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School Finance in Latin America: A Conceptual Framework and a Review of Policies

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School Finance in Latin America – A Conceptual Framework

Technical Note

Education Division

Inter-American Development Bank

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Abstract

Education spending has significantly increased in Latin America and the Caribbean (LAC) over the last few decades. Most education systems in the region have improved teacher salaries, introduced programs that focus on improving learning in the most disadvantaged schools and systemic accountability. The available data suggests that increased spending combined with economic and social reforms has had an impact on educational outcomes such as improvement on primary and secondary completion rate and moderate but sustained progress in closing the learning gap with more developed countries. However, education systems in LAC still lag significantly behind most developed countries in terms of student performance in international assessments, which illustrate persistent learning gaps. Since education also consumes an increasing share of government expenditures, a constant concern among governments across the region is how to allocate education resources. In this context, school finance strategies offer policy tools to governments to increase efficiency in spending, increase learning, and narrow achievement gaps. Despite the relevance of school funding policies to improve educational quality and equity, there is little systematic analysis that compares education finances across Latin American countries.

This conceptual framework aims to bridge this gap by providing a comprehensive description of the mechanisms through which school funding in LAC is governed, distributed, and monitored. This framework includes five key dimensions of school finance systems: (i) sources of funding and the transfers between different levels of government (i.e. national, subnational, local, and schools); (ii) decision-making authority at different levels of government; (iii) information and accountability systems; (iv) resource allocation rules; and (v) allocation of teachers. For each one of these dimensions, we review the relevant literature, collect information through the implementation of an extensive data collection instrument we developed, and provide comparative evidence of the school funding mechanisms in eight school systems from Latin America: The federal government of Argentina, the City of Buenos Aires (Argentina), the federal government of Brazil, the State of Pernambuco (Brazil), the municipality of Rio de Janeiro (Brazil), and the national governments of Chile, Colombia, and Peru.

The main results of the study are presented along the five key dimensions presented above: (i) all systems reviewed have implemented compensatory funding using funds from the national level, however, they seem insufficient to compensate for the inequities in spending across subnational governments; (ii) overall school autonomy is low, with Colombia and Peru exhibiting the lowest levels and Chile the highest; (iii) all systems surveyed have introduced some accountability mechanisms to ensure that budget regulations are followed, including internal and external audits, and transparency laws. Regarding performance-based accountability, all LAC governments reviewed have introduced standardized assessments of students, schools, and/or teachers. However, they vary in the extent to which they publish school-level test results and in the extent to which financial consequences are tied to performance; (iv) most of the reviewed systems in the region have already introduced, or are evaluating the introduction of, objective criteria to increase transparency, efficiency, and equity in the distribution of resources. While there is limited evidence on the optimal design of funding formulas, the experiences of SEP in Chile and FUNDEB in Brazil show that these can be useful tools to increase funding equity; and (v) evidence relating to teacher allocation suggests that efficiency and equity challenges remain. Regarding efficiency, all the systems reviewed rely on face-to-face procedures to allocate hired teachers to schools whereas more advanced systems are using computer-generated algorithms that take into account information about vacancies and applicant preferences. Regarding equity, the incentives to address the teacher shortage in hard-to-staff schools are limited or non-existent in most systems and insufficient or ineffective in those systems that have introduced these types of incentives.

Contents

Introduction

Education spending has increased significantly in Latin America and the Caribbean (LAC) over the last few decades. In the region, expenditures on education as a percent of GDP per capita increased from 3% in the 1990s to over 5% today, converging to the OECD average. In current dollars, spending on primary and secondary schools surpasses US$2,000 per student, which, while still low compared to most OECD countries, in real terms represents roughly triple what was spent on each student in the 1990s.

National and local governments in the region have spent copious resources on schooling inputs to improve substandard learning conditions. They have invested in infrastructure, materials for learning, school meal programs, technology, extended school day programs, and teachers (OECD, 2016; CEPAL, 2015). Most countries in the region have also drastically improved teacher salaries over the last three decades (UNESCO, 2015). Many school systems have also introduced compensatory programs that focus on improving learning in the most disadvantaged schools (Reimers, 2002) and systemic accountability (Bruns et al., 2011) and teacher reforms (Bruns & Luque, 2015; Elacqua, Hincapie, Vegas, Alonso, et al. 2018).

Most evidence shows that increased spending combined with other factors, such as economic and social reforms, had an impact on educational outcomes. For instance, data from the Economic Commission for Latin America and the Caribbean (CEPAL) show that the region's primary school completion rate has increased ten percentage points between 1997 and 2014. Secondary and tertiary enrollment rates have also expanded rapidly in the region. Gross enrollment in secondary school increased from 60% in 1990 to over 90% in 2015. Tertiary enrollment also expanded from 17% in 1990 to over 45% in 2015 (CIMA, 2017; UNESCO, 2015).

Most evidence from international assessments also shows that LAC countries are making moderate but sustained progress in closing the learning gap with more developed countries. For example, Latin American countries have improved their test scores in the Programme for International Student Assessment (PISA). Over the last fifteen years, the math, reading, and science test scores for the region have increased almost 10%, 6%, and 5% respectively. According to PISA results, learning has improved particularly for Brazil, Chile, Colombia, Mexico, and Peru. Moreover, while the range in performance within the region remains substantial, most countries also showed significant improvements in math and language between 2006 and 2013 on UNESCO's Regional Assessment (TERCE) of 3rd and 6th graders in 15 LAC countries.

However, despite these learning gains, education systems in Latin America still lag significantly behind most developed countries on student performance in international assessments. For example, in PISA 2015, around 15% of 15-year-old students from the OECD achieved an advanced learning level in science, math or reading. In Latin America, less than 1.5% students perform at this level. Moreover, although some Latin American countries have narrowed the achievement gap among students from different social backgrounds (e.g. Chile and Peru), levels of education inequality in the region are some of the highest worldwide (Carnoy et al., 2014; OECD, 2016; IDB, 2017).

Persistent learning gaps, combined with the fact that education consumes an increasing share of government expenditures, have raised awareness and concern among governments across the

region about how education resources are allocated. The economic crisis in many countries in the region is also prompting more questions as governments reconsider spending priorities in the context of reduced budgets. Thus, one of the main challenges in the region is to continue improving student outcomes with limited resources to pursue this goal.

School finance strategies offer policy tools to governments to increase efficiency in spending, increase learning, and narrow achievement gaps. While the level of funding matters (e.g. Vegas & Coffin, 2015), the rules and regulations that govern education funding systems also determine whether resources are targeted to initiatives that promote equitable learning opportunities for all students. Despite the relevance of school funding policies to achieve educational quality and equity, there is little systematic analysis[1] that compares education finances across Latin American countries.[2]

This conceptual framework aims to bridge this gap by providing a comprehensive description of the mechanisms through which school funding in Latin America is governed, distributed, and monitored. This framework includes five key dimensions of school finance systems (OECD, 2017; Atkinson et al, 2005): (i) sources of funding and the transfers between different levels of government (i.e. national, subnational, local, and schools); (ii) decision-making authority at different levels of government; (iii) information and accountability systems; (iv) resource allocation rules; and (v) the allocation of teachers. For each one of these dimensions, we review the relevant literature and provide comparative evidence of the school funding mechanisms in Latin America.

The comparative analysis focuses on eight school finance systems in the region: The federal government of Argentina, the City of Buenos Aires (Argentina), the federal government of Brazil, the State of Pernambuco (Brazil), the municipality of Rio de Janeiro (Brazil), and the national governments of Chile, Colombia, and Peru. To better understand the school finance systems in Latin America, we created a survey instrument to gather primary data (see Appendix 1) on the rules and procedures of the four dimensions described above. We completed this survey using information from legal documents and interviews with diverse stakeholders from each education system. In addition to the qualitative survey on school funding, we also draw on administrative data at the school, teacher, and student levels.

The contribution of this conceptual framework is twofold. First, the information we gathered and systematized for this study provides a deeper understanding of school funding policies in Latin America and facilitates identification of emerging issues in the region's education finance systems. This conceptual report lays the groundwork for an ambitious research agenda on school finance in Latin America. For example, in one of our empirical papers, we focus on the dimension of "resource allocation rules" and examine teacher sorting on different dimensions (salaries, temporary contracts, novice teachers) in Chile, Colombia, and Peru. In a separate paper, we explore how the threat of accountability affects school level spending decisions in Chile. We are also developing empirical papers that explore some of the other school finance dimensions. For example, we examine how the decentralization policy introduced in Colombia in 2001, that gave more autonomy to a group of municipalities, influenced equity and efficiency of spending. We

[1] While there is a growing literature on school finance in the United States (e.g. Jackson et al., 2016), there is scant research in Latin America.

[2] Most of the school finance literature in Latin America has focused on the macro level (spending per pupil, as a percentage of GDP, proportion current versus capital, etc.). See, for example, CEPAL's Social Panorama of Latin America reports). Also see Morduchowicz (2003): http://unesdoc.unesco.org/images/0013/001316/131669s.pdf

are also exploring the impact of a policy adopted in Colombia that created networks of rural and urban schools to optimize economies of scale of inputs and improve student outcomes. Finally, we examine how the unique teacher contract regime in Rio de Janeiro, which addresses teacher shortages by opening temporary positions for permanent teachers to work extra hours, affects teacher productivity and equity.

