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Efficiency of Pro-Poor Public Spending: Does the Quality of the Public Financial Management (PFM) System Matter?

A Cross-Section Study

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Abstract

Pro-poor public spending is an important tool used for promoting development and poverty reduction. Yet, it has been hard to find evidence that public spending actually translates into desired outcomes. Public financial management (PFM) systems have been pointed out as one vital factor affecting public spending efficiency, but this has yet not been confirmed in any empirical research. By using new data available from two indexes assessing the quality of the PFM system, this thesis assess whether the quality of the PFM system increases efficiency of public spending within the health- and education sectors. Efficiency of public spending within the two sectors is measured as child (under-5) mortality and education attainment. The results do not give any support to the assumed positive relationship between the quality of the PFM system and public spending efficiency. Due to limitations related to data, such as small sample sizes, the hypothesis should yet not be ruled out. No general conclusion is therefore drawn and the advices from this, first study assessing the PFM systems importance, is to analyze the presumed relationship further. Recommendations are to use a more comprehensive set of data and dependent variables which are more closely linked to public spending efficiency.

Keywords: Public financial management, Public spending, Child mortality, Education attainment

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Abbreviations

2SLS	Two-stage least squares
CPIA	Country Policy and Institutional Assessment
ELF	Ethnolinguistic fractionalization
GDP	Gross national product
GNI	Gross national income
HIC	High income countries
HIPC	Highly indebted poor countries
ICRG	International Country Risk Guide
IV	Instrumental variables
MDG	Millennium Development Goals
NGO	Non-governmental organizations
OLS	Ordinary least squares
PEFA	Public Expenditure and Financial Accountability
PFM	Public financial management
PI	Performance Indicator
UNESCO	United Nations Educational, Scientific, and Cultural Organization
WDI	World Development Indicators

1 Introduction

In 1990s, the global community acknowledged that economic growth itself is not necessarily developmental and focus has been redirected from economic development into poverty reduction and human development. With this change, it has been a re-acknowledgement of the role of the government and public expenditure. Today, governments are thus encouraged to use public recourses on "pro-poor" services. (Andrews, 2009:3f; Simson, 2012:1, 5; Wilhelm and Fiestas, 2005:2) Subsequently, investments have been redirected from the productive sector toward the social sector and pro-poor allocation of the budget is widely recognized as a key instrument for reducing poverty. (Curran and de Renzio, n.d.:6; Wilhelm and Fiestas, 2005:v)

Despite the focus on, and the seemingly broad consensus on, the importance of public spending, there is surprisingly little evidence assuring that public spending actually has a positive effect on service outcomes and poverty reduction (Wilhelm and Fiestas, 2005:5). There are several empirical studies analyzing public spending's effect on poverty and on economic growth, and public spending is found to have a positive effect in some studies while no relationship is found in others.

So how come public spending is transformed into desired public service- and poverty outcomes in some cases while it in others does not seem to have an effect? Wilhelm and Fiestas (2005:7) argue that countries' institutional setting determines the feasibility of policy interventions, and that high quality public sector institutions improve public service delivery. In line with this, the World Bank means that, although public resources are allocated on the right goods and services, it is hard to achieve desired social service outcomes if the budget institutions are malfunctioning. The World Bank further argues that poor public financial management (PFM) systems, is one of the main explanatory factors to why governments face difficulties in transforming public spending into efficient public services (World Bank, 2003 in Rajkumar and Swaroop, 2008:96f).

Although the quality of institutions, and the PFM system, is assumed to affect efficiency of public spending, few studies have been carried out in this area. Rajkumar and Swaroop (2008) as well as Wilhelm and Fiesta (2005) therefore argue that the impact of institutional

constraints on public spending needs to be examined further. Similarly, Wescott (2009:22) writes that: "Although it is presumed that better PFM processes will contribute to better service outcomes, that needs to be separately validated".

A reason why this assumption has not been analyzed might frankly be the lack of a good set of data capturing the quality of PFM systems. However, the World Bank, together with other actors[1], initiated a program in 2001 in order to create a method to measure countries PFM performance, called the Public Financial Management Performance Measurement Framework (PEFA). The PEFA method is now an internationally accepted and standardized instrument for measuring the equality of PFM systems, and the assessments provide reliable information on the performance of countries PFM systems, processes and institutions. (PEFA Secretariat, n.d.) de Rensio et al. (2011:7) write that the: "PEFA assessments are a unique source of information, a new dataset which sheds light on an aspect of governance which until very recently had been mostly overlooked".

The PEFA initiative has not only resulted in a rather large data set including PEFA assessments from various countries from 2005 to 2012, but has also been used as a temple for the World Bank's PFM rating included in their annual Country Policy and Institutional Assessments (CPIA), which now also provide a rather substantial source of information over the quality of countries PFM systems.

1.1 Purpose and Research Question

The purpose of this study is to analyze the quality of the PFM system's effect on the efficiency of public spending. By taking advantage of the data now available from the PEFA initiative, this is, to the author's awareness, the first empirical study over the presumed relationship. The aim is to contribute to the understanding of why public spending sometimes translates into desired outcomes, while it fails in others.

The theoretical framework is based on new institutional economic theory, with the assumption that institutions influence development, poverty reduction and also efficiency of public spending. The hypothesis is that the quality of the PFM system affects the efficiency of public spending, and that a good system makes it easier to translate public spending into

[1] IMF, DIFID, MAEE, Norad and SECO

desired public service outcomes. The research question follows: *Does the quality of public financial management (PFM) system affect the efficiency of pro-poor public spending?*

1.2 Method and Data

To take advantage of all available information regarding the quality of the PFM system, data from the PEFA assessments as well as the CPIA index is used. Efficiency of public spending is measured through assessing outcomes in the health- and education sectors, proxied as child (under-5) mortality and education attainment. Four cross-sectional Ordinary least squares (OLS) regressions are performed with the PEFA- and CPIA data sets, two assessing health- and two education outcomes. To capture the effects of the quality of the PFM system on public spending efficiency, a multiplicative interaction term is used.

1.3 Limitations

The main limitations of this study are caused by lack of data. The earliest data of the quality of the PFM system is from 2005, limiting the analysis to cross-section regressions. Moreover, data for several variables is scarce resulting in small sample sizes ranging between 34 and 37. This might decrease the precision of the estimations and the ability to generalize the results, while it also increases the risk of measurement errors. The limitations occurring from lack of data are decreased by using both the PEFA- and the CPIA index as measurements of the quality of the PFM system, and by looking on both the health- and education sector. However, the problems still persists and precautions have to be taken when interpreting the results as well as drawing conclusions based upon them.

1.4 Disposition

The thesis is divided into eight chapters and proceeds as following. First, an overview over previous research regarding public spending and PFM is presented followed by a presentation of the theoretical framework. Chapter four and five present the method and the data used. The results and robustness controls are thereafter presented followed by a discussion of the results in chapter seven. Lastly, concluding remarks are found in chapter eight.

2 Literature Review

There are many studies that analyze the effect of public spending on economic growth and poverty reduction, e.g. Aschauer (1989), Barro (1990, 1991), Levine and Renelt (1992), Easterly and Rebelo (1993), Devarajan et al. (1996), Mittnik and Neumann (2003), and De la Croix and Delavallade (2009). Yet, no unequivocal picture appears and the results vary significantly among countries and type of sectors. Looking at the two sectors in focus in this study, there is neither any conclusive evidence on whether public education- and health spending have a positive impact on service outcomes such as education- and health status (Gupta et al. 1999:4).

Several studies analyzing the link between public education spending and education attainment find only a weak positive- or non-existent relationship (Landau, 1986; Noss, 1991; Mingat and Tan, 1992, 1998; Flug et al., 1998). Harbison and Hanushek (1992) reviewed 12 studies looking at this relationship in developing countries and found that half of the studies did find a statistically significant relationships while the other half did not find such evidence (Rajkumar and Swaroop, 2002:97). Some variables found to have an impact on education attainment is per capita income, the age distribution of the population, parental perception of cost and benefits of education, family background, and parental education (Appleton et al., 1996; Flug et al., 1998; Mingat and Tan, 1992).

The picture of the literature assessing the effect of public health spending on health service outcomes is similar. Several studies find that public spending impact on health status measured as infant- or child mortality is small or statistically insignificant (Aiyer et al., 1995; Kim and Moody, 1992; McGuire et al., 1993; Musgrove, 1996; Filmer and Pritchett, 1997; Filmer, et al., 1998). Regarding other factors affecting health outcomes, Carrin and Politi (1995) found poverty ratios and income levels crucial for countries health status. The importance of income is confirmed by Filmer and Pritchett (1999:1309, 1317) which found that 95% of cross-national variation in child mortality could be explained by income per capita, income inequality, level of female education, level of ethnic fragmentation, and predominant religion. Comparing the two sectors, Lopez (2002) found public spending to better explain positive education than health outcomes. Moreover, the correlation was

stronger when using government spending in per capita terms and as a share of GDP, than spending as share of government spending. (Lopez, 2002: 11-14)

Several studies have searched for possible explanations to the varied results from studies assessing the relationship between public spending and public service outcomes. The spark of interest for the role of institutions within the development field has increased the number of studies trying to shed a light over institutions' role for economic growth and different developmental outcomes. Jutting (2003) reviews literature regarding the relationship between institutions and development indicators. According to him, the evidence from cross-sectional studies ensures the importance of institutional quality for economic growth and development. Yet, the literature review reveals a disagreement over the relative importance of various institutions. (Jutting, 2003:19)

Kaufmann et al. (1999) and Kaufman et al. (2004) find that institutional indicators, such as voice and accountability, political stability and violence, government effectiveness, and regulatory burden and rule of law have a strong direct impact on infant mortality. In another study by De La Croix and Delavallade (2006) it was found that countries with high corruption tend to invest more in physical capital than in health and education. Thus, evidence shows that institutions might have a direct effect on health- and education outcomes. So what is the status on research around institutions' impact on the transformation of public spending into desired service outcomes?

Rajkumar and Swaroop (2008) attempt to get some clarifications over the relationship between public spending and health- and education outcomes, measured as infant mortality and primary education failure rate, by analyzing the importance of the quality of governance. Their results show that the efficacy of public health spending is positively related to the level of governance.[2] Assessing the effect of public education spending gives a similar picture.[3] Hence, their study show that good governance, measured as well-

[2] 1% increase in the share of public health spending in GDP lowers the under-5 mortality rate by 0.32% in countries with good governance, 0.20% in countries with average governance, and has no impact in countries with weak governance. (Rajkumar and Swaroop, 2002)

[3] 1% point increase in the share of public education spending in GDP lowers the primary education failure rate by .70% in countries with good governance, and has no discernible impact in countries with weaker governance. (Rajkumar and Swaroop, 2002)

functioning bureaucracies and low corruption, seem to be vital in order to be able to transform public spending in to good public service. (Rajkumar and Swaroop, 2008: 98-105)

As mentioned, the PFM system is often mentioned to be one factor affecting public spending efficiency. Yet, there are no studies assessing whether the suggested relationship is valid or not. A review over the existing studies including the PEFA assessments, the most acknowledged measurement of the quality of PFM system, shows that the most studies analyze the performance of PFM systems, PFM reforms, and what factors are likely to affect PFM systems and PFM reforms (Porter et al., 2010; de Renzio and Dorotinsky, 2007; de Renzio, 2009; de Renzio et al. 2011; and World Bank 2010b, 2012b). The quality of the PFM system is hence often used as the dependent variable. One study where PFM is used as the explanatory variable is one by Dabla-Noris et al. (2010:20) which assess PFM systems' effect on fiscal performance. The results show that countries with a good PFM system tend to have higher fiscal balances and lower debt.

Wescott argues that, although it is presumed that the quality of PFM system has an impact on service outcomes, the relationship needs to be validated (Wescott 2008 in Andrews, 2009:6). He argues that more work is needed in order to confirm the suggested link between the quality of the PFM system and public spending efficiency (Wescott, 2009:150). Also, Pretorius and Pretorius question whether enough attention is being paid to the service delivery perspective in PFM reforms. According to them, there are no evaluations over PFM reforms' influence on service delivery. In their review over PFM reform literature, nine knowledge gaps are addressed. One concerns the link between PFM reforms and service delivery and whether improved PFM systems could contribute to improved service delivery. (Pretorius and Pretorius, 2008:Xiii, 41, 49)

This study aims to initiate the assessment of the importance of PFM quality in attaining desired public service outcomes through public spending. This is hence a first attempt to fill the knowledge gap pointed out in the PFM literature and the hope is to provide a base and a source for discussion for future research within the area.

3 Theory

3. 1 Pro-Poor Public Spending

The term pro-poor is commonly used in the development literature. Pro-poor policies can be referred to as policies, and public expenditures, which reduce poverty, hence, benefit and target poor people (Curran and de Renzio, n.d.:1; Cuesta. et.al., 2012:35). Efficiency of pro-poor public spending can thus be measured through assessing whether public spending results in reduced poverty[4].

There is no universal recipe with the optimal mixture of public spending to reduce poverty. The constellation of suitable public spending is rather said to be country specific, and what can be seen as pro-poor spending varies between countries. (IMF and World Bank, 2001:8) Curran and de Renzio (n.a.:5) argue that each country has to find their own constellation of expenditures that is appropriate for the country specific context and circumstances.

The traditional definition of pro-poor spending often includes social sector spending on health, education and social services. These sectors are also given much attention in the general development discourse. In the Human Development Index (HDI), education and health are given two thirds weight in the index. Moreover, four out of the eight Millennium Development Goals (MDGs) concerns issues regarding health and education. However, the definition has broadened, and pro-poor spending is now also often referring to spending supporting elements of the productive sector, and spending directed towards empowering women. (Peters, 2002:8f)

Hence, pro-poor spending consists of a broad based set of expenditures, which also are specific to each country's needs and circumstances. Due to the limited scope of this thesis, pro-poor spending is limited to spending within the health- and education sectors. The benefit of choosing these sectors is the relatively good availability of data regarding public

[4] There are many definitions of poverty. Here it refers to the definition stated at the World Summit on Social Development in Copenhagen in 1995 which follows: "Poverty has various manifestations, including lack of income and productive resources sufficient to ensure sustainable livelihoods; hunger and malnutrition; ill health; limited or lack of access to education and other basic services; increased morbidity and mortality from illness; homelessness and inadequate housing; unsafe environments; and social discrimination and exclusion. It is also characterized by a lack of participation in decision-making and in civil, social and cultural life." (United Nations, 1995)

spending and service outcomes. Further, it allows comparison with previous research within the area, as these sectors are widely used in development- and public service research.

