The Size of Government in Empirical Research: A Case Study from the Czech Republic

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Abstract

The aim of this paper is to discuss the substance of macroeconomic aggregates that are commonly used in empirical research to express the size of government. Although public sector aggregates normally provide a basis for the assessment of the size of government, there are broader aggregates that capture the scope of government more realistically. This paper presents the relevant statistical concepts, the current state of methodology, as well as discusses the degree of instability in existing methodology and its effect on the robustness of empirical research findings and recommendations. In addition, this paper, on the basis of currently available data, demonstrates the extent of the differences between these statistical concepts in terms of monetary values as well as numbers of employees. The results not only show that the size of government is much larger than estimated, but that it can also have far-reaching consequences for both economic policy and economic research.

Keywords: size of government, public sector, national accounts, total revenues, total expenditures.

Introduction

Research into how to determine the optimal size of government through analyses of macroeconomic aggregates has become one of the major topics of economic research and political economy. Researchers focus, *inter alia*, on the impact of government on economic growth, the economic cycle, unemployment and/or the rate of inflation[1]. The majority try to provide answers to questions such as what is the optimal size of government compatible with the highest possible rate of sustainable economic growth accompanied by high utilisation of the labour force and a low rate of inflation. When investigating the macroeconomic causal relations just mentioned, aggregates as provided by the national accounting model are customarily exploited and analysed.

Although all macroeconomic aggregates could be critically examined, our primary focus is on the ways in which the size of government is or can be expressed, as well as the robustness of the relevant definitions underlying these measurements. This is of great importance because the substance of aggregates, as well as the lack of a clear-cut definition in the methodology, usually goes unnoticed by researchers who use macroeconomic aggregates in their work. It therefore comes as no surprise that adjectives such as "public", "government" or even "state" are generally considered to have a similar or even the same meaning. However, from the statistical point of view there are substantial differences[2] that imply differentiating explanatory power. Simply put, the central issue is which (public) institutions should be counted as being part of government and therefore contributing to its size, and which should not.

Macroeconomic models such as national accounts or Government Finance Statistics (GFS) provide relevant data for all of these levels of aggregation (public/government/state). It is subsequently up to a researcher to decide which data to use for empirical examination. Currently, researchers customarily reach for government sector data (government) and use it as a proxy for the size of government. One serious objection can be raised against this approach. As will be shown later, the government sector constitutes only a part of the entire public sector. As a result, data for this sector to a certain extent underestimates the overall hold of government over an economy. This implies that using data for the public sector as a whole can put the size of government in a very different perspective.

On the top of this, relevant definitions of the public or government sector are not deep-seated; they are the subjects of continuous methodological changes bringing frequent revisions. This is, of course, a serious matter, since instability and uncertainty regarding the adequacy of the definitions naturally determines the reliability of quantifications (Morgenstern, 1963) and hence the robustness of the conclusions of empirical analyses. To demonstrate the differences quantitatively, we will use the national accounts data for the Czech Republic to show uncertainties embedded in the macroeconomic aggregates.

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[1] An in-depth overview of scientific works on the topic can be found in, for example, Zimčík (2016), Chobanov and Mladenova (2009) or Bergh and Henrekson (2011).
[2] Rybacek and Vebrova (2018)

Use of data in empirical research

It is informative to first take a brief look at the use of macroeconomic aggregates in economic research and some of the conclusions drawn. Government size is often estimated on the basis of the final consumption of government institutions, i.e. the transactions in final products by government institutions. Using the ratio between the final consumption of government institutions and GDP, Barro (1989) concluded that the optimal government size is 25% of GDP. On the basis of the same approach, Günalp and Dincer (2005) found the optimal size of government to be 17.3% of GDP, whereas Chobanov and Mladenova (2008) found it to be 10.4%. Among the many others expressing the size of government in the same way, we can refer to the works of Landau (1983) and Cameron (1982).