The second goal of this framework is to guide IDB's dialogue with governments in Latin America. Our study has been used to inform policymakers about diverse issues related to education finance and to facilitate peer-learning among Latin American countries. For example, our team is working with a group of specialists in Brazil to design a proposal for the reformed Fund for the Maintenance and Development of Basic Education and Teacher Appreciation (Fundo de Manutenção e Desenvolvimento da Educação Básica e de Valorização dos Profissionais da Educação – Fundeb). One of our contributions to this project is to analyze and share with Brazilian policy-makers lessons learned about school funding formulas in other countries of Latin America. We also currently have diverse projects to support governments to reform their school finance systems in Chile, Colombia, the City of Buenos Aires, the State of Pernambuco, the city of Rio de Janeiro, and Peru. In our work with governments, we are formulating specific recommendations informed by the comparative evidence we are generating in the region.

This conceptual framework is a work in progress. We will administer the school finance survey in other countries, including Barbados, Costa Rica, Ecuador, Haiti, Jamaica, Mexico, and Panama. At the end of this study, we will have completed a comprehensive review of the school funding rules in Latin America and will have gathered unique school finance data to support the Education Division's empirical work as well as our policy debates with local government.

In the following sections, we present the scholarly debate and empirical evidence on each school finance dimension and provide a comparative analysis of the funding rules and regulations in a set of eight school finance systems in the Latin America. We conclude with lessons for policymakers in the region.

1. Sources of funding and transfer of resources

A primary role of any government is to guarantee provision of an adequate level of funding to all students in the public educational system. Who should fund schools? How to ensure an efficient and equitable distribution of resources? How to guarantee the fiscal ability of local units of government and address potential imbalances? These are some of the key questions that underlie the two topics addressed in this section: sources of funding and intergovernmental transfers of resources.

This section is divided into three main subsections: Subsections 1.1 and 1.2 provide a detailed description of where schools' funding originates and how it is transferred across national, regional, and local government units until it reaches the school. We examine the literature on alternative transfer designs and the implications on equity and efficiency of school funding. Subsection 1.3 describes the sources of funding and the transfer of resources in eight systems in Latin America.

1.1 Sources of funding

School funding is often raised through taxes from the central, subnational, and local levels,[3] where the size of the budget share of each level determines the degree of the countries' (de)centralization. In fact, raising funds for education is often a multi-level responsibility of central and regional bodies. The provision of public services from the central level is usually supported by national taxes, while subnational and local levels often make use of their own taxes along with additional revenues from the central government. In general, there are three main models regarding the initial source of funding: 1) *primarily central government*; 2) *primarily regional government*; 3) *primarily local government* (Aktison, 2005).

The level of government that raises the educational funds usually has the autonomy to purchase and allocate resources. In education networks that are often locally funded, the local entities have more discretion over most school finance decisions. In this context, the current section analyses fiscal decentralization. The section on decision-making authority will address the issue of which governmental level raises and allocate educational resources (the political and administrative dimension of decentralization[4]). While fiscal autonomy mainly emphasizes spending autonomy, the opposite does not necessarily hold.

An emerging literature that explores the impact of fiscal decentralization on spending efficiency in education. Advocates argue that in a more autonomous fiscal setting, local bodies will increase their responsiveness to local needs since they are in a better position to understand

[3] National: The country level; Subnational: The administrative level immediately below the national level – for example, subnational divisions are considered *Provincias* in Argentina and *Estados* in Brazil or *Regiones* in Chile or Peru; Local: All administrative divisions that fall under the sub-national level. It might include, for example, municipalities, communes, counties, local administrative units such as UGEL in Peru, school districts and/or villages.

[4] There are three main types of decentralization: Fiscal decentralization, political decentralization, and administrative decentralization. Fiscal decentralization refers to the responsibility of regional/local bodies to raise funds for education from their own revenue sources; political decentralization, in contrast, refers to the legitimacy of local governments enshrined in the national constitution, which often involves local elections, revenues of local tax collection and a division of competencies and representativeness regarding political decisions and implementation; administrative decentralization, may either represent central authorities settled down in local jurisdictions for decision-making purposes or local representatives have some authority to plan, manage, and make decisions, conditional on some ground rules set by the central level (Farvacque-Vitkovic and Kopanyi, 2015; Alonso and Sanchéz, 2011).

local demands, improving their delivery and allocation services and provision of goods (Oates, 1972). Furthermore, the efficiency gain also arises from greater accountability due to the closeness between fund providers and beneficiaries (Yilmaz, et al., 2012).[5] However, some have pointed out that for fiscal decentralization to be effective, the transfer of fiscal power to sub-national levels should be "supplemented by institutional arrangements", such as support provisions in cases of macroeconomic instability, or monitoring and supervision in cases of distortive fiscal behavior (Ebel and Yilmaz, 2003). In fact, the literature is scarce and mixed when it comes to the efficiency improvements within fiscal decentralization contexts. Most of the debate focuses on theoretical and descriptive evidence (Yilmaz et al., 2004).

Fiscal decentralization skeptics counter that when local governments are the main source of funding, there may be a risk of generating spending inequities across jurisdictions (Farvacque-Vitkovic and Kopanyi, 2015). Critics are concerned that while wealthier regions will likely have the capacity to raise sufficient local tax revenues to provide adequate funding, more disadvantaged areas may not be able to raise sufficient local resources to provide a quality education. Thus, skeptics maintain that this would generate a vicious circle where wealthier students receive a higher quality education and less privileged areas spend proportionally less on their students, most of whom are from disadvantaged backgrounds.

In the United States, for example, school funding strongly relied on local taxes until the early 1970s, when several states began to introduce school finance reforms in K-12 education. These states underwent legal challenges to their school finance systems. Many state courts ruled that the low per pupil spending levels related to local district's fiscal capacity was unconstitutional and demonstrating of the state's failure to provide an adequate education for all. Several studies have explored the effects of court-mandated finance reforms on school spending and educational achievement (e.g. Card and Payne, 2002; Roy, 2011; and Lafortune et al., 2016). These studies find that spending and achievement equity across school districts has improved due to significant spending increases in low-income districts.[6] Jackson et al. (2016) analyzed the effect of the local spending increments (school finance reforms) on labor market outcomes of children in these districts. The authors took advantage of the randomness of the reform's timing as an exogenous variation in school spending and compared the exposed cohort to students not exposed to the reform. They found a significant increase in completion rates and, later in life, higher earnings. Furthermore, Jackson et. al. (2016) demonstrated that fiscal decentralization (decision-making at the state level in this case) in contexts of regional socioeconomic inequality, can mitigate disparities in school funding across districts and, ultimately, reduce learning and earning gaps between disparate socioeconomic areas. In other words, the presence of such imbalances in regional/local taxation can be addressed by introducing subnational fiscal arrangements that redistribute resources from the state to the district level (Bird, 2011).

Research exploring fiscal decentralization transitions finds that local jurisdictions with greater levels of fiscal autonomy tend to spend lower proportions of their own revenues on education (Grossman and West, 1994; Ebel and Yilmaz, 2004; Wang et al, 2012) and inequality

[5] The literature on efficiency analysis dialogues better with political decentralization and autonomy on decision-making then on fiscal decentralization *per se*. Therefore, further review on this topic is out of the scope of this section, being analyzed in more detail in section 3.

[6] Studies also show that resources may matter more for children from low-income households than for more advantaged students (Baker & Green 2008).

between more and less privileged municipalities tends to increase (e.g. Winkler and Rounds, 1996 in Chile and Herbst and Wojciuk, 2014 in Poland).

Many school finance reforms around the globe have introduced compensatory grants to address fiscal imbalances. In general, more disadvantaged regions – which often serve low-income students and lack the fiscal capacity to raise sufficient funding – receive higher grants from the central level. Ahlin and Mork (2007), for example, show that in Sweden, the shift of school funding and provision responsibility from the central to the local level, accompanied by a simultaneous system of equalization funding, reduced disparities in per pupil expenditure across municipalities. Faguet and Sánchez (2008) find that the decentralization of education finance in Bolivia made government more responsive by re-directing public investment to areas of greatest need, since the decentralization was driven by a "fiscal equalization shock".

Herbst and Wojciuk (2014), on the other hand, examined the impact of the decentralization transition in the 1980s on local education expenditures in Poland. The authors found that, despite the compensatory mechanisms adopted by the central government, there is still a significant imbalance in education funding across municipalities. Particularly, teachers' hourly salaries do not differ significantly between the richest and poorest areas[7], whereas teaching hours diverge significantly. The authors also found inequity in access to infrastructure, technical support and counselling activities, psychologists, assistant teachers, and libraries.

The Brazilian regional redistributive fund (Fund for the Maintenance and Development of Basic Education and Teacher Appreciation or Fundeb) is another example of a policy used to reduce regional tax imbalances[8] (Cruz, 2017). Fundeb is a federally mandated redistributive program intended to reduce regional inequalities in per pupil spending. Fundeb is a state fund that receives revenues from specific state and municipal taxes and transfers. This fund is then redistributed to state and municipal governments based on student enrollments. If per-pupil funds in a state do not meet the national minimum, the federal government transfers additional resources to the state's Fundeb account (the so-called federal complement).

