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TRANSMISSION MECHANISM OF THE PUBLIC FINANCE MANAGEMENT INTO (BETTER) HEALTH AND EDUCATION OUTCOMES IN THE WESTERN BALKANS

Policy Study 57

Transmission mechanism of the Public Finance Management into (better) health and education outcomes in the Western Balkans[1]

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ABSTRACT

This paper explores the transmission mechanism of Public Financial Management (PFM) into health and education outcomes in the Western Balkans, focusing on how PFM practices like multiyear budgeting, transparency, and efficiency influence service delivery and sectoral outcomes. Utilizing Roodman's conditional mixed-process estimator on data from 2006 to 2020, the study finds that in education, PFM improvements in budget execution and expenditures per capita enhance technical efficiency, indirectly boosting service delivery measures such as preschool rates and pupil/teacher ratios. These changes correlate with better student performance in reading and mathematics. In health, while PFM enhancements lead to increased expenditures, only budget execution shows a significant positive impact on physician availability and DPT immunization rates, which in turn improve life expectancy. This analysis underscores the critical role of effective PFM in enhancing service delivery and improving sectoral outcomes in the Western Balkans.

JEL: E62, H3, H51, H52

CONTENTS

1. INTRODUCTION

Western Balkan countries rank at the bottom of the list of 70 countries in the OECD Program for International Student Assessment (PISA), while the average infant mortality rate for the region is 0.66%, double the EU average. Other education and health outcomes are similarly unsatisfactory. Equally critical are indicators related to the performance of underlying services. For example, only 9% of children under the age of three in North Macedonia are enrolled in formal childcare, compared to 18% in Serbia and 32% in the EU. The average immunization rate in the WB is 87.7%, declining from 93.2% in 2000, while the number of hospital beds per 1,000 citizens averages 3.6, compared to 5.6 in the EU. Spending reflects this service delivery: public expenditures on education average 3% of GDP, while those on health average 4.5% of GDP, compared to 4.8% and 7.1% in the EU, respectively.

Public Financial Management (PFM)—the system of how policies and development activities are implemented—may be a key determinant of the technical efficiency and quality of service delivery, and hence of sectoral outcomes. Two key dimensions of PFM are crucial for education and health service delivery and outcomes in the Western Balkans: management of assets and liabilities, and the predictability and control of budget execution. Between these two aspects of PFM and the final outcomes lies an ample space where specific mechanisms take place. Notably, "process indicators" must be appropriately modeled within the framework. The empirical literature on this issue is scarce in terms of proper identification and modeling of such "transmission mechanisms."

This paper aims to establish and investigate the transmission mechanism of Public Finance Management quality on education and health outcomes in a rigorous econometric manner. To that end, a four-stage system of equations is employed, allowing macro-determinants and other country characteristics identified in the literature to affect PFM quality, which in turn affects operational efficiency, which in turn affects service delivery, which finally affects outcomes. By doing so, this study models the entire process between PFM and outcomes, understands the size and significance of reactions within each stage, and identifies potential bottlenecks. A variety of PFM, operational efficiency, and service delivery indicators are used, expected to illuminate the role of different PFM facets in achieving process and final outcomes. The analysis is contextualized by qualitative information gathered through interviews across six Western Balkan countries.

LITERATURE REVIEW

Public Finance Management encompasses how policies and development activities are implemented, particularly regarding fiscal discipline, strategic resource allocation, and efficient service delivery (PFM, PEFA, 2005). The concept describes how public money is spent, including budget preparation, approval, and execution (Andrews et al., 2014). Several quality dimensions of PFM have been identified. Transparency, for example, may ensure better resource distribution and prevent centralization among elites (Bellver and Kaufmann, 2005), improving allocative efficiency and increasing trust in government and policymaking processes (de Renzio et al., 2005). Goryakin et al. (2017) emphasize budget credibility, transparency, and institutional accountability. The Open Budget Survey measures transparency by assessing public access to budget information, including online availability, timeliness, and comprehensiveness (International Budget Partnership, 2022). Multiyear budgeting, or medium-term frameworks, address dynamic fiscal inefficiency by putting resource allocation into a long-term perspective (Vlaicu et al., 2014). Budget execution reflects fiscal discipline and governments' ability to deliver public services according to plan. Participatory budgeting, as part of the broader PFM concept, facilitates equitable allocation and distribution of scarce resources (Lassou et al., 2021).

Higher PFM quality could result in better health and education outcomes. For example, effective planning ensures timely availability of funds, reduces leakage, and ensures efficient use of funds, such as obtaining value for money in procurement (Fritz et al., 2014). Therefore, the PFM mechanism should enhance fiscal discipline and allocative efficiency, ultimately improving service delivery and final outcomes (Goryakin et al., 2017). However, the empirical literature remains fragmented regarding the comprehensive understanding of intermediate "process indicators" between PFM and outcomes.

Following the theoretical logic, the relationship between PFM and sectoral outcomes has been fragmentally investigated in the literature. Some papers attempt to estimate the direct link between PFM and final outcomes. According to Fritz et al. (2014), this PFM-outcomes link is through operational efficiency, where an improved PFM system should enhance the operational efficiency of (health and education) expenditures, which in turn results in better outcomes. Fonchamnyo

and Sama (2016) investigate the link between budgetary and public finance management and public sector efficiency, finding a positive and significant correlation in the health sector (measured by life expectancy at birth, infant mortality rates, and immunization against measles).

In addition to studies on the relationship between PFM, service delivery, and outcomes, many researchers have examined the role of transparency and governance. The potential impact of PFM on sectoral outcomes is likely dependent on institutional capacity to convert investments in the PFM framework into better services (Filmer and Pritchett, 1999; Fukuda-Parr et al., 2011). Research investigating institutional factors, such as the role of good governance and the link between transparency and development outcomes, has found that transparency is crucial for stronger human development outcomes (Fukuda-Parr et al., 2011), effective allocation of budgetary funds for health and education (Ablo and Reinikka, 1998), and the impact of spending on final outcomes (Rajkumar and Swaroop, 2002). Part of the literature examines the impact of PFM, measured through multiyear budgeting, on fiscal discipline and technical efficiency. Multiyear budgeting reduces volatility in the disbursement of funds, improves expenditure controls, enhances overall budgetary discipline, and increases the ability to account for future fiscal challenges in annual budget preparation (Vlaicu et al., 2014; Bevan and Palomba, 2000). However, achieving transparency through multiyear planning has evident challenges, particularly in developing countries (Allen, 2009). Multiyear planning is especially relevant for education and health services, where long-term activities and goals are needed. Empirical findings from low- and middle-income countries suggest that introducing the most advanced forms of Medium-Term Performance Frameworks (MTPFs) is positively related to the cost-effectiveness of public health expenditures (Brumby et al., 2013). However, few studies explore this dimension regarding potential relationships with education and health service delivery and outcomes.

The literature focusing on the relationship between sectoral public spending and outcomes in health and education is extensive, though findings are heterogeneous. Wolff's (2015) findings suggest that secondary-level educational expenditures have a positive and significant impact on both math and literacy scores in PISA. Similarly, results for North Macedonia indicate that increased public resources spent on secondary education are associated with better performance by secondary-school pupils from poor families (Petreski and Petreski, 2018).

Harbison and Hanushek (1992) summarize findings from 12 studies on developing countries focused on the relationship between education spending and outcomes. Half of these studies found a positive and statistically significant impact of higher public spending on educational outcomes, while others found no measurable impact. Findings in the health sector are generally positive. Bidani and Ravallion (1997) examined the relationship between public health spending, life expectancy, and infant mortality rates in 35 developing countries, finding a positive effect of higher public health spending on analyzed outcomes.