An even wider range of empirical studies utilise total revenues or total expenditures to express the size of a government, which – especially due to the inclusion of transfers – represent a wider concept than that of final consumption. Gwartney, Lawson and Holcombe (1998), who found a negative relationship between the size of government and economic growth, used total government expenditure in terms of GDP as a proxy for the size of government. Similarly, Garrett and Rhine (2006), Altunc and Aydin (2013), Alfonso and Furceri (2010), Bergh and Karlsson (2010) and Marlow (1983) analysed data on total expenditures or total revenues of governments. As the government sector is predominantly financed by taxes or quasi-taxes, total tax revenues can only replace the aggregate of total revenues in exceptional cases. This is the case in Fölster and Henreksson (2001), Colombier (2009) and Agell-Ohlsson-Thoursie (2006).

Due to the scope of the research carried out in this area, we can provide only a partial listing of the studies addressing these questions. Still, this brief overview tellingly illustrates not only the intensity of the use of national accounts aggregates, but also the heterogeneity of the expression of the size of government. For our further discussion, it is however important to emphasise the fact that all of the aforementioned indicators are built on the same population of institutions, which are identified by the national accounting methodology under the adjective "government".

Statistical concepts

Statistical systems work with several concepts that are meant to describe economic behaviour and the size of the public sector. The narrowest concept, which any discussion on the size of the public sector must take into account, is the notion of the State. On a statistical level it covers entities known as organisational bodies of the state. Historically, these are institutions with a monopolistic right to apply legitimate force (Weber, 1984), which can obtain finances based on the taxation of their subordinated citizens. The revenues and expenditures of these units go directly through the state budget, with their final balance affecting the balance sheet of the State.

With the growth in the past few decades in the number of institutions derived from the state, the population of state organisations became insufficient to capture the true size of the public sector (Sennholz, 1987). A shift towards the network-based securing of public services and property (Goldsmith and Eggers, 2004) via institutions derived from the state necessitated a wider definition thereof to be translated into the concept of the government sector; the government sector now therefore includes all so-called public non-market producers[3].

Under the current methodology, the creators of manuals make a step further by defining the so-called public sector. This macroeconomic entity captures not only government units, i.e. institutions grouped in the government sector, but also public institutions supposedly operating on a market-oriented basis, as well as the central bank, which, by definition, constitutes a separate subsector of the financial entity. The reason for the methodological delineation of the public sector is that it supposedly better reflects the actual impact of the government on the economy[4].

The delineation of the public sector and its relation to the government institutions sector is illustrated in the following diagram:

Figure 1: Structure of the public sector in national accounts

Non-financial corporations	Financial institutions	Government institutions	Non-profit institutions serving households	Households
Public	Public	Public	Private	Private
Private	Private			

Source: ESA2010

As the diagram shows, the public sector represents the widest level of aggregation of public entities and covers both the government institutions sector, whose aggregates primarily serve as the input for empirical studies, as well as public non-financial companies and public financial institutions, which are controlled by government institutions. One necessary, but inadequate, condition for including a public body outside the government institutions sector is a sufficient level of decision-making autonomy that would allow us to consider it an independent institutional unit[5]. For completeness, it

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[3] For a definition of the sector, see ESA2010 par. 20.05-20.07. The public institutions sector is furthermore divided into the subsector of central public institutions, local public institutions and social security funds, see par. 2.111-2.117 ESA2010.

[4] SNA2008, par. 22.6 states that *"it is hence useful to create a sector consisting of all units in the public institutions sector and all public corporations in order to analyse the total impact of the government on the economy."*

[5] See par. 2.12 ESA2010.

needs to be added that by definition the public sector does not include non-profit institutions serving households[6], households, and, based on convention, also does not include non-residential entities owned by residential public entities[7].