De Souza et al. (2015) find that Fundeb alleviated interstate disparities in educational spending. This is consistent with other evidence (Araujo, 2013) that shows that municipal revenue inequality decreased by 12% between 2006 and 2011. Nevertheless, funding disparities across municipalities persist in Brazil. As illustrated in Figure 4, inequality is mainly driven by discretionary revenue financed by local resources.

In addition, a growing body of research addresses the fiscal behavior of local government authorities when they receive 'grants-in-aid' from higher levels of government. If poorly designed, intergovernmental contributions may lead to perverse incentives, such as a reduction in tax-collection efforts or overspending (Farvacque-Vitkovic and Kopanyi, 2015; OECD, 2017). More specifically, OECD (2016) highlights some mechanisms through which distorted behavior may manifest itself: (i) *reduction in subnational tax effort*: if grants are a negative function of the total

[7] The authors maintain that most of the difference in teaching time is due to language classes and physical education.
[8] The fund in Brazil collects states' and municipalities' taxes revenues and redistributes back to states and municipalities based on the number of enrolments in their respective educational network. Although not incorporating an explicit socioeconomic indicator in its redistribution formula, Fundeb's transfers ended up, on average, benefiting more the poorer localities, since those places receive more financing than their initial contribution to the fund (de Souza et al., 2015) – and the opposite may happen in the richer areas. Moreover, in areas where a national predetermined per pupil value is not reached, a federal compensatory fund complements the amount allocated to those places.

amount raised by the local jurisdiction, it might encourage local authorities to undermine their own tax collection, since a greater collection entails a reduced grant; (ii) *pressure on spending:* cost-based grants, which is a positive function of the price and the quantity of service or good provided by the local body, may lead subcentral authorities to distort information in order to acquire more funds from the central level; (iii) *increased deficit or debt*: subnational bodies' commitment may not always be transparent, since the local authority may act strategically, overspending and creating a deficit expecting that they will receive additional funds (Apud Aldasoro and Seiferling, 2014).

OECD (2017) finds that misalignment between the level that finances (central level) and the one that spends (subnational level) can generate "misuse of resources and waste". For example, Nushe et al., (2016) show that, in Austria, staff expenditures, previously agreed on between the federal government and the provinces, can be updated by the provinces to hire more teachers. These late adjustments create incentives for the Austrian provinces to "over hire" teachers, since part of the additional money comes from the central level. Indeed, the authors report that the number of teachers not included in the initial budget for staff almost doubled between 2006 and 2010.

In addition, some evidence in Brazil suggests that extra aid-revenues from the central government to local levels are more susceptible to be misused (Brollo, 2013) or spent ineffectively (Caselli and Michels, 2013). Gadenne (2017), for instance, evaluated a program that enabled municipalities to improve their fund-raising capacities in Brazil.[9] The author compared the behavior of municipalities that experienced an increase in their own resources due to the program, vis-a-vis a corresponding variation of an unconditional federal transfer. The study examines if local authorities spent resources differently based on the source of funding. The results show that municipalities that participated in the program provide, on average, higher levels of education infrastructure than its federal budget counterpart. The author concludes that technical assistance to enhance the ability of sub-central bodies to raise their own revenues may be a more effective policy in education than intergovernmental grants.

In this context, a question that has often been raised in policy debates is how to measure a subnational level fiscal effort. And further, how to encourage sub-central entities to maximize their effort towards a more efficient tax collection even in the presence of intergovernmental transfers. OECD (2016) provides examples of initiatives that attempt to mitigate the potential drawbacks mentioned above: (i) calculate the *potential* tax base of the locality instead of the *actual* tax revenue[10]; (ii) allocate resources based on explicit indicators, such as sociodemographic, geographic or an estimate of the costs (in case there are explicit goods or services to be purchased), in order to determine the actual need of the subnational entities; (iii) reform the grant system, for example, aligning the amount transferred to the localities' needs, increasing transparency and discouraging corruption and inefficient practices, and increasing the commitment of local governments in education.

The current Title I program in the US, for example, holds a set of fiscal requirements that work as fiscal requirements, including "maintenance of effort" and "supplement, not supplant"[11].

[9] Program participation is voluntary, therefore Gadenne (2017) explores the timing of the program placement in order to estimate causal effects.

[10] There are different methodologies suggested in the literature to compute the potential tax base of a jurisdiction.

[11] https://www.newamerica.org/education-policy/policy-explainers/early-ed-prek-12/school-funding/federal-funding/title-i/fiscal-requirements/

The former requires that districts keep investing at least 90% of previous annual expenditures (from local and state resources). If the state does not comply, federal funding is proportionally cut. This encourages sub-central levels to maintain their fiscal efforts and not over rely on federal financing. The latter states that the federal fund is a supplement to the state's investment for the poorest students. Further, in 2016, a new funding stream aimed to allocate additional funds to states tied to specific requirements, one of which is an increase of funds for the poorest districts.

1.2 Transfer of resources

The way resources are transferred is a key policy lever for most decentralized countries (OECD, 2016). The mechanisms that govern the flow of resources to schools and the number of authorities involved in this process, are key dimensions and play a central role in the functioning of any educational system.

Due to the different possible arrangements of governance within a system, it might happen that the body which has the authority to purchase and allocate the resources to schools is different from the government body that provides the funds. Atkinson (2005) outlines 4 possible scenarios:

(i) Central authority funds and purchases the resources for schools
(ii) Local authorities purchase the resources for schools with funding they receive from the central government and/or from their own revenues;
(iii) Schools purchase the resources with funding they receive indirectly from the central government *via* local authorities;
(iv) Schools purchase the resources with the funding they receive directly from the central government and/or directly from subnational/local government revenues.

Moreover, different combinations of the four abovementioned scenarios may concurrently occur within the same educational system depending on the type of educational good or service provided. For instance, the central level of government is most likely to be responsible – or at least involved in the rules – of teaching staff payroll in LAC.[12] This is consistent with evidence in Europe, which shows that teacher salaries are paid at the central level in one-third of European countries (Eurydice, 2000).

The rules underlying the way transferences take place may directly affect the degree of authority the receiving body enjoys when purchasing and allocating resources (Aktison, 2005; Farvacque-Vitkovic, C., Kopanyi, 2015; OECD, 2017). The following describes the two main types of transferences:

(i) Unconditional (or general) transfers: The recipient has autonomy to use resources (they are not earmarked or tied to specific objectives). Lump-sum and block grants are the most common examples. The former allows full discretion to the local body, which decides, in turn, how much should be allocated to education. The latter specifies the area of expenditure, for instance, a fund for primary schooling. The amount transferred is often a factor of exogenous criteria, such as population size or the district's geographic location (urban vs rural). It may also have equalization purposes, giving consideration socioeconomic levels during its elaboration.
(ii) Earmarked (or conditional) transfers: This specifies the type of spending category for the funds ("input-based conditionality"). In this case, the local entity loses its decision-making

[12] Evidence restricted to the sample under consideration in this study.

authority. Earmarked transfers can also be tied to specific outcomes ("output-based conditionality"). Moreover, the central government may require that a share of the municipalities' own revenue be allocated to a particular resource along with the intergovernmental grant.

The way governments design and regulate the flow of funds plays an important role on the degree of local autonomy over expenses, administrative responsibilities, and the governance of school funding, which in turn, has implications on the efficiency and equity of school funding. Shah (2007), for instance, maintains that unconditional transfers maximize the welfare of municipalities, since it allows flexibility to adjust the resources based on local demands. As discussed above, discretionary aid-grants may generate perverse incentives. In addition, Atkinson (2005) draws attention to the fact that the number of authorities involved in the flow of resources may have adverse effects, such as "fragmentation", unclear division of responsibilities or problems related to the capacities of administrative staff at all levels of authority involved (OECD, 2017). Scholars also argue that schools subsidized directly by the central government are likely to be better monitored and have clearer lines of accountability (Atkinson, 2005).

Farvacque-Vitkovic, C., Kopanyi, (2015) propose several mechanisms to improve the design of intergovernmental transfers. Among them, the authors emphasize the targeting of the intergovernmental transfers. Tanno (2017), for example, based on a simulation exercise[13], finds that 8% of municipal and state education networks in Brazil that should have received Fundeb's federal complement, did not receive it. On the other hand, 2% of local entities that should not have received the federal complement did receive it.

1.3 Sources of funding and transfer of resources in Latin America

1.3.1 Sources of funding

This section provides a comprehensive description of the sources of funding and the transfer of resources in 8 school finance systems in Latin American: 5 countries (Argentina, Brazil, Chile, Colombia, and Peru) and 3 subnational systems (the City of Buenos Aires or CABA), the state of Pernambuco and the municipality of Rio de Janeiro). More specifically, CABA and Rio de Janeiro represent local level education systems in Argentina and Brazil, respectively, whereas Pernambuco is part of the subnational (state) education network in Brazil.14 The diagrams in the annex describe the sources and transfer of funds for each system.

