with county status.

5 The property tax also plays an important role as a source of revenue for municipalities and towns with county status. It is not only a fiscal policy tool but also an instrument of competition among local governments.

In Poland, intergovernmental transfers account for a large proportion of subnational governments' revenues[6]. This is addressed in the model, as recommended by Ehdaie (1994), who argues that excluding it might increase the risk of obtaining biased estimates. Specific grants (FC_SC/FC_SGj) and general grants (FC_GG/FC_GGj) are examined as separate sources of revenue. Econometric modelling makes a standard use of control variables. In this study, they are Poland's GDP *per capita* in constant prices of 1999 (GDPC) and the size of Poland's population (P), which were chosen based on Marlow's work (1988). The first of them is consistent with Wagner's law, which states that economic growth stimulates demand for new public goods and is positively correlated with the size of the government sector. The use of the second variable is justified by its ability to capture the effect of economies of scale in the delivery of public goods and services.

Because public sector finances data are usually reported on an annual basis and the three-level system of government and financial decentralisation in Poland, like in other post-communist countries, has a relatively short history, the available time series (1999-2020) contained few observations. This is a major challenge to the use of the vector autoregression (VAR) models selected for this analysis, which require relatively long time series due to variable lags. However, the models also have the advantage of solving the problem of the potential endogeneity of decentralisation because they do not distinguish between exogenous and endogenous variables.

The process of selecting the appropriate form of the VAR model starts with testing variables for stationarity. In order to determine whether time series are generated by a stationary process, the Kwiatkowski – Phillips – Schmidt – Shin (KPSS) test, the augmented Dickey-Fuller test, and the Dickey-Fuller Generalised Least Squares test (ADF-GLS) were used. When the results of the ADF and KPSS tests were inconsistent, the ADF-GLS test was applied. The maximum lag length for the ADF and ADF-GLS tests and the KPSS test was determined using the following formulas:

$l_{\text{ADF/ADF-GLS}} = \text{int}\left[12 \cdot \left(\frac{NO}{100}\right)^{0.25}\right]$ (Schwert, 1989, p. 7) and $l_{\text{KPSS}} = \text{int}\left[4 \cdot \left(\frac{NO}{100}\right)^{0.25}\right]$ (Kwiatkowski et al. 1992, p. 169-171), where *NO* represents the number of observations and *int* means rounding down to the nearest integer. Hence, $l_{\text{ADF/ADF-GLS}} = 8$ a $l_{\text{KPSS}} = 2$ for a sample containing 22 observations.

The stationarity test results showed that most time series were integrated of order 1 (I(1)). Stationary variables PS_S, PS_ST, FD_EEC, and FD_AEC, and variables integrated of order > I(1): PS_APC, PS_AEM, FD_RRV, FD_REV, FD_REC, FD_AEV, FD_AEM, FD_SV, FD_SM, FC_TT, FC_TC, FC_SGT, FC_SGC, and FC_GGM were omitted from further analysis.

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[6] Between 1999 and 2020, theycontributed an average of 48% of local revenue; calculated based on Statistics Poland data.

Variables I(1) were used to build vector error correction models (VEC[7]) that allow the long-run relationships between non-stationary time series, which are of primary importance for this study, to be captured (Johansen, 1995). Before the models were built according to the Johansen procedure, comprising the trace test and the maximum eigenvalue test (1991, pp. 1558–1561, 1992, pp. 387–394), variables I(1) were tested for cointegration. The Johansen tests were applied after the lag length (k) for the whole system of the equation was determined.

Given that the Johansen tests show sensitivity to the model specification, a decision had to be made whether the constant and the trend would be in a cointegration relationship. The plots of many variables pointed to the presence of linear trends, so the Johansen procedure was performed for VEC models with an unrestricted constant and with an unrestricted constant and a restricted trend (Johansen, 1995, p. 82).

The model lag length (k) should reflect the natural relationships between the variables and prevent autocorrelation between the random error terms. Because of the annual time series, was found to be appropriate, and the choice between k=1 and k=2 was made according to the Akaike information criterion (AIC) and the Schwarz--Bayesian criterion (BIC). When they pointed to different orders of autoregression, both versions were tested for cointegration. The VEC model was estimated using the same approach: when the maximum eigenvalue test and the trace test yielded different orders of cointegration (r), both versions of the VEC model were estimated.