Health and education outcomes (e.g., PISA scores, life expectancy at birth, infant mortality rates) have been extensively used in the literature to measure system effectiveness. However, these outcome indicators may be problematic when investigating the impact of PFM, as they may overlook the mechanisms between PFM and outcomes. Goryakin et al. (2017) term these "process indicators," which are closely related to service performance. The OECD has attempted to address this gap by defining proxies for input/process indicators, such as access to education, participation rates, progression rates, student-teacher ratios, teacher salaries, immunization coverage, and the number of hospital beds, all of which can affect education and health outcomes (OECD, 2012; OECD, 2015).

While theoretical and empirical research on individual links in this mechanism is well understood, comprehensive empirical evidence on the intermediate chains through which PFM affects system performance outcomes is lacking. The main obstacle has been the shortage of data and the relatively short period of PFM implementation in the Western Balkans. Considering current PFM performance, poor achievements in education and health, and the lack of studies on the gap between PFM and final outcomes, this paper contributes to both the literature and economic policies in the region. This paper is the first empirical study of the transmission mechanism of Public Finance Management into health and education outcomes in the Western Balkans.

BACKGROUND AND STYLIZED FACTS

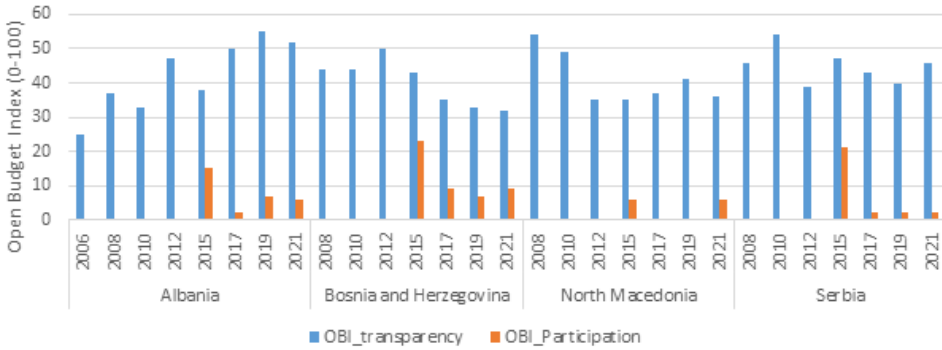
PUBLIC FINANCE MANAGEMENT

Transparency

The budget transparency in the Western Balkan countries is at a moderate level. Figure 1 presents two dimensions of the Open Budget Transparency Index: overall transparency and participation in budget design for the period from 2006 to 2021 for Albania, Bosnia and Herzegovina, North Macedonia, and Serbia. The transparency score ranges from 0 (lowest transparency) to 100 (highest transparency). For all four countries, the transparency score is below the threshold of 61, which indicates the minimum level for publishing sufficient information to inform public debate. In Albania, the trend is increasing, while Bosnia and Herzegovina shows a decreasing trend. The score for North Macedonia dropped from 54 in 2008 to 35 in 2012 and has remained stagnant. Similarly, in Serbia, the transparency score has been generally stagnant since 2010. These figures rank the Western Balkan countries among those with limited published information to support informed public debate.

The moderate scores are mainly due to the absence of certain documents or their publication in a simplified form, such as citizen budgets, mid-year reviews, and pre-budget statements. The Participation Index reveals even lower scores, below 23, indicating that budget decision-making and monitoring remain closed to the public and are still in their infancy.

Figure 1: Budget transparency in Western Balkan countries

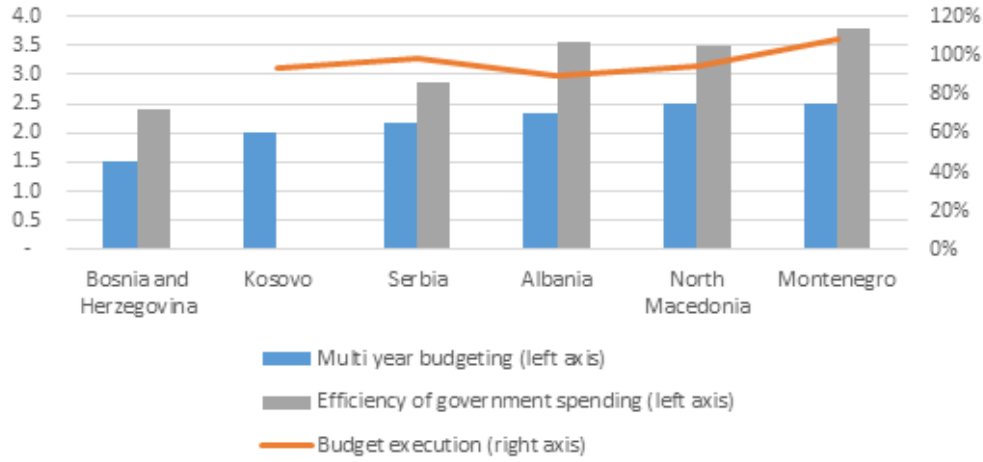


Source: Open Budget Survey 2006-2021

Multi-year budgeting, budget execution and efficiency of government spending

Figure 2 presents several aspects of Public Finance Management for Western Balkan countries: multi-year budgeting, budget execution and efficiency of government spending.

Figure 2: Multi-year budgeting, Budget execution and Efficiency of government spending in Western Balkan countries



Source: WEF Global Competitiveness Index for Efficiency of government spending; Public Expenditure and Financial Accountability (PEFA) assessments for multi-year budgeting; Budget execution reports for Western Balkan countries for budget executions

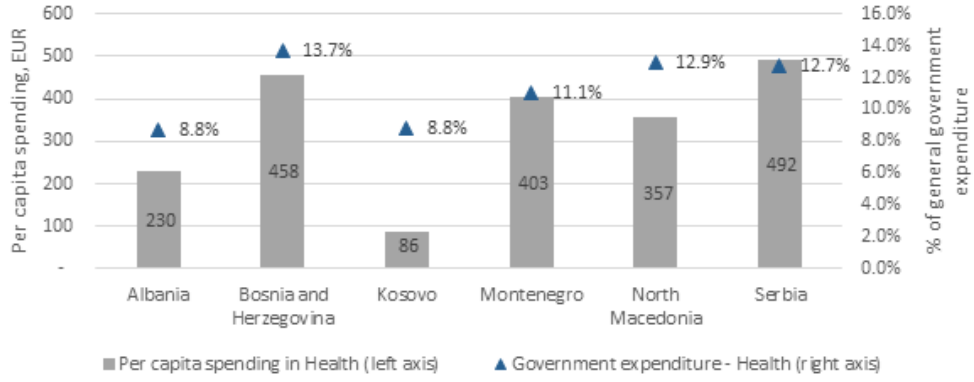
Western Balkan countries have lagged behind in this process. While PEFA scores have improved over time, some dimensions and performance indicators remain weak. For example, in all countries of interest, the performance score for the 'multi-year perspective in fiscal planning, expenditure policy, and budgeting' indicator ranges between 1.5 and 2.5 (out of a maximum of 4). Key weaknesses in mid-term budgeting include the lack of mid-term classification (administrative, economic, or functional), unclear links between the macro-fiscal framework and subsequent budgets, and inconsistencies in budgets compared to previous years' estimates. Similarly, moderate performance is observed in the efficiency of government spending indicator, with scores ranging from 2.5 to 3.8 (out of a maximum of 7). Budget execution reflects budget credibility and fiscal discipline. Overall, the budget execution of Western Balkan countries is satisfactory, exceeding 90% of the initial budget. However, under-execution is not a major issue. Potential reasons for under-execution include cautious budget planning, low administrative capacities for budget implementation, delays in political decisions required for spending, and stringent payment approval processes.

Government expenditures

Government expenditures are key sources of funding for education and health services in the Western Balkan countries. Yet, public expenditures in education and health services as a share of general government expenditures are modest (Figures 3 and 4).