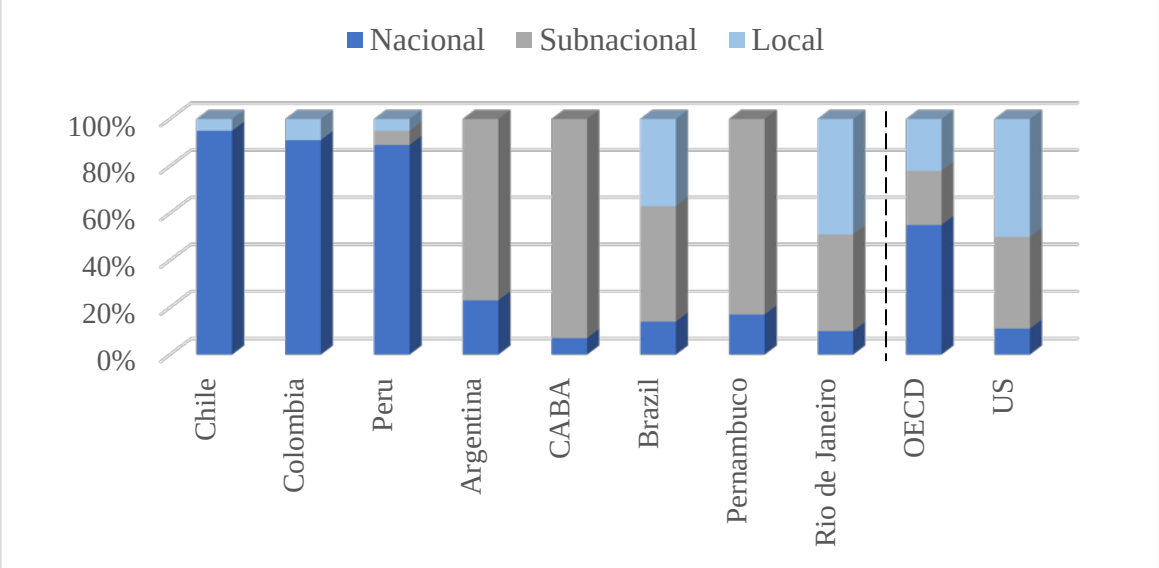
Revenues for school funding can originate from various sources. The most important source is local taxes, usually collected by different government bodies. In this context, Figure 1 illustrates the share of sources of funding collected by central, subnational, and local levels in the 8 LAC systems of reference. Evidence from OECD countries and the US is displayed for the sake of comparison. Figure 1 shows that the source of school funding generally comes from three government levels. Chile, Colombia and Peru are the countries with the highest share of central level funding: 95%, 91% and 89% respectively. In contrast, school finance in Argentina is

[13] The simulation took into account a per-pupil cost based on the total cost per education network of each system (municipal and state) per federal and state instead of the actual cost per pupil – which would correspond, according to the author, to the "ideal equalization value, with maximum allocative efficiency".

predominantly regionally funded. For example, less than 10% of funds for schools in the City of Buenos Aires come from the federal government. The main sources of funding in Brazil (over 85%) are state (49%) and municipal (37%), a pattern that is reflected in Pernambuco and Rio de Janeiro. While in the state of Pernambuco 83% of funds come from state taxes, municipal revenues make up almost half of the funds of the municipality of Rio de Janeiro. Less than 10% of resources for Rio's schools come from federal sources of funding.

Figure 1 shows that, on average, OECD countries have a more balanced funding composition between the three levels of government. On the other hand, Brazil, has a very similar funding structure to the US, in which a larger share of funding originates from state revenues.[15]

Figure 1: Sources of funding in public educational systems in Latin America (2016)

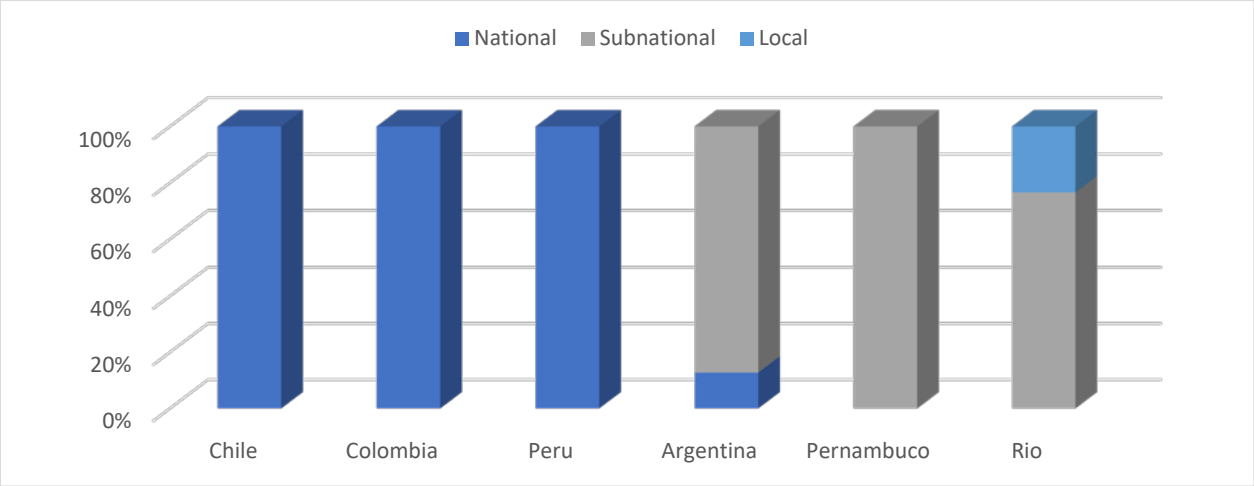


Source: School Finance Questionnaire for the systems in LAC; Education at a Glance (2016) for OECD and US.
Note: Data from Brazil corresponds to the municipal education network; Pernambuco data includes only the state education network, whereas information on the municipality of *Rio de Janeiro* corresponds exclusively to the municipal public schools. Fundeb has federal equalization fund for the subnational or local governments that are not able to reach a pre-determined per pupil value based on their own sources. As a result, in 2016, a small share (about 13%) of Pernambuco's funding comes from the federal level in 2016, whereas Rio de Janeiro did not receive resources from the federal equalization fund.

The participation of each level of government in school funding varies depending on the spending category (European Comission, 2000). *Figure 2* shows the sources of funding exclusively for teacher payroll, which typically makes up the highest proportion of expenditure in public educational systems (OECD, 2017). Teachers are paid by the central government in three out of six systems that have available data. In Colombia and Peru, the central government transfers earmarked money to their local counterparts, responsible for paying teaching staff. As expected, in the more fiscally decentralized systems, teachers are paid with subnational funds, such as in City of Buenos Aires, the state of Pernambuco, and the municipality of Rio de Janeiro. *Figure 2* also illustrates that teacher payroll funding tends to be concentrated in one tier of government.

[15] Prior to school finance reforms in many states in the US, funding was even more heavily skewed toward local sources (e.g. Jackson et al., 2015; Lafortune et al., 2016).

Figure 2: Sources of funding: Teachers' payroll (2016)

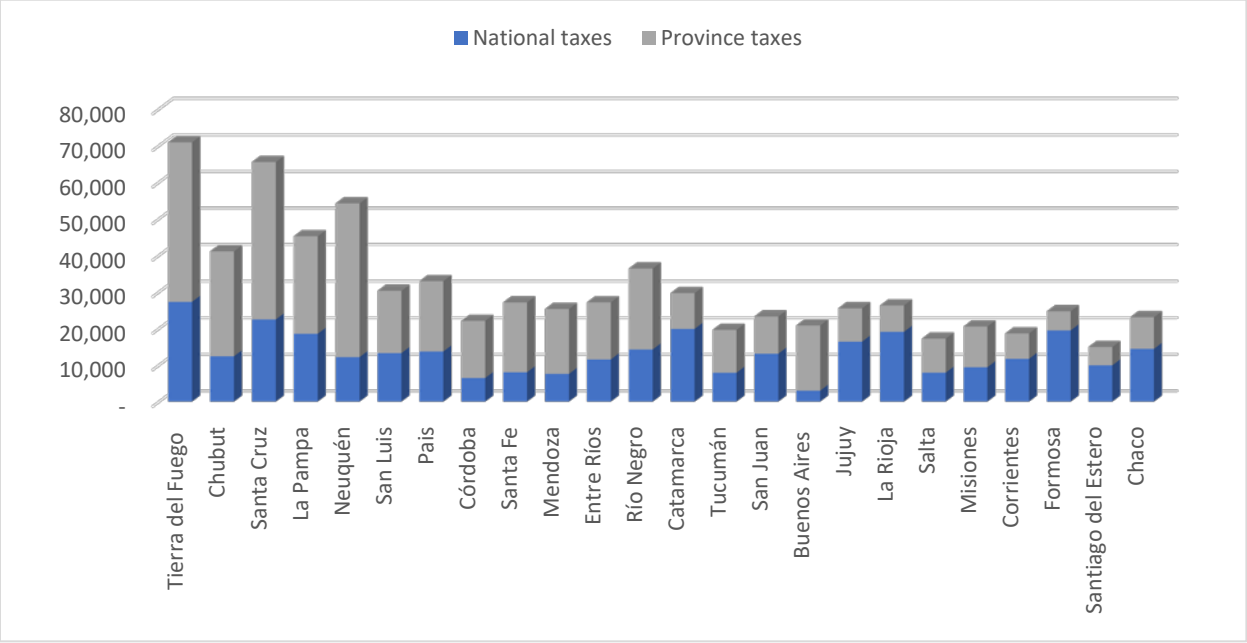


Source: Schools Finance Questionnaire

As discussed previously, when it comes to decentralized sources of funding, school funding relies on the fiscal capacity of subnational or local levels, generating potential regional inequalities in per pupil spending. In the set of Latin America educational systems considered, on average, 75% of total funding in basic education comes from subnational or local level revenues. This share is also similar to most countries in Europe, where, on average, 80% of funding comes from local sources (Atkinson, 2005). The extent to which local expenditures reflects the fiscal capacity of local levels, versus local priorities, has generated a persistent policy debate, since fiscal decentralization may generate greater inequities in school financing. In this context, the next two figures show the distribution of sources of funding across territorial units within two school systems in the region.[16]

[16] We currently only have evidence for Brazil, Argentina, Peru, and Colombia.