The plots of the variables indicated that in some time series (2009 to 2010, the financial crisis, and from 2020, the coronavirus pandemic), atypical observations were present. If this could improve the statistical properties of the VEC model, they were accounted for as binary variables without including them in the long-run relationships.

Results

The selected estimates of the long-run equilibrium parameters normalised against variables that represent the size of the given level of government[8] are presented

[7] The general VEC model formula can be found, for instance, in *Likelihood-Based Inference in Cointegrated Vector Autoregressive Models* (Johansen, 1995).

[8] In order to identify each cointegrating vector the number of restrictions must equal as r^2. When r=1, only one normalizing restriction is needed, and for r>1, r independent restrictions have to be imposed on each of the r long-run relationships. In this study, in the case of r>1, zero restrictions were first imposed on the parameters on the control variables to prevent the loss of information about the shape of the long-run relationship between the size of the government sector and decentralisation.

in Appendices 2 and 3. The estimates are statistically significant at the 5% level (the numbers in parentheses are Student's t-statistics). All characteristic roots of the models of the government sectors are contained in a unit circle. From the VEC models with an unrestricted constant and with an unrestricted constant and a restricted trend that contain the same variables, those with better statistical properties of the normality test (the Doornik-Hansen test), the autocorrelation and ARCH effect tests (the LM-type tests described by Lütkepohl (2005) in sections 4.4.4 and 16.5.1) were selected.

The results of the analysis are presented for each individual measure of the public sector size. Tables 2 through 6 summarize the estimates of the long-run equilibrium parameters (Appendices 2 and 3 concern the aggregate government sector and the municipalities sector, respectively). They also indicate whether the influence of decentralisation, fiscal collusion, time effect, and Poland's GDP and population on the size of the government sector as a whole and its levels was positive or negative (+ or -). Each table deals with one type of measure of the sector size.

Table 2.
The direction of influence of particular variables on PS_E/PS_EN/PS_Ej

	PS_E	PS_EN	PS_EV	PS_EC	PS_ET	PS_EM
FD_RR/FD_RRj				+		
FD_EE/FD_EEj	+	-	+		+	+-
FD_LT/FD_LTT, FD_LTM		-			-	-
FD_PT/FD_PTT, FD_PTM					+	-
FD_A/FD_Aj	-	-	+	-	+	
FD_AE/FD_AEj	-	+			+	
FD_S/FD_Sj	-	+		+	+	
t	+			-	-	
FC_T/FC_Tj	+-	+-	+			+-
FC_SG/FC_SGj	-		+-			+
FC_GG/FC_GGj			+	+-	+-	
GDPC	+-	+	+	+	+	-
P			+			

Source: created by the authors.

Table 3.
The direction of influence of particular variables on PS_AP/PS_APN/PS_APj

	PS_AP	PS_APN	PS_APV	PS_APC	PS_APT	PS_APM
FD_RR/FD_RRj	-				-	
FD_EE/FD_EEj			+		+	
FD_LT/FD_LTT/FD_LTM					+	
FD_PT/FD_PTT/FD_PTM						
FD_A/FD_Aj		+				
FD_AE/FD_AEj	+	-			+	
FD_S/FD_Sj					+	
t						
FC_T/FC_Tj	-	+	+			
FC_SG/FC_SGj						
FC_GG/FC_GGj	-		+		+-	
GDPC	+	-	+		+-	
P						

Source: created by the authors.

Table 4.
The direction of influence of particular variables on PS_AW/PS_AWN/PS_AWj

	PS_AW	PS_AWN	PS_AWV	PS_AWC	PS_AWT	PS_AWM
FD_RR/FD_RRj				-		
FD_EE/FD_EEj	+					
FD_LT/FD_LTT/FD_LTM						
FD_PT/FD_PTT/FD_PTM						
FD_A/FD_Aj				-	-	
FD_AE/FD_AEj						
FD_S/FD_Sj	+			+		
t						
FC_T/FC_Tj						
FC_SG/FC_SGj	-					
FC_GG/FC_GGj				-	-	
GDPC				+	+	
P						

Source: created by the authors.