On average, across the Western Balkan countries, health spending is 11.6% for the period 2006 to 2021, which is much lower than the EU average of 14.5% for the same period (Eurostat, 2022). However, there are substantial differences among the countries. While some countries (Serbia, North Macedonia, and Bosnia and Herzegovina) are closer to the EU average, Albania and Kosovo lag significantly behind their Western Balkan counterparts. Furthermore, the share of public investment in health within overall expenditures has remained stagnant during the analyzed period, except for Bosnia and Herzegovina, which has shown an upward trend. This indicates the limited fiscal space of the region. Due to relatively smaller budgets compared to the EU, this translates into low levels of health expenditure per capita, exacerbating discrepancies between the region and the EU. The Western Balkans spend 10 times less relative to their EU counterparts. This may negatively affect the quality of public healthcare services, increasing out-of-pocket expenditure and placing a large burden on individual disposable incomes.

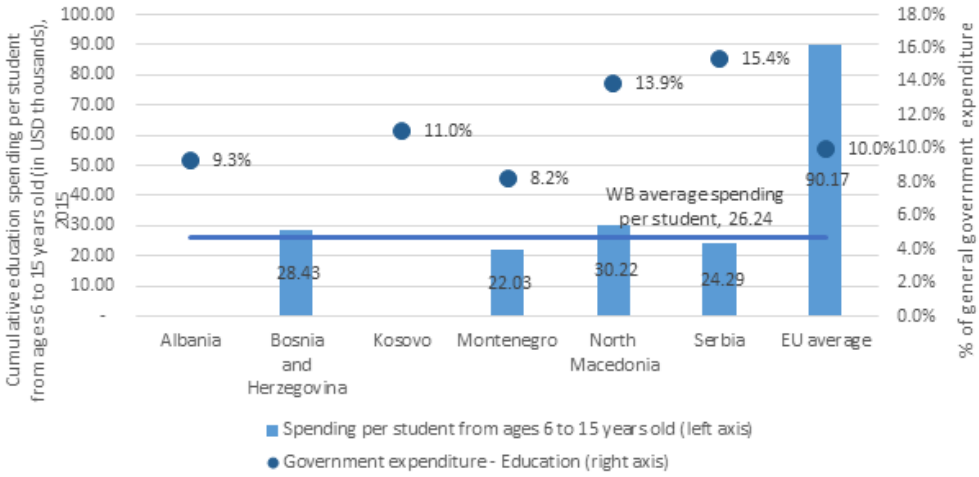
Figure 3: Government expenditures on health per capita and as a share of total government expenditure (average for 2006-2021)



Source: Budget execution reports for Western Balkan countries, World Bank, calculation by the author

In the Western Balkans, government education spending as a share of total expenditures is heterogeneous among the countries, ranging from an average of 8.2% for Kosovo to 15.4% for Serbia (Figure 4). The proportion of government spending in total expenditure for most countries is comparable to the EU average. However, cumulative education spending per student in compulsory education is poor, averaging $26,000 (PPP-adjusted) per student—roughly three times lower than the EU average of $90,000. In addition, the majority of public spending on education in the region is allocated to teaching staff wages and material costs (ETF, 2020), accounting for up to 85% of total budget funds allocated for education programs in North Macedonia (Petreski et al., 2021). This reduces funding available for capital investments and educational materials (e.g., textbooks, ICT equipment, laboratories) essential for effective teaching.

Figure 4: Cumulative education spending per student from ages 6 to 15 years old (2015) and Government expenditures on education as a share of total government expenditure (average for 2006-2021)



Source: Budget execution reports for Western Balkan countries; Eurostat; OECD PISA 2015

Service Delivery/Resources and Outcomes

The allocation of resources—financial, human, and material—to education and health systems is crucial for delivering high-quality services. The Western Balkan countries are identified as inadequately resourced to provide effective learning environments for students and adequate health conditions (Omic et al., 2021). Table 1 provides information on key resources for service delivery in education and health systems in the Western Balkan countries.

Schools' capacity to provide instruction is significantly hindered by a lack of educational materials, such as textbooks, ICT equipment, library resources, and laboratory materials (over 50%), as well as by inadequate physical infrastructure (over 40%). In contrast, the OECD averages for these deficiencies are much lower, at 28% and 33%, respectively. Access to computers connected to the internet in schools is also limited in the region, with an average of one computer per 3.8 students and one per 3.4 teachers, compared to 1.2 computers per student and one per teacher in OECD countries (OECD data).

In terms of teaching resources, the Western Balkan countries average 13.8 pupils per teacher in primary education, a ratio comparable to the EU average of 13.6 (Eurostat). This indicates that teaching staff availability is not a major concern. However, the figures vary across countries, with some having a significantly higher ratio than the EU average. Early childhood education is essential to prepare children for compulsory primary education, ensure inclusiveness, reduce inequalities, and narrow the disparity of educational outcomes between socio-economic groups (Cunha et al., 2006). Yet, preschool education in the Western Balkans is notably low, averaging 38%, far below the EU average of 93% (World Bank data). This can be attributed to low spending on preschool education, insufficient capital investment in preschool infrastructure, cultural factors (e.g., women's roles in society), labor market development, and the individual characteristics of parents (Petreski and Petreski, 2018).

Similar to education, healthcare services in the region lag behind EU averages, with significant disparities between countries. In 2020, 86% of infants in the region were immunized with DPT, about seven percentage points lower than the EU average of 93%. Regarding personnel and equipment resources, the region is moderately equipped, with an average of 4.06 hospital beds and 2.5 physicians per 1,000 people. Both indicators are below the EU averages of 4.06 and 4.9, respectively, highlighting concerns about human resources. Factors such as low investments in health systems, emigration of health workers from the Western Balkans, and insufficient incentives for healthcare workers (Schneider et al., 2021) contribute to these resource shortfalls.

Table 1: Selected service delivery indicators in Education and Health

		Albania	Bosnia and Herzegovina	Kosovo	Montenegro	North Macedonia	Serbia
Eduction	Pupils-teacher ratio, primary (latest available data)	16.77	16.13	13.80	7.44	14.73	13.75
	Preschool education (latest available data)	49%	18%	4%	63%	33%	62%
	% of students whose learning outcomes are hindered by lack of educational material (2018)	50%	67%	86%	37%	65%	49%
	% of students whose learning outcomes are hindered by lack of physical infrastructure (2018)	40%	47%	50%	40%	37%	47%
	Number of computers with Internet per teacher (2018)	0.19	0.25	0.10	0.38	0.46	0.37
	Ratio of school computers available to 15-year-olds for educational purposes to the total number of students in the modal grade for 15-year-olds (2018)	23%	30%	12%	21%	43%	30%
Health	Immunization, DPT (% of children ages 12-23 months) (latest available data)	98%	73%		84%	84%	92%
	Hospital beds (per 1,000 people) (latest available data)	2.89	3.49		3.86	4.28	5.61
	Physicians (per 1,000 people) (latest available data)	1.65	2.16		2.76	2.87	3.11

Source: World Bank, OECD PISA 2018, State Statistical offices of Western Balkan countries, calculations by the author

Table 2 presents selected outcome indicators in health and education for the Western Balkan countries. According to the latest OECD Program for International Student Assessment (PISA) results for 2018, over 50% of 15-year-olds performed at level 1 or below in reading and mathematics. This ranked the Western Balkans at the bottom of the list of 77 countries (e.g., Albania ranked 55th, North Macedonia 67th, and Kosovo 75th) (OECD, 2019). Similarly, the average infant mortality rate for the region, at 5.5 per 1,000 live births (ranging from 2 in Montenegro to 8.8 in Albania), still falls far behind the EU average of 3 (World Bank data, 2019). Life expectancy has improved over the last two decades, reaching an average of 75.53 years in 2020; however, it is still roughly five years lower than the EU average.