Figure* 3: Argentina – Provincial annual per pupil spending (pesos argentinos) in basic education by sources of funding (2015)*



Source: Own elaboration based on information provided by the National Direction of Fiscal Coordination with the Provinces, Ministry of Treasury and Public Finances.

Figure 3 reports the per pupil spending of national and provincial sources in Argentina. The provinces were ranked based on their score on the human development index (HDI), from highest to lowest. National funds include resources received by the primary distribution of the Coparticipation fund and the non-Coparticipation taxes[17] collected at the national level.[18] Similarly, the funds at the province level include the sum of the funds each province receives from the Coparticipation, taxes collected at the subnational level and other funds transferred from the national government that are tied to specific expenditure items.

It is worth noting that, first, the most advantaged provinces have greater fiscal capacity. More specifically, the correlation between HDI and the level of provincial revenue collected for education is 0.85, with a p-value < 1%. Second, the disparity in per pupil expenditure seems to be mainly driven by local resources. *Figure* 3 also shows that the share of national funds increases as the province become poorer.[19] The Coparticipation regime, in this sense, compensates per pupil expenditure in Argentina. However, per pupil spending remains highly unequal across provinces, reinforcing the debate in the literature about inequity when the system relies mainly on local funding sources. Tierra del Fuego, the province with the highest per student expenditure, spends

[17] Coparticipation taxes are taxes collected at the national level that are subject to the coparticipation regime. According to the law, coparticipation taxes are subject to a primary distribution, in which the National government receives 37.89% of the total tax collection and the provinces receive 61.11%.
[18] Non-coparticipation taxes at the national level are exporting rights taxes.
[19] The correlation coefficient between national funding and HDI is -0.65 with a p-value < 1%.

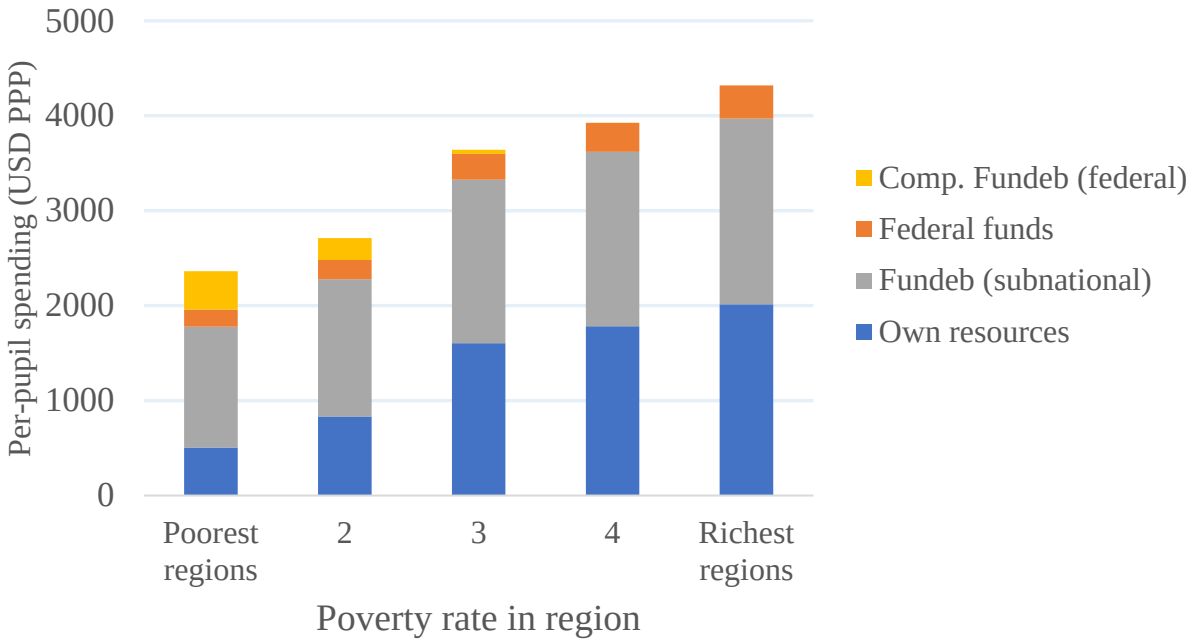
three times more than the average province and almost five times more than the most disadvantaged province, Santiago del Estero.[20] According to Morduchowicz (2009), this is not related to the importance of educational expenditures in provincial budgets, but is an effect of inequities in local sources of funding. The Coparticipation regime will be discussed in more detail in sections 2 and 4.

In addition, Figures 6 and 7 in the appendix show the distribution of per pupil spending in basic education paid by local resources in Peru and Colombia, respectively. In both cases, the data show a discrepancy in per pupil spending across regional governments in Peru and *entidades territoriales* in Colombia. While we have not explored the socioeconomic data for these two countries, if the amount of resources raised through local taxes is a proxy for the economic development of the region,[21] both figures suggest the existence of funding inequities in the Colombian and Peruvian systems.

Finally, Figure *4* shows the relative share of local sources on municipal education expenditures compared to subnational sources (Fundeb) and federal sources to the municipalities in Brazil. The municipalities are ranked according to the socioeconomic indicator (HDI) and classified into five groups, from the wealthiest (1st quintile) to the poorest (5th quintile). Again, the graph suggests that the more developed municipalities raise more funds than lower income municipalities – and consequently, invest more in education. Note that the federal and subnational funds represent almost the same relative share in all municipal's SES quintiles, suggesting a neutral rule underlining the transference of those funds to the municipalities.[22] On the other hand, if we consider the federal equalization fund (complement),[23] the difference decreases but resources are not sufficient to equalize municipal resources.

[20] It is important to note here that the basket of common goods is more expensive in the southern provinces than in the central and northern ones, which may overestimate the inequality in student expenditure.
[21] This proxy may be problematic since we are not able to disentangle the fiscal (in)ability from the political priority given to education investments of the local level of government.
[22] Roughly, such rules are mostly based, on the number of enrollments.
[23] If the national minimum spending per student is not reached by a local or subnational system, the federal government complements Fundeb's amount. This equalization fund corresponds to 10% of the total amount that the municipality/state has designated to Fundeb.

***Figure 4**: Municipal education system of Brazil: Annual per pupil spending (in reais) in basic education by sources of funding (2014)*



Source: SIOPE, RREO (2014).

As mentioned above, countries have adopted compensation methods to equalize resources or, at least, mitigate the consequences of fiscal decentralization in educational systems. In Latin America, Brazil and Argentina are the only systems considered here that address fiscal imbalances through special equalization funds. Also, both countries have the most decentralized fiscal structure among the systems analyzed.

In Argentina, the "*Régimen de Coparticipación*" rule defines that coparticipated taxes[24] are subject to a *primary distribution*, in which the national government receives 37.89% of the total tax collection and the provinces receive the remaining 61.11%. The *secondary distribution* allocates the 61.11% between the provinces with (non-explicit) compensatory criteria.[25] In general, provinces that have less capacity to collect taxes locally receive more funds from the coparticipation regime. However, as verified in Figure 3, it is often not enough to compensate inequities between provinces.

[24] Coparticipated taxes are taxes collected at the national level that are subject to the coparticipation regime. The non-coparticipated taxes are collected at the national level, but are (at least not completely) not distributed with the provinces. Coparticipated taxes are Income Tax, Value Added Tax, Internal Coparticipated Taxes (Taxes to tobacco, alcoholic beverages, mobile and satellite telephone services, and automobiles, among others), Transfer of property goods Tax, Prizes of Lottery and Sports Competitions Tax (16% of the collection of these tax goes directly to fund "Popular Libraries" administered by the Ministry of Education), Cooperative's Capital Tax, Minimum Presumed Income Tax, Credit and Debit in Bank Account Tax, Betting Tax and Indirect Online-betting Tax.

[25] With the use of the term "non-explicit," we mean that even if the result of the distribution is considerably equitable, there are no explicit criteria to reach that result.