The failure of pro-poor public spending As mentioned in the Introduction, public spending does not always result in desired public service outcomes. The World Bank argues that many governments fail to fulfill their obligation to provide public education and healthcare to the poor and points out four main reasons for this: Most government spending benefits the non-poor: Problems with getting the money to the front line service provider: Poor incentives for effective service delivery for public servants: Low demand for public service from the poor. (World Bank, 2003:3f, 39) Moreover, Wilhelm and Fiestas argue that public spending efficiency is affected by country specific conditions, such as level of urbanization, demographic structure, regional poverty patterns, etc. They further emphasize the role of countries institutional settings. (2005:v, 6, 22) North defines institutions as: "The formal and informal rules of the economic game" (Todaro and Smith, 2002:79). Formal institutions include constitutions and laws governing economies and politics, and the informal include customs, traditions and taboos (Aron, 2000:103).

The World Bank states that: "It may be known how to educate a child or stop an infant from dying. But institutions are needed that will educate a generation of children or reduce infant mortality by two-thirds" (2003:17). According to them, the main cause making services fail the poor is inadequate institutional arrangement, and they argue that it is vital to have institutions that increase efficiency and accountability (World Bank 2003:46, 58). Not only has it been proved that institutions have a large impact on growth and poverty, but also on policy intervention outcomes. According to Wilhelm and Fiestas (2005:6), high quality public sector institutions are accompanied with improved public service delivery which could be explained by enhanced capacity, better incentives for public service providers and increased accountability.

3.2 Public Financial Management

According to Rajukamar and Swaroop (2007:97), one of the main reasons why governments fail to translate public spending into efficient services is poor budget management. Many argue that the quality of the PFM systems have a large impact on whether pro-poor spending will be transformed to desired service outcomes, the success of implementation of

fiscal and pro-poor policies, economic growth, and poverty reduction[5]. Peters (2002:9) argues that in order to improve education outcomes and productivity in primary health care, it is critical to improve the efficiency of resource management in existing public programs.

According to Simson (2012:7), the importance of strengthening the PFM system is gaining attention. The role of the PFM system is also highlighted in the international development discourse by various actors and the importance of improving PFM systems is e.g. pointed out in the Paris Declaration. Good and credible PFM systems are often a prerequisite for obtaining budget support. Also, in the initiative giving debt relief to highly indebted poor countries (HIPC), it is not only a focus on improving public spending, but also improving budget execution (Peters, 2002:10; Pretorius and Pretorius, 2008:5f).

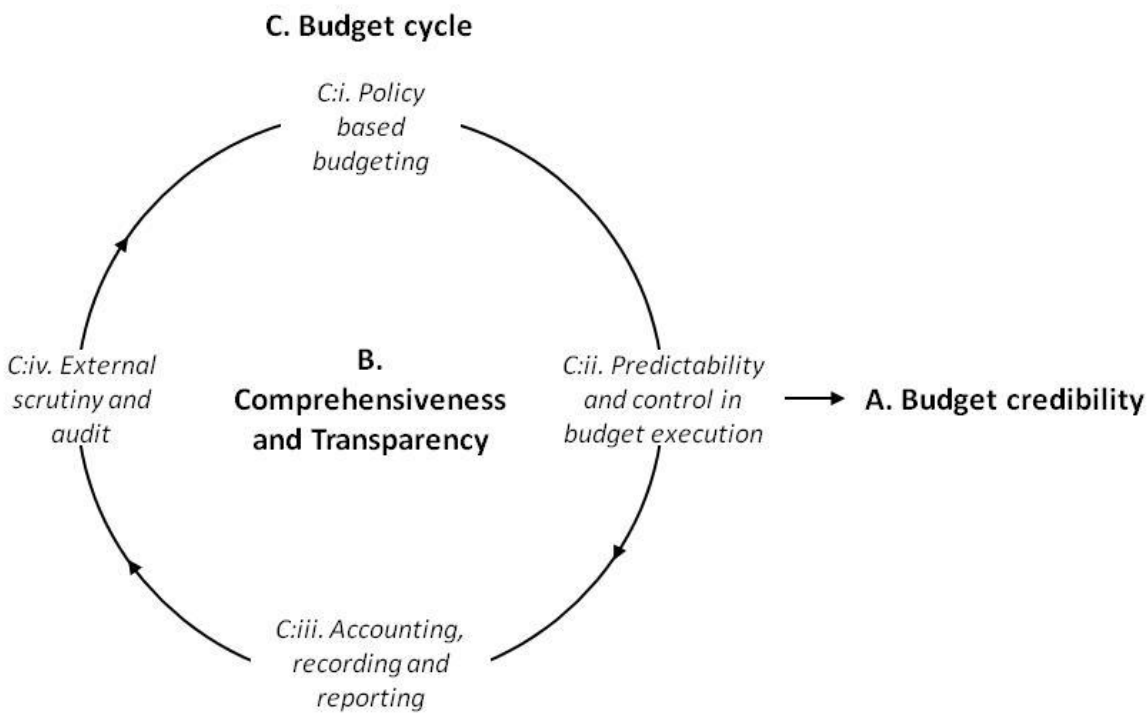
There is not one universal definition of the PFM system. One narrow definition is that the PFM system is the downstream activities of budget execution, control, accounting, reporting, monitoring and evaluation. More widely, the PFM system could also include activities such as preparation and fulfillment of the budget cycle, budget oversight and control, taxing and debt management, procurement, and resource allocation, all inter-related subsystems of the PFM system as a whole (Pretorius and Pretorius, 2008:iii, vii, 2).

In the PEFA framework, the PFM system is divided into three sub-groups: A. Budget credibility: B. Comprehensiveness and transparency: C. Budget cycle.[6] The last sub-group C is divided into; policy-based budgeting; predictability and control in budget execution; accounting, recording and reporting; and external scrutiny and audit. See Figure 3.1 for illustration and Appendix A for further explanation. It is the institutions and processes involved in these three parts that defines the PFM system in this study. In the section below, the sub-groups are explained further as their linkage to public spending efficiency is discussed.

[5] Mentioned by: Curran and de Renzio, na:6; Dabla-Norris. et. al., 2010:3; de Renzio and Dorotinsky, 2007:2ff; Peters, 2002:1; Pretorius and Pretorius, 2008:iii, vii; Wescot, 2009:141; and Wilhelm and Fiestas, 2005:19.

[6] Donor practices are also included in the PEFA assessments. However, it is excluded in this study since the focus is on the PFM quality and within country and national practices. The three sub-groups are all divided into performance indicators (PI), and the whole assessment includes 28 PIs, excluding donor practices (including three indicators)

Figure 3.1: *Structure and coverage of the PFM system as measured in the PEFA assessments (PEFA Secretariat 2005:4)*



3.3 Public Financial Management and Pro-Poor Public Spending Efficiency

The PEFA Secretariat (2011:6) argues that an orderly and open PFM system supports efficiency of service delivery. There are several possible causal links between the quality of the PFM system and the efficiency of public spending. Below are examples of possible negative impacts on public spending efficiency likely to occur due to malfunctioning and poor PFM systems. The disposition follows the PEFA's division of the PFM system into the three sub-systems, A-C, presented in Figure 3.1 above.

A. Budget Credibility The PEFA Secretariat (2011:66) means that the budget has to be realistic and implemented as passed in order for it to be a tool for policy implementation. They argue that: "Adjustments [of the budget] may fall disproportionately on non-salary recurrent expenditures, which are likely to have significant impact on the efficiency of resources used at the service delivery level." (ibid.) Since front line service deliverers are furthest out in the resource allocation chain, they are the units that suffers most when expenditures exceed budget estimates, or when resources are re-directed for other

purposes (ibid:43). Also Peters (2002:2f), argues that programs designed to benefit poor people often are harmed when executed budgets differ from the original plan. One explanation for this is that: ”Non-compliance with the budget may lead to a shift across expenditure categories, reflecting personal preferences rather than efficiency of service delivery.” (PEFA Secretariat, 2011:66) Finally, bad forecasting of revenues makes it harder to address spending imbalances and to promote poverty reduction through the preparation and execution of the budget. It also makes it more difficult to conduct adequate analysis of the composition of expenditures within and across sectors, which in turn makes it harder to ensure alignment with poverty concerns. (Fozzard et al., 2001:9)

B. Comprehensiveness and Transparency[7] Comprehensiveness of the budget is vital to ensure that government operations take place within its fiscal policy framework and are subjected to adequate budget management and reporting arrangements according to the PEFA Secretariat (2011:66), which also writes that:

> “Lack of comprehensiveness is likely to increase waste of resources and decrease the provision of services. It limits competition in the review of the efficiency and effectiveness of the different programs and their inputs. It may also facilitate the development of patronage or corrupt practices by limiting the scrutiny of operations, expenditures and procurement processes not integrated in budget management and reporting arrangements.” (PEFA Secretariat, 2011:66)

Further, the PEFA Secretariat (2011:18) means that lack of comprehensiveness of information in budget documentation decreases the possibility to hold actors accountable and makes it harder to control whether the budget aligns with country priorities. Another aspect mentioned by the World Bank (2003:181) is that an incomprehensive budget and bad revenue forecasting can result in aggregate fiscal deficits. Deficits can in turn be translated into financial crisis, forcing governments to cut basic services.

Transparency of the budget is also vital for public spending efficiency. Transparency enables external scrutiny of government policies and programs and their implementation (PEFA Secretariat, 2011:66). An opaque budget process is decreasing the publics’ insight in the budget process and the PEFA Secretariat means that: “Lack of transparency limits the availability of information on the resources available for the service delivery units. This

[7] Transparency can be defined as public dissemination of information and decision making so that the public can assess whether public interests is being served (Herbert, 2007:262).

weakens the capacity of local communities to exercise any scrutiny on the resources allocated and used at the service delivery units." (ibid.)

The importance of transparency is also recognized by the World Bank (2000:9, 48), and according to them is the budget offering a way for citizens to hold service providers accountable[8]. Without public access to information on the budget, citizens' ability to influence and monitor public sector performance is reduced (ibid.). This can also open up for corruption as low transparency decreases the cost for politicians and public servants to break rules, agreements and promises. If expenditure allocations and planned expenditures stay un-published, it is easier to alter plans since the general public is unlikely to demand explanations. An opaque budget will hence make it easier for the government to abandon expenditure priorities. (Campos and Pradhan, 1996:9; Peters, 2002:9) Tracking expenditures in Uganda is a good example of the importance of transparency. Leakages in the education sector were found and only 13% of intended expenditures reached primary schools in one area. When the information was published, the resources reaching schools rose to 80%. (World Bank, 2003:87)

C The Budget Circle

C.i Policy-Based Budgeting A policy-based budget process enables the government to plan the use of resources in line with its fiscal policy and national strategy (PEFA Secretariat, 2011:67). The PEFA Secretariat argues that: "A poor budget process does not allow discussions over efficiency in the use of resources. In particular, it does not allow an orderly review of existing policies and new policy initiatives." (ibid.) To have a long time perspective when planning the budget is also of importance. Without multiyear expenditures frameworks, tradeoffs across sectors and time are less transparent. It also makes it harder to link short-term macro-economic stabilization needs with medium- and long term demands on the budget. This could be harmful for policy design and planning, and subsequently also deteriorate efficiency of service delivery. (Holmes and Evans, 2003:5, World Bank, 2003:183, 193) Moreover, in order to align the budget with macro-economic, fiscal and sector policies, it is important that relevant actors participate in the budget process. Finally, if the budget is

[8] The World Bank define accountability as a relationship among actors that has five features; delegation, finance, performance, information about performance, and enforceability (2003:47).

not passed in time, government activities, such as public service provision, might be delayed. (PEFA Secretariat, 2011:24)

C.ii Predictability and Control in Budget Execution According to the PEFA Secretariat (2011:67), predictable and controlled budget executions are necessary to enable effective management of policy and program implementation. If flows of resources are unpredictable, it is harder for front-line service deliverers to plan and use the resources in a timely and efficient manner. Another consequence is that it might foster an environment where controls are habitually by-passed. (ibid.) Regarding control of the budget, the PEFA Secretariat argues that: "Inadequate controls of payrolls, procurement and expenditure processes may create the opportunity for corrupt practices, leakages and patronage." (ibid.) According to the World Bank (2003:185), the quality of procurement systems influence transparency, contestability, accountability, and efficiency of the PFM system. Leakages, primarily through fraud and corruption, can in turn result in poor-quality of public services (ibid.). Also the PEFA Secretariat (2011:67) means that poor procurement systems are likely to limit efficiency of public programs by increasing the costs or leading to inadequate quality of procured goods or services.

Further, poor quality of the tax system could affect spending efficiency negatively through; tax revenues (through decreased tax compliance and collection); poor revenue estimation; and poor availability and timeliness of tax transfers to treasury (PEFA Secretariat, 2011, 28-32). Overall, weak budget execution harms beneficiaries of government services, especially the poor. Concrete results could be that hospitals obtain insufficient supplies and equipment and therefore have low capacity, or that schools do not receive school materials so that the quality of education decreases. (Peters, 2002:7)

C.iii Accounting, Recording and Reporting "A lack of information on how resources have been provided and used for service delivery is likely to undermine the planning and management of services." (PEFA Secretariat, 2011:68) The PEFA Secretariat therefore argues that timely, relevant and reliable financial information is required to support all fiscal- and budget management and decision-making processes. (ibid.) They further mean that: "Inadequate information and records would reduce the availability of evidence that is required for effective audit and oversight of the use of funds and could provide the

opportunity for leakages, corrupt procurement practices or use of resources in an unintended manner." (ibid.) Without a good system for tracking public expenditures, it is hard to control whether expenditures reach planned destinations and make it more difficult to reveal abuses of public funds. (World Bank, 2003:184) According to Herbert (2007:274), it also decreases the overall accountability and transparency of public expenditures. Finally, a poor accounting system can result in poor assets management, which in turn might lead to increased costs and poorer service delivery (ibid.)

C.iv Effective External Scrutiny and Audit Effective scrutiny by the legislature and through external audit is according to the PEFA Secretariat (2011:68) vital for holding the government accountable for its fiscal- and expenditures policies and their implementation. Without the possibility to hold the government accountable, the value of services is likely to be diminished (ibid.) Campos and Pradhan (1996:9) similarly argue that limited scrutiny decreases pressure on the government to deliver what is promised in the expenditure plan.

"Inadequate audit means that the accounting and use of funds is not subject to detailed review and verification." (PEFA Secretariat, 2011:68) Poor auditing makes it more difficult for governments to hold itself accountable for how policymakers and providers spend public funds (World Bank, 2003:185). Decreased accountability of public officials could increase corruption in the public sector and deteriorate the efficiency of government service and programs (Peters, 2002:15).