Table 2: Selected Outcomes indicators in Education and Health

	Albania	Bosnia and Herzegovina	Kosovo	Montenegro	North Macedonia	Serbia
Life expectancy at birth, total (years) (2020)	78.69	77.55	71.09	75.93	75.69	74.23
Mortality rate, infant (per 1,000 live births) (2020)	8.80	4.90	7.20	2.00	5.20	4.90
Mortality from CVD, cancer, diabetes or CRD between exact ages 30 and 70 (%) (2019)	11%	19%		22%	23%	22%
PISA: 15-year-olds by mathematics proficiency level (%). Level 1 and Below 1 (2018)	42%	58%	77%	46%	61%	40%
PISA: 15-year-olds by reading proficiency level (%). Level 1A, 1B, 1C and Below Level 1C (2018)	52%	54%	79%	45%	55%	38%

Source: World Bank, WHO, OECD PISA 2018

PFM transmission mechanism: PFM Quality, Efficiency, Service delivery and outcomes

Fiscal constraints in the Western Balkan countries have contributed to underperforming education and health outcomes. However, significant improvements can be achieved by strengthening the transmission mechanism from public finance management (PFM) through increased efficiency, leading to higher-quality service delivery. Figure 5 illustrates the correlation between several dimensions of the PFM transmission mechanism.

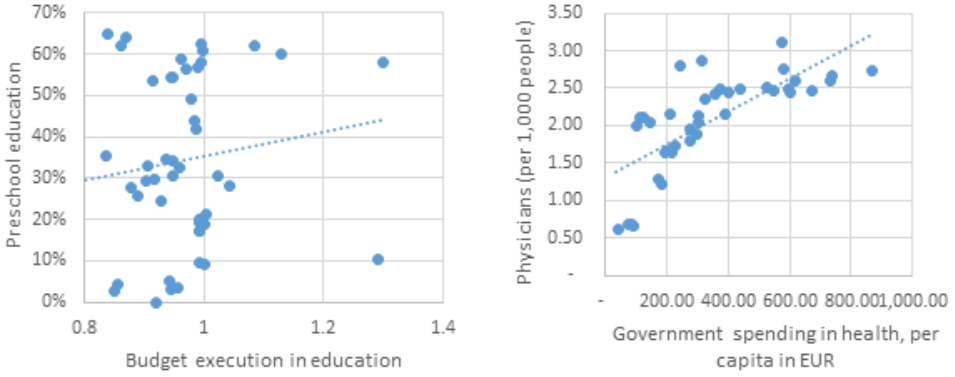
The first dimension (Section A) explores the relationship between budget efficiency—measured by budget execution and the allocation of expenditures in the education and health sectors—and PFM quality, assessed through transparency, efficiency, and multiyear budgeting. The data suggests a positive correlation between PFM quality and budget execution in education and health. Periods characterized by higher transparency and spending efficiency are associated with improved budget execution in these sectors. This indicates that resources are likely being redirected toward more efficient sectors with greater administrative capacity to manage funds. However, the chart does not clearly depict a correlation between multiyear budgeting and budget execution.

The second dimension of the transmission mechanism (Section B) connects technical efficiency at the sectoral level with service delivery outcomes. Higher budget efficiency in the education sector and increased funding in the health sector are likely to result in higher preschool enrollment rates and an increased number of physicians—key proxies for service delivery. This dimension appears to be a critical link for achieving better final outcomes. The third dimension (Section C) focuses on how improved service delivery translates into better outcomes. Enhanced service delivery, driven by increased efficiency, is a significant contributor to achieving higher educational and health outcomes. For example, countries where schools face greater shortages of educational resources tend to have lower PISA reading performance. Conversely, countries with a higher number of physicians per 1,000 people exhibit longer life expectancy. These findings underline the importance of addressing gaps in service delivery to achieve more substantial societal benefits.

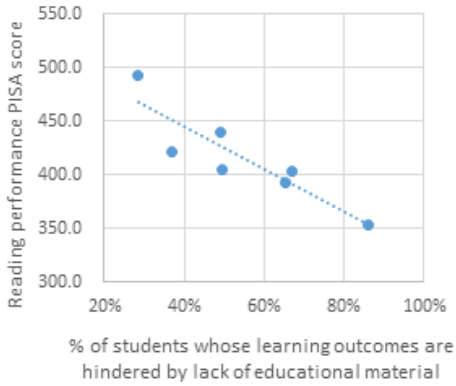
Figure 5: PFM quality – Efficiency -Service delivery – Outcomes for Western Balkan countries (2006-2021)

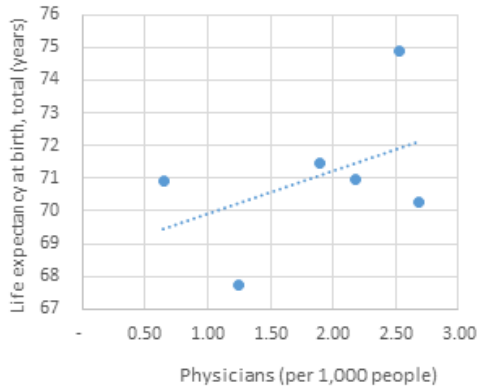
A) Selected indicators for PFM Quality and Efficiency in Health and Education spending

B) Efficiency and service delivery



C) Service delivery and outcomes





Source: Budget execution reports for Western Balkan countries, World Bank, OECD data, calculations by the author

Building on this background, the transmission mechanism of Public Finance Management (PFM) into improved health and education outcomes will be examined through the following hypotheses:

H1: Public finance management improves spending efficiency

H2: Improved spending efficiency leads to better sectoral service delivery in education and health.

H3: Enhanced service delivery translates into improved final outcomes in education and health.

DATA AND METHODOLOGY

This section outlines the choice of variables and related data sources, followed by an explanation of the empirical methodology used to identify and estimate the effects of public finance management (PFM) on budget efficiency, service delivery, and outcomes in the Western Balkan countries.

Data. The sample consists of six Western Balkan countries—Albania, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia, and Serbia—covering the period 2006 to 2020. This timeframe reflects the data availability for most variables. The variables are categorized into four main groups: PFM quality, budget efficiency, service delivery in education and health sectors, and outcomes in the sectors of interest.

PFM quality is measured using three indicators:

- Efficiency of government spending, calculated and published by the World Economic Forum.

- Multi-year budgeting, captured by the P1-12 Indicator of the PEFA framework, derived from PEFA country assessments.

- Transparency, as measured by the Open Budget Index (OBI).

Although the OBI participation indicator (published by the International Budget Partnership) was considered as a proxy for stakeholder involvement in planning, it was ultimately excluded from the analysis due to insufficient data.

Budget efficiency is assessed using two metrics:

- Expenditures per capita in education and health, sourced from World Bank data and calculations based on central budgets.

- Budget execution, calculated as the ratio of total executed budgets in education and health to initially planned budgets for these functions.

The budget execution variables were compiled from multiple sources, including Ministries of Finance, budget laws, budget execution reports, official gazettes, and data from the GAP Institute for Kosovo's budgets. Additionally, the ratio of expenditures in education and health to total government expenditures was used as an explanatory variable, derived from the same sources.

Service delivery is measured using the following variables:

- Pupil-teacher ratio in primary education (World Bank data).
- Preschool enrollment, calculated as the ratio of children enrolled in preschool to the total number of children of preschool age (World Bank data, State Statistical Offices, UN population data).
- DPT immunization rates (% of children aged 12–23 months, World Bank data).
- Hospital beds per 1,000 people (World Bank data).
- Physicians per 1,000 people (World Bank and WHO data).

PISA data related to education resources is used as a proxy for service delivery, though it is only available for two time periods (PISA rounds).

Outcomes are measured by three key indicators:

- Life expectancy at birth (total years, World Bank data).
- PISA mathematics proficiency scores for 15-year-olds (% at level 1 and below).
- PISA reading proficiency scores for 15-year-olds (% at levels 1A, 1B, 1C, and below level 1C).

Challenges with Data

A key challenge is the presence of missing data for indicators assessed infrequently, creating gaps for certain years. The PFM process in the Western Balkans is in its early stages, resulting in relatively short data series. The multi-year budgeting indicator is derived from PEFA assessments conducted at different times in different countries, typically covering two- to three-year periods. For earlier years not covered by assessments, scores are applied retroactively based on supporting evidence (PEFA, 2020).