Furthermore, another two funds in Argentina have compensatory elements in their allocation rules: (i) The National Teacher Incentive Fund (FONID) has the objective to compensate the low levels of teacher salaries paid by the provinces. The national government transfers a fixed sum to the provinces for each active teacher in the system (proportional to the number of hours worked) in addition to the salary paid with the provincial fund; (ii) The National Teacher Salary Compensation Program has the goal of equalizing the differences in teachers' salaries across provinces and is assigned using the national minimum teacher salary negotiated at the national level. The provinces that do not reach the national minimum after salary negotiations with the unions and after counting the FONID receive the additional funds from the national government to close the resource gap.[26]

1.3.2 Transfer of resources

The mechanisms that govern the flow of resources to schools and how many authorities are involved in this process are key dimensions in the functioning of any educational system. When the same authority raises the funds and purchases the resources, no transfer is needed. On the contrary, when a specific resource acquisition is the responsibility of more than one government body, which is the case, for example, of student's services (meals and transportation) in Pernambuco, or there is an intermediate entity involved in the management and purchasing of resources, such as in Chile, transfers can take place. Following the types of transfers described in the literature review above, *Table 1*[27] summarizes the type of transfers (from the central to local levels) that take place in each system, i.e., general, earmarked, compensatory or funds that go straight to schools for each system analyzed

Table 1: Type of transfer between central level to the local/regional government body (2016)

Type of transfer	Chile	Colombia	Peru	Argentina	Pernambuco	Rio[2]
General	X	X	X		X	X
Earmarked	X	X	X	X	X	X
Compensatory[1]				X	X	
Direct to school	X	X	X	X	X	X

Source: School finance Questionnaire.
Note 1: We are identifying compensatory funds as the ones designed specifically to compensate funding imbalances between local/regional government bodies due to fiscal decentralization.
Note 2: Rio did not report any federal complement amount through Fundeb in 2016. Therefore, despite in other years Rio could have received such amount, the information provided in the tables includes only data in 2016.

[26] In practice, the allocation of this fund has been made in a similar fashion to the FONID. Some specific provinces, where the minimum salary did not reach the national minimum, were assigned a fixed sum to distribute equally to all teachers, according to the hours worked. Most provinces that receive these funds receive the same per-teacher allocation.

The eight systems have at least one of the most common type of transfer, the general or unconditional. The description of transfers is not exhaustive. We focus our discussion on two main types of transfers.

In Chile, school finance includes two components: the national voucher system and municipalization of public schools. Also, since the central government of Chile provides 96% of the resources, all school resources are purchased with transferred funds. Chile has 24 different transfers (*subvenciones*) with different assignment criteria. Among those 24 transfers, the general subsidy and the preferential student subsidy (SEP)[28] are the two most important central subsidies, that represent almost 70% of the overall governmental K-12 funding. Chile also provides earmarked transfers, such as PIE (*Programa de Integración Escolar*), for students with special needs[29] and "*refuerzo educativo*[30]" for students who require additional support. Finally, the central government sends a transfer directly to schools to fund facility maintenance.

The most sizeable transfer in Colombia is the *Sistema General de Participaciones* (SGP), which is raised from tax and non-tax revenues collected by the central government, most of which flow to *Entidades Territoriales Certificadas* (ETC). There are three SGP transfers that can be used for education: i) SGP Education, ii) SGP General Purpose and iii) SGP School Meals. SGP Education constitutes 58.5% of the SGP, SGP General Purpose is 11.6%, and SGP School Meals is only 0.5%. The SGP is earmarked for education, therefore, the ETC must spend the money on a range of specific categories, defined as the "provision of the service and complement" which accounts for 92% of the total amount of resources, most of which goes to pay staff payroll. SGP General Purpose is discretionary at the ETC level, which means that the municipality may or may not use the funds to cover school expenses. SGP School Meals is earmarked to fund the School Meals Program (*Programa de Alimentación Escolar*, PAE). The *Sistema General de Regalías* (SGR) is funded by the extraction of natural resources such as oil and gas, which are distributed among ETCs. It is not earmarked for education, but may be used for schooling, depending on the local level needs. Lastly, Colombia also has a small amount of money that flows from the central government to the school level (Free Education Fund) to be managed and spent by principals on operations in the school network.

In Peru, *Ordinary Resources* account for 86% of public spending in education and are collected by the national government and considered a general transfer from the central government to regional authorities. The second most important source of revenue for education is Determined Resources ("*Recursos Determinados*").[31] The amount approved by the budget law under *Recursos Ordinarios* covers all resources necessary for permanent costs: current teachers, administrative and support staff; instructional equipment and basic services. Pedagogical materials

[28] Even though we are classifying SEP as a general transfer, a range of restrictions apply, such as for example, SEP money can neither be used to pay teachers nor school operational costs.

[29] The schools must sign an agreement with the central level to be able to access these resources.

[30] *Refuerzo educativo* aims to carry out reinforcement and support courses for those students who have obtained poor performance in school.

[31] Determined Resources include the municipal compensation fund (FONCOMUN), municipal taxes, taxes, fees from the exploitation of natural resources (canon, sobrecanon, *regalías* and tariffs), and the fund for the promotion of regional and local investment (FONIPREL).

are bought centrally and distributed to each *Unidad de Gestión Educativa Local* (UGEL) by the Ministry of Education. The subnational level is responsible for the distribution of resources from the UGEL to the schools.

In Argentina, there are three main funds that are transferred from the central government to the *Provincias* or directly to schools: The National Teacher Incentive Fund (FONID), the National Teacher Salary Compensation Program and the National Fund for Technical Education. The first two have been described earlier in this section. The Technical and Professional Education National Fund finances infrastructure, equipment, inputs, teacher training and pedagogical interventions for technical public schools. Argentina also has other minor earmarked transfers to provinces, targeted for school facilities, provision of netbooks (given to them directly), and support for extracurricular activities. In addition to the transfers mentioned above, CABA also receives a small amount for school maintenance from the Federal Ministry of Education.

Pernambuco, as well as other Brazilian states, receives intergovernmental grants: the most representative transfer being the "State's participation fund" - FPE (Fundo de participação estadual), which corresponds to a constitutional, non-conditional fund to support states (1946 Consent, art. 15, subsection IV). From FPE's total amount, the states should deduct 25% for the "maintenance and development of education," which includes basic and higher education. Further, according to the constitutional amendment nº 53 of 2006,[32] of the amount allotted to maintenance and development of education, 20% must be allocated to Fundeb. These same rules apply to Rio de Janeiro, for the intergovernmental "*municipalities participation fund*" (FPM). The second group of federal transfers are earmarked for basic education: (a) *salário educação*[33], which corresponds to 2.5% of all formal companies' workers payroll taxes. This tax revenue is credited monthly to the Education Secretariat's budget according to the number of students enrolled in the state/municipality network; (b) *Fundo Nacional de Desenvolvimento da Educação* (FNDE) comprised of three different transfers: *Programa Dinheiro Direto na Escola* (PDDE), *Programa Nacional de Alimentação Escolar* (PNAE), *Programa Nacional de Apoio ao Transporte do Escolar* (PNATE), respectively, to general spending, meals and transportation and a few less representative additional resources, as revenues from transferring agreements with the federal government to specific programs, usually infrastructure, such as the PAR (*Plano de ações articuladas*) program. Furthermore, as already mentioned, Brazil has an equalization fund through a federal complement, including Fundeb's funds. Such complementary funds correspond to 10% of the total amount that the state/municipality has allocated to Fundeb and is intended to address inequities at the local level so states and municipalities can reach the national minimum spending per student.

Given that Fundeb is a co-participated regional fund, the computation of per pupil spending takes into account the state's total revenues allocated to the fund – which includes the state and municipality revenues. Therefore, the fund is distributed back to the state's and municipality's

[33] Employers are required to pay 2.5 percent of their company's payroll to finance basic education. This tax is collected by the federal government. 10 percent of *salário-educação* goes to FNDE to fund federal education programs. From the remaining budget: a) 1/3 goes to the federal government, and b) 2/3 is distributed among states and municipalities based on student enrollment.

education network according to their respective enrollments. Consequently, since Pernambuco has a greater revenue for education then the municipalities, the state ends up transferring relatively more resources to Fundeb than it receives and is thus classified as a "net-donor" (Cruz, 2017). For example, in 2016 Pernambuco transferred R$3.2 billion to Fundeb but only received back 2.4 billion, a difference of 1.57 billion.

2. Decision-making authority

Decision-making authority and the way different stakeholders share resource allocation responsibilities in education are key to improving the efficiency and cost effectiveness of schools, (Atkinson et al., 2005). These school finance features include defining: (1) who is responsible for distributing resources to schools; (2) who makes decisions about the amount of resources schools receive; and (3) who makes decisions about the design and execution of spending on certain items (e.g. teacher hiring process). The level of government at which these decisions are made could have an impact on both the level of efficiency and equity of resource distribution in the education system. We look at the specific role of local and school autonomy in the system of reference and find that the governance of school funding varies substantially by budget item among and within countries in the LAC region.

This section focuses on the different school finance decision-making authority levels across the systems of reference. The first sub-section presents a brief review of the literature on the role of local authorities in the provision of public education in the public service centralization/decentralization framework. The second sub-section builds on the more specific literature on school autonomy with a focus on school-based management reforms. Third and fourth sub-sections introduce a descriptive comparison on local and school autonomy over the management of teachers and other budget items, respectively.

2.1 Local Autonomy

Decentralization of education decision making is a popular policy for improving school performance, especially in developing countries (Carnoy et al., 2008). Among the arguments in favor of a leading role for decentralized decision-making in the provision of public services is the idea that local leaders may have a better sense of local preferences and will allocate resources more efficiently (Oates, 2006; Barankay and Lockwood, 2007; Tiebout, 1956). Thus, the needs of individual schools can be better addressed because of the closer proximity to decision-making (European Commission, 2000). Additionally, some have argued that by bringing decisions closer to the interested local community, decentralization may improve the monitoring of teachers and schools by parents and local communities (Galiani et al., 2008). On the other hand, critics of decentralized decision-making contend that strong reliance on subnational decision-making may raise equity concerns (OECD 2017) and point to the lack of capacity at subnational government levels, especially in rural and marginal urban areas, to exercise responsibility for public services (Bardhan, 2002; Treisman, 2007; Gordon, 2015).