3.4 A Model of Public Spending Including PFM

Having described the possible causal mechanisms in which the quality of the PFM system could have an impact on the efficiency of public spending, the model used in the empirical analysis is presented in this sub-chapter.

Following the model used by Rajkumar and Swaroop, 2002, public service outcome[9] in program *p and country i* , is assumed to have the following production function:

$$\left(\mathrm{Outcome}_i^p\right) = e^{A_i} * \left(\frac{\mathrm{GDP}_i}{\mathrm{N}_i}\right)^{\alpha} * \left(\frac{\mathrm{PS}_i^p}{\mathrm{GDP}_i}\right)^{\beta} \qquad (1)$$

[9] E.g. indicators of health status, such as child mortality, or education status, such as proportion of children completing primary education.

Written in natural logarithms:

$$ln(\mathrm{Outcome}_{\mathrm{i}}^{\mathrm{p}}) = \mathrm{A_i} + \alpha \ln\left(\frac{\mathrm{GDP_i}}{\mathrm{N_i}}\right) + \beta \ln\left(\frac{\mathrm{PS_i^p}}{\mathrm{GDP_i}}\right) \quad (2)$$

PS^p_i is public spending on program *p* in country *i, N_i* is the population of country *i*, *GDP* is the gross domestic product, and *A* represents a set of country specific variables. The function indicates that public service outcome; improves with increased country income; improves, or does not deteriorates with increased public spending; and depend on country specific factors.

As mentioned above, public spending does not always seems to be translated into efficient public services and positive outcomes. It could hence be assumed that only a fraction, β of public spending is used for-, or will contribute to productive purposes, and that the coefficient on public spending, β, on program *p*, can be written as:

$$\beta = \gamma(.) * \beta_p \quad (3)$$

Where β_p is the productivity of public service created from the spending on program p and, $\gamma_{(.)}$ is a measure of the efficacy of public spending. In Rajkumar and Swaroop's study (2008) assessing governance impact on public spending efficiency, $\gamma_{(.)}$ is defined as a function of state governance[10]. With the aim of assessing whether the quality of countries PFM system has an impact on public spending efficacy, it is here assumed that the efficiency of public spending is a function of the quality of the PFM system in country *i* as following:

$$\gamma_i = \varphi_{0,i} + \varphi_{1,i} PFM_i \quad (4)$$

Where PFM_i is a measurement of the quality of the PFM system, $\varphi_{1,i}$ is the factor in which the quality of the PFM system affects public spending and $\varphi_{0,i}$ is country specific effects. An equation that is useful for the empirical model is received by inserting equation 3 and 4 into equation 2, which gives:

$$ln(\mathrm{Outcome}_{\mathrm{i}}^{\mathrm{p}}) = \mathrm{A_i} + \alpha \ln\left(\frac{\mathrm{GDP_i}}{\mathrm{N_i}}\right) + \beta_{\mathrm{p}}(\varphi_{0,i} + \varphi_{1,i} PFM_i) \ln\left(\frac{\mathrm{PS_i^p}}{\mathrm{GDP_i}}\right) \quad (5)$$

Public spending efficiency, measured as service outcomes, is thus assumed to depend up on countries' income per capita, public spending as a share of country income, a set of country specific factors and the quality of the PFM system. By including the interaction term,

[10] $\gamma_i = \varphi_{0,i} + \varphi_{1,i} G_i$ Where G is a measure of governance. (Rajkumar and Swaroop, 2002:6)

containing the quality of the PFM system and public spending, it is possible to analyze whether the quality of the PFM system affects the efficiency of public spending or not.

4 Method

4.1 The Model

As mentioned in Chapter 3.2, both the PEFA assessments and the CPIA index 13 are suitable proxies for the quality of the PFM system. To take advantage of the two different set of data, allowing two estimations on health- and education outcomes respectively, four cross-sectional OLS regressions are conducted. Cross-section estimations are the only method applicable on the set of data provided by the PEFA assessments. Data from the CPIA indicator 13 exists for 6 years and could hence be used in panel estimations. Yet, cross-section estimations using averages from the time period are carried out for three reasons. The main reason is the lack of data, especially for the dependent variable, education attainment, but also for various control variables.[11] The other two reasons are the short time period and the fact that little time-variation actually exists when assessing data for many of the key variables. However, in order to use the available data to the greatest extent, and as a means of controlling the cross-section method, a panel estimation is carried out with the Health-CPIA dataset.

From the theoretical model showing the presumed public service production function (Equation 5 in Chapter 3.4), the empirical estimation for health- and education outcomes are specified as follows:

$$\ln(\mathrm{HS_i}) = \beta_0 + \beta_1 \ln(\mathrm{PCGDP})_i + \beta_2 \ln(\mathrm{PHSGDP})_i + \beta_3 \mathrm{PFM_i} + \beta_4 \mathrm{PFM_i} * \ln(\mathrm{PHSGDP})_i + \beta_5 \mathrm{X_i} + \varepsilon_i \quad (6)$$

$$\ln(\mathrm{ES_i}) = \beta_0 + \beta_1 \ln(\mathrm{PCGDP})_i + \beta_2 \ln(\mathrm{PESGDP})_i + \beta_3 \mathrm{PFM_i} + \beta_4 \mathrm{PFM_i} * \ln(\mathrm{PESGDP})_i + \beta_5 \mathrm{X_i} + \varepsilon_i \quad (7)$$

The variables for country *i* are: **HS** - health status measured as the rate of child (under-5) mortality: **ES** - education status measured as expected primary completion rate: **PCGDP** - per capita GDP measured in purchasing power parity adjusted dollars; **PHSGDP** and **PESGDP** -

[11] Such as public spending, female education, adult education, income inequality.

public health- and education spending as a share of GDP: **PFM** - the quality of the PFM system measured through the PEFA assessments or CPIA indicator 13: **X** - a vector of country-specific socioeconomic variables: **ε** - an error term.

In order to capture both direct- and indirect effects from the quality of the PFM system, the PFM variable enters into the model both as an independent variable and interacted with public spending as a share of GDP. One can question whether there is a direct link between the quality of the PFM system and health- and education outcomes, as no related literature indicates that a direct link exists. Yet, it is possible that the PFM variable picks up variation in the dependent variable caused by the quality of the countries' institutions in general. An indication of this is that the International Country Risk Guide (ICRG) index, measuring the quality of countries institutions,[12] and the CPIA index has a correlation coefficient of 0.56 and the PEFA assessments 0.36. Including an individual variable for PFM quality might hence pick up effects from the quality of countries' institutions in a broader sense than the PFM system.

The prediction, from the theoretical point of view, is that the quality of the PFM system has a positive effect on the efficiency of public spending, and thus that the interaction term (and β_4) will have a positive coefficient. It is important to be aware of that interpreting coefficients in a regression including an interaction term is different than in an additive model. The usage of interaction terms has been criticized for various reasons, e.g. that coefficients become more difficult to interpret and that estimates become sensitive to the specific set of data. Yet, Fredrich argues that the inclusion of a multiplicative term can increase accuracy, provide a more detailed analysis and also increase explanatory power. He therefore advocates for the inclusion of interactive terms if appropriate. (Fredrich, 1987: 798f, 803f, 832) Since the aim of this study is to analyze the interaction between the quality of PFM system and the efficacy of public spending, the multiplicative model is used despite its drawbacks. Yet, it is important to consider them when analyzing the results, especially sensitivity to data since relatively small samples are used. As for the interpretation of the marginal effect, it is important to have in mind the difference from coefficients from

[12] The International Country Risk Guide's indicator of quality of government includes, Corruption, Law and Order, and Bureaucracy Quality. It is scaled from 0 to 1 and higher values indicate higher quality of government.

additative variables,[13] and that the marginal effect of public spending depends not only on the level of spending but also on the quality of the PFM system.[14]

4.2 Limitations

According to Jutting (2003:19), there is a general consensus among experts that institutions tend to be endogenous to development outcomes. It is possible that reverse causality exists between the main variables in the regressions, and that public service outcomes and public spending and/or the quality of the PFM system are jointly determined. An example of a possible way for the dependent variable to effect quantity of public spending is that it is likely that governments in countries with high child mortality devote a larger share of public spending on health in order to reduce mortality. The same reasoning can be made for education attainment. This could result in a negative or small regression coefficient for public spending, despite a positive impact on service outcomes. (Filmer and Pritchett, 1999:1313) In order to address the problem with reverse causality, many are using instrumental variables[15] (IVs) and 2SLS estimations instead of OLS (see Filmer and Pritchett, 1999; Gupta et al. 1999; Rajkumar and Swaroop, 2008). However, Rajkumar and Swaroop argue that the OLS method is a valid tool which reveals how the key variables are correlated, irrespective causality. Moreover, they argue that there is no reason to believe that results are biased due to endogeneity. (2008:107f) Thus, and despite the risk of endogeneity, it is presumed that normal OLS estimations are sufficient as a first attempt to assess the link between the PFM system and public spending efficiency.

5 Data

Variables and data are chosen on the basis of availability in order to get the most comprehensive set of data possible. Moreover, in order to make results comparable, variables used in previous research are used when feasible. Appendix B presents all variables

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[13] The marginal effect of public spending on health status is given by; δln(HSit)/ δln(PHSGDP)it= β2+ β4PFMit; and for education status by; δln(ESit)/ δln(PESGDP)it= β2+ β4PFMit.

[14] Based on Fredrich's (1982:810) discussion, a confidence interval for this marginal effect can be calculated as following: $VAR[\beta_2+ \beta_4 PFM_{it}]=VAR[\beta_2]+ PFM_{it}2VAR[\beta_4]+2 PFM_{it}COV[\beta_2, \beta_4]$. This confidence interval shows whether the marginal effect of public spending is statistically significant at various qualities of PFM systems. The effect of public spending could thus be significant at some values of the PFM variable and insignificant at others. See Fredrich (1982) for further discussion.

[15] Filmer and Pritchett (1999) use country neighbors' public spending and Rajkumar and Swaroop (2008) use country laws as IVs.

together with the source, and countries included in the regressions are listed in Appendix C. Countries included are low- or middle income countries since no high income countries are included in the PEFA assessment (except for Norway which is excluded in the sample) or the CPIA index. A common problem when conducting studies including these countries is availability of data, which also is a major problem in this analysis as it results in small sample sizes. A summary of the statistics on the dependent and the main explanatory variables can be seen in Table 5.1 below.

Table 5.1: *Summary statistics on main variables*

Variables	Max	Min	Mean	Std. Dev.	Observations
Regression Health-PEFA					
Under 5 mortality	185.40	10.10	70.40	49.23	37
Per capita GDP (in PPP adjusted 2005$)	12918.58	303.19	3772.28	3406.46	37
Public health spending (share of GDP)	7.45	0.76	2.95	1.50	37
Quality of PFM system (PEFA)	5.14	1.25	3.05	0.92	37
Regression Health-CPIA					
Under 5 mortality	185.57	13.87	92.24	44.62	37
Per capita GDP (in PPP adjusted 2005$)	4326.74	301.02	1787.85	1085.28	37
Public health spending (share of GDP)	4.95	0.74	2.51	1.14	37
Quality of PFM system (CPIA)	4.21	2.14	3.34	0.54	37
Regression Education-PEFA					
Education attainment	103.46	42.39	80.20	14.83	34
Per capita GDP (in PPP adjusted 2005$)	24150.88	303.19	3894.26	4683.96	34
Public health spending (share of GDP)	4.61	0.63	1.98	0.92	34
Quality of PFM system (PEFA)	4.54	1.25	3.02	0.87	34
Regression Education-CPIA					
Education attainment	103.73	30.26	72.34	16.13	37
Per capita GDP (in PPP adjusted 2005$)	4665.85	301.02	1856.61	1257.00	37
Public health spending (share of GDP)	5.51	0.58	2.06	1.14	37
Quality of PFM system (CPIA)	4.21	1.79	1.79	0.59	37

The PEFA regressions The data for the PEFA regressions consists of 37 observations for the health regression and 34 for the education. The PEFA assessments are conducted in different years, with the start in 2005, and data for the dependent- and explanatory variables are based on the same year as the PEFA assessment.

Due to lack of data, means of available data from two years before- and two years after the year of the PEFA assessment are used for the control variables female education and income inequality in the health regressions. In the education regressions, means are calculated and used for the dependent variable, education attainment, and the control variables public primary education spending, private primary education spending, adult literacy, and income inequality.[16] Using means might cause measurement errors which should be held in mind when drawing conclusion from the results.

Nine PEFA assessments exists for 2011, five of them are repeated assessments, meaning that that five countries already have an observation from a previous year. Since means are used for some variables, calculated with data from two years before and after the PEFA assessment, including data from 2011 is not be possible due to lack of data from 2013. Moreover, there are many missing observations for 2011 for various variables.[17] Therefore, the nine observations from 2011 are dropped and the data set thus include observations from the time period 2005-2010. One could question whether there might be any time effects since the observations not are from the same year. Being aware of this shortcoming, it is overseen due to the relatively short period of time.[18]

The CPIA regressions The data used for the CPIA regressions consists of 37 observations for both the health- and education regression. For each variable, means from the time period 2005-2010 are used. [19] The CPIA assessments are available from 2005 and for each year until 2011. Yet, data is only used up until 2010 due to scarcity of data for other variables, and in order to use the same set of data as in the cross-section analysis. As mentioned above, some data is scarce, especially for education attainment, education spending, and for some control variables. The means could thus be misleading and cause measurement errors. However, one can assume that variables change relatively little due to the short time period.

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[16] The decision to calculate means with two years before and after the PEFA assessment was based on that many observations should have been excluded if more years should have been used. If the mean would have been calculated with three years before the PEFA observation, all years from 2010 should have been excluded since data from 2013 not is available yet.

[17] Water, Ethnolinguistic fractionalization, Income inequality, Female and Adult education.

[18] One possible time effect could be the economic crisis in the end of the 21st century. However, the crisis hit the high income countries the worst, i.e., not the countries included in the analysis.

[19] The first CPIAs are from 2005 and assessments are available for each year until 2011. Yet, data is only used up until 2010 in order to use the same set of data as in the cross-section analysis.

5.1 Dependent Variables

Health According to Filmer and Pritchett (1999:1309), infant- and child (under-5) mortality are the most commonly used indicators of health status (see e.g. Gupta et al., 1999; and Rajkumar and Swaroop, 2008). In this study, health status is proxied as child (under-5) mortality which reveals how many new born babies out of 1000 that will die before reaching the age of 5 years, if subjected to current age-specific mortality rates. The data is obtained from the World Bank's WDI. There is no indication in previous literature on which indicator is the most suitable assessing public spending efficiency. In order to control if using infant mortality changes the results, a control regression is run with this as the dependent variable.