As it has been made clear, the public sector is divided between two basic parts, the government sector, including non-market public units, and the rest of the public sector, including public units whose behaviour is akin to private market producers. As a result, a public institution operating on a market-oriented basis, as it is treated in the methodology, adds to the "size of government" only in terms of its transactions with government institutions, or through its assets and liabilities where a government institution is a counterparty.

With this, we are approaching one of the methodological sources for the underestimation of the size of government in statistics, which is the treatment of market behaviour in the statistical methodology. Evidently, the way the methodology assesses market behaviour is of key importance, which is briefly discussed further on. At this point however, it is important to keep in mind that the size of the economic sphere governed by political forces might be presented on several levels of aggregation. This can be illustrated by the differences between all the concepts in terms of the number of institutions.

Table 1: State, government institutions, public sector, Czech Republic, 2017

	Number of institutions
Organisational units of the State	278
Government institutions (government sector)	18,094
Public sector	19,269

Source: Business register

It is worth adding that although the number of organisational units of the State is comparatively low (278), they manage most of the revenues and expenditures of the public sector.

Discussion of the boundaries of macroeconomic entities

As mentioned in the previous section, the scope of the government institutions sector is fundamentally influenced by the methical description of market behaviour in the SNA2008 and ESA2010 national accounting manuals (including the follow-up manual specifically covering government deficit and debt). The method used to delineate the non-

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[6] In case of public control of a non-profit institution for households, this is a public non-market producer which must, by definition, be included in the sector of public institutions.

[7] A statistical image of the public sector as a whole is furthermore influenced by objective limits during the creation of macroeconomic statistics. These include first and foremost the convention of including an economic unit in only a single institutional sector, whereas the decision on which sector it is included in is predominantly based on majority ownership. As a result, this leads to the over- or undervaluation of the size of the public sector, the scope of which is de-facto unquantifiable due to not taking into account the ownership of shares by public institutions.

market sphere has gone through significant changes since the first methodologies for national accounts were released.

At present, the public sector itself is delineated via the application of the concept of control[8], which generally represents the ability of government institutions to affect or directly determine the policies of the given producer. If the given producer is owned or otherwise significantly influenced by a government institution, for example, via specific regulatory actions, then it is included in the public sector. The next step then assesses the economic behaviour of the given public entity, i.e. whether it is considered a market or non-market public producer. The market or non-market nature of the public entity is assessed using a range of quantitative as well as qualitative criteria[9].

The first (quantitative) criterion compares revenues with selected costs in order to arrive at the conclusion if prices charged by a producer are economically significant or not[10]. This criterion therefore assesses behaviour on the basis of the statistical analysis of prices. A number of objections can be raised against this approach. First, the rule requires at least 50% of production costs to be covered by own revenues, i.e. without any specific financial assistance received from the government. So, if only 51% of total revenues comes from households as customers, which are free to decide whether to buy or not, and the remainder is, for example, covered by the government to avoid losses, it is still sufficient - from the methodological point of view - to consider the given public producer as a market producer. This approach is highly questionable. The provision of subsidies to a public producer provides little market incentive. Furthermore, the existing prices do not reveal whether they are a result of the operation of market forces. Prices as a criterion for the assessment of market behaviour are therefore more misleading than useful.

While in the ESA1995 methodology the quantitative criterion plays a dominant role, the revised ESA2010 standard places more emphasis on qualitative criteria that primarily target the motivational environment surrounding the given producer. Which sector a public producer is placed in therefore depends on the existence of private competitors, free entry into the given branch, the structure of customers in terms of economic sectors or the transfer of risks associated with the performance of the given activity. This second group of criteria requires profound analysis of the institutional environment in which public units operate[11]. Although this approach is highly relevant, it stands on the application of "soft criteria" which are the subjects of subjective assessments.

Irrespective of the treatment of market behaviour, the question still remains: Is the division of the public sector into a market and non-market part for measuring government

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[8] Par. 20.18 and 20.306 ESA2010

[9] Par. 3.27-3.41 ESA2010, MGDD section 1.2.4.