Table 5.
The direction of influence of particular variables on PS_AEj

	PS_AEV	PS_AEC	PS_AET	PS_AEM
FD_RR/FD_RRj		-	-	
FD_EE/FD_EEj	+		+	
FD_LT/FD_LTT/FD_LTM				
FD_PT/FD_PTT/FD_PTM				
FD_A/FD_Aj		-	-	
FD_AE/FD_AEj				
FD_S/FD_Sj				
t				
FC_T/FC_Tj				
FC_SG/FC_SGj	+			
FC_GG/FC_GGj		-	-	
GDPC	+	-	-	
P				

Source: created by the authors.

Table 6.
The direction of influence of particular variables on PS_S/ PS_SN/PS_Sj

	PS_S	PS_SN	PS_SV	PS_SC	PS_ST	PS_SM
FD_RR/FD_RRj				-		
FD_EE/FD_EEj		-	+-			
FD_LT/FD_LTT/FD_LTM						
FD_PT/FD_PTT/FD_PTM						
FD_A/FD_Aj		+	+			
FD_AE/FD_AEj		-				
FD_S/FD_Sj		-				
t						
FC_T/FC_Tj		+	+			
FC_SG/FC_SGj						
FC_GG/FC_GGj				-		
GDPC		+-	+			
P						

Source: created by the authors.

Key:

– variable <> I(1), omitted from estimation

– no long-run equilibrium relationship

\+ – growth of the government sector

\- – reduction of the government sector

+- – unclear direction of influence

– a measure of the sector size <> I(1), omitted from estimation

A negative relationship between decentralisation and the measures of the government sector is found for public administration decentralisation (FD_A, FD_AE, FD_S) when the size of the aggregate government sector is measured by the GDP share of total public spending (PS_E), and for revenue decentralisation (FD_RR) when the size of the sector is represented by public administration employment as a percentage of Poland's population (PS_AP). These relationships demonstrate that the Leviathan hypothesis is true for Poland. An additional argument in support of this finding is the direction of FC_T influence on PS_E, which is positive but only in the model that presents the effect of the decentralisation of gross salary expenditure on administration (FD_S). It is also notable that although FD_AE and FD_S expand the central government sector (PS_EN), the increase is obviously smaller than the decrease in the size of the aggregate local government sector because the aggregate government sector measured by PS_E ultimately shrinks.

The decentralisation of expenditures (FD_EE) is associated with an increase in the GDP share of the government sector's total expenditures and in public administration employment in relation to the working-age population (PS_AW). By contrast, the decentralisation of expenditures on government administration and administration staff salaries increases PS_AP and PS_AW, respectively. These relationships indicate that the Leviathan hypothesis should be rejected.

The decentralisation of own revenue from local taxes (FD_LTT and FD_LTM) has a limiting effect on the size of the sectors of municipalities and towns with county status measured by the GDP shares of their expenditures (PS_ET and PS_EM, respectively). Subnational governments' greater revenue autonomy (FD_LT) contributes to a relative decrease in the expenditures of the central government sector (PS_EN) while it has a positive influence on PS_APT. This is quite natural, as greater revenue autonomy boosts the demand for personnel who are responsible for tax collection and tax enforcement, etc. The decentralisation of revenue from local taxes has a reducing effect on the local government sector, which is a sum of diverse and multidirectional impacts of particular local taxes (Table 2). For instance, relatively more revenue from the property tax increases the expenditures of towns with county status in relation to GDP but decreases those of municipalities. This implies that the tax stimulates competition among municipalities but not among towns with county status.

The decentralisation of own revenues (FD_RRT) causes a relative fall in employment in the administration of towns with county status (Table 3). As noted above, local taxes have the opposite effect. It can therefore be argued that local government shares of nationally administered taxes (PIT and CIT), which together with local taxes are the main source of own revenue for local governments, influence employment in the administration of towns with county status more strongly than local taxes. In most cases where a statistically significant relationship between the decentralisation of revenues

and the appropriate measure of the size of the local government sector was empirically confirmed, decentralisation limited the sector's growth, especially at the county level. The decentralisation of expenditures was found to have the opposite effect, at least among voivodeships and towns with county status. The signs of the estimated parameters on relationships between FD_RRV and PS_SV and between FD_RRM and PS_EV do not conclusively indicate how the relationships will develop in the long term.