Education Commonly used measures for education status are enrollment rates and education attainment. Rajkumar and Swaroop define the later as the number of school-aged children that enter and complete school or a specific grade. They argue that education attainment is a superior measurement since enrollment rates do not take drop-out rates into consideration. Further, education attainment tends to has an inverse relationship with drop-out rates which indicate low education quality. (Rajkumar and Swaroop, 2008:102) According to the World Bank, low primary school completion indicates low enrollment rates, high drop-out rates, and low educational progress, and is thus a good indicator on failures of the education system (2003:111). On the basis of the discussion above, education attainment is proxied as the expected primary completion rate. Data on education status is gathered from WDI, but origin from UNESCO Institute for Statistics. The expected primary completion rate is measured as;

> "*the total number of new entrants to the first grade of primary in a given year, regardless of age, who are expected to reach the last grade of primary education, regardless of repetition, expressed as a percentage of the population at the official entrance age to primary education in the same year. It is calculated by multiplying the gross intake ratio to the first grade of primary education by the survival rate to the last grade of primary*." (World Bank, 2013)

Since some students repeat grades or return to school after dropping out, the index might overstate education status, and it is possible that the ratio is above 1.0 (Barro and Lee, 1996: 218f).

5.2 Explanatory Variables

The quality of the PFM System Two variables are used as proxies for the quality of the PFM system, the PEFA assessments and the CPIA indicator 13. Since the CPIA index 13 is based

upon the PEFA framework, there are large similarities between the two indexes, see Appendix A for deeper description and comparison. The correlation between the data of the two variables existing for the same country and year is 0.755. The PEFAs offer more comprehensive assessments while the CPIAs provide a larger set of data. As mentioned, in order to get a more robust and comprehensive insight in the link between the quality of PFM system and public service efficiency, both indexes are used in this study.

Public Expenditure and Financial Accountability – PEFA The PEFA framework, initiated by the World Bank together with other actors[20] in 2001, is now an internationally accepted and standardized tool to get reliable information on the performance of countries PFM systems. (PEFA Secretariat, n.a.) The framework provides a comprehensive method to assess countries' PFM systems, it is applicable to all countries, and includes a broad set of indicators covering wide aspects of the PFM system. (de Renzio and Dorotinsky, 2007:7, 21)

As mentioned in Chapter 3.2, the PEFA assessments are divided into three sub-groups, consisting of 28 Performance Indicators (PIs) all together. The PIs are given a score from A-D (including D+, C+ and B+), where A indicates highest performance. The letter scores are transformed into numbers where higher scores denote better performance (D=0 and A=6).[21] Thereafter, the means of the 28 PIs are calculated where all PIs are given the same weight. Data is collected from the PEFA Secretariat, only finalized public assessments are included.

Although the PEFA assessments today provide a large set of data useful in quantitative studies, the PEFAs were not meant be used in cross-country comparisons (de Renzio, 2009:2). Even if the same methodology for the PEFA assessments is used, it is still a risk that they are carried out in different ways and subjectivity can cause differences in the scoring of indicators (Wescott, 2008:46). Another problem relates to missing scores for some PIs, which can result in biased means (Eckardt and Schickinger, 2010:14). Nevertheless, average values for country PEFA scores have been used in many reports and studies. de Renzio et al. (2011:10) argue that missing observations is not a serious measurement problem and according to them, countries with more missing scores are not significantly different in any

[20] IMF, DIFID, MAEE, Norad and SECO

[21] According to the PEFA Secretariat (2009:6), this technique is increasingly being used in PEFA assessment reports and is also used in various PFM studies, e.g., de Renzio, 2009 and de Renzio et al., 2011.

noticeable ways. Finally, for a PEFA mean to truly reflect the PFM quality in a good way, all PIs should ideally be equally important. Yet, this is not the reality since some indicators might be more important than others, and importance might differ between countries. (de Renzio, 2009:3)

de Renzio (2009:3f) argues that, while recognizing its limitations and problems, the PEFA assessments methodology ensures that quantitative cross-country comparisons can be feasible in most cases. The assumption taken is that the limitations and possible measurement errors have to be considered and that caution has to be taken drawing generalizing conclusions, but that the PEFA assessments do provide a feasible set of data useful for the aim of this thesis.

Country Policy and Institutional Assessments – CPIA Another interesting set of data over countries' PFM systems is found in the World Bank's annual CPIA index. It includes 16 criteria assessing the quality of countries policy- and institutional framework considered important for fostering growth and poverty reduction (World Bank, 2012a; World Bank, 2010a). The 13th criteria assess the quality of budgetary- and fiscal management. It consists of three PFM dimensions; the comprehensiveness and credibility of the budget; the effectiveness of the PFM system; and the timeliness and accuracy of accounting and fiscal reporting (see Appendix A for further description). Criteria 13 use the PEFA index, IMF Code of Good Practices on Fiscal Transparency[22] and the PRMPS Governance Indicators[23] as guideposts. (World Bank, 2010a:3, 13)

The CPIA indicator 13 ranks countries on a six-point scale where 6 indicates a good performance. Intermediate scores, 1.5-5.5, are also given. The three dimensions included in indicator 13 are scored separately and are given equal weight in the overall rating of the indicator. Data is gathered from the World Bank's IDA Resource Allocation Index.

Since the CPIA indicator 13 is based upon the PEFA methodology, the same problems are present for this set of data. Further downsides with the CPIA indicator 13 are that it is not as detailed as the PEFA index. Moreover, the problem with subjectivity in the score settings

[22] See: http://www.imf.org/external/np/fad/trans/code.htm
[23] See: http://go.worldbank.org/MFAH3FKZ20

might be even more severe for the CPIA indicator as it might be affected by lending decisions (de Renzio et al., 2011:7). However, the CPIA indicator 13, as the PEFA assessments, is considered to be a valid proxy for PFM quality in this study.

Public spending According to Lopez (2002:1), the three most commonly used indicators for public spending are; in per captia terms; as a share of GDP; and as a share of total government spending. Public spending as a share of GDP is used by various previous studies, e.g. Filmer and Pritchett (1999), and Rajkumar and Swaroop (2008), and is also used in this analysis to make results comparable.

Data on public spending, defined as recurrent and capital spending from central- and local government budgets, external borrowing and grants, is used from the World Bank's WDI. As mentioned in Chapter 3, public expenditures are argued to reduce poverty to a larger extent if they are spent on *primary* education- and health care. Data for public expenditures on primary education exists and is used in the analysis. However, data on primary health care is not fund and instead, data on health care as a whole is used. Lopez (2002:5) mentions problems with reliability of data as many low income countries may omit or misreport spending and since budgetary reporting standards can vary between nations.

5.3 Control Variables

A variety of socio-economic factors are assumed to affect countries' health- and education status. Control variables used in the regressions are standard in related literature[24]. As mentioned above, Appendix B provides definitions and sources of all included variables.

The positive relationship between *national income* and health- and education status is confirmed by various studies and is according to Filmer and Prichett (1999:1311) universally acknowledged. Also *income distribution* is assumed to effect health- and education status (ibid; Rajkumar and Swaroop, 2008:103), and is thus important to control for. A control variable for income distribution, using data on the Gini-coefficient, is included for the two health regressions. Due to the scarcity of data, the sample sizes decrease[25] when including this control variable. Robustness controls are therefore made excluding income distribution

[24] See Filmer and Pritchett, 1999; Gupta et al,. 1999; La Porta et al, 1999; Rajkumar and Swaroop, 2008:101.
[25] Including a control variable for income distribution decreases the sample size with 18 observations in the PEFA-Health sample and with 17 observations for the CPIA-Health sample.

in order to see whether the loss of data changes the results. As for the education regressions, the lack of data reduces the sample size below 30[26] when income distribution is included and the variable is therefore dropped.

Gupta et al. (1999:8) and Wilhelm and Fiestas (2005: 22) argue that not only public, but also *private spending* is likely to affect health- and education outcomes. Data on private spending on education is too scarce and cannot be included in the estimations. However, data on private health spending exists and is thus included in the two health regressions.

Variables regarding parental education are often included as control variables in research related to health- and education status. Female education has appeared to be an important factor explaining child mortality (Filmer and Pritchett, 1999:1311), and *female literacy* is therefore included in the health regressions. However, due to lack of data, including this variable decreases the sample[27] and a robustness check is therefore made where female literacy is excluded. Regarding education status, home background accounts for a large share of the variation in learning outcomes according to the World Bank (2003:119). *Adult literacy* is thus included in the education regressions. Data on adult literacy is rather scarce[28] and the variable is therefore dropped in a robustness control in order to see whether a larger sample will provide different results.

The percentage of *muslim* population and the degree of *ethnolinguistic fractionalization* are widely used variables in both health- and education studies[29] and are thus included in the health- as well as the education regressions. Two extra control variables are included in the health regressions, *access to safe water* and the *distance from the equator*, both assumed to be important factors affecting child health. (Filmer and Pritchett, 1999:1312; Leipziger et al., 2003 in Wilhelm and Fiestas, 2055 6; and Gupta et al., 1999:7f).

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[26] Observations for the PEFA-Education sample is 23 if income distribution is included and 29 for the CPIA-Education.

[27] Including a control variable for female literacy decreases the sample size with 13 observations in the PEFA-Health sample and with 5 observations for the CPIA-Health sample.

[28] Including a control variable for adult literacy decreases the sample size with 1 observations in the PEFA-Education sample and with 11 observations for the CPIA-Education sample.

[29] See La Porta et al., 1999:263; Caldwell (1986) in Filmer and Pritchett, 1999:1312; Easterly and Levine (1996) in Filmer and Pritchett 1999:1312; Schults (2003) in Gupta et al,. 1999:8

There are other variables that might have been suitable to include in the analysis, such as a demographic factors and the degree of urbanization. The main reason for why they are not included is shortage of data and problems with multicollinearity.

6 Results

To make sure that multicollinearity does not exist between variables, the correlation between all included variables are calculated and presented in Appendix D. Rather high correlations exist between income per capita and female education, adult literacy rate and access to safe water.[30] According to Westerlund (2005:160f), a rule of thumb is to not allow correlation higher than 0.8. The correlation between income per capita and the other mentioned variables should thus not be high enough to cause any problems. Moreover, multicollinearity does only increase uncertainty around the affected coefficients while the variances of other variables stay the same (Wooldridge 2009:98-99). As income per capita, female education, adult literacy rate and access to safe water only are control variables, and the correlations are below 0.8, they are included as control variables. Breusch-Pagan-Godfrey and Whites tests are performed to check for heteroskedasticity, and Breusch-Godfrey LM tests are performed to control for autocorrelation. As none seem to be present, normal standard errors are used in all regressions. The results from the four OLS regressions are presented in Table 6.1 below.

Health Regressions Note, a negative coefficient indicates a positive relationship with service outcome, as it implies a decrease in child mortality. The results give no evidence supporting the hypothesis that the quality of the PFM system affects efficiency of public spending. The interaction term, as well as the independent PFM- and public spending variable is insignificant in both regressions. The sign of the coefficients for public spending and the interaction term differ in the PEFA- and CPIA regressions. The coefficient for the interaction term is negative in the CPIA regression which is in line with the hypothesis, but is positive in the PEFA regression. As for public spending, the coefficient is negative in the PEFA regression and positive in the CPIA. In both regressions, the coefficient for PFM quality is

[30] Income per capita and female education in the Health-PEFA regression (0.613); income per capita and access to safe water in the Health-CPIA regression (0.633); and income per capita and adult literacy in the Education-PEFA regression (0.559)

Table 6.1: *Regression results*

Dependent Variable→	Under-5 mortality (ln)		Education attainment (ln)	
Independent Variable ↓ Regression →	Health PEFA	Health CPIA	Education PEFA	Education CPIA
GDP per capita in PPP adjusted 2005$ (ln)	-0.243**	-0.251	0.061	-0.018
	(-2.520)	(-1.650)	(1.185)	(-0.291)
PFM quality (PEFA)	-0.194		-0.025	
	(-1.142)		(-0.360)	
PFM quality (CPIA)		-0.151		0.249***
		(-0.595)		(2.777)
Public spending as share of GDP (ln)	-0.482	0.469	0.135	0.565
	(-1.054)	(0.491)	(0.565)	(1.646)
PFM quality (PEFA)*Public spending (ln)	0.133		-0.036	
	(0.894)		(-0.400)	
PFM quality (CPIA)*Public spending (ln)		-0.111		-0.181*
		(-0.394)		(-1.739)
Private health spending as share of GDP (ln)	0.138	0.211		
	(1.054)	(1.357)		
Ethnolinguistic fractionalization	0.780***	0.544**	-0.078	-0.077
	(3.266)	(2.553)	(-0.684)	(-0.650)
Female education	-0.010**	-0.012**		
	(-2.695)	(-2.463)		
Adult literacy rate			0.006**	0.004
			(2.324)	(1.517)
Income inequality	0.012	0.013		
	(1.412)	(1.296)		
Distance from the equator	0.103	0.450		
	(0.168)	(0.636)		
Percentage of population Muslim	0.004	0.001	0.001	-0.001
	(1.451)	(0.583)	(0.925)	(-0.689)
Access to safe water	-0.012**	-0.003		
	(-2.658)	(-0.668)		
Constant	6.850***	6.376***	3.526***	3.370***
	(7.870)	(4.671)	(12.589)	(7.948)
R^2	0.906	0.806	0.513	0.485
Number of observation	37	37	34	37
Prob. (F-statistic)	0.000	0.000	0.005	0.004

*Note: T-statistics in parenthesis. * Significant at 10%; ** significant at 5%; and *** significant at 1%.*

negative, revealing a direct negative, but insignificant, relationship between the quality of the PFM system and child mortality.

Among the other regressors, results from both regressions show that ethno-linguistic fractionalization increases child mortality while female literacy decreases it, which is in line with theory and results from related literature. The coefficients for income per capita are

negative in both regressions, as expected since income is assumed to be one of the main factors affecting child mortality. The coefficient is significant at the 5% level in the PEFA regression, but insignificant in the CPIA. The explanation might be that the effect from income per capita is picked up by some of the other regressors. Furthermore, the results show that access to safe water is significantly and negatively related to child mortality in the PEFA regression. The R-squared values are high, 0.91 for the PEFA regression and 0.81 for the CPIA regression. This is probably caused by overfitting, which generally occurs when a model have many parameters in relation to numbers of observations, which is the case here.

