EQUILIBRIUM

Quarterly Journal of Economics and Economic Policy
Volume 13 Issue 3 September 2018
p-ISSN 1689-765X, e-ISSN 2353-3293
www.economic-policy.pl

ORIGINAL PAPER

Citation: Kargol-Wasiluk, A., & Wildowicz-Giegiel, A. (2018). The quality of public finance in the light of fiscal governance concept: implications for the European Union countries. *Equilibrium. Quarterly Journal of Economics and Economic Policy*, *13*(3), 411–426. doi: 10.24136/eq.2018.020

Contact to corresponding author: a.kargol@uwb.edu.pl, University of Bialystok, Faculty of Economics and Management, ul. Warszawska 63, 15-062 Białystok, Poland

Received: 23 June 2017; Revised: 24 May 2018; Accepted: 9 June 2018

Aneta Kargol-Wasiluk
University of Bialystok, Poland

Anna Wildowicz-Giegiel
University of Bialystok, Poland

The quality of public finance in the light of fiscal governance concept: implications for the European Union countries

JEL Classification: *H30; H60; H62; H63; H87*

Keywords: *public finance; quality; fiscal governance; principal component analysis*

Abstract

Research background: The research area on the quality of public finance (QPF) appears to be intellectually attractive. In the light of the challenges of the 21st century, public finance should be characterized by adequate quality, ensuring effective implementation of the economic functions of government. The problem of QPF is increasingly more frequent in the face of a deteriorating fiscal situation of most countries in Europe and around the world. Hence, it is worth considering which factors determine the quality of public finance.

Purpose of the article: This article aims to show the possibility of assessing the quality of public finance in the light of fiscal governance concept. The identification of the key components of QPF seems to be useful from the point of view of empirical research, and can be implemented to assess the quality of public finance in the EU–28.

Methods: Descriptive analysis along with principal component analysis (PCA) was implemented to indicate dimensions of QPF.

Findings & Value added: The quality of public finance consists of a well-designed fiscal rules (numerical and non-numerical) and institutions, as well as structural reforms. The obtained results allow to characterize the quality of public finance through the prism of six identified principal components. They have a mixed character, two of them are partly or

totally related to the institutional aspects of public finance, which proves their importance in the process of improving the quality of public finance. Improving the quality of public finance remains a key challenge for policy makers in the EU. The growing impact of globalization and the aging population also cause the need to improve the qualitative aspects of fiscal policy. The study contributes to the literature on public finance, particularly in the empirical dimension through broadening the knowledge on institutional factors which can be used to measure QPF index. The results of research have certainly enriched the existing knowledge on the phenomenon of QPF and the ways of its measurement.

Introduction

In the light of the challenges of the 21st century, public finance should have an adequate quality, guaranteeing the efficient implementation of the core economic government functions. The problem of the quality of public finance (QPF) is increasingly raised in the face of the worsening fiscal performance in the majority of the EU–28 countries. Therefore, it is worth considering which factors determine the possibility of enhancing public finance efficiency.

In the case of this type of research, it is difficult to avoid certain generalizations and simplifications, because the concept of quality is multidimensional. In the sphere of public finance, quality can be considered through: the prism of a philosophical approach to the quality understood as a certain degree of perfection and the prism of public governance, including principles of good governance (democracy, transparency, accountability, efficiency, effectiveness, participation and social inclusion). An alternative way of capturing the quality of public finance is the assessment of public finance functions such as allocation, redistribution and stabilization which were distinguished by Musgrave (1959). Research on the quality of public finance also uses the concept of fiscal governance, which includes numerical fiscal rules, non-numerical fiscal rules and independent fiscal institutions.

The theoretical aim of the presented article is to show the possibility of assessing the quality of public finance in the light of the fiscal governance concept, considering additionally the approaches presented above. In the empirical analysis, the authors have attempted to identify key indicators of the public finance quality, within the framework of the identified dimensions serving to build QPF index for EU Member States.