One of the risks of decentralisation is the overgrowth of government administration and a rise in its cost. This study has confirmed that there is a negative long-run relationship between the decentralisation of administration employment (FD_A) and relative public spending of the central government sector (PS_EN), that the decentralisation of employment in the voivodeship administration (FD_AV) relatively increases the units' total expenditure and expenditure on administration staff salaries (PS_EV and PS_SV, respectively), and that the decentralisation of employment in the administration of towns with county status (FD_AT) increases their total expenditure (PS_ET). However, it does not increase the number of local administration staff in relation to the total population of Poland or the working-age population in the long term. An inverse relationship has been found for counties and towns with county status: FD_AC decreases PS_AWC while FD_AT decreases PS_AWT. The increasing effect of FD_A on PS_APN and PS_SN suggests that the central administration does not considerably decrease following decentralisation, or that recentralisation took place.

The decentralisation of expenditure on administration staff salaries and total expenditure on government administration contributes to a relative increase in the expenditures of the central government sector (PS_EN), counties, and towns with county status (PS_EC and PS_ET). They also reduce the size of the aggregate government sector measured by the GDP share of its expenditures, which implies that they restrict the growth of expenditures of the local government sector as a whole.

The time effect was significant on the expenditures of towns, towns with county status, and the aggregate government sector. The positive relationship between this variable and the aggregate government sector was probably due to rigid expenditures accounting for a significant share of the budget expenditures or to the operation of Parkinson's law, which states that public expenditures tend to increase with revenues[9], *ceteris paribus*. At the same time, the spending of counties and towns with county status was found to decline in relation to GDP each year.

Fiscal collusion (FC_T) was determined to increase spending (PS_EN, PS_EV), employment (PS_APN, PS_APV), and the cost of administration staff salaries (PS_SN, PS_SV) at the central government and voivodeship levels, which supports the Leviathan hypothesis for Poland. This mechanism may lead to the loosening of fiscal discipline.

[9] Public revenues increased in the period under consideration in both real and nominal terms.

The analysis of specific grants and general grants as separate factors demonstrated that they differently influence the size of the government sector. General grants tend to reduce the size of the counties and towns with county status sectors but increase spending and administration employment at the voivodeship level (PS_EV and PS_APV). A general rule that explains the effect of specific grants is more difficult to formulate, other than that they reduce employment and expenditure across the government sector.

Conclusion

The study has shown that financial and administrative decentralisation in a unitary country such as Poland is a complex process that affects the entire government sector and its particular levels in many different ways. The Leviathan hypothesis was rejected or confirmed depending on which measure was used to assess decentralisation and the size of the government sector. For instance, the decentralisation of government administration reduced in the long term the government sector size measured by the GDP share of public expenditure while the decentralisation of own revenues decreased government administration employment in relation to Poland's population. These relationships indicate that the Leviathan hypothesis is true for Poland. On the other hand, however, the decentralisation of public expenditure increased in the long term the GDP share of public expenditure as well as employment in government administration in relation to the working-age population. As for the decentralisation of expenditures on government administration and administration staff salaries, it led to the expansion of employment in government administration in relation to both the total population and the working-age population. These relationships support the rejection of the Leviathan hypothesis.

Due to the methodological problems and the limited availability and comparability of the data, the results of the study are as inconclusive as the results of earlier investigations. In general, however, they confirm that the Leviathan hypothesis holds true for Poland.

Because of the relatively short time series, which significantly limited and complicated estimations, a new study will be carried out to estimate relationship (2) again, with panel data on each level of government. The use of a time-series cross-sectional analysis will certainly help clarify ambiguities about how decentralisation influences municipalities, and enable comparisons between the results obtained with aggregated and disaggregated data. The panel data and a greater number of observations will allow the individual characteristics of local government units to be accounted for in the model. This new study will also use more recent statistical data and will examine the impact of the Covid-19 pandemic, which has noticeably contributed to increases in public expenditure and expanded the role and functions of the state.