Education Regressions In the opposite of the health regressions, a negative coefficient is indicating a negative relationship with service outcome, as it implies a decrease in education attainment. The hypothesis is not verified in the education regressions either. Instead, the interaction term is negative in both regressions and is significant at the 10% level in the CPIA estimation. So this result goes against the hypothesis as it imply that the quality of the PFM system actually has a negative effect on public spending efficiency, since public spending interacted with PFM quality here seems to decrease education attainment.

The public spending coefficient is positive but insignificant in both regressions. The PFM coefficient is negative and insignificant in the PEFA regression while it in the CPIA regression is positively correlated to education attainment at the 1% significant level. This indicates that the quality of the PFM system has a direct positive effect on education outcomes. In the opposite of the health regressions, income per capita is not significant and the coefficients, positive as expected from theory in the PEFA regression, and negative in the CPIA regression, are very small. As for the other control variables, adult literacy in the PEFA estimation is significantly and positively related to education attainment.

6.1 Robustness Control

In order to test the robustness of the results, nine different specifications are tested and also regressions where outliners and geographical regions are excluded from the sample. The results are found in Appendix E and F respectively. Regarding the robustness of the main specifications, there are no signs of redundant or omitted variables in the four main regressions. However, the Ramsey RESET-test for the Health-CPIA- and the Education-CPIA

regressions show sign of misspecification.[31] For the later, excluding the independent PFM variable and dropping an education attainment outliner from the sample, makes the sign of misspecification disappear, but they persist for the Health-CPIA regression throughout the robustness controls.

Non-linearity The relationship between the dependent variable and public spending is assumed to be linear. According to Rajkumar and Swaroop (2008:107), it is however possible that the true relationship can take another, non-linear, form. If this is the case, the public spending variable and the interaction term might capture the non-linear effect of public spending. In order to test for omitted non-linearity, squared terms of the spending variable are included in the regressions. The results are presented in Appendix E, Table E.1. The included squared public spending coefficients are all insignificant, indicating that the relationship between public spending and service outcomes is linear as assumed. Moreover, adding the variable did not change the results significantly in any of the four regressions.

Lagged public spending It is arguable that health- and education status not only are affected by spending undertaken in the same year, but also in previous years (Rajkumar and Swaroop, 2008:99). In order to control for lagged public spending effects, lags from up to five years are included in the health regressions. Data on public education spending is scarce and it is thus not possible to control for lagged education spending effects. By including spending for 5 years back in time, all public health spending that could have affected the age group 0-5 is included. For the PEFA regressions, each lag is added one by one in five different regressions. For the CPIA regression, on lag is included with the mean of public spending undertaken between 2000-2004. The results from the regressions are presented in Appendix E, Table E.2.

The lagged spending variable in the CPIA regression is positive but insignificant and the inclusion of the variable does not change the results to a great extent. In the PEFA regression, the sign of the lagged spending variable varies and is negative and positive every other year. Moreover, the lag from 2 years back, when 2 lags are included, is significantly and positively correlated with child mortality. Also lags from 4 and 5 years back, when 5 lags

[31] The F-statistics for the Ramsey RESET-test in the Health-CPIA estimation is 5.51 and in the Education-CPIA estimation it is 6.00 compared with the critical value of 4.26.

are included, are significant, the 4th lag with a positive- and the 5th with a negative coefficient. Turning to the other variables, when lagged spending for 5 years is included, PFM quality becomes significant at the 5% level and public spending becomes significant on the 10% level, both with a negative sign. Yet the interaction term stays the same, positive and insignificant in all five regressions. Overall, it is hard to draw any general conclusions from the varying results around whether public spending lags should be included or not. However, since the main variable, the interaction term, is unaffected when lags are included, the main regressions is assumed to be robust in this perspective.

Infant mortality Another common measure of health status is infant (under-1) mortality. Infant mortality is therefore used as dependent variable as a means to check the robustness of the results from the health regressions. The results are found in Appendix E, Table E.3. The results from the regressions are very similar to the ones in the main regressions. Child (under-5) mortality can thus be regarded as an adequate dependent variable in the health estimations.

Excluding the PFM as an individual variable The reasoning behind including the PFM variable as an independent variable is explained in Chapter 4.1. However, it is not a rule of thumb to include the variables in interaction terms as individual variables. Therefore, and since no literature suggesting a direct effect between the quality of the PFM system and public spending efficiency is found, regressions are made excluding the individual PFM variable. The results are presented in Appendix E, Table E.4.

For the PEFA regressions, excluding the individual PFM variable did not change the results noteworthy. The only thing worth mentioning is that the interaction term turned negative in the Health-PEFA estimation, but the correlation is still insignificant. The results change more in the CPIA estimations. In the Education-CPIA regression, the interaction term, negatively and significantly related to education attainment in the main regression, turned insignificant and positive. Moreover, when performing a RESET-test, there is no longer a sign of misspecification[32] which exists in the main regression. It is therefore questionable whether it is correct to include the individual PFM variable in the Education-CPIA regression.

[32] The F-value for the RESET-test is 0.21 compared to the critical value 4.26.

In the Health-CPIA estimation, the coefficient signs did not change for any of the variables. But income per capita, public spending, the interaction term, and income inequality turned significant at the 10% level from not being significant in the main estimation. The rise of the t-value for the public spending variable is hard to understand. However, the rise of the t-value for the interaction term might be caused by that the interaction term also picks up the direct effect from the PFM variable that is excluded. This might thus be a sign that the individual PFM variable should be included in the regression. What is rather puzzling is that this did not happen in the other regressions, and also, there are still signs of misspecification as in the main Health-PEFA regression[33]. The overall conclusion, due to small changes in the results, and to not overlook a possible direct relationship between the quality of the PFM system and service outcome, is that it is preferable to include an individual PFM variable.

Excluding variables in order to get larger sample sizes

Health regressions Many observations are missing for female literacy and income inequality which reduce the sample size substantially in the health regressions. In order to test the estimations with larger sample sizes, regressions are made without these variables, both individually and jointly, i.e., three test regressions are made for both the PEFA and the CPIA regression[34]. See Appendix E, Table E.5 and E.6 for results.

In the PEFA regressions, the results stay rather unchanged, but some changes occur in the CPIA regressions. The PFM variable, insignificant in the main regression, turns significant in both estimations where income inequality is excluded. The coefficients are still negative as in the main regressions, indicating that the quality of the PFM system has a direct negative effect on child mortality. The coefficient for public spending, positive in the main regression, becomes negative when dropping female literacy, and the correlation turns significant at the 10% level when both female literacy and income inequality are excluded. The interaction term, negative in the main regression, turned positive in all three control regressions, and it becomes significant when both female literacy and income inequality are excluded. Hence,

[33] The F-value for the RESET-test is 5.43 compared to the critical value 4.26.

[34] The sample size in the main Health-PEFA regression is 37, and the sample size is; 48 excluding female literacy; 55 excluding income inequality; and 78 excluding both variables.
The sample size in the main Health-CPIA regression is 37, and the sample size is; 38 excluding female literacy; 54 excluding income inequality; and 61 excluding both variables.

this result goes against the hypothesis as it shows that the quality of the PFM system decrease efficiency of public spending.

Education regressions To test the education estimations on larger sample sizes, regressions excluding the control variable for adult literacy are conducted.[35] The results are presented in Appendix E, Table E.7. Excluding adult literacy did not change the results to a great extent. The changes worth mentioning are that the coefficient for PFM quality turns positive, but yet insignificant, in the Education-PEFA estimation. As for the Education-CPIA regression, public spending becomes positively significant, and the interaction term becomes significant at the 5% level in comparison to the 10% level in the main regression.

Looking on both the health- and education regressions, the CPIA regressions with larger sample sizes strengthen the indication that PFM quality may have a positive direct effect on service outcomes, which were implied in the main Education-CPIA regression. As for the interaction term, the coefficient turned positive and significant when both female literacy and income inequality are excluded in the Health-CPIA regression. This further demolishes the hypothesis that the PFM quality enhances public spending efficiency, as in the Education-CPIA regression. However, since the results in the CPIA estimations vary a lot, it is not suitable to draw any conclusions from this.

Panel regression As mentioned in Chapter 4.1, the data used in the Health-CPIA regression could also be used in a panel estimation, which is conducted as a means of robustness control. The random effects panel estimation includes data from 2005-2010 including 222 observations. The results are found in Appendix E, Table E.8.

There are some noteworthy differences between the cross-section and the panel estimation. First, the R-squared term decreases significantly and the model only explain 60% of the variance in child mortality in the panel estimation compared to 81% in the cross-section. This confirms the assumed problem with overfitting. The coefficient for the PFM variable turns positive, while the coefficient for public spending turns negative, opposite to the main regressions, but both are still insignificant. The interaction term is unchanged, still negative

[35] The sample size in the main Education-PEFA regression is 34, and the sample size is 47 excluding adult literacy.
The sample size in the main Education-CPIA regression is 37, and the sample size is 42 excluding adult literacy.

and insignificant. Hence, the result from the panel estimation does not shed any further light over whether the quality of the PFM system has an impact on public spending efficiency.

Outliers In order to control for the possibility that a few, relatively high- or low observations for some variables bias the results, it is common to drop those observations from the sample. Outliers are found for the, PEFA assessments, CPIA index, and education attainment. Regressions are therefore conducted without theses outliers and the results are found in Appendix F, Table F.1.

The result did not change much when excluding the PEFA- and CPIA outliers. But excluding the education outliner resulted in some changes. Excluding the outliner in the Education-CPIA regression only change the results slightly. More interestingly, when performing a RESET-test, there is no longer a sign of misspecification as in the main regression.[36] When excluding the outliner in the Education-PEFA estimation, public spending becomes positively significant at the 5% level from being insignificant in the main regression. Also the t-value for the interaction term increases remarkably so that the term becomes negatively significant. Yet again, contrary to the hypothesis, this result indicates that the quality of the PFM system has a negative effect on public spending efficiency.

Split samples As mentioned in Chapter 3.2, the quality of the PFM system might be influenced by the countries historical-, political- and social heritage. In order to control for this, regressions with split samples are conducted excluding countries located in different geographical areas. The countries included in the study are from six geographical regions.[37] Since most of the countries included in the sample are from Sub-Saharan Africa, excluding this region makes the sample far too small. Also, excluding the other regions one by one means just dropping a few observations. Despite this, regressions with split samples are made and no large changes in the results occur in any of the estimations. A preferable method for future research might be to include regional dummies instead of using split samples.

[36] The F-value for the RESET-test is 0.06.

[37] The six regions included in the samples are; East Asia and the Pacific; Europe and Central Asia; Latin America and the Caribbean; Middle-East and North Africa; South Asia; and Sub-Saharan Africa.

7 Discussion

This chapter provides an overview and a discussion of the main findings and elaborates on weaknesses in the method and data. Starting with the health regressions, the coefficient for the interaction term is positive[38] in the PEFA regression and negative[39] in the CPIA regression, both insignificant. No conclusion whether the quality of the PFM system increases the efficiency of public health spending can hence be drawn. The general picture from the results for the individual PFM variable and public spending is that they both have a negative but insignificant effect on child mortality. Regarding the control variables, income per capita, female literacy and access to safe water decrease child mortality while ethno-linguistic fractionalization increases it.

The results are to some extent less ambiguous for the education regressions. The interaction term is negative in both the PEFA and CPIA regressions[40], and is significant in the CPIA regression. The result from the CPIA regression reveals, in contrary to the hypothesis, that the quality of the PFM system has a negative effect on public education spending efficiency. For the independent PFM variable, the results from the PEFA regression consist of small and insignificant values. However, the PFM variable is significant in the CPIA regression, indicating that the quality of the PFM system have a positive direct effect on education outcomes. As for public spending, although it is positive in the PEFA- as well as the CPIA regression, the relationship is not significant. Regarding the control variables, adult literacy increases education attainment.

The results from all regressions except the Health-CPIA regression are rather robust as the results from the main regressions are fairly stable throughout the robustness checks. Since the signs of misspecification in the Education-CPIA regression dispread when dropping the education attainment outlier, the results from that regression might be preferable. Yet, the results are rather similar so in this case, the main specification is considered appropriate. As for the Health-CPIA regression, the problem with misspecification persists throughout the robustness control. This is rather puzzling since a common model for child mortality is used,

[38] In the main regression as well as in all but two robustness controls, where the individual PFM variable is excluded and the regression with a larger sample size, where income inequality is excluded.
[39] In the main regression as well as in all but three robustness controls, the ones with larger sample sizes.
[40] The only estimations where the interaction term coefficient is positive are in the PEFA regression with a squared public spending term and the CPIA regression where the individual PFM variable is excluded.

and since the same model is used in the Health-PEFA regression which does not show signs of misspecification. The results from the Health-CPIA regression should hence be viewed upon with caution.

The results from the Education-CPIA regression show that the quality of the PFM system has a direct positive effect on education attainment. Yet, this is not confirmed in the other regressions. There are no arguments found in related literature that the PFM system influences service outcomes (here health- and education status) except for through the efficiency of public spending. One possible explanation to why the PFM system could have a direct effect is that the variable might be an indicator for the quality of countries' institutions overall, which seem to have an impact on health- and education status. If so, it might not be the quality of the PFM system per se, but the overall quality of the countries' institutions that lies behind the direct positive relationship between the quality of the PFM system and education attainment in the Education-CPIA regression.

Since the methodology of measuring the CPIA indicator 13 is based upon the methodology used in the PEFA assessments, the variables should be rather similar. This is confirmed as the variables correlation is rather high (0.76). Yet, the results differ to some extent between the PEFA- and the CPIA regressions. The actual difference in the methodology used for the PEFA- and CPIA index, as well as the methodology used in this study, using means from 2005-2010 in the CPIA regressions, are likely factors causing the results to differ. Further, the results could be affected by which countries are included in the sample, especially since the sample sizes are small, and multiplicative methods are known to be sensitive to the set of data used.

Regarding small sample sizes, it is well known that data is scarce for many low- and middle income countries. Conducting regressions with small samples is here assumed prior to not carry out the analysis at all. Larger sample sizes are however to prefer, and optimal would have been to perform panel- or time-series analysis in order to capture changes in time and get a more throughout analysis. The panel estimation made with the Health-CPIA data is an attempt to use all data available. Yet, it only includes six years which probably is a too short time period to capture relationships between factors that might change slowly. In summary regarding the data, the small sample sizes are probably the largest draw back in this study. Consequently, results need to be interpreted with caution. However, performing many

regressions, by using two different PFM variables and two different variables for public spending efficiency, is an attempt to compensate for the small sample sizes.