To conduct the study a descriptive method with elements of statistical data analysis, including Principal Component Analysis were used. The study was mainly carried out on the basis of literature both devoted to the fiscal governance and the quality of public finance. In relation to the empir-

ical research, data from Eurostat, the International Monetary Fund and the World Bank were used.

The paper is structured as follows. Section 1 introduces the category of public finance quality. The next section presents the conceptual framework of QPF in the light of the fiscal governance concept. Section 3 describes the methodology of QPF measurement, while section 4 shows the results of empirical research considering the analyzed dimensions of QPF. The final section summarizes the conducted research indicating possible directions and limits of the implemented approach.

The category of quality. Some theoretical considerations

The category of quality can be variously defined in different field of sciences. Plato claimed that "quality" (Greek *poiotes*, Latin *qualitas*) is a certain degree of perfection. Such terms as: genre, value, class, brand, type, feature, property belong to the synonyms of this concept. Quality may also mean compliance with the requirements. In social sciences, unlike in the applied sciences, a majority of definitions are descriptive. In the economics, finance or management, the category of quality is understood in many ways, which is determined by the possibility of conducting research in the particular field of science. It seems that management as a science stands out against the background of economic sciences in dealing with the concept of quality. On the basis of the management theory, the category of quality is recognized as the degree to which the set of inherent properties meets the specific requirements. The issues concerning the quality are also considered in the context of life quality, products quality or utility value of goods. Considering value in the economics, certain attributes such as price, cost, attractiveness and even perfection are regarded. It seems that the most difficult is to measure "the quality" if the price category is not a subject of analysis.

It is worth to mention that Świtalski (2008) made interesting deliberations on quality in economics. He believes that: "In modern economies, quality is at least as important as the costs and prices of goods" (Świtalski, 2008, pp. 141–167). Therefore, if such an approach is accepted, it is difficult to be indifferent to the category of quality. It is worth emphasizing that "quality" is of relative importance, because something considered as having high quality in the eyes of a given individual may be reversely perceived by another person. As Elassy (2015) claims: particular groups of people may have similar views on something that should be understood by quality, but these views are merely "similar", but not "identical", because everyone has

a different perception (Elassy, 2015, pp. 250–261). The cited author, following the approach proposed by Green (1994), distinguishes the several approaches to the category of quality:

- Quality as conformance to standards. This concept is often used for public services. However, a certain difficulty may arise from a way of measuring those standards.
- Quality as fitness for purpose. In this context, the concept of good governance can be taken into account in the public sector. However, it may be difficult to define appropriate goals, because it is important who defines those goals.
- Quality as effectiveness in achieving institutional goals — this refers to high quality institutions that have a clearly defined mission and they know how to achieve specific goals (the concept of good governance seems to be useful in relation to the public sector).
- Quality as meeting customers' stated needs. Under this approach, it is important to know who the consumers are, what their needs are, and how they can be satisfied. Moreover, consumers should have full information about the product they purchase.
- The traditional concept of quality. This approach takes into account a product or service that is distinctive, because it gives a special status to its owner or user. In such context the quality is identified with excellence.

In the authors' opinion, the approaches described above may be partly useful in explaining the essence of QPF.

Fiscal governance and QPF dimensions

Hoffman and Gibson (2005) note that political institutions are not the only mechanisms that are analyzed to explain the effects of public policy. They point out that equally important in this respect are fiscal relations between the government and the society which may help to explain the public policy outcomes. Research on these relations is referred to as fiscal theory of governance. In this theory, two main aspects can be distinguished. Firstly, the shape of political institutions reflects the government demand for public revenue. In this situation, the government has incentives to rely on the political preferences of its citizens because their income depends on it. Alternatively, if the government is not dependent on citizens' income, it has much fewer incentives to take into consideration their political preferences. Secondly, Hoffman and Gibson (2005) stress that taxpayers should benefit from public policies almost proportionally to the share in public revenue

financed by them. Summing up, it seems that the above considerations constitute a theoretical background to the analysis of the concept of fiscal governance.