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Appendix 1.
Variables and data sources

Symbol	Description	Source	Additional info
TR	total revenues of the state budget	Report on state budget execution (annual), Ministry of Finance; annual macroeconomic indicators – Statistics Poland (SP); The analysis of state budget execution and the monetary policy guidelines in 1999 – Supreme Audit Office	https://stat.gov.pl/en/poland-macroeconomic-indicators; https://www.nik.gov.pl/plik/id,1541.pdf – 1999 data sourced from the Supreme Audit Office; https://www.gov.pl/web/finance/revenue-expenditure-execution
TE	total expenditures of the state budget		
TET	expenditures of the state budget excluding general grants and specific grants for local governments		
T, TV, TC, TT, TM	transfers from the state budget (general grants and specific grants for local governments): algu[10]		

[10] „Algu" denotes all local governments, voivodeships, counties, towns with county status, and municipalities.

Symbol	Description	Source	Additional info
SG, SGV, SGC, SGT, SGM	specific grants for local government units: algu	Local Data Bank, SP	https://bdl.stat.gov.pl/BDL/dane/podgrup/temat ->Public finance ---> Revenues (of)...
GG, GGV, GGC, GGT, GGM	general grants for local government units: algu		
OR, ORV, ORC, ORT, ORM	local governments' own revenues (excluding transfers from the state budget): algu		
LT, LTT, LTM	local governments' own revenues from local taxes: towns with county status and municipalities together, towns with county status, municipalities, respectively[11]		
PT, PTT, PTM	local governments' own revenues from the property tax: towns with county status and municipalities together, towns with county status, municipalities, respectively		
TEL, TELV, TELC, TELT, TELM	budgetary expenditures of local government: algu		https://bdl.stat.gov.pl/BDL/dane/podgrup/temat --->Public finance ---> Expenditures (of)...
EA, EAV, EAC, EAT, EAM	public administration expenditures: algu		
EC, EL, ELV, ELC, ELT, ELM	average employment in administration by level of government: central, algu	Concise Statistical Yearbook of Poland, SP	https://stat.gov.pl/en/topics/statistical-yearbooks/statistical-yearbooks/concise-statistical-yearbook-of-poland-2021,1,22.html
SC, SL, SLV, SLC, SLT, SLM	gross salary expenditures in administration by level of government: central, algu		
GDP	gross domestic product, market prices, PLN	„GDP and the main components", Eurostat database	http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_gdp&lang=en; GDP in current prices adjusted using a price deflator, 1999=100
GDPC	gross domestic product ***per capita***, PLN, constant prices of 1999		

[11] The only local govenrment units with tax powers in Poland are municipalities and towns with county status.

Symbol	Description	Source	Additional info
P	Poland's population (annual average)	Demographic Yearbook of Poland, SP	https://stat.gov.pl/en/topics/statistical-yearbooks/statistical-yearbooks/demographic-yearbook-of-poland-2021,3,15.html
PW	working-age population in Poland; women 15-59 years, men 15-64 years (annual averages)		

Source: created by the authors.

Appendix 2.
Estimates of the long-run equilibrium parameters for the aggregate government sector

Lag order and Johansen's test results							
k	2	2	2	2	2	2	2
r	2	1	3	1	1	2	2
Long-run parameter estimates							
Model No	1	2	3	4[12]	5	6	7
	PS_E	PS_E	PS_E	PS_E	PS_AP	PS_AP	PS_AW
FD_RR					-0.03 (8.85)		
FD_EE	0.77 (3.78)						0.05 (5.37)
FD_LT							
FD_A	-1.81 (5.79)						
FD_AE			-8.17 (10.34)	-5.06 (5.95)		0.08 (2.33)	
FD_S		-12.95 (7.96)					0.5 (3.99)
FC_T	-0.42 (3.4)	0.35 (3.4)	0 (0)		-0.04 (17.19)		

[12] Model No. 4 used zero-one variables for the years 2009–2010.

Lag order and Johansen's test results							
FC_SG				-0.35 (4.46)			-0.07 (8.38)
FC_GG						-0.04 (12.91)	
GDPC	0 (0)	-2.6×10^{-6} (2.14)	0 (0)	1.3×10^{-7} (1.98)	1.2×10^{-7} (20.17)		0 (0)
P						0 (0)	
t		0.01 (3.26)					
Tests (***p-values***)							
L-B	0.66	0.88	0.85	0.94	0.42	0.24	0.29
ARCH	0.28	0.09	0.21	0.59	0.42	0.87	0.22
DH	0.19	0.16	0.24	0.31	0.14	0.16	0.60

Source: created by the authors in Gretl.