An additional factor that should be mentioned is the choice of dependent variables. Child mortality and education attainment are variables widely used and accepted as proxies for health- and education status and public spending efficiency. However, there are many factors influencing health- and education status, and it is also likely that there are many factors affecting the efficiency of public spending. It is therefore possible that the influence from the quality of the PFM system on public service outcomes, through public spending, is rather small if it exists. It would thus be desirable to find dependent variables that are more closely related to public service efficiency than child mortality and education attainment.

8 Conclusion

The aim of this thesis is to analyze the relationship between the quality of countries' public financial management (PFM) system and public spending efficiency. The hypothesis is that the quality of the PFM system influences the efficiency of public spending positively, but this has yet not been analyzed empirically.

The focus is directed towards pro-poor public spending, limited to the health- and primary education sector. Efficiency of spending is measured by child (under-5) mortality and education attainment respectively. Data from two new measurements of the quality of the PFM system, the PEFA assessments and the CPIA index 13, are interacted with public spending, resulting in four multiplicative cross-sectional OLS regressions.

No support for the presumed relationship between the quality of PFM system and efficiency of public spending is found. The interaction term shows a negative relationship between the quality of the PFM system and public spending efficiency in all regressions except for the Health-CPIA regression. Moreover, the interaction term is insignificant in all but one of the four regressions, the Education-CPIA regression. In general, the control variables behave in line with theoretical expectations. Public spending is positively, but insignificantly, correlated with service outcomes. It is thus hard to draw any conclusions regarding whether public spending improves service delivery or not.

It might be possible that the PFM system's importance for translating public spending into desired outcomes is overstated. Another possible explanation behind the ambiguous results might be that the effect of the quality of the PFM system on spending efficiency actually is too small on the health- and education indicators used. For further research it might therefore be preferred to use other dependent variables, measuring the efficiency of public spending more directly than child mortality and education attainment. Further, as mentioned throughout the thesis, scarcity of data is a major challenge for the robustness of the analysis. It reduces the sample sizes, decreases precision, and might cause measurement errors since means have to be calculated for some variables. Scarcity of data also limits the analysis to cross-section regressions although it is preferred to conduct panel- or time-series analysis. Since multiplicative regressions are said to be sensitive to the set of data, the small sample size is of extra concern.

So, although the results show weak indications that the quality of the PFM system does not have, or even has a small negative effect on efficiency of public spending, the un-robustness of the results and the weaknesses in the study make it hard to draw any general conclusions. Looking at related literature revealing several presumed linkages between PFM and public spending efficiency, it is hard to believe that the quality of the PFM system does not have an effect on public spending efficiency. An advice is thus to continue to analyze the relation between the PFM system and public spending, with larger sets of data, carrying out panel- or time-series analysis, and using other dependent variables which are more closely related to public service efficiency and quality.

The importance to continue to analyze this relationship should be emphasized. Public spending is an acknowledged tool for reducing poverty and promote development, but is however not always translated into desired outcomes. In order to make public spending pro-poor and effective, it is therefore important to find out which factors that are influencing the efficiency of public spending. If the quality of the PFM system is proven to increase efficiency of public spending, it could be translated into important policy recommendations for reaching desired outcomes within the public sector. In the theoretical discussion, the importance of some aspects of the PFM system, such as transparency, are more frequently mentioned as important elements for public spending efficiency than others. It would hence be of interest to analyze different parts of the PFM system separately. This sort of analysis

could reveal which parts of the PFM system that are the most important to improve in order to increase public spending efficiency. Nevertheless, as stated, no clear conclusions or policy recommendations can be made in this thesis. Yet, the hope is that future research could reveal whether the quality of the PFM system is an important factor for increasing efficiency of pro-poor public spending, and could result in policy recommendations on how to translate public spending into effective public services.

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Appendix A. The PEFA assessments and CPIA indicator 13

Table A.1: *Performance Indicators for the PEFA assessments*

	A. PFM-OUT-TURNS: Credibility of the budget
PI-1	Aggregate expenditure out-turn compared to original approved budget
PI-2	Composition of expenditure out-turn compared to original approved budget
PI-3	Aggregate revenue out-turn compared to original approved budget
PI-4	Stock and monitoring of expenditure payment arrears
	B. KEY CROSS-CUTTING ISSUES: Comprehensiveness and Transparency
PI-5	Classification of the budget
PI-6	Comprehensiveness of information included in budget documentation
PI-7	Extent of unreported government operations
PI-8	Transparency of inter-governmental fiscal relations
PI-9	Oversight of aggregate fiscal risk from other public sector entities.
PI-10	Public access to key fiscal information
	C. BUDGET CYCLE **C(i) Policy based Budgeting**
PI-11	Orderliness and participation in the annual budget process
PI-12	Multi-year perspective in fiscal planning, expenditure policy and budgeting
	C(ii) Predictability and Control in Budget Execution
PI-13	Transparency of taxpayer obligations and liabilities
PI-14	Effectiveness of measures for taxpayer registration and tax assessment
PI-15	Effectiveness in collection of tax payments
PI-16	Predictability in the availability of funds for commitment of expenditures
PI-17	Recording and management of cash balances, debt and guarantees
PI-18	Effectiveness of payroll controls
PI-19	Transparency, competition and complaints mechanisms in procurement (until 2010: competition, value for money and controls in procurement)
PI-20	Effectiveness of internal controls for non-salary expenditure
PI-21	Effectiveness of internal audit
	C(iii) Accounting, Recording and Reporting
PI-22	Timeliness and regularity of accounts reconciliation
PI-23	Availability of information on resources received by service delivery units
PI-24	Quality and timeliness of in-year budget reports
PI-25	Quality and timeliness of annual financial statements
	C(iv) External Scrutiny and Audit
PI-26	Scope, nature and follow-up of external audit
PI-27	Legislative scrutiny of the annual budget law
PI-28	Legislative scrutiny of external audit reports
	D. DONOR PRACTICES
D-1	Predictability of Direct Budget Support
D-2	Financial information provided by donors for budgeting and reporting on project and program aid
D-3	Proportion of aid that is managed by use of national procedures

(PEFA, 2011:9)

Table A.2: *Criteria for the 6 scores for the 3 categories of the CPIA indicator 13*

1	a	If there is a budget, it is not a meaningful instrument, nor an indicator of policies or tool for allocation of public resources. There is no forward look in the budget, nor any meaningful consultation with spending ministries. No consistent budget classification system is used. More than 50 percent of public resources from all sources do not flow through the budget.
	b	Expenditures across broad budget categories have little or no relationship to the amounts budgeted. There is practically no monitoring and reporting of public expenditures. Payment arrears exceed 10% of total expenditures, or cannot be determined.
	c	There is no reconciliation of cash accounts with fiscal records. No regular, in-year fiscal reports are produced. Public accounts are seldom prepared, or are more than five years out of date. The use of public resources is not on the public agenda.
2	a	There is no discernible link with government policies or priorities, and no forward look in the budget. The budget is formulated without meaningful consultation with spending ministries. No consistent budget classification system is in use. Significant fiscal operations (e.g., extra-budgetary expenditures and donor funded projects of 25-50 percent of total spending by value) are excluded from the budget.
	b	Actual expenditures often deviate significantly from the amounts budgeted (e.g., by more than 30 percent overall or on many broad budget categories). There is no adequate system of budget reporting and monitoring. Payments arrears exceed 10% of total expenditures.
	c	Reconciliation of banking and fiscal records is undertaken less frequently than monthly, and discrepancies are often left unexplained. In-year fiscal reports are largely useless, due to lengthy delays or inaccurate data. There are significant delays (more than three years) in the preparation of the public accounts. The accounts are not (professionally) audited or submitted to the legislature in a timely way, and no actions are taken on budget reports and audit findings.
3	a	Policies or priorities are explicit, but are not linked to the budget. There is no forward look in the budget. The budget is formulated in consultation with spending ministries The budget classification system does not provide an adequate picture of general government activities. A significant amount of funds controlled by the executive is outside the budget (e.g., 10-25%), and a number of donor activities bypass the budget.
	b	Expenditures deviate from the amounts budgeted by more than 20 percent overall, or on many broad budget categories. Budget monitoring and control systems are inadequate. Payment arrears are 5-10% of total expenditures.
	c	Reconciliation of banking and fiscal records is undertaken less frequently than monthly, or discrepancies are not always accounted for. In-year budget reports are prepared quarterly less than 8 weeks after the end of the period, but their usefulness is undermined somewhat by inaccurate data or reporting only at high levels of aggregation. There are significant delays (e.g., more than 10 months) in the preparation of public accounts. Accounts are not audited in a timely and adequate way, and few if any actions are taken on budget reports and audit findings.
4	a	Policies and priorities are broadly reflected in the budget. Some elements of forward

		budget planning are in place. The budget is formulated in consultation with spending ministries, from a sufficiently early stage in the budget preparation process. The budget classification system is comprehensive, but different from international standards. Less than 10% of funds controlled by the executive are outside the budget.
	b	Actual expenditures deviate from the amounts budgeted by more than 10 percent on many broad budget categories. Budget monitoring and control systems exist, but there are some deficiencies. Payment arrears may exist but are less than 5% of total expenditures.
	c	Reconciliation of banking and fiscal records is undertaken satisfactorily, on a monthly basis. In-year budget reports are prepared quarterly less than 6 weeks after the end of the period, with reasonably accurate data, broken down to at least program or functional level. There are delays (e.g., more than 6 months) in preparation of the public accounts. The accounts are audited in a timely and professional manner, but few meaningful actions are taken on budget reports or audit findings.
5	a	Policies and priorities are linked to the budget. Multi-year expenditure projections are integrated into the budget formulation process, and reflect explicit costing of the implications of new policy initiatives. The budget is formulated through systematic consultations with spending ministries and the legislature, adhering to a fixed budget calendar. The budget classification system is comprehensive and consistent with international standards Off-budget expenditures are minimal, and transparent.
	b	The budget is implemented as planned, and actual expenditures deviate only slightly from planned levels (by less than 10 percent on most broad categories). Budget monitoring occurs throughout the year based on well functioning management information systems. Payment arrears are negligible or non-existent.
	c	Reconciliation of banking and fiscal records is practiced comprehensively, properly, and in a timely way (daily or weekly). In-year fiscal reports are prepared at least quarterly, issued within 4 weeks of end of period, and provide accurate data on all budget items, with coverage of expenditures at both the commitment and payment stages. The public accounts are prepared within 6 months of the end of the fiscal year, and include full information on revenue, expenditure, and financial assets and liabilities. Accounts are audited in a timely, professional and comprehensive manner, and appropriate action is taken on budget reports and audit findings.
6		Criteria for “5” on all three sub-ratings are fully met. In addition:
	a	Budget supporting documents are submitted to the legislature, with the annual budget, with information on macroeconomic assumptions, estimates of budgetary impact of major revenue and expenditure policy changes, and comparisons to previous budget outturns or estimated outturns.
	b	Funds available to spending agencies or ministries are highly predictable within the budget year. In-year adjustments are infrequent, follow pre-specified guidelines, and are consistent with stated priorities.
	c	The public has timely and inexpensive access to annual budget documentation, in-year and year-end reports, and external audit reports.

(World Bank, 2010a:34f)

Appendix B. Data Appendix

Table B.1: *Data appendix*

Variable	Description and Source
Per-capita GDP (PPP)	*GDP per capita, PPP (constant 2005 international $).* PPP GDP is gross domestic product converted to international dollars using purchasing power parity rates. Data are in constant 2005 international dollars. Source: World Development Index (WDI)
Child (under 5) mortality	Child under-five mortality rate is the probability per 1,000 that a newborn baby will die before reaching age five, if subject to current age-specific mortality rates. Source: WDI
Education attainment	Expected primary completion rate. Total. The total number of new entrants to the first grade of primary in a given year, regardless of age, who are expected to reach the last grade of primary education, regardless of repetition, expressed as a percentage of the population at the official entrance age to primary education in the same year. It is calculated by multiplying the gross intake ratio to the first grade of primary education by the survival rate to the last grade of primary. Source: WDI (Original Source: UNESCO Institute for Statistics)
PFM quality – PEFA	An average of 28 Performance Indicators assessing various important entities of the PFM System. Source: PEFA Secretariat
PFM quality – CPIA indicator 13	The CPIA rates countries against a set of 16 criteria grouped in four clusters: (a) economic management; (b) structural policies; (c) policies for social inclusion and equity; and (d) public sector management and institutions. Criteria 13 measures Quality of Budgetary and Financial Management. Source: World Bank, International Development Association.
Public health spending	Health expenditure, private (% of GDP). Public health expenditure consists of recurrent and capital spending from government (central and local) budgets, external borrowings and grants (including donations from international agencies and nongovernmental organizations), and social (or compulsory) health insurance funds. Source: WDI
Private health spending	Health expenditure, public (% of GDP). Private health expenditure includes direct household (out-of-pocket) spending, private insurance, charitable donations, and direct service payments by private corporations. Source: WDI
Public primary education spending	Total expenditure on educational institutions and administration as a % of GDP. Public sources. Primary. Total expenditure on educational institutions and administration as a % of GDP. Public sources. Primary is the expenditure coming from public sources spent on primary education expressed as a % of GDP. Source: WDI
Private primary education spending	Total expenditure on educational institutions and administration as a % of GDP. Private sources. Primary. Total expenditure on educational institutions and administration as a % of GDP. Private sources. Primary is the expenditure coming from private sources spent on primary education expressed as a % of GDP. Source: WDI
Female education	Adult (15+) literacy rate (%). Female. Adult (15+) literacy rate (%). Female is the percentage of females age 15 and above who can, with understanding, read and write a short, simple statement on their everyday life. Generally, 'literacy' also encompasses 'numeracy', the ability to make simple arithmetic calculations. This indicator is calculated by dividing the number of female literates aged 15 years and over by the corresponding age group population and multiplying the result by 100. Source: WDI (Original Source: UNESCO Institute for Statistics).
Adult literacy	Adult (15+) literacy rate (%). Total is the percentage of the population age 15 and above who can, with understanding, read and write a short, simple statement on their everyday life. Generally, 'literacy' also encompasses 'numeracy', the ability to make simple arithmetic calculations. This indicator is calculated by dividing the

	number of literates aged 15 years and over by the corresponding age group population and multiplying the result by 100. Source: WDI (Original Source: UNESCO Institute for Statistics)
Income inequality	Gini index measures the extent to which the distribution of income (or, in some cases, consumption expenditure) among individuals or households within an economy deviates from a perfectly equal distribution. A Lorenz curve plots the cumulative percentages of total income received against the cumulative number of recipients, starting with the poorest individual or household. The Gini index measures the area between the Lorenz curve and a hypothetical line of absolute equality, expressed as a percentage of the maximum area under the line. Thus a Gini index of 0 represents perfect equality, while an index of 100 implies perfect inequality. Source: WDI
Predominantly Muslim	Muslims as percentage of population. Source: University of Gothenburg's Quality of Government/QoG Standard Dataset. (Original sources: Barrett (1982), Worldmark Encyclopedia of the Nations (1995), Statistical Ab-stract of the World (1995), United Nations (1995) and CIA (1996))
Ethnolinguistic fractionalization	Ranges from 0 to 1. Average values of 5 different indices, based on: (1) probability that two randomly selected people from a given country will not belong to the same ethnolinguistic group (index is based on the number and size of population groups as distinguished by their ethnic and linguistic status); (2) probability of two randomly selected individuals differing in their native language; (3) probability of two randomly selected individuals not speaking a common language; (4) probability of two randomly selected individuals not speaking the official language; and (5) the percentage of the population not speaking the most widely used language. Source: University of Gothenburg's Quality of Government/QoG Standard Dataset. (Original Source: Easterly and Levine (1997))
Access to safe water	Improved water source (% of population with access. Access to an improved water source refers to the percentage of the population with reasonable access to an adequate amount of water from an improved source, such as a household connection, public standpipe, borehole, protected well or spring, and rainwater collection. Unimproved sources include vendors, tanker trucks, and unprotected wells and springs. Reasonable access is defined as the availability of at least 20 liters a person a day from a source within one kilometer of the dwelling. Source: WDI (Original Source: World Health Organization and United Nations Children's Fund)
Degree of urbanization	Urban population (% of total). Urban population refers to people living in urban areas as defined by national statistical offices. It is calculated using World Bank population estimates and urban ratios from the United Nations World Urbanization Prospects. Source: WDI
Distance from the equator	The absolute value of the latitude of the capital city, divided by 90 (to take values between 0 and 1). Source: University of Gothenburg's Quality of Government/QoG Standard Dataset. (Original Source: La Porta et al. 1999)
Infant (under 1) mortality	Infant mortality rate is the number of infants dying before reaching one year of age, per 1,000 live births in a given year. Source: WDI. (Original source: Level & Trends in Child Mortality. Estimates Developed by the UN Inter-agency Group for Child Mortality Estimation (UNICEF, WHO, World Bank, UN DESA, UNPD))