Similarly, for education outcomes, PISA performance data in reading and mathematics is published every three years. PISA reports provide average trends for comparative purposes, which were used to estimate missing data between assessment periods (PISA, 2018).

Methodology

The empirical methodology models the transmission mechanism linking public finance management to education and health outcomes in a rigorous econometric framework. This process is conceptualized as follows:

PFM Quality -> Technical Efficiency -> Service Delivery -> Outcomes

Based on this conceptual framework, a four-stage model is proposed to capture the causal chain.

$$\text{PFM\_quality}_{i,t} = \alpha_{1,i} + \gamma_{1,t} + \sum_{j=1}^{n} \beta_{10j} country\_ch_{i,t} + \beta_{11} rev_{i,t} + \beta_{12} pop_{i,t} + \varepsilon_{1i,t} \quad (1)$$

$$\text{Technical\_eff}_{i,t} = \alpha_{2,i} + \gamma_{2,t} + \sum_{j=}^{n} \beta_{20j} country\_ch_{i,t} + \beta_{21} rev_{i,t} + \beta_{22} pop_{i,t} + \beta_{23j} PFM\_quality_{i,t} + \varepsilon_{2i,t} \quad (2)$$

$$\text{Service\_delivery}_{i,t} = \alpha_{3,i} + \gamma_{3,t} + \sum_{j=1}^{n} \beta_{30j} country\_ch_{i,t} + \beta_{31} rev_{i,t} + \beta_{32} pop_{i,t} + \beta_{33} Operational\_eff_{i,t} + \varepsilon_{3i,t} \quad (3)$$

$$\text{Outcomes}_{i,t} = \alpha_{4,i} + \gamma_{4,t} + \sum_{j=1}^{n} \beta_{40j} country\_ch_{i,t} + \beta_{41} rev_{i,t} + \beta_{42} pop_{i,t} + \beta_{43j} service\ delivery_{i,t} + \varepsilon_{4i,t} \quad (4)$$

Whereby:

$PFM\_quality_{i,t}$ stands for the Public Finance Management quality for country i in time t. PFM quality is measured through three PEFA indicators: PI-12, Multi-year perspective in fiscal planning, expenditure policy and budgeting; efficiency of government spending WEF; Open Budget Index (OBI) transparency. PEFA indicator on multiyear budgeting is ordered variables from 1 (worst quality) to 4 (best quality); the WEF indicator on efficiency is from 1 (inefficient) to 7 (efficient), while OBT is index variable from 1 (weak) to 100 (adequate);

$Technical\_eff_{i,t}$ stands for the education and health efficiency for country i in time t, measured through: budget execution in education and health; and log of per capita spending in education and health;

$Service\_delivery_{i,t}$ is the quality of service delivery in public education and health for country i in time i, measured through the following variables: teacher/pupils ratio, enrolment ratio in kindergartens, immunization coverage, hospital beds, and physicians.

$Outcomes_{i,t}$ stands for the education and health achievements, measured through the following variables: PISA achievements in math and reading and life expectancy at birth.

$country\_ch$, contains a set of macroeconomic variables for country i in time t: income per capita and growth rate.

$rev_{i,t}$ is the tax revenues as percentage of GDP for country i in time t.

$pop_{i,t}$ is a natural log of total population (five-year average, lagged by one year), for country i in time t.

The alphas stand for the country fixed effects and they will wipe out time-invariant characteristics that may have been important for the relationships explored herein, like the initial levels of development of the countries. The gammas stand for the time fixed effects and they will wipe out time trends prevalent for the entire Western Balkan, like the way in which the Global Crisis hit the region. Epsilons are the usual idiosyncratic errors and they are assumed to be well-behaved.

The four-stage system of equations (1)-(4) aims to capture the transmission mechanism of PFM on sectoral outcomes. The framework assumes that an improved PFM system (e.g., enhanced multiyear budgeting) increases the system's technical efficiency (e.g., adequate allocation of funds for education and improved budget execution). This improved efficiency subsequently enhances service delivery (e.g., higher preschool enrollment rates), which ultimately leads to better education outcomes (e.g., a reduction in the percentage of students performing below minimum proficiency levels).

The four-stage system of equations (1)-(4) is estimated using Roodman's (2011) conditional mixed-process (CMP) estimator. This estimator facilitates the combination of equations with dependent variables of different types (e.g., continuous, binary, or ordered), enabling a comprehensive and flexible approach to modeling the relationships within the framework.

RESULTS

Following the setup of hypotheses formulated in research question, this section presents the results of the estimated system of Equations 1-4. Evidences about the PFM transmission mechanism in education and health sector in the Western Balkan countries are organized around four research questions: i) which macroeconomic characteristics are the drivers of public finance management quality, ii) how changes in PFM quality affect technical efficiency (budget execution and sectoral funds allocation), iii) how changes in PFM quality and technical efficiency affect operational efficiency through service delivery in two sectors, and iv) how service delivery influence on education and health outcomes.

Macroeconomics characteristics and PFM quality in Western Balkan countries

Table 3 presents the estimated results of Equation 1 of the model, where we estimate how different macroeconomic indicators influence on public finance management, measured through three indicators: efficiency (Column 1), multiyear budgeting (column 2) and transparency (column 3). The results show variances between different PFM indicators. We find that macroeconomic indicators population and GDP per capita are statistically significant for the Efficiency indicator. Higher GDP per capita and population size, increase the efficiency score. For multiyear budgeting, results are mixed in terms of significance and sign. GDP per capita and the revenues as percentage of GDP are two statistically significant variables, but with the opposite than the expectations signs, indicating that higher GDP per capita and revenues decrease the multiyear budgeting score. The literature on multiyear budgeting identified that there are differences in budgeting process between developing and developed countries that may affect the multiyear budgeting, and, raise a question of adequate implementation of the process (Boex et. al, 2000; and Oxford Policy Management, 2000). Boex et.al (2000) notes that developing countries often suffer from unrealistic forecasts of future budget revenues and the absence of a strategy that prioritizes expenditure programs. This is the case of Western Balkan countries. Therefore, higher revenues may reflect these weaknesses, and explain the negative sign. On the other side the impact of the multiyear budgeting on fiscal performance varies depending of the phase of implementation, where more advance phases

provide higher impact (Vlaicu et al. 2014). Western Balkan countries are at the lower phases of implementation. With regards to the transparency PFM indicator, we find a significant positive impact of population and revenues for transparency. Higher population size and higher revenues as percentage of GDP, increase transparency. Opposite to our expectations, GDP growth is negatively related, higher GDP growth reduce transparency.

Table 3: Results of PFM quality and macroeconomics characteristics

	Efficiency	Multiyear budgeting	Transparency
Population	**6.537*** **	-2.342	**119.5*** **
	(1.991)	(2.004)	(45.05)
GDP per capita	**1.229*** **	**-1.173*** **	16.91
	(0.401)	(0.442)	(11.14)
GDP Growth	-0.013	-0.00142	-0.619**
	(0.225)	(0.0094)	(0.31)
Revenues as percentage of GDP	0.011	-0.0659***	1.252***
	(0.023)	(0.0204)	(0.456)
Constant	-104.09***	4.189**	-150.9***
	(30.980)	(48.7)	(742.2)
Observations	64	78	71

Source: Author calculations
, **, and * denote significance at the 10%, 5%, and 1% level, respectively. Standard errors are provided in parentheses*

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The effects of PFM quality on technical efficiency and service delivery in Education and Health sectors I Western Balkan countries

Table 4 presents the results of the estimated evidence on transmission mechanism from three PFM quality dimensions (efficiency, multiyear budgeting and transparency) to budget execution rates and expenditures per capita in education (proxy for technical efficiency) and service delivery in education, measured through percentage of children in preschool education and pupil teacher ratio (proxy for operational efficiency). Columns 1-5 present results of the relationship between PFM indicator Efficiency and the technical efficiency in spending (Columns 1-3) and service delivery (Columns 4-5) in education. Columns 6- 9 present results for the performance of second PFM dimension, multiyear budgeting, and Columns 10-13 present results for the third dimension, transparency.