Andersen *et al.* (2010) argue that fiscal governance refers to a set of rules, institutions, political processes and internal practices related to the development and implementation of the public budget. It seems that this is *sensu stricto* definition as the explanation of the fiscal governance phenomenon focuses on the aspects strictly related to the budgetary procedure. Well-known researchers, such as von Hallerberg *et al.* (2009) perceive fiscal governance as a framework for fiscal policy (in a broad perspective referring to various types of institutions and procedures that are present in the budget process).

At the European level, national fiscal governance is defined as rules, regulations and procedures that affect how the fiscal policy is planned, approved, conducted and monitored, thus it is called the organization of the budget process (European Commission). From the EU perspective fiscal governance should be understood as the process of fiscal policy coordination using numerical fiscal rules (national), independent fiscal institutions and medium-term fiscal framework.

Fiscal governance realizes such goals as:

- achieving reasonable budget indicators, especially by anticipating the deficit, i.e. coping with high deficits and debt ratios,
- reducing the cyclicality of fiscal policy (ensuring its stability),
- improving the efficiency of public expenditure,
- effective public debt management.

These goals can be achieved by limiting the discretionary behavior of policy-makers and promoting long-term targeted budgeting. Fiscal governance can also support the efficient use of public funds by monitoring public spending programs and linking them to allocation sources (European Commission). It should be noted that since the 1970s the ratio of public debt to GDP in EU countries has been steadily increasing. Due to the global economic crisis, there has been a further drainage of public finance in recent years. It has generated a significant need for fiscal consolidation (along with the focus on fiscal rules, fiscal councils and public debt management). In the light of the previous considerations, the concept of fiscal governance may become useful in the analysis of QPF concept and its factors that are inseparably related to public policy efficiency.

Certain features, such as publicity and transparency, refer to the quality of public finance. These elements of QPF are also statutory principles of public finance in Poland. In a wider and more comprehensive approach, it means a perfect way to conduct public policy relating to public finance.

Thanks to the undertaken actions, the government will manage to achieve the assumed goals, taking responsibility for the results of fiscal policy (see Nicolo & Chong, 2016).

The quality of public finance is a multidimensional concept. It can be seen as all arrangements and actions of fiscal policy that support macroeconomic goals, in particular long-term growth. Therefore, QPF includes rules that will not only ensure a good budgetary situation and long-term stability, but also those that increase the potential production in the economy and facilitate adaptation and appropriate response to economic shocks. To achieve those goals, public funds should be used in an efficient and effective manner. At the same time, the government should implement fiscal policy in such a way as to create an incentive for both the effective labor and goods and services market functioning.

According to Barrios and Schaechter (2008), QPF can be divided into six dimensions: (i) government size (level of public revenue and expenditure), (ii) fiscal position and sustainability, (iii) composition, efficiency and effectiveness of public expenditure, (iv) structure and efficiency of public revenue. A set of fiscal rules, institutions and procedures ((v) fiscal governance) simultaneously affects all above mentioned dimensions. In addition, public finance can influence the market functioning and the whole business environment in many ways which can be seen as the sixth indirect dimension of QPF (VI) (Figure 1).

The concept of QPF can be understood as comprehensive actions of fiscal policy that ensure the achievement of macroeconomic objectives. As stated by Soroceanu and Lupascu (2011): "Current economic risk increases the need for greater emphasis on the quality of public finances in the process of economic and budgetary monitoring" (Soroceanu and Lupascu 2011, p. 68). It is worth noting that QPF is more than the pursuit of a low deficit and public debt level, although this still remains the main goal. All the solutions under public finance should contribute to the effective allocation of resources and the support of macroeconomic goal. Increasing the quality of public finance through fiscal policy can take place through the use of two mutually reinforcing ways. On the one hand, it can be directly done by increasing the efficiency of public revenue and public expenditure and, on the other hand, indirectly, by: reducing social costs and their distortions, supporting long-term economic growth and strengthening adaptability in case of economic shocks.