[10] The notion of economically significant prices is defined in the par. 20.19 ESA, as "prices which have a substantial influence on the amounts of products producers are willing to supply and on the amounts of products that purchasers wish to acquire."

[11] This recent trend has led not only to an expansion of the government sector, but also to instability in the delimitation of sectors and ambiguities in international comparability. Simply put, pushing quantitative criteria to the background created the opportunity for subjective assessments and heterogeneity in the application of the rules.

size economically and analytically justifiable? In par. 22.6 of the SNA, the authors implicitly admit that data for the public sector provide a more complete picture on the influence of the government on the economic system. The separation of public entities based on whether their behaviour follows market principles or not is therefore the subject of ongoing methodological discussions and disputes. Patherine and Blades (1982) emphasise the fact that the subject of the activities of these institutions is not redistribution; their decision-making on production and prices is chiefly guided by the market mechanism rather than controlled by political forces.

On the other hand, some authors view this concept as a weak point of the methodology as well as of macroeconomic aggregates[12]. Public institutions always benefit from at least an implicit guarantee from the government. The risk of going bankrupt is therefore mitigated, thereby shaping its decision-making process as well as its innovativeness. Besides, the control from the side of government also allows the government to effectively implement its economic and social policies through the publicly controlled institutions - with examples including public banks, public transport companies and public infrastructure companies.

To divide the public sector between the market and the non-market sphere is therefore highly questionable. International statistical authorities like the International Monetary Fund or Eurostat have recently begun to appreciate the importance of getting the full picture on the public sector. It is with this in mind that they launched a data collection process the aim of which is to collate data on those public institutions, which in the national accounts methodology are left out of the government sector and the size of government.

Quantitative analysis

Different levels of aggregation can naturally provide a significantly different image of economic behaviour or the impact of public entities on the economic system. This is demonstrated here through an examination of the differences in the national accounting data published by the Czech Statistical Office (hereinafter CZSO). Key indicators are compared for the central government institutions subsector, such as the best approximation of a state entity, the government institutions sector and the public sector as a whole, whereby the data are taken from the satellite account published by the CSZO.

In this definition, the public sector also covers public financial institutions and especially the central bank as the implementing body of economic monetary policies. With respect to the need to have data on the impact of fiscal authorities, modified data will also be used for the public sector that does not cover the impacts of monetary policies, represented notably by the central bank[13]. Nevertheless, the analysis will focus first and foremost on

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[12] For instance Bajo and Primorac (2015), Stiglitz (1989), Sennholz (1987), DiLorenzo and Bennett (1983).
[13] Even though the central bank is considered, by the national accounting methodology, a non-market producer and its production is appraised on the basis of its costs (ESA2010, p. 63), by convention it is also the only public non-market producer which is currently left outside the government institutions sector.

the quantitative differences between the government institutions sector and the public sector.

Table 2 presents an overview of the flow parameters representing the given levels of aggregation of government institutions in relation to GDP.

Table 2: Percentage share of GDP per flow and (sub)sector, Czech Republic, 2011-2015[14]

Flows	Measurement unit	2011	2012	2013	2014	2015
Value added						
- central government institutions	% GDP	6.8	6.9	7.0	6.9	6.7
- government sector	% GDP	13.7	13.9	14.0	13.6	13.3
- public sector	% GDP	18.4	18.3	18.4	18.3	17.7
- public sector (excl. central bank)	% GDP	18.3	18.3	18.3	18.3	17.6
Total revenues						
- central government institutions	% GDP	28.9	29.1	29.3	28.3	29.1
- government sector	% GDP	40.3	40.5	41.4	40.3	41.1
- public sector	% GDP	51.3	51.4	52.0	50.0	50.1
- public sector (excl. central bank)	% GDP	50.9	51.0	51.5	49.7	49.8
Total expenditures						
- central government institutions	% GDP	31.2	32.8	30.9	30.4	30.3
- government sector	% GDP	43.0	44.5	42.6	42.2	41.7
- public sector	% GDP	53.8	55.0	52.6	51.5	49.8
- public sector (excl. central bank)	% GDP	53.6	54.7	52.4	51.2	49.7
Final (economic) balance						
- central government institutions	% GDP	-2.3	-3.7	-1.6	-2.0	-1.2
- government sector	% GDP	-2.7	-3.9	-1.2	-1.9	-0.6
- public sector	% GDP	-2.5	-3.6	-0.6	-1.5	0.3
- public sector (excl. central bank)	% GDP	-2.6	-3.7	-0.9	-1.5	0.1