Appendix C. Countries Used in Regressions

Table C.1: *Countries used in regressions*

Health-PEFA	Health-CPIA	Education-PEFA	Education-CPIA
Obs. 37	Obs. 37	Obs. 34	Obs. 37
Albania	Bangladesh	Bangladesh	Angola
Bangladesh	Bhutan	Botswana	Bangladesh
Bolivia	Bolivia	Burkina Faso	Bhutan
Brazil	Burkina Faso	Burundi	Bolivia
Burkina Faso	Burundi	Cape Verde	Burkina Faso
Central African Rep.	Cambodia	Central African Rep.	Burundi
Colombia	Cameroon	Colombia	Cambodia
Congo, Dem. Rep.	Central African Rep.	Congo, Dem. Rep.	Cameroon
Costa Rica	Congo, Dem. Rep.	Costa Rica	Cape Verde
Cote d'Ivoire	Cote d'Ivoire	El Salvador	Central African Rep.
Dominican Rep.*	Ethiopia	Ghana	Chad
El Salvador	Ghana	Guatemala	Comoros
Ethiopia	Guinea	Honduras	Congo, Dem. Rep.
Gabon	Honduras	Indonesia	Ethiopia
Honduras	India	Jordan	Gambia, The
Indonesia	Kenya	Kenya	Ghana
Jordan	Lao, PDR	Liberia	Guinea
Kenya	Madagaskar	Malawi	Honduras
Liberia	Mali	Mali	India
Mali	Mauritania	Mauritania	Lao, PDR
Mauritania	Mongolia	Morocco	Lesotho
Morocco	Mozambique	Mozambique	Madagascar
Mozambique	Nepal	Nicaragua	Malawi
Nepal	Nicaragua	Paraguay	Mali
Nicaragua	Niger	Peru	Mauritania
Pakistan	Nigeria	Philippines	Mongolia
Paraguay	Pakistan	Rwanda*	Mozambique
Peru	Rwanda	Tanzania	Nicaragua
Philippines	Senegal	Togo	Niger
Rwanda	Sri Lanka	Trinidad & Tobago	Rwanda
South Africa	Sudan	Tunisia	Senegal
Uganda**	Tanzania	Uganda	Sri Lanka
Zambia	Togo	Vanuatu	Tanzania
	Uganda		Togo
	Vietnam		Uganda
	Yemen, Rep.		Vanuatu
	Zambia		Zambia

** Used twice in the regression*
*** Used three times in the regression*

Appendix D. Correlation Matrix

Table D.1: *Correlation matrix, Health-PEFA*

	Under-5 mortality (ln)	Per capita GDP (in PPP adjusted 2005$)	PFM quality (PEFA)	Public spending as share of GDP (ln)	Private health spending as share of GDP (ln)	Ethnolinguistic fractionalization	Female education	Income inequality	Distance from the equator	Percentage of population Muslim	Access to safe water
Under-5 mortality (ln)	1.000										
Per capita GDP (in PPP adjusted 2005$)	-0.621	1.000									
PFM quality (PEFA)	-0.514	0.488	1.000								
Public spending as share of GDP (ln)	-0.283	0.250	0.534	1.000							
Private health spending as share of GDP (ln)	0.093	-0.177	-0.040	0.120	1.000						
Ethnolinguistic fractionalization	0.654	-0.313	-0.458	-0.548	0.114	1.000					
Female education	-0.755	0.613	0.352	0.295	-0.033	-0.334	1.000				
Income inequality	-0.147	0.346	0.394	0.403	0.075	-0.053	0.318	1.000			
Distance from the equator	-0.324	0.167	0.237	-0.086	-0.266	-0.317	-0.025	-0.227	1.000		
Percentage of population Muslim	0.161	-0.252	-0.070	-0.243	-0.240	-0.127	-0.470	-0.604	0.465	1.000	
Access to safe water	-0.689	0.404	0.311	0.130	0.114	-0.507	0.363	0.004	0.461	0.025	1.000

Table D.2: *Correlation matrix, Health-CPIA*

	Under-5 mortality (ln)	Per capita GDP (in PPP adjusted 2005$)	PFM quality (CPIA)	Public spending as share of GDP (ln)	Private health spending as share of GDP (ln)	Ethnolinguistic fractionalization	Female education	Income inequality	Distance from the equator	Percentage of population Muslim	Access to safe water
Under-5 mortality (ln)	1.000										
Per capita GDP (in PPP adjusted 2005$)	-0.683	1.000									
PFM quality (CPIA)	-0.419	0.346	1.000								
Public spending as share of GDP (ln)	-0.044	0.068	0.359	1.000							
Private health spending as share of GDP (ln)	0.238	-0.320	-0.112	0.044	1.000						
Ethnolinguistic fractionalization	0.587	-0.345	-0.169	-0.198	-0.026	1.000					
Female education	-0.655	0.525	0.212	0.146	0.096	-0.419	1.000				
Income inequality	0.061	0.094	0.026	0.324	-0.030	0.126	0.313	1.000			
Distance from the equator	-0.381	0.417	0.139	-0.085	-0.471	-0.360	0.017	-0.291	1.000		
Percentage of population Muslim	0.283	-0.156	-0.188	-0.303	-0.117	0.093	-0.573	-0.370	0.182	1.000	
Access to safe water	-0.410	0.633	0.320	-0.035	-0.039	-0.241	0.320	-0.086	0.326	-0.204	1.000

Table D.3: *Correlation matrix, Education-PEFA*

	Education attainment	Per capita GDP (in PPP adjusted 2005$)	PFM quality (PEFA)	Public spending as share of GDP (ln)	Adult literacy rate	Ethnolinguistic fractionalization	Percentage of population Muslim
Education attainment	1.000						
Per capita GDP (in PPP adjusted 2005$)	0.523	1.000					
PFM quality (PEFA)	0.339	0.494	1.000				
Public spending as share of GDP (ln)	-0.091	-0.266	0.110	1.000			
Adult literacy rate	0.666	0.559	0.374	-0.100	1.000		
Ethnolinguistic fractionalization	-0.386	-0.379	-0.490	0.188	-0.323	1.000	
Percentage of population Muslim	-0.059	-0.092	0.079	-0.057	-0.402	-0.136	1.000

Table D.4: *Correlation matrix, Education-CPIA*

	Education attainment	Per capita GDP (in PPP adjusted 2005$)	PFM quality (CPIA)	Public spending as share of GDP (ln)	Adult literacy rate	Ethnolinguistic fractionalization	Percentage of population Muslim
Education attainment	1.000						
Per capita GDP (in PPP adjusted 2005$)	0.442	1.000					
PFM quality (CPIA)	0.404	0.295	1.000				
Public spending as share of GDP (ln)	-0.025	-0.147	0.092	1.000			
Adult literacy rate	0.573	0.498	0.141	0.119	1.000		
Ethnolinguistic fractionalization	-0.368	-0.254	-0.249	0.067	-0.367	1.000	
Percentage of population Muslim	-0.450	-0.331	-0.283	0.130	-0.598	0.285	1.000

Appendix E. Results from Robustness Controls

Table E.1: *Results from robustness control for non-linearity*

Dependent Variable→	Under-5 mortality (ln)		Education attainment (ln)	
Independent Variable ↓ Regression →	Health PEFA	Health CPIA	Education PEFA	Education CPIA
GDP per capita in PPP adjusted 2005$ (ln)	-0.248043**	-0.235644	0.058930	-0.024541
	(-2.487876)	(-1.532568)	(1.141140)	(-0.400037)
PFM quality (PEFA)	-0.212036		-0.052983	
	(-1.153137)		(-0.692152)	
PFM quality (CPIA)		-0.117766		0.243654**
		(-0.456503)		(2.698578)
Public spending as share of GDP (ln)	-0.407594	0.389670	0.151872	0.665439*
	(-0.767529)	(0.404288)	(0.632460)	(1.817163)
PFM quality (PEFA)*Public spending (ln)	0.151590		0.011333	
	(0.921304)		(0.108140)	
PFM quality (CPIA)*Public spending (ln)		-0.173849		-0.181588*
		(-0.594169)		(-1.739024)
Private health spending as share of GDP (ln)	0.121992	0.207251		
	(0.841514)	(1.329592)		
Ethnolinguistic fractionalization	0.783180***	0.586690**	-0.060746	-0.057296
	(3.214535)	(2.676958)	(-0.523683)	(-0.473089)
Female education	-0.009891**	-0.010836**		
	(-2.642715)	(-2.281059)		
Adult literacy rate			0.006152**	0.005297
			(2.354745)	(1.690805)
Income inequality	0.011561	0.011939		
	(1.360656)	(1.209448)		
Distance from the equator	0.020044	0.475543		
	(0.029160)	(0.669004)		
Percentage of population Muslim	0.003786	0.001233	0.000786	-0.000939
	(1.446702)	(0.553179)	(0.770577)	(-0.626341)
Access to safe water	-0.011414**	-0.004846		
	(-2.108381)	(-0.933800)		
Constant	6.871888***	6.280498***	3.583439***	3.369038***
	(7.721360)	(4.569869)	(12.41453)	(7.901775)
Public spending^2	-0.067773	0.211829	-0.123603	-0.084796
	(-0.290187)	(0.899540)	(-0.884957)	(-0.823809)
R^2	0.906287	0.811949	0.527875	0.496852
Number of observation	37	37	34	37
Prob. (F-statistic)	0.000	0.000	0.008	0.007

*Note: T-statistics in parenthesis. *significant at 10%; ** significant at 5%; and *** significant at 1%.*

Table E.2: *Results from robustness control including lagged public spending*

Dependent Variable→	Under-5 mortality (ln)					
Independent Variable ↓ Regression →	Health PEFA	Health PEFA	Health PEFA	Health PEFA	Health PEFA	Health CPIA
	Public spending(-1)	Public spending(-2)	Public spending(-3)	Public spending(-4)	Public spending(-5)	Public spending(-1-5)
GDP per capita (PPP adjusted 2005$ (ln)	-0.245986**	-0.241351**	-0.243073**	-0.214075**	-0.287323**	-0.278283
	(-2.461636)	(-2.545204)	(-2.456085)	(-2.121198)	(-2.833446)	(-1.651636)
PFM quality (PEFA)	-0.197453	-0.270710	-0.275227	-0.243209	-0.398905**	
	(-1.129759)	(-1.591010)	(-1.515374)	(-1.337835)	(-2.129459)	
PFM quality (CPIA)						-0.166003
						(-0.635730)
Public health spending as share of GDP (ln)	-0.550141	-0.696764	-0.717208	-0.514160	-1.424756*	0.414435
	(-0.859226)	(-1.138154)	(-1.071992)	(-0.752057)	(-1.810678)	(0.422181)
PFM quality (PEFA)*Public spending (ln)	0.134196	0.150173	0.155044	0.123286	0.268026	
	(0.882000)	(1.038721)	(0.980190)	(0.776206)	(1.619076)	
PFM quality (CPIA)*Public spending (ln)						-0.112790
						(-0.391593)
Private health spending as share of GDP (ln)	0.137540	0.166328	0.166316	0.165561	0.127399	0.215651
	(1.027019)	(1.300176)	(1.271721)	(1.278572)	(1.037970)	(1.361851)
Ethnolinguistic fractionalization	0.784002***	0.876673***	0.875600***	0.883530***	0.990491***	0.557429**
	(3.201705)	(3.694748)	(3.605010)	(3.672604)	(4.277525)	(2.542489)
Female education	-0.009793**	-0.008626**	-0.008499**	-0.010062**	-0.007622**	-0.010947**
	(-2.571161)	(-2.354267)	(-2.111452)	(-2.399972)	(-1.853286)	(-2.211581)
Income inequality	0.011633	0.013689	0.013994	0.012686	0.020470**	0.011562
	(1.366538)	(1.680375)	(1.547229)	(1.406229)	(2.199132)	(1.117383)
Distance from the equator	0.096734	-0.076988	-0.084946	-0.144974	0.372466	0.392601
	(0.154215)	(-0.127905)	(-0.136528)	(-0.234562)	(0.587115)	(0.535354)
Percentage of population Muslim	0.003546	0.005134*	0.005233*	0.004891*	0.004483	0.001325
	(1.415653)	(2.039736)	(1.857602)	(1.744750)	(1.702934)	(0.586382)
Access to safe water	-0.012103**	-0.010109**	-0.010156**	-0.010279**	-0.008304*	-0.002779
	(-2.559359)	(-2.195099)	(-2.143124)	(-2.190315)	(-1.843551)	(-0.548238)
Constant	6.869348***	6.612274***	6.622181***	6.473099***	6.795781***	6.593124***
	(7.662769)	(7.680375)	(7.461086)	(7.293515)	(8.027231)	(4.433622)
Private health spending (-1)	0.071082	-0.534784	-0.548727	-0.763298	-0.671171	
	(0.155900)	(-0.998057)	(-0.960940)	(-1.287276)	(-1.204832)	
Private health spending (-2)		0.778968*	0.846788	1.019266	1.219477	
		(1.915621)	(0.953653)	(1.144189)	(1.451665)	
Private health spending (-3)			-0.053540	-0.627459	-0.263722	
			(-0.086436)	(-0.806959)	(-0.351361)	
Private health spending (-4)				0.537362	1.569796**	
				(1.200680)	(2.353665)	
Private health spending (-5)					-1.274275*	
					(-1.989618)	
Private health spending (mean 1-5)						0.083086
						(0.407699)
R^2	0.906054	0.918980	0.919008	0.924211	0.936733	0.806946
Number of observation	37	37	37	37	37	37
Prob. (F-statistic)	0.000	0.000	0.000	0.000	0.000	0.000