Research methodology

For the purpose of empirical research devoted to the quality of public finance in the EU–28 countries, data from the years 2004 and 2014 coming from Eurostat, World Bank and International Monetary Fund was used. Following the selection criteria suggested by OECD (2005), such as: relevance, statistical reliability, country and time coverage as well as timelines, the authors finally decided to include two periods. This choice can be explained by the fact that in year 2004 the biggest enlargement of the EU took place, and there is a rationale for the comparison of the difference in the scope of QPF between the beginning and the end of the analyzed period.

Based on the review of potentially relevant QPF indicators proposed by Barrios and Schaechter (2008), the authors chose 26 indicators characterizing different dimensions of QPF. The size of government was measured by the percentage of total government expenditure (TG Expend) and total government revenue (TG Revenue) in relation to GDP. The fiscal position and sustainability was described by variables such as deficit and debt (% GDP). To measure the public sector performance both inputs and output indicators were taken into account. The expenditure-side was characterized by spending on: health (% GDP), education (% GDP), general public services (% GDP), social protection (% GDP) and R&D (% GDP). In turn, the efficiency-side was reflected by the ratio of population with tertiary education to education expenditure (Scol/Educ), the number of patents to R&D expenditure (Pat/R&D), the ratio of life expectancy at birth to health expenditure (Lifeexp/HExpen) and the ratio of Gini coefficient to social protection expenditure (Gini/SociaProtExpen). The structure and efficiency of revenue system was measured through the ratio of direct taxes to the total government revenue (Dtaxes/TGRevenue). Among direct taxes total taxes on labour (Ltaxes) and capital (Capitaltaxes) were used, while indirect taxes were represented by taxes on consumption (Ctaxes). As institutional factors determine fiscal governance, six of them were included in the study, such as fiscal rule index (FRI), government effectiveness index (GovEfect), regulatory quality index (Rquality), rule of law index (RuleofLaw), corruption index (Corrupt) and medium-term budgetary frameworks (Mtbf).

If data scarcity of some variables appeared, the authors substituted missing values with national average values of the variables according to the suggestions of Shi and Svensson (2002) and Nardo *et al.* (2005). Because the components of QPF presented in the literature are identified through heterogeneous measures, and the construction of QPF index is the main goal of future research, one of the normalization methods — percentile rank was used. Next, elaborated by Hotelling (1933), a principal component

analysis (PCA) was conducted to extract factors determining the quality of public finance in the EU-28.

A principal component is defined as a linear combination of optimally weighted observed variables. It is assumed that there are Q variables in a dataset whose variance can be explained by a smaller number of variables — principal components Z_1 $Z_{2...}Z_Q$

$$\begin{aligned} Z_1 &= a_{11}x_1 + a_{12}x_{12} + \cdots + a_{1Q}x_Q \\ Z_2 &= a_{21}x_1 + a_{22}x_{22} + \cdots + a_{2Q}x_Q \\ Z_Q &= a_{Q1}x_1 + a_{Q2}x_2 + \cdots + a_{QQ}x_Q \end{aligned} \tag{1}$$

Principal components should satisfy the following conditions:

- they are uncorrelated (orthogonal),
- the first principal component accounts for the maximum possible proportion of the variance of the set of x's, the second principal component shows the maximum of the remaining variance, and so on until the last of the principal component which absorbs all the remaining variance no accounted for by the preceding components.

PCA involves finding the eigenvalues λ_j, j=1,…, Q of the sample covariance matrix,

$$CM = \begin{bmatrix} cm_{11} & cm_{12} \ldots cm_{1Q} \\ cm_{21} & cm_{22} \quad cm_{2Q} \\ \ldots & \ldots \quad \ldots \\ cm_{Q1} & cm_{Q2} \quad cm_{QQ} \end{bmatrix} \tag{2}$$

where the diagonal element cm_{ii} is the variance of x_i and cm_{ij} is the covariance of variables x_i and x_j. The eigenvalues of the above matrix are the variances of the principal components and can be found by solving the equation $CM–\lambda I = 0$, while I is the identity matrix with the same order as CM, and λ is the vector of eigenvalues (Mourão, 2008).