Source: CZSO; own calculations

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[14] Data on total government revenues and expenditures are presented on a consolidated basis, i.e. the most significant internal flows are excluded to avoid double- or multiple-counting of certain flows due to a fragmented public or government sector.

With respect to production, i.e. based on the percentage share of GDP, available data show less significant differences between the government institutions sector (13.3% in 2015) and the public sector (17.7%). However, more significant differences can be seen in the widely used analytical aggregates of total revenues and expenditures[15]. In 2015, total public sector revenues represented 50.1 percentage points (hereinafter p.p.) of GDP, i.e. 10 p.p. more than the total revenues of the government institutions sector. With regards to total expenditures, the public sector represented a share of 49.8 p.p. of GDP, which is 8.1 p.p. more than the government institutions sector.

Over the whole timeline, the share of public sector revenues in GDP was 10.3 p.p. higher than the revenues of the government institutions sector. With respect to total expenditures, the size of the public sector was on average 9.8 p.p. higher than that of the government institutions sector. The concept of the public sector in national accounting therefore identifies the size of the public sector as being an economically larger entity than the government institutions sector, as described by the data used in empirical research.

With respect to economic balance, used for instance to quantify fiscal impulses for the purposes of implementing monetary policies, the data reveal differences both with respect to the overall level and year-on-year changes. In 2015, a year-on-year comparison showed a reduction in the definition of the government institutions sector by 1.3 p.p., and in the case of the public sector, the scope of year-on-year improvement exceeded these values by a further 0.5 p.p.

The change in the economic balance between the specified years also underwent significant changes. While the balance in the government sector was 2.1 p.p. lower in 2015 than in 2011, in the public sector the economic balance underwent a change of +2.8 p.p. Once the impact of the central bank policies is taken into account, this change can be corrected to +2.7 p.p. The scope of the fiscal impulse therefore indicates significant differences between the government institutions sector and the public sector.

Naturally, status parameters are also relevant for analysing the impact of the public sector on the economy. Table 3 presents the percentage share of individual macroeconomic entities in the ownership of assets, liabilities, including debts, and employment in the total economy.

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[15] Total revenues and expenditures are quantified as per the definition listed in the ESA2010 manual, par. 20.76 and 20.92.

Table 3: Percentage share of total economy per stock and (sub)sector, Czech Republic, 2011-2015

Stocks	Measurement unit	2011	2012	2013	2014	2015
Total assets						
- central government institutions	% TE[16]	24.2	24.0	22.4	21.7	20.9
- government sector	% TE	32.4	32.1	30.2	29.4	28.6
- public sector	% TE	37.8	37.5	36.5	35.9	35.7
- public sector (excl. central bank)	% TE	35.9	35.5	34.1	33.3	32.6
Total liabilities						
- central government institutions	% TE	10.8	12.1	11.7	11.8	11.0
- government sector	% TE	11.9	13.3	12.8	12.9	11.9
- public sector	% TE	17.7	19.0	19.3	19.3	20.1
- public sector (excl. central bank)	% TE	13.0	14.8	13.9	13.9	13.5
Debt						
- central government institutions	% TE	15.2	16.2	15.1	14.5	14.1
- government sector	% TE	16.2	17.2	16.0	15.4	14.9
- public sector	% TE	27.9	28.6	28.8	29.0	29.8
- public sector (excl. central bank)	% TE	19.5	21.1	19.5	19.6	18.2
Number of employees						
- central government institutions	% TE	8.5	8.4	8.4	8.4	8.4
- government sector	% TE	19.3	19.0	19.1	19.1	19.0
- public sector	% TE	23.4	22.6	22.8	22.9	22.6
- public sector (excl. central bank)	% TE	23.3	22.6	22.8	22.8	22.6