Local authorities may play an important role in the provision of public education. This role may vary according to the educational system design and the level of autonomy over different school funding features. Upper-tier government regulation may extensively shape subnational spending, thus precluding discretionary powers over various budget items. Indeed, subnational governments often act as implementing agencies for policies determined by the central government and financed through earmarked transfers, while retaining essential regulatory and financial power at the central level. Local authorities exert little control over the education budget if, for example, teachers' salaries, class sizes, length of school days, and other rules are mandated by an upper-tier government (OECD, 2016). For this reason, and because it is one of the most important education inputs, this section takes a closer look at local autonomy in setting teacher salaries and in designing

teacher hiring processes. Even though evidence is scarce on this topic, some research shows that the governance level at which teachers are hired can have an impact on learning outcomes. For example, in Kenya, a program implemented to hire contract teachers had positive effects on learning outcomes when administered by an NGO, while it did not have an effect when scaled up to the national level (Bold et al., 2013).

2.2 School Autonomy

School decentralization encompasses a set of policies that includes the devolution of fiscal and administrative responsibility over schools to local governments and communities, school-based management, vouchers, public-private partnerships, and privatization (Dantas, 2016). In Latin America, as in many developing regions of the world, efforts to encourage school autonomy and/or community participation are aimed at making schools more efficient (Gunnarson et al., 2009). There is a growing empirical literature that has examined the impact of several school decentralization interventions on different educational outcomes. In this section we mainly focus on school-based management reforms.

Two dimensions are key when examining the devolution of decision making: (1) the degree of autonomy being devolved - *what*; and (2) the people to whom the decision-making authority is devolved - *who* (Barrera-Osorio et al., 2009). With regards to the first dimension, the range of local decisions and responsibilities varies from curriculum planning, setting academic standards, evaluating students, choosing school materials, maintaining the school, to hiring and evaluating personnel (Gunnarsson et al., 2009). With regards to the second dimension, school-based management (SBM) policies imply the transfer of responsibilities to school principals, teachers, parents, or members of the community, and afford different degrees of decision-making power (Di Gropello and Marshall, 2011).

The literature on the impact of SBM reform policies shows mixed results depending on the policy design and the observed educational outcome. Greater parental involvement in teacher management is found to be effective in reducing teacher absenteeism and improving student performance in Kenya (Duflo, Dupas, Kremer, 2015) and in El Salvador (Jimenez and Sawada, 1999). Engaging the community in school affairs appears to influence teacher effort, which in turn leads to higher achievement in Honduras[34] (di Gropello and Marshall, 2009) and to a steady increase in student enrollments in El Salvador (di Gropello, 2006). In Brazil, the school decentralization policy program (*Plano de Desenvolvimiento da Escola* – PDE) designed to help schools become more responsive to students and their communities had no effect on student achievement but led to positive effects on passing grades and on the relationship between spending (on teaching and learning material, and furniture) and student gains (Carnoy et al., 2008). In Mexico, a SBM reform designed to give financial autonomy to parents' associations was found to have a positive effect on reducing grade failure and repetition rates (Gertler, Rubio-Codina, Patrinos, 2012) and on improving student test scores (Lopez-Calva and Espinosa, 2006).

More generally, there is evidence that decision-making at the school level may be conducive to student achievement in well-developed systems, but detrimental to learning in low-income ones and in systems with low levels of accountability (Galiani, Gertler and Schargrodsky, 2008;

[34] However, these gains are offset by lower levels of capacity among teachers, who tend to lack formal teaching credentials and experience.

Hanushek, Link and Woessmann, 2013). This suggests that, for any decentralized process to be successful, it should take place in a solid constitutional and administrative context, where the accountability relationships between local and central governments are transparent and well regulated (Crook and Sverrison, 2001; Ahmad et al., 2006).

2.3 Local and school autonomy over teaching staff

This section takes an in-depth look at the governance similarities and differences of teacher hiring and payment systems. As previously stated, defining who makes decisions on the design and execution of spending on teachers often has an impact on how equitable and efficient distribution of salaries and other teacher characteristics are (e.g. novice teachers). As summarized in Table 2, in the 8 systems in the region considered, schools have low levels of autonomy over the management of teachers.

As federal systems, Argentina and Brazil share similarities in the way salaries are defined and allocated. In both countries, conditional on the minimum wage established at the federal level, teacher salaries are determined by the subnational entities (provincial level in Argentina, state and municipal levels in Brazil).[35] In contrast, in Colombia and Peru, the central government plays a central role in setting teacher salary scales, and the conditions to access higher salary brackets are set by the Ministry of Education (and the Ministry of Finance in the case of Peru). The Chilean public-school system is in certain ways similar to the federal systems where public-school operators manage school personnel according to national regulations (e.g. National Minimum Basic Salary), but municipalities have the autonomy to set specific local incentives. While the level of government that sets teacher-salaries differs across the 8 systems, subnational and/or local authorities are responsible for paying teacher salaries in all systems.

The authority that defines teacher hiring standards also differs across systems. As compared to a more centralized design in Colombia and Peru, stronger local autonomy over the design of teacher entry standards is found in Argentina, Brazil and Chile. While subnational and local authorities in Colombia and Peru do not participate in the design of the teacher hiring process, they have a role in final hiring (and firing) decisions. For instance, in Colombia, school principals have the authority to determine whether the teacher can enter the career path after a probationary period of four months. In Peru and Chile, school principals (school owners or *sostenedores* in Chile) participate in the hiring panel. Authority over teacher hiring is more limited in isolated or disadvantaged schools where fewer teachers apply. In those cases, principals must decide between hiring a low-performing (based on the results in the hiring process) or inexperienced teacher or filling the vacancy with a temporary or uncertified teacher.

[35] In Brazil, even though the states transfer resources from local taxation into a fund for education (Fundeb), the federal government determines teachers' minimum wage, and establishes that at least 60% of the state fund program must be spent on teacher salaries. On the other hand, incremental slices on teachers' salaries, such as merit pay and increased pay for hard to staff school policies, are set by the local authorities.

Table 2: Level of responsibility over hiring and paying teachers

System	Responsibility over setting salaries/salary scale	Responsibility over setting hiring process	Responsibility over hiring	Responsibility over paying salaries
Argentina	National/Subnational	Subnational	Subnational	Subnational
Brazil - Rio de Janeiro (Municipality)	National/Local	Local	Local	Local
Brazil - Pernambuco (State)	National/Subnational	Subnational	Subnational	Subnational
Chile	National/Local	Local	Local/School	Local
Colombia	National	National	Subnational (ETC)/School	Subnational (ETC)
Peru	National	National	Local/School	Subnational/Local (DRE/UGEL)

Source: Own elaboration

2.4 Local and school autonomy over other expenditures

School funding governance varies in the LAC region. In Chile, funding for infrastructure and educational equipment is provided to municipal schools (and to a lesser extent, to privately managed schools) by the central level and executed at the subnational level. In Argentina, both the national and subnational levels provide funding for school infrastructure, while in Peru school principals receive direct transfers from the central level for building maintenance[36], and infrastructure can be provided by the three levels of government.[37] In Rio de Janeiro, the local government is responsible for setting the budget and defining the allocation of spending on infrastructure, materials, and services across schools. However, local budgetary decisions must comply with some federal regulations.[38] Schools in Rio de Janeiro can also raise some of their own resources (which represent less than one percent of Rio's education budget) that can be spent on infrastructure, among other inputs. In Pernambuco, the budget for infrastructure is raised and set at the subnational level. Furthermore, a specific federal funding program (PDDE - "Money straight to schools"), transfers federal money directly to schools, which have the autonomy to allocate the resources to a wide range of spending categories, including infrastructure and basic services. School principals do not have any authority over setting the amount they receive for this program.

Operational and student services budgets (e.g. transportation and school meals programs) are centrally managed and executed at the school level in Argentina and Peru. In Argentina, these budgetary items are set, planned, and approved at the subnational level and, in some cases, executed by the schools. In Colombia and Peru, school meal programs are provided by the central

[36] Resources from the Maintenance Program are the only budget items that school principals manage.

[37] For the case of infrastructure, several actors have a role. The National School Infrastructure Program (PRONIED) is run by MINEDU and, for 2017, has a budget of over S/ 2 billion for pre-investment studies, building, maintenance, and equipment of schools across the country. Regional and Local Governments can also use resources from their budgets for infrastructure investment.

[38] One important federal law is the Law of Fiscal Responsibility, which determines, for example, a ceiling for personnel spending.

level and executed through school committees,[39] and municipalities can allocate resources for school transportation services.

Pedagogical material and equipment are provided by both the national and subnational levels in Argentina, while in Peru its provision is centrally regulated and distributed by the local level (UGEL) under the supervision of the subnational level (*Dirección Regional de Educación* or DRE).[40] In Pernambuco, schools have a certain degree of autonomy over this category, but it is much less significant in terms of the budget when compared to the national and subnational levels. In Chile, the operational budget is managed and allocated by the municipalities. However, school principals play a role in spending and managing a share of these resources, especially related to school daily expenses.