The reliability and accuracy of indicators describing the distinguished dimensions of QPF were tested through the statistics, such as Alfa Cronbach, Kaiser-Meyer-Olkin (KMO) and Barlett's test of sphericity.

Empirical analysis of QPF dimensions

Before starting the PCA procedures, both the reliability and accuracy of the proposed set of indicators of QPF were checked through the Alfa Cronbach and the KMO statistics The achieved results are satisfactory and statistically significant. Alpha Cronbach obtained the value of 0.792 (above the recommended value of 0.7), while the measure of KMO adequacy was 0.729 (exceeded the acceptable value of 0.5). Bartlett's spatial index (α <0.05) also confirmed the significance of Pearson's correlation coefficients between the analyzed pairs of variables. On this basis, the principal components analysis was conducted.

Under the process of PCA, six components were extracted, which accounted for 79,3% of the total variation. The first component accounted for 24,4% of the total variation, the second — 19,61%, the third — 11,63%, the fourth — 11.13%, the fifth — 8,1% and the sixth — 7,42%.

Beyond the fulfilment of the criterion of sufficient proportion which assumes that the degree of explanation of retained variables should obtain at least 75% and the Kaiser criterion for selecting factors having eigenvalues greater than 1, the Cattell's screen test additionally confirmed the number of retained factors. Next, the varimax rotation with Kaiser normalization was implemented in order to minimize the number of variables necessary for explanation of the analyzed phenomenon and simplify the interpretation of the principal component factors.

The results presented in Table 2 allow to characterize the quality of public finance through the prism of six extracted principal components. The first principal component is built by the following variables: the total tax revenue, measured by the share of direct taxes in total tax revenue (Dtaxes/TR — 0,912), and the level of direct taxes in % of GDP (Dtaxes 0,875), the effectiveness of public expenditure, measured by the number of patents to R&D expenditure (Pat/R&D — 0,832), and institutional factors, such as government effectiveness (GovEfect — 0,827) and the quality of law (RuleofLaw — 0,855). The second principal component represents variables related to the level of total public revenue (TGRevenue — 0,818), labour taxation (Ltaxes 0,800), government inputs on R&D (R&DExpen — 0,700) and social public expenditure (SocialProtExpen — 0,798). The third principal component is characterized by two attributes: the level of public expenditure regarding general public services (GPserviceExpe — 0,724) and the level of public debt (Debt — 0,913). Similarly, component 4 is built on the basis of two attributes referring to the tax revenue such as the percentage share of indirect taxes and consumption taxes in GDP (IDtaxes — 0,830). Component 5 consists of attributes identified with the quality of

fiscal governance, including fiscal rules (FRI — 0,853) and medium-term budgetary frameworks (Mtbf — 0,720), while component 6 is shaped by the expenditure on health (HealthExpen — 0,648).