As discussed, we hypothesize that higher PFM quality will lead to higher technical efficiency and will improve fiscal discipline by improving the budget execution and service delivery on a direct way. We further explore the effects of PFM quality on service delivery, through the indirect transmission mechanism, where PFM effects on budget execution and expenditures per capita are transmitted on better service delivery indirectly through the improved technical efficiency. Hence, in the third equations for service delivery in education (Columns 4,5,8,9,12 and 13) we are estimating the impact of budget execution and expenditures in education on service delivery.

The results confirm that PFM mechanism has direct impact on technical efficiency in education, and can influence on service delivery through the both direct and indirect mode. The efficiency and multiyear budgeting have direct positive impact on technical efficiency, while transparency is not statistically significant. The multiyear budgeting is statistically significant for the budget execution in education but not for the expenditures per capita in education. Higher score of multiyear budgeting (PEFA scores) improves the budget execution in education. With regards to the service deliveries in education, the multiyear budgeting is not statistically significant for preschool education and pupil teacher ratio. Therefore, the direct impact of multiyear budgeting on service deliveries is not identified. These findings could be explained with the earlier findings of Vlaicu et al. (2014), where measurable effects of multiyear budgeting process on effective public service delivery are identified only at the most advance phase of implementation of multiyear budgeting, the medium term performance framework, that is not the case of the Western Balkan countries. On the other side, efficiency is statistically significant for both technical efficiency indicators, only when multiyear budgeting is included as an independent exogenous variable. This finding shows that multiyear budgeting can influence the transmission mechanism through different channels. Increasement of one efficiency score (WEF scores) improves budget execution rate in education for 37 % and expenditures per capita in education for 1.7 percent. In the same model, we find a significant positive impact of multiyear budgeting on budget execution in education and expenditures per capita in education. The direct impact of PFM performance on service deliveries is find in the efficiency model only, where higher efficiency decrease the pupil teacher ratio.

The indirect impact of PFM performance, (through improved technical efficiency) on service deliveries in education is identified for efficiency and multiyear budgeting. Improved budget execution has positive im-

pact on pupil teacher ratio (in the multiyear budgeting model). Higher budget execution ratio for 1% decrease the pupil/teacher ratio for 0.23. This could be explained with the potential of multiyear budgeting to improve long term planning including investments in school resources. While in the case of preschool education indicator, the transmission mechanism is working through the expenditures per capita in education, an additional per capita spendings in education increases the preschool education. Similar, higher government spending on education as a share of GDP, increase the preschool education ratio and decrease the public/teacher ratio. Our findings confirm that increasing public spending on education is likely to be more effective in-service delivery in education when PFM mechanism is working through improvement of technical efficiency. This finding contributes to the literature that investigate the efficiency of public spending in education and the link between public spending and outcomes in education.

The other macroeconomic characteristics are partially statistically significant for technical efficiency and service delivery in education sector. Higher population size increases budget execution and expenditures per capita in education, but decrease the education service delivery by decreasing the preschool education rate and increasing the pupil/teacher ratio. These findings are consistent across all equations reported in the table. This could be explained with the methodology of budget allocation in education in Western Balkan countries, where one of the conditioned criteria is the number of students in education, indicating that larger number of students would increase the expenditure per capita in education. However, if the supply of services is not in line with the demand, and spending in education are not allocated for expansion of capacities, the larger size of children could reduce the quality of the services, in our case increase the pupil/teacher ratio or decrease the preschool ratio. The ETF (2020) noted that small proportion of public spending in education are used for improving and investing in education infrastructure. The GDP per capita increase the expenditures per capita in education, and decrease the pupil/teacher ratio. The GDP growth is statically significant only for the pupil-teacher ratio and opposite to our expectations, where higher GDP growth increase the pupil-teacher ratio.

The revenues as percentage of GDP are statistically significant for preschool education ratio and the pupil teacher ratio, but robustness is week. Higher revenues decrease the preschool education ratio and increase the pupil teacher ratio. This could be explained with the weaknesses in budget preparation, resulting in overestimated budgets,

unrealistic projections and underspending. Schiavo-Campo and Tommasi (1999), note that underspending problem is frequent issue for developing countries. Second explanation could be the unproportional funds allocation among sectors with regards to the revenues growth, that is confirmed by the latest school-finance trends and literature. Research has shown that government education spending as a share of GDP in lower-middle-income countries has remained flat in the past 10 years (World Bank, 2021). The school finance literature for the Western Balkan countries points to a potential under-investment in the sector (OECD, 2018; Council of Europe Development Bank, 2021) and not proportional investment in the education sector relative to the growth of the budgets (Petreski and Petreski, 2018).

Table 4: The effects of PFM effects on technical efficiency and service delivery in Education sector

	Efficiency					Multiyear budgeting				Transparency			
Dependent → Independent ↓	Budget execution in education	Budget execution in education	Expenditures per capita in education	Preschool education (% of children in preschool)	Pupil teacher ratio	Budget execution in education	Expenditures per capita in education	Preschool education (% of children in preschool)	Pupil teacher ratio	Budget execution in education	Expenditures per capita in education	Preschool education (% of children in preschool)	Pupil teacher ratio
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*	*(13)*
Efficiency	35.031	**37.572*** **	**1.171*** **	43.403	**-1.252*** **								
	(96.993)	(12.032)	(0.189)	(39.767)	(0.28)								
Multiyear budgeting		**4.153*** **	**0.040** **			**0.408*** **	0.062	7.649	-0.069				
		(1.282)	(0.019)			(45.273)	(0.395)	(12.911)	(0.375)				
Transparency										1.083	0.002	0.717	0.0139
										(1.333)	(0.013)	(2.116)	(0.016)
Budget execution in education				**-0.557*** **	-0.014			**-0.231** **	**-0.012*** **			0.063	-0.008
				(0.134)	(0.012)			(0.125)	(0.003)			(0.277)	(0.009)
Expenditures per capita in education				**83.350*** **	0.380			-26.605	0.545			-16.524	1.389
				(29.043)	(0.257)			(25.067)	(0.845)			(-0.254)	(1.621)
Government expenditures in education (% of total expenditures)				**2.028** **	**-0.042** **			-0.621	0.037			-0.239	-0.051

				(0.964)	(0.013)			(0.848)	(0.027)			(3.254)	(0.088)
Population	**665.558****	**784.82*****	**8.896*****	**-1353.852*****	**21.408****	**584.012*****	**6.553*****	**-418.423*****	**24.063*****	**257.4*****	**5.495*****	**-987.39*****	**14.043*****
	(386.043)	(5.94)	(0.321)	(9.53)	(11.78)	(38.51)	(0.309)	(8.673)	(0.278)	(12.29)	(0.07)	(34.458)	(1.29)
GDP per capita	-24.632	3.92E+01	-0.898	-7.260	**-11.906*****	1.26E+01	**1.306*****	**93.848*****	**-7.540*****	2.36E+01	**1.098*****	6.321	**-12.099*****
	(126.412)		(0.321)	(33.929)	(1.903)	(48.87)	(0.376)	(30.063)	(1.001)	(24.68)	(0.13)	(58.87)	(2.645)
GDP Growth	1.302	0.141	0.016	-0.219	0.047	0.303	**-0.008*****	-0.385	**0.054*****	0.609	-0.05	0.879	**0.075****
	(1.62)	(1.06)	(0.256)	(1.651)	(0.04)	(0.31)	(0.003)	(0.404)	(0.014)	(0.90)	(0.00)	(1.280)	(0.292)
Revenues as percentage of GDP	0.026	**2.196****	0.003	-1.476	0.079**	0.708	0.011	-0.254	**0.077****	-1.78	0.0002	**-3.008**	0.070
	(1.527)	(1.19)	(0.027)	(1.662)	(0.439)	(2.50)	(0.624)	(0.866)	(0.030)	(1.17)	(0.13)	(1.891)	(0.046)
Constant	**-9713**	-12126	-124.87	1977.23	-198.4504	-8701.899	-104.0759	**5630.695**	-275.515	-3921	-86.306	14798	-97.824
	6421.816				181.5339					0.00			
Observations	64	64	64	64	64	78	78	78	78	70	70	70	70
Country Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculations

, **, and * denote significance at the 10%, 5%, and 1% level, respectively. Standard errors are provided in parentheses.*

Following the same structure for presenting results as used in the education sector, Table 5 shows the effects of PFM on technical efficiency and service delivery in the health sector in the Western Balkan countries.