Source: CZSO; own calculations

The differences between individual levels of aggregation are especially notable in the case of liabilities, including debt[17]. While the government institutions sector reached a debt share of 14.9% at the end of 2015, for the public sector this stood at 29.8%. A significant growth in this indicator is caused notably by the inclusion of liabilities arising from the implementation of monetary policies. If the impacts of the monetary policies were

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[16] TE = total economy.

[17] I.e. liabilities with a fixed maturity period linked to payments of interest or other regular payments.

disregarded, the growth of the debt compared to the government institutions sector would be 3.3 p.p. in the given year. With respect to ownership, the public sector´s percentage share of total assets was 35.7% at the end of 2015, i.e. 7.1 p.p. more than the percentage share of the government institutions sector.

As the level of aggregation increases, we see fluctuating increases of 5 to 8 p.p. in the percentage share of total assets and liabilities. On the other hand, the data on percentage shares in relation to total liabilities and debts show that the central government institutions sector has a dominant position within the government institutions sector when it comes to foreign sources of funding. The difference between both units amounts to about 1 p.p. on average. However, the inclusion of public companies leads to a significant increase in the percentage shares of the public sector, especially due to the liabilities arising from the implementation of monetary policies. The data show that at the end of 2015 the public sector´s share of the total volume of liabilities was 20.1%, and of the volume of debt 29.8%.

Table 3 also illustrates the percentage shares of individual public sector units in the total number of employees according to the national accounting concept. With respect to the number of employees, differences that are more prominent are especially notable between the central government institutions subsector and the government institutions sector, on average by 10.7 p.p. This is predominantly caused by the fact that a range of key activities undertaken by the government institutions sector, for example, individual consumption services such as transportation, education or medical services, are provided at a local level, which has an impact on the number of employees in local government institutions. Extending the population of entities through the addition of public market producers therefore further increases the percentage share of the public sector, but to a lesser extent than is the case for flow- or state-based financial parameters.

The analysis of the data therefore illustrates significant differences between individual macroeconomic units in terms of the percentage share of overall revenues and expenditures in GDP, whereby the same also applies to total liabilities and debts. The data describing the public sector according to the national accounting concept(s) provide(s) a significantly different image of the scope of the flows passing through the public sector. The same also goes for the financial position of the sector, as measured by the value of its liabilities and debts. On the other hand, less profound differences can be found on the basis of production indicators, indicators measuring the ownership of assets and the number of employees. These show that the growing impact of the public sector need not always be accompanied by an increase in the number of employees in the public sector.

Conclusion

The macroeconomic aggregates of national accounting utilised in empirical research to express government size represent neither the sole nor the broadest means by which to delineate the size of the public sector in an economic system. As shown, national accounting works with several levels of public entity aggregation. The central government

institutions subsector is the narrowest and at the same time closest concept to the entity referred to as the "State". The wider group of government institutions then represents an important subgroup of the public sector, but not the public sector as a whole, since the methodology further divides the public sector into a market and non-market sphere. As a result, the utilisation of data about the government institutions sector to estimate government size in empirical research leads to an underestimation of the scope of government influence on an economy. At the same time, it was shown that this statistical underestimation is most prominent for the flow indicators of total revenues and expenditures, which are predominantly used in empirical studies to estimate government size.

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