Discussion

An institutional approach to public finance has resulted in increased interest in the quality of public finance. As many multidimensional phenomena, the concept of QPF causes a number of methodological implications. Regardless of the complexity of this category, the study on its theoretical as well as empirical dimensions, seems to be an extremely valuable piece of research initiative from the point of view of the necessity to measure QPF. It is worth emphasizing that research development on the significance of institutions in public finance (including fiscal governance) has been influenced by empirical studies of such authors as: von Hagen (1992), Alesina and Perotti (1996), Kaufmann *et al.* (1999), Mourão (2008), Hameed (2005), Alt and Lassen (2006), Dell'Anno and Dollery (2012), etc. The abovementioned authors usually focused on fiscal transparency, codes of good practices and the role of institutions responsible for fiscal outcomes. A growing body of empirical and theoretical studies has also been devoted to the concept of quality of fiscal institutions (Gleich, 2003; Hallerberg *et al.*, 2007; Debrun *et al*., 2008; Afonso & Hauptmeier, 2009; Schaechter *et al.*, 2012; Giosi *et al*., 2014). The majority of authors who concentrate on the quality of institutions in the public finance sphere paid attention on formal institutional setup which supports fiscal discipline and is particularly desired after the recent public finance crisis. Undoubtedly, the focus on institutional dimension of public finance quality is dominated in the current literature. The latest studies concentrate on fiscal rules and fiscal councils in the context of their influence on fiscal outcome (Coletta *et al*., 2015). For this reason, the trial to analyze the dimensions of QPF for the purpose of construction of index which allows to compare this phenomenon across the EU–28 countries, is worth the effort. The authors are simultaneously conscious of the limits of the applied PCA method. It is important to highlight the problem with interpretation of principal component if the entire survey sample is not self-weighting or missing data in the original data set occurs.

Conclusions

Based on the conducted analysis, it can be concluded that there is a need to further improve the theoretical basis for examining the quality of public finance. In the current debate on the public finance condition in the EU–28, some aspects of the quality of public finance have been selectively emphasized, such as: responsible fiscal policy, fiscal governance, transparency, efficiency and effectiveness, etc. However, there still is a research gap regarding a comprehensive approach to this phenomenon, especially in the context of institutional factors. Empirical analysis of the quality of public finance shows which of the indicators adopted for the study, according to the existing state of knowledge, can be used in the future to construct index of QPF in the analyzed countries of the European Union.

It appears that QPF evaluation and monitoring matters as institutions are responsible for enhancing the sustainability of public finance. Empirical research showed that the quality of public finance can be presented through the prism of six principal components. Among the six distinguished groups of indicators, two of them fully or partially refer to the institutional aspects of public finance, which proves their importance in the process of improving the quality of public finance. Therefore, it is worth analysing the institutional factors influencing the shape of the public finance system in a wider scope. Summing up, undoubtedly the obtained empirical results may change with the use of a larger number of indicators which measure QPF, however, the presented analysis allows for determining further directions of research development. It seems that future research should be concentrated on the construction of composite index of QPF enriched with the extended institutional indicators. The assessment of QPF would allow to indicate the groups of EU–28 countries with higher and lower level of quality of public finance on the basis of standard Musgravian functions and fiscal governance indicators.

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Annex

Table 1. Components loadings for QPF variables

Component	Initial eigen values			Extraction sums of Squared Loadings			Rotation sums of Squared Loadings		
	1	2	3	1	2	3	1	2	3
1	10,086	38,790	38,790	10,086	38,790	38,790	6,368	24,493	24,493
2	3,486	13,407	52,198	3,486	13,407	52,198	5,101	19,618	44,111
3	2,897	11,143	63,341	2,897	11,143	63,341	3,026	11,639	55,750
4	2,029	7,803	71,143	2,029	7,803	71,143	2,896	11,138	66,887
5	1,714	6,593	77,736	1,714	6,593	77,736	2,098	8,069	74,957
6	1,207	4,642	82,378	1,207	4,642	82,378	1,930	7,421	82,378

Note: 1 – Total; 2 – % of variance; 3 – % cumulative; Extraction Method – Principal Component Analysis.