*Note: T-statistics in parenthesis. * significant at 10%; ** significant at 5%; and *** significant at 1%.*

Table E.3: *Results from robustness control using infant mortality as dependent variable in health regressions*

Dependent Variable→	Under-1 mortality (ln)	
Independent Variable ↓ Regression →	Health PEFA	Health CPIA
GDP per capita (PPP adjusted 2005$ (ln)	-0.200725**	-0.190333
	(-2.510885)	(-1.420214)
PFM quality (PEFA)	-0.179268	
	(-1.273091)	
PFM quality (CPIA)		-0.162817
		(-0.727180)
Public health spending as share of GDP (ln)	-0.403950	0.415273
	(-1.067920)	(0.493262)
PFM quality (PEFA)*Public spending (ln)	0.095175	
	(0.771609)	
PFM quality (CPIA)*Public spending (ln)		-0.115464
		(-0.463089)
Private health spending as share of GDP (ln)	0.119230	0.188543
	(1.097880)	(1.379393)
Ethnolinguistic fractionalization	0.580999***	0.411916**
	(2.937594)	(2.194086)
Female education	-0.008428**	-0.010130**
	(-2.771839)	(-2.461878)
Inqome inequality	0.010994	0.011509
	(1.596964)	(1.334108)
Distance from the equator	0.333189	0.607233
	(0.655938)	(0.974679)
Percentage of population Muslim	0.002843	0.000294
	(1.399486)	(0.150400)
Access to safe water	-0.010939***	-0.002299
	(-2.878087)	(-0.537636)
Constant	6.159604***	5.657958***
	(8.549328)	(4.707499)
R^2	0.910468	0.778921
Number of observation	37	37
Prob. (F-statistic)	0.000	0.000

*Note: T-statistics in parenthesis. *significant at 10%; ** significant at 5%; and *** significant at 1%.*

Table E.4: *Results from robustness control excluding the individual PFM variable*

Dependent Variable→	Under-5 mortality (ln)		Education attainment (ln)	
Independent Variable ↓ Regression →	Health PEFA	Health CPIA	Education PEFA	Education CPIA
GDP per capita (PPP adjusted 2005$ (ln)	-0.234607**	-0.253594*	0.050646	0.031253
	(-2.422809)	(-1.687858)	(1.203706)	(0.488733)
Public health spending as share of GDP (ln)	-0.078409	0.956369*	0.184615	-0.011979
	(-0.268916)	(1.962095)	(0.969773)	(-0.039604)
PFM quality (PEFA)*Public spending (ln)	-0.017731		-0.058089	
	(-0.256283)		(-0.904244)	
PFM quality (CPIA)*Public spending (ln)		-0.261169*		0.011077
		(-2.033696)		(0.129066)
Private health spending as share of GDP (ln)	0.113620	0.227290		
	(0.872895)	(1.507179)		
Ethnolinguistic fractionalization	0.746904***	0.522983**	-0.062918	-0.117012
	(3.131435)	(2.519643)	(-0.603056)	(-0.902304)
Female education	-0.010663***	-0.012128**		
	(-2.934931)	(-2.695431)		
Adult literacy rate			0.006114**	0.005390
			(2.399170)	(1.657406)
Income inequality	0.011820	0.015182*		
	(1.412955)	(1.734614)		
Distance from the equator	-0.156125	0.479399		
	(-0.272235)	(0.687792)		
Percentage of population Muslim	0.003082	0.001333	0.000951	-0.000709
	(1.267442)	(0.608107)	(0.965578)	(-0.432381)
Access to safe water	-0.011128**	-0.003118		
	(-2.462028)	(-0.650892)		
Constant	6.354230***	5.821651***	3.528936***	3.745410***
	(8.375240)	(5.907236)	(12.81358)	(8.425451)
R^2	0.901055	0.802855	0.510665	0.347658
Number of observation	37	37	34	37
Prob. (F-statistic)	0.000000	0.000	0.002	0.034

*Note: T-statistics in parenthesis. *significant at 10%; ** significant at 5%; and *** significant at 1%.*

Table E.5: *Results from robustness control with larger sample size in the Health-PEFA regression, excluding female literacy and income inequality*

Dependent Variable→	Under-5 mortality (ln)		
Independent Variable ↓ Regression →	Health PEFA	Health PEFA	Health PEFA
	Exc. Fem. Lit.	Exc. Income ineq.	Exc. Fem. Lit & Income ineq.
GDP per capita (PPP adjusted 2005$ (ln)	-0.387668***	-0.190581**	-0.400059***
	(-4.930145)	(-2.240049)	(-5.671887)
PFM quality (PEFA)	-0.145017	-0.059267	-0.129593
	(-0.837695)	(-0.465880)	(-1.276605)
Public health spending as share of GDP (ln)	-0.407192	0.165829	-0.044385
	(-0.954788)	(0.534149)	(-0.176169)
PFM quality (PEFA)*Public spending (ln)	0.123106	-0.056646	0.022834
	(0.818247)	(-0.538633)	(0.262818)
Private health spending as share of GDP (ln)	0.103977	0.168062*	0.180158**
	(0.939570)	(1.965009)	(2.389123)
Ethnolinguistic fractionalization	0.951908***	0.539696***	0.655647***
	(4.645854)	(2.820380)	(3.852337)
Female education		-0.010659***	
		(-2.816909)	
Income inequality	0.011187		
	(1.348160)		
Distance from the equator	0.150598	-0.891439	0.290324
	(0.257492)	(-1.500664)	(0.576118)
Percentage of population Muslim	0.005524***	0.002287	0.001925
	(2.787501)	(1.067651)	(1.200270)
Access to safe water	-0.008475**	-0.006700*	-0.006623**
	(-2.190179)	(-1.881057)	(-2.150723)
Constant	6.779747***	6.509127***	7.343382***
	(9.147421)	(9.613808)	(13.64148)
R^2	0.848349	0.843980	0.793117
Number of observation	48	55	78
Prob. (F-statistic)	0.000	0.000	0.000
Restet-test			

*Note: T-statistics in parenthesis. *significant at 10%; ** significant at 5%; and *** significant at 1%.*

Table E.6: *Results from robustness control with larger sample size in the Health-CPIA regression, excluding female literacy and income inequality*

Dependent Variable→	Under-5 mortality (ln)		
Independent Variable ↓ Regression →	Health CPIA	Health CPIA	Health CPIA
	Exc. Fem. Lit.	Exc. Income ineq.	Exc. Fem. Lit & Income ineq.
GDP per capita (PPP adjusted 2005$ (ln)	-0.414724***	-0.139533	-0.477664***
	(-3.017763)	(-1.142158)	(-4.784995)
PFM quality (CPIA)	-0.404207	-0.335159*	-0.500958**
	(-1.529798)	(-1.780626)	(-2.434529)
Public health spending as share of GDP (ln)	-0.522709	0.133296	-1.282634*
	(-0.525336)	(0.185059)	(-1.867636
PFM quality (CPIA)*Public spending (ln)	0.182654	0.005429	0.367590*
	(0.619629)	(0.025238)	(1.716518)
Private health spending as share of GDP (ln)	-0.022737	0.354463***	0.187423*
	(-0.156939)	(3.518325)	(1.925128)
Ethnolinguistic fractionalization	0.744992***	0.564907***	0.622043***
	(3.428570)	(3.137490)	(3.335569)
Female education		-0.012814***	
		(-3.495366)	
Income inequality	0.003885		
	(0.374243)		
Distance from the equator	0.080431	0.704492	0.533833
	(0.111916)	(1.243769)	(0.883424)
Percentage of population Muslim	0.004061*	-0.001652	0.002059
	(2.035713)	(-0.997619)	(1.323330)
Access to safe water	-0.002119	-0.007311**	-0.008285**
	(-0.395536)	(-2.087338)	(-2.164144)
Constant	8.182786***	6.878638***	9.473322***
	(6.054738)	(6.497003)	(9.603715)
R^2	0.740396	0.816985	0.772443
Number of observation	38	54	61
Prob. (F-statistic)	0.000	0.000	0.000

*Note: T-statistics in parenthesis. *significant at 10%; ** significant at 5%; and *** significant at 1%.*

Table E.7: *Results from robustness control with larger sample size in the education regressions, excluding adult literacy*

Dependent Variable→	Education attainment (ln)	
Independent Variable ↓ Regression →	Education PEFA	Education CPIA
GDP per capita (PPP adjusted 2005$ (ln)	0.109595**	0.033813
	(2.757926)	(0.728300)
PFM quality (PEFA)	0.018264	
	(0.312551)	
PFM quality (CPIA)		0.255895***
		(2.866127)
Public health spending as share of GDP (ln)	0.077242	0.842789**
	(0.399571)	(2.720165)
PFM quality (PEFA)*Public spending (ln)	-0.040997	
	(-0.548016)	
PFM quality (CPIA)*Public spending (ln)		-0.252230**
		(-2.633178)
Ethnolinguistic fractionalization	0.021074	-0.089001
	(0.223223)	(-0.754204)
Percentage of population Muslim	-0.000694	-0.003228**
	(-0.866864)	(-3.029998)
Constant	3.488294***	3.294555***
	(13.98959)	(8.332570)
R^2	0.366764	0.464292
Number of observation	47	42
Prob. (F-statistic)	0.004	0.001

*Note: T-statistics in parenthesis. *significant at 10%; ** significant at 5%; and *** significant at 1%.*

Table E.8: *Results from robustness control from the panel estimation*

Dependent Variable→	Under-5 mortality (ln)
Independent Variable ↓ Regression →	Health CPIA
GDP per capita (PPP adjusted 2005$ (ln)	-0.000232***
	(-7.543474)
PFM quality (CPIA)	0.008033
	(0.307219)
Public health spending as share of GDP (ln)	-0.018951
	(-0.207244)
PFM quality (CPIA)*Public spending (ln)	-0.008821
	(-0.312892)
Private health spending as share of GDP (ln)	-0.082073***
	(-2.644494)
Ethnolinguistic fractionalization	0.484126**
	(2.494011)
Female education	-0.007305**
	(-2.059490)
Inqome inequality	0.010279
	(1.281597)
Distance from the equator	0.381766
	(0.674358)
Percentage of population Muslim	0.000683
	(0.364729)
Access to safe water	-0.013767***
	(-5.797370)
Constant	5.504332***
	(11.90758)
R^2	0.598293
Number of observation	222
Prob. (F-statistic)	0.000

*Note: T-statistics in parenthesis. *significant at 10%; ** significant at 5%; and *** significant at 1%.*

Appendix F. Results from Excluding Outliners

Table F.1: *Results from robustness control excluding outliners*

Dependent Variable→	Under-5 mortality (ln)		Education attainment (ln)		
Regression →	Health-PEFA	Health-CPIA	Education-CPIA	Education-PEFA	Education-CPIA
Independent Variable ↓ Outliner →	PEFA[41]	CPIA[42]	CPIA[43]	Education[44]	Education[45]
GDP per capita in PPP adjusted 2005$ (ln)	-0.225434**	-0.251829	-0.015721	0.043426	0.028535
	(-2.573693)	(-1.681960)	(-0.257465)	(1.225739)	(0.526417)
PFM quality (PEFA)	-0.154642			0.008352	
	(-0.991188)			(0.173850)	
PFM quality (CPIA)		-0.140518	0.257925***		0.164861*
		(-0.561466)	(2.820629)		(2.017336)
Public spending as share of GDP (ln)	-0.096298	0.690714	0.566786	0.396136**	0.562243*
	(-0.220305)	(0.723494)	(1.634595)	(2.323687)	(1.890001)
PFM quality (PEFA)*Public spending (ln)	0.008747				
	(0.061613)				
PFM quality (CPIA)*Public spending (ln)		-0.182077	-0.178603*	-0.117366*	-0.175869*
		(-0.642494)	(-1.703372)	(-1.850314)	(-1.955478)
Private health spending as share of GDP (ln)	0.003043	0.197615			
	(0.023353)	(1.291520)			
Ethnolinguistic fractionalization	0.463539*	0.573301**	-0.083110	0.016718	-0.103825
	(1.866783)	(2.719228)	(-0.694814)	(0.208718)	(-1.011526)
Female education	0.011961***	-0.009477*			
	(-3.511633)	(-1.959631)			
Adult literacy			0.003764	0.006808***	0.001394
			(1.187303)	(3.802722)	(0.510318)
Income inequality	0.003625	0.012591			
	(0.449052)	(1.306395)			
Distance from the equator	-0.681842	0.501970			
	(-1.085531)	(0.720112)			
Percentage of population Muslim	0.002332	0.001517	-0.001137	0.000991	-0.001891
	(1.030122)	(0.692841)	(-0.752935)	(1.437431)	(-1.438049)
Access to safe water	-0.010891**	-0.003788			
	(-2.605445)	(-0.790169)			
Constant	7.454101***	6.261440***	3.378523***	3.479228***	3.555577***
	(9.121937)	(4.653912)	(7.890210)	(18.07023)	(9.568837)
R^2	0.925240	0.812829	0.477608	0.695996	0.442614
Number of observation	35	35	36	33	36
Prob. (F-statistic)	0.000000	0.000003	0.006310	0.000035	0.013298

*Note: T-statistics in parenthesis. *significant at 10%; ** significant at 5%; and *** significant at 1%.*

[41] Brazil and South Africa is excluded from the sample.
[42] Armenia and Burkina Faso is excluded from the sample.
[43] Burkina Faso is excluded from the sample.
[44] Uganda is excluded in the sample.
[45] Chad is excluded in the sample.