The results indicate that the direct impact of PFM on technical efficiency is moderate, whereas its impact on health service delivery is more robust. Both direct and indirect influences are observed, though the magnitude and direction of effects vary across different PFM and service delivery indicators. The direct impact of PFM on technical efficiency is statistically significant through transparency and multiyear budgeting, particularly when efficiency is included as an explanatory variable. An improvement in transparency and multiyear budgeting by one score increases expenditures per capita in health, suggesting that multiyear budgeting plays a role in prioritizing and allocating funds across key sectors. This aligns with the findings of Fritz et al. (2014). The results indicate that better PFM performance has a direct impact on DPT immunization rates and the number of physicians. Improved efficiency and transparency lead to higher DPT immunization rates for children, with efficiency exerting a stronger influence compared to transparency. However, the relationship between multiyear budgeting and immunization shows a negative sign, which is contrary to expectations. Regarding the relationship between PFM performance and the number of physicians, the results show that improved multiyear budgeting has a positive direct impact. However, we do not find evidence that PFM performance is associated with an increase in the number of hospital beds.

Furthermore, the results suggest that technical efficiency is transmitted to service delivery in the health sector. Improved budget execution has a positive and statistically significant effect on the number of physicians and the DPT immunization rate for children aged 12–23 months. Similarly, higher expenditures per capita in health increase DPT immunization rates but, contrary to expectations, are associated with a decrease in the number of physicians. Additionally, the relationship between technical efficiency and hospital beds is not statistically significant.

Table 5 can also be used to analyze the macroeconomic determinants of technical efficiency and service delivery. While some explanatory variables are significant for health expenditures per capita, their effect on budget execution in health is not consistently robust. The results suggest that larger population size, higher GDP per capita, and higher GDP growth contribute to increased expenditures per capita

in health. Regarding service delivery indicators, a larger population size and higher GDP per capita are associated with an increase in the number of physicians, but, contrary to expectations, these factors are also linked to a decrease in the immunization rate. GDP growth is positively and statistically significant for immunization in only one model, suggesting that higher economic growth may contribute to an increase in immunization rates. These findings indicate that the relationship between health service delivery and macroeconomic characteristics may be influenced by additional factors or the stage of economic development, aspects that fall beyond the scope of this study.

Table 5: The effects of PFM effects on technical efficiency and service delivery in Health sector

	Efficiency					Multiyear budgeting						Transparency				
Dependent → Independent ↓	**Budget execution in health**	**Expenditures per capita in health**	**Physicians (per 1,000 people)**	**Immunization, DPT (% of children ages 12-23 months)**	**Hospital beds (per 1,000 people)**	**Budget execution in health**	**Expenditures per capita in health**	**Expenditures per capita in health**	**Physicians (per 1,000 people)**	**Immunization, DPT (% of children ages 12-23 months)**	**Hospital beds (per 1,000 people)**	**Budget execution in health**	**Expenditures per capita in health**	**Physicians (per 1,000 people)**	**Immunization, DPT (% of children ages 12-23 months)**	**Hospital beds (per 1,000 people)**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**	**(13)**	**(14)**	**(15)**	**(16)**
Efficiency	13.35	-0.023	**-0.705*** **	**23.503*** **	-0.0338			-0.088								
	(8.505)	(0.05)	(0.155)	**(2.886)**	(44.022			(0.056)								
Multy year budgeting						**-13.763*** **	0.021	**0.070** **	**0.403*** **	**-26.63*** **	0.0825					
						(4.85)	(0.041)	(0.397)	(0.116)	(5.38)	(2.497)					
Transparency												-0.837	**0.004** **	-0.001	**0.674*** **	-0.002
												(2.723)	(0.002)	(0.013)	(0.047)	(0.018)
Budget execution in health			**0.014*** **	-0.001	0.00006				-0.00006	**0.703*** **	0.0004			0.006	0.0004	0.0003
			(0.001)		(0.0004)				(0.0007)	(0.133)	(0.0004)			(0.03)	(0.0020	(0.10)
Expenditures per capita in health			-0.048	**12.690*** **	-0.138				**-1.130*** **	-1.054	0.082			-0.924	0.756	-0.037
			(0.102)	(2.786)	(1006)				(0.307)	(1.419)	(6.243)			(1.230)	(1.34)	(0.10)
Population	**-263.660*** **	0.594	**5.816*** **	**-116.191*** **	-8.075	2.807	**2.3007*** **	**0.882**	2.901	**-178.667**	**-9.194*** **	**66.08*** **		0.134	0.228	**-8.984*** **
	(19.87)	(1.201)	(0.768)	(8.648)	(81.977)	(11.30)	(0.716)	(0.985)	(2.007)	(108.950)	(0.633)	(21.803)		(0.271)	(0.222)	(0.212)
GDP per capita	-3.786	**0.653** **	**2.788*** **	**-48.0402*** **	-0.437	8.028	**1.269*** **	**0.747** **	**0.809**	**-49.746** **	0.775	19.205	0.593	-3.064	-91.837***	-0.439
	(37.52)	(0.283)	(1.231)	(14.946)	(536.05)	(19.53)	(0.153)	(0.290)	(0.751)	(21.978)	(4.602)	(44.892)	(0.535)	(7.682)	(0.69)	(0.87)
GDP Growth	0.133	0.006	-0.009	0.113	0.006	-0.290	-0.0106***	**0.09** **	0.003	0.288	-0.002	-0.965	0.903***	2.708***	-31.717	0.008
	(0.947)	(0.007)	(0.059)	(0.479)	(6.652)	(0.37)	(0.003)	(0.004)	(0.018)	(0.450)	(0.066)	(1.758)	(0.197)	(0.872)	(21.48)	(0.05)
Revenues as percentage of GDP	-0.395	-0.014	-0.003	0.193	0.0002	0.659	-0.0008	-0.010	**0.050** **	-1.526	0.013	3.133	-0.003	0.0004	0.807***	-0.003
	(0.854)	(0.010)	(0.057)	(0.521)	(15.017)	(0.81)	(0.916)	(0.007)	(0.025)	(0.984)	(0.193)	(2.258)	(0.005)	(0.017)	(0.25)	(0.23)

Government expenditures in health (% of total expenditures)			0.003	-0.155	**0.026****				-0.004	**0.023**	**0.051*****		-0.009	0.011	-0.787**	0.023
			(0.003)	(0.110)	(0.012)				(0.003)	(0.444)	(0.018)		(0.008)	(0.482)	(0.36)	(0.017)
Constant	4014.224	-8.396	-106.3837***	2067	127.26	8.423	-3222	-13.495	-44.658*	**3213****	131.880	-1083	-10.772	28.27	1637.634	140.10
		19.39					0	16.649	26.999	1718.32					1908.371	
Observations	60	60	60	60	60	81	81	81	81	81	81	67	67	67	67	67
Country effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Source: Author calculations

, **, and * denote significance at the 10%, 5%, and 1% level, respectively. Standard errors are provided in parentheses.*

The effects of service delivery on outcomes in education and health sectors in Western Balkan countries

The previous sections of this paper identified statistically significant positive effects of PFM quality on service delivery in education and health—both as a direct relationship and indirectly through improved technical efficiency (budget execution and expenditures per capita in the respective sectors). The final equation of the CMP model estimates the impact of service delivery on outcomes in education (PISA performance) and health (life expectancy at birth). Table 7 presents the regression outputs showing the relationship between service delivery and final outcomes in the education and health sectors. Columns 1 and 2 report the effects of service delivery in education on reading performance (Column 1) and mathematics performance (Column 2), measured by the percentage of 15-year-old students performing below the minimum proficiency level in PISA assessments. Column 3 presents the effects of service delivery in health on life expectancy at birth.