Appendix 3.
Estimates of the long-run equilibrium parameters for municipalities

Lag order and Johansen's test results				
k	2	2	2	2
r	2	2	2	1
Long-run parameter estimates				
Model No	1	2	3	4
	PS_EM	PS_EM	PS_EM	PS_EM
FD_RRM				
FD_REM				
FD_EEM	1.2 (5.74)		-0.33 (5.13)	-0.28 (3.51)
FD_LTM		-0.32 (2.19)		

Lag order and Johansen's test results				
FD_PTM			-1.45 (7.34)	
FD_AM				
FC_TM	-2 (4.84)	0.42 (3.91)	1.05 (9.29)	
FC_SGM				1.26 (7.06)
GDPC	0 (0)	0 (0)	0 (0)	-5.3×10^{-7} (3.9)
Tests (***p-values***)				
L-B	0.35	0.10	0.18	0.99
ARCH	0.85	0.57	0.39	0.87
D-H	0.24	0.24	0.19	0.09

Source: created by the authors in Gretl.

Financial and Administrative Decentralisation and the Leviathan Hypothesis for Poland: Multivariant Cointegration Analysis

Abstract

The study uses empirical data from 1999 to 2020 to examine empirically the Leviathan hypothesis for Poland, a unitary country with /a/ decentralised financial system. The research hypothesis being tested is that the degree of financial decentralisation and the size of the government sector are negatively related to each other. Factors that stimulate or constrain the growth of the government sector and public expenditures are also identified. The basis of the macroeconometric modelling is a multivariant cointegration analysis. The Leviathan hypothesis being rejected or confirmed is found to depend on the type of measure of decentralisation and public sector. The size of the government sector measured by the GDP share of public expenditures decreases in

the long term following the administrative decentralisation. In contrast, the decentralisation of own revenues reduces the ratio of public administration employees to Poland's total population. These relationships support the validity of the Leviathan hypothesis. However, in the long term, the decentralisation of public expenditure increases the GDP share of total public expenditure and public administration employment in relation to the working-age population in the country. Meanwhile, in the long-term, the decentralisation of expenditures on administration and administration staff salaries increases government administration employment in relation to the total population and the working-age population. These cases provide grounds to reject the Leviathan hypothesis.

Keywords: financial decentralisation, administrative decentralisation, subnational government, Leviathan hypothesis

Decentralizacja finansowa i administracyjna oraz hipoteza Lewiatana dla Polski: wieloczynnikowa analiza kointegracji

Streszczenie

W badaniu wykorzystano dane empiryczne z lat 1999–2020, aby empirycznie zbadać hipotezę Lewiatana dla Polski, kraju unitarnego o zdecentralizowanym systemie finansowym. Testowana hipoteza badawcza zakłada, że stopień decentralizacji finansowej i wielkość sektora rządowego są ze sobą negatywnie powiązane. Zidentyfikowano również czynniki, które stymulują lub ograniczają wzrost sektora rządowego i wydatków publicznych. Podstawą modelowania makroekonometrycznego jest wielowymiarowa analiza kointegracji. Odrzucenie lub potwierdzenie hipotezy Lewiatana zależy od rodzaju miary decentralizacji i sektora publicznego. Wielkość sektora rządowego mierzona udziałem PKB w wydatkach publicznych maleje w długim okresie po decentralizacji administracyjnej. Natomiast decentralizacja dochodów własnych zmniejsza stosunek pracowników administracji publicznej do całkowitej liczby ludności Polski. Te zależności potwierdzają słuszność hipotezy Lewiatana. Jednak w długim okresie decentralizacja wydatków publicznych zwiększa udział PKB w całkowitych wydatkach publicznych i zatrudnieniu w administracji publicznej w odniesieniu do populacji w wieku produkcyjnym w kraju. Tymczasem w długim okresie decentralizacja wydatków na administrację i wynagrodzenia pracowników administracji zwiększa zatrudnienie w administracji

rządowej w odniesieniu do całkowitej liczby ludności i populacji w wieku produkcyjnym. Przypadki te stanowią podstawę do odrzucenia hipotezy Lewiatana.

Słowa kluczowe: decentralizacja finansowa, decentralizacja administracyjna, rząd subnarodowy, hipoteza Lewiatana

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