Table 2. Rotated component matrix for QPF

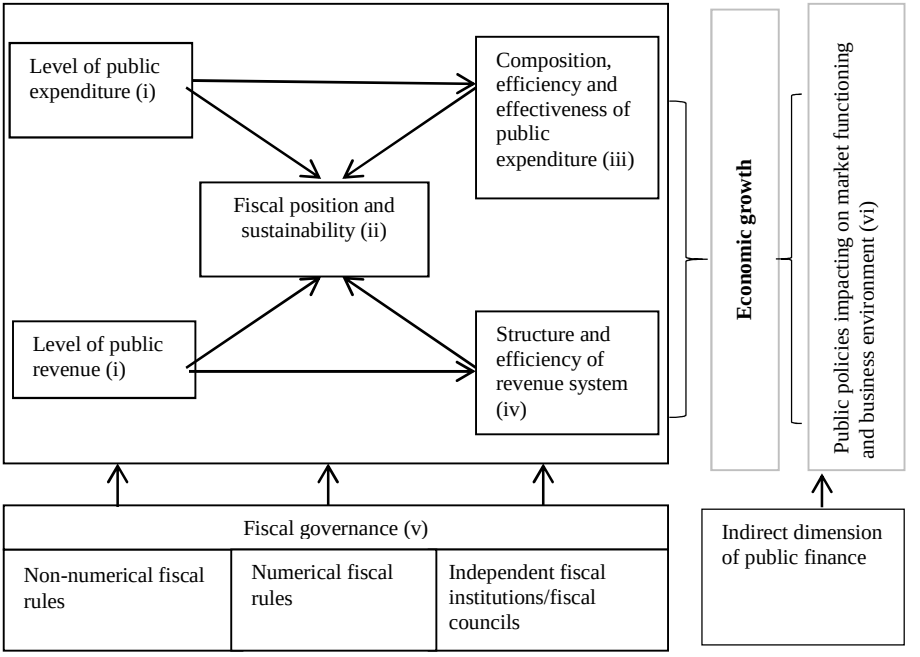
	Component					
	1	2	3	4	5	6
TGExpend	0,254	0,698	0,548	0,276	0,054	0,183
IDtaxTR	-0,277	-0,510	-0,089	0,626	-0,109	-0,280
TGRevenue	0,400	**0,818**	0,226	0,261	0,065	0,106
IDtaxes	0,088	0,318	0,194	**0,830**	-0,047	-0,202
Dtaxes/TGRevenue	**0,912**	0,038	0,055	-0,011	0,081	0,046
Dtaxes	**0,875**	0,313	0,136	0,060	0,084	0,066
Ctaxes	-0,264	-0,068	-0,028	**0,853**	-0,042	-0,116
Ltaxes	0,304	**0,800**	-0,010	0,025	0,101	0,330
Capitaltax	0,660	0,194	0,354	-0,126	0,002	-0,340
GPserviceExpen	0,220	0,370	**0,724**	0,305	-0,101	-0,078
HealthExpen	0,393	0,448	0,235	-0,210	0,070	**0,648**
EducationExpen	0,291	0,162	-0,071	0,638	-0,087	0,319
SocialProtExpen	0,341	**0,798**	0,339	0,098	0,178	0,093
R&DExpen	-0,335	**0,700**	-0,265	-0,399	0,054	-0,165
Scol/Educ	0,295	-0,095	0,015	-0,309	0,577	-0,254
Pat/R&D	**0,832**	0,301	0,017	0,065	0,153	0,253
Lifeexp/HExpen	-0,326	-0,427	-0,186	0,231	-0,007	-0,706
Gini/SocialProtExpen	-0,377	-0,847	-0,158	-0,075	-0,136	-0,182
FRI	0,075	0,146	-0,032	-0,121	**0,853**	-0,063
Mtbf	0,187	0,252	0,006	0,075	**0,720**	0,307
GovEfect	**0,827**	0,240	0,077	-0,087	0,012	0,107

Table 2. Continued

	Component					
	1	**2**	**3**	**4**	**5**	**6**
Rquality	0,541	-0,011	-0,309	-0,102	-0,547	-0,143
RuleofLaw	**0,855**	0,154	-0,095	-0,016	0,095	0,229
Corrupt	0,689	0,324	-0,140	0,018	0,226	0,303
Deficit	0,279	0,062	-0,828	0,102	0,015	-0,138
Debt	0,136	0,186	**0,913**	-0,048	0,117	0,050

Note: Extraction Method – Principal Component Analysis.

Figure 1. Quality of public finance



Source: own elaboration based on: Barrios and Schaechter (2008, p. 7).