The results indicate that service delivery variables are statistically significant for final outcomes in the education sector, though their impact varies across subjects. Preschool education is statistically significant for reading proficiency but not for mathematics proficiency. A higher preschool enrollment rate is associated with a decrease in the proportion of 15-year-old students below minimum reading proficiency levels. This finding aligns with earlier research. The OECD (2014) noted that "attendance in pre-primary education is associated with better student performance later on". Similarly, Magnuson, Ruhm, and Waldfogel (2007) found that preschool education positively affects reading performance, with stronger and more lasting benefits for disadvantaged children. The pupil-teacher ratio is statistically significant only for mathematics performance, where a lower pupil-teacher ratio is associated with a reduction in the percentage of students performing below the minimum proficiency level in mathematics. Previous empirical research on the effect of pupil-teacher ratios on educational outcomes has shown mixed results. Urquiola (2006) found that reducing the pupil-teacher ratio in Bolivia only improved language test scores but not mathematics, which contrasts with our findings. In Chile, Urquiola and Verhoogen (2009) found that lower pupil-teacher ratios improved test scores in both mathematics and language subjects. An impact evaluation of Serbia's Roma Teaching Assistant Program by Battaglia and Lebedinski (2015) found that adding an extra teacher significantly improved math and language test scores in schools with

fewer than 43 Roma students. Our findings contribute to the empirical literature on developing countries, as most existing research evaluates the impact of preschool education and pupil-teacher ratios on average or high-performing students, while our study examines their effect on the lowest-performing students. Among the macroeconomic variables, population size and revenues as a share of GDP are statistically significant for mathematics performance, suggesting that a larger population size and higher government revenues are associated with a decrease in the proportion of students performing below the minimum proficiency level in mathematics.

The results on health sector outcomes, indicate that two out of the three health service delivery variables are statistically significant predictors of life expectancy. DPT immunization is positively associated with higher life expectancy at birth, where an increase in immunization rates leads to a gain of 2.04 years in life expectancy. Physician density (per 1,000 people) also has a statistically significant positive effect, where an increase of one physician per 1,000 people raises life expectancy by 0.042 years. Among the macroeconomic variables, population size is the only statistically significant predictor of life expectancy, with a positive sign, indicating that larger populations correlate with higher life expectancy. In contrast, hospital bed availability per 1,000 people is not statistically significant, suggesting that factors beyond basic healthcare infrastructure—such as quality of care and access to specialized medical services—may play a more critical role in determining life expectancy in the Western Balkans.

Table 6: Impact of service delivery on outcomes in education and health sectors

Dependent → Independent ↓	PISA: 15-year-olds by reading proficiency level (%). Level 1A, 1B, 1C and Below Level 1C	PISA: 15-year-olds by mathematics proficiency level (%). Level 1 and Below 1	Life expectancy at birth, total (years)
	(1)	(2)	(3)
Preschool education	-**0.264*** **	0.0037	
	(0.157)	(0.037)	
Pupils-teacher ratio, primary	-0.309	**8.318*** **	
	(1.450)	(2.690)	
Immunization, DPT			**2.04*** **
			(0.562)
Physicians			**0.042*** **
			(6.527)
Hospital beds			7.84
			(12.972)
Population	-142.659	**-232.383*** **	**73.647*** **
	(83.406)	(84.211)	(6.048)
GDP per capita	-5.42E+00	17.354	18.343
	(19.610)	(28.5073)	(14.481)
GDP Growth	0.234	-0.4003	-0.527
	(0.192)	(0.260)	(0.447)
Revenues as percentage of GDP	-0.13	**-0.539** **	-0.36
	(0.221)	(0.281)	(0.596)
Constant	2241.076**	3227.816***	-1433
	1266.843	1107.281	
Observations	78	78	81
Country effects	Yes	Yes	Yes

Source: Author calculations
, **, and * denote significance at the 10%, 5%, and 1% level, respectively. Standard errors are provided in parentheses.*

CONCLUSION

Western Balkan countries (WB) rank among the lowest of the 77 countries assessed in the OECD Program for International Student Assessment (PISA), while the region's infant mortality rate of 5.5 per 1,000 live births remains significantly higher than the EU average of 3. Equally concerning are service performance indicators, which highlight inefficiencies in education and healthcare systems. Public Financial Management (PFM) plays a crucial role in shaping technical efficiency and service quality, ultimately influencing sectoral outcomes. Three key PFM dimensions are particularly relevant to education and health service delivery in the Western Balkans: multiyear budgeting, transparency, and efficiency in public spending.

This paper examines the PFM transmission mechanism in the education and health sectors across six Western Balkan countries: Albania, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia, and Serbia. The study has two main objectives: To generate new knowledge about the PFM mechanism and its expected outcomes in education and health in the Western Balkans. To investigate the gap between PFM and final health and education outcomes by estimating the effects of PFM on technical efficiency and service delivery, contributing to the broader PFM literature. This study is the first to empirically investigate the PFM transmission mechanism in the Western Balkans. Using Roodman's (2011) conditional mixed-process (CMP) estimator, a four-stage system of equations was applied to a panel dataset covering six countries from 2006 to 2020.

The findings suggest that multiyear budgeting and efficiency enhance budget execution and per capita education expenditures, serving as proxies for technical efficiency. However, no direct impact of PFM on service delivery, specifically preschool enrollment and the pupil-teacher ratio, was identified. Instead, PFM influences service delivery indirectly through improvements in technical efficiency. Higher budget execution is associated with lower pupil-teacher ratios, while increased per capita education spending leads to higher preschool enrollment rates. Similarly, greater government spending on education as a share of GDP contributes to higher preschool enrollment rates and a reduction in the pupil-teacher ratio. In terms of education outcomes, a higher preschool enrollment rate reduces the proportion of 15-year-old students performing below minimum proficiency levels in reading, while a

lower pupil-teacher ratio is linked to better mathematics performance, but this relationship is not observed for reading.

In the health sector, higher performance in multiyear budgeting and transparency leads to increased health expenditures per capita, though budget execution does not show a statistically significant impact. Nonetheless, budget execution positively affects the number of physicians and DPT immunization rates for children aged 12–23 months. Similarly, higher per capita health expenditures increase DPT immunization rates, yet unexpectedly, they are associated with a decline in the number of physicians, suggesting potential inefficiencies in resource allocation. Regarding health outcomes, increased DPT immunization is linked to a 2.04-year increase in life expectancy at birth, while a rise of one physician per 1,000 citizens is associated with a 0.042-year increase in life expectancy. These results highlight the crucial role of PFM mechanisms in shaping service delivery and outcomes in education and health, emphasizing the importance of technical efficiency in translating financial resources into tangible sectoral improvements.

These findings underscore the importance of PFM mechanisms in shaping education and health outcomes in the Western Balkans. Efficient budget execution, multiyear planning, and transparency are key drivers of improved service delivery. However, their impact is often indirect, reinforcing the need for stronger institutional frameworks and strategic resource allocation to enhance the quality and accessibility of education and healthcare services. This study contributes to the empirical literature by providing new evidence on the PFM transmission mechanism in developing and transitional economies, emphasizing the critical link between public finance management, technical efficiency, service delivery, and sectoral outcomes.

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