Public schools in Argentina and Pernambuco do not have the autonomy to acquire additional technical consulting or teacher training than what is already provided by the subnational level. In Peru, the most important teacher training programs are designed by the central level and implemented by the local level (UGEL). In Chile, as part of the Preferential Student Subsidy, school principals have a role in determining how these resources are spent on pedagogical material and equipment, technical consulting, and training services.

Finally, in Colombia, teachers and principals have the autonomy to determine course content for core curriculum and have the legal authority to select textbooks. While in Peru and Chile, the curriculum is defined at the central level. In Brazil and Argentina, each subnational and local government can define their own curriculum, following some national guidelines**.**

In sum, the 8 school systems in LAC demonstrate overall low levels of school autonomy, usually limited, in some countries, to teacher hiring, infrastructure, and minor operational expenditures. This is consistent with the school autonomy findings from PISA 2015, that shows that across OECD countries, most students attend schools whose principal reported being responsible for hiring teachers (70%) or firing teachers (57%), but fewer than one in four students attend a school whose principal reported being responsible for policies such as establishing teacher salaries (20%) or salary increases (23%) (OECD, 2016). At the same time, there is significant variation in levels of autonomy across the 8 systems considered, with Colombia and Peru having the lowest levels of local autonomy.

[39] The program in Colombia has recently been subject to investigations by the National General Comptroller (*Contraloría General de la República*). In this evaluation, the Comptroller stated that the main problem in the execution of the program is the multiplicity of sources of funding and the difficulty to execute these resources given the rules and restrictions. Also, the report highlights the lack of supervision and support by the Ministry of Education of the subnational units (ETCs) in the timely execution of the budget, efficiency issues in the hiring of companies that provide the service, and low expenditure accountability which, in turn, has led to corruption lawsuits (El Tiempo, 2017).

[40] In Peru each Regional Government oversees the schools within its authority and is responsible for acquiring most of the inputs necessary for regular operation. Nevertheless, some resources are not procured through the local level, as it is the case for pedagogical materials.

3. Accountability

Accountability is a prominent issue in school finance. Authorities who make funding decisions are usually held accountable for complying with budgetary laws and regulations and for distributing resources in an efficient and equitable way. Low accountability, some argue, is an important factor explaining why additional resources to education might not improve student outcomes: public education can be harmed by corruption and inefficiencies if governments do not have incentives to make good use of school funding (Bruns et al., 2011). Accountability is more critical when multiple levels of governance are involved in the financial decision-making process. In decentralized school systems, overseeing the finances of lower level authorities is assumed to be a necessary strategy to ensure an adequate allocation of resources (Hanushek et al., 2013; Burns and Koester, 2016; OECD, 2017).

Multi-level governance systems across the areas under discussion approach accountability in various ways: governments can be accountable to its citizens (bottom-up accountability), to public agencies (horizontal accountability), and/or to higher-level authorities (vertical accountability) (Schaeffer and Yilmaz, 2008). Bottom-up accountability includes citizens who hold governments accountable through elections, civil society organizations, and the media. Parental choice of schools also represents a form of bottom-up accountability because it gives parents more power to pressure schools to deliver better education. In Latin America, Chile's school voucher system is an example of a system with unrestricted parental choice. Moreover, since the 1990s, Chile has been publicizing information on school performance, which intends to encourage parents and communities to exert pressure on schools.[41] Horizontal accountability involves, for example, school boards and community councils that monitor the use of financial resources at the school and local levels, respectively. In Brazil, *Conselhos de Acompanhamento e Controle Social* (Councils of Monitoring and Social Control – CACS) are composed of diverse social actors who hold authorities responsible for the use of funding from Fundeb, the equalization program described in section 1. Lastly, vertical accountability includes the role of central auditing bodies in overseeing the finances of local authorities. In Colombia, the Ministry of Education performs periodic audits to verify public and private school enrollments, which form the basis for funding allocations, and in Chile, the *Superintendencia de Educacion* monitors school-level spending.

In this section, we discuss the mechanisms through which these two different forms of accountability are achieved. We first show evidence of how financial accountability can ensure that authorities comply with budgetary regulations and reduce corruption in usage of school funds. Second, we present the literature on performance-based accountability to illustrate initiatives in which the allocation of resources is a factor of the outcomes produced by schools and school systems. For each of these subsections, we provide comparative evidence of financial and performance-based accountability in 8 school finance systems in Latin America.

3.1 Financial accountability

Corruption and mismanagement of education funds are a major concern in Latin America. The misuse of educational funds can have serious implications for the quantity and quality of

[41] Despite the theoretical argument, the empirical evidence is not conclusive on whether parents have the capacity to make informed decisions and pressure the schools to improve their management and results (Schneider, Teske, & Marschall, 2002; Elacqua et al., 2006).

inputs allocated to schools. Using data on audit reports of Brazil's anti-corruption program, Ferraz, Finan, and Moreira (2012) examined the extent to which reduced educational funds due to corruption affects student outcomes. They found that students living in municipalities where corruption was uncovered scored 0.35 standard deviations lower on standardized tests. They also found that corruption has a negative impact on the quality of school infrastructure and on the provision of in-service training to teachers. These results suggest that increased financial accountability to reduce leakage in the flow of resources to schools can improve educational outcomes.

There is little evidence, however, on how financial accountability decreases corruption and "leakage" of public funding to education. Evidence from outside of education has shown that top-down budget monitoring reduces funding leaks in the public sector. Olken (2007), for example, studied the impact of financial auditing in a nationwide village-level infrastructure project in Indonesia. After funds had been awarded but before construction started, some villages were randomly selected to receive a notification saying that their project would be subsequently audited by the central government. Olken found that the difference between reported expenditures by local officials and the author's own estimate of actual expenditures was 8 percent smaller among village that faced higher risks of being audited.

The main challenge with this top-down approach to financial accountability is that legal and financial agencies responsible for auditing public finances in developing countries may lack capacity or be corrupt themselves. An alternative route to this approach was taken by the government of Uganda, which tried to promote public monitoring of resource use by increasing budget transparency. To reduce funding leaks, the government began to publish data on the amount of monthly grants to schools in the national newspaper. According to a public expenditure tracking survey, schools in the 1990s received only 20 percent of the central government transfers to education and the bulk of the national grants was retained by local authorities. Reinikka and Svensson (2006) found that proximity to a newspaper outlet is positively correlated with the head teachers' knowledge about the national grant program and with a reduction in the diversion of school funds. In a different paper, these authors (2005) show that the newspaper campaign also had a positive effect on school enrollment and student performance. Finally, Bjorkman (2007) exploits between-district variation in newspaper penetration to examine the impact of the grant program on student achievement. She found that students residing in districts that were highly exposed to the information campaign scored substantially higher on standardized tests.

Similarly, the Textbook Count 1-2-3 program in the Philippines was developed to combat corruption in the provision of learning materials to schools. The program published detailed information about the delivery of textbooks to each province in local newspapers. Although the program has not been systematically evaluated, there has been an estimated 40 percent increase in the provision of materials in schools (Bruns et al., 2011). Taken together, these experiences show that transparency of the budgeting process can reduce leakage in the flow of resources to schools and, as a result, improve educational outcomes.

In decentralized countries it is important that reporting and monitoring of education budgets and provision of school inputs are reported at all levels of governance. In the United States, for example, spending has been historically reported at the school district level. However, as research has shown, there is large variation in per-pupil expenditures within school districts (Rubenstein et al., 2007; Ejdemyr and Shores, 2017). Recently, the Every Student Succeeds Act (ESSA) in the

United States has required that school districts report per-pupil spending at the school level to unmask microlevel inequalities in spending.

3.1.1 Financial accountability in Latin America

All countries surveyed in this conceptual framework have accountability mechanisms to ensure that budget regulations are followed, including internal and external audits. In Argentina, the national government exerts top-down accountability by means of an electronic platform, the Transfer System of Educational Resources (*Sistema de Transferencias de Recursos Educativos,* SITRARED), which registers every transfer made from the national government to the subnational and school levels, and where the recipients report how the funds have been allocated. In Buenos Aires, private schools that receive public funds are also required to report information on their budgets and student enrollment to local authorities.

In Peru, all public institutions can be audited by the Republic's General Controller (*Contraloría General de la República*), which is the head of the National Control System. As part of this system, each Executing Unit in the country has an Internal Controlling Unit that oversees each public institution—including the ones that manage the education budget—and is responsible for reporting irregularities to the General Controller.

In Brazil, the local governments conduct financial audits on a regular basis, and the national government occasionally selects local authorities by means of lottery to be audited. Moreover, both the national and local governments have their annual budgets (*Lei Orçamentária Anual* – LOA) approved by Congress. Although schools and regional units (CREs in Rio de Janeiro and GREs in Pernambuco) are responsible for controlling a small part of the education budget, they must report their activities to higher level authorities.

In Colombia, the National Ministry of Education hires external auditors to control local data on student enrollment and school inputs, which are criteria used to determine national transfers. The subnational government is also responsible for monitoring school data and reporting official statistics to the national government. Local governments must use the monitoring system Unique Territorial Format (FUT) to report local financial transfers and budgets to the national government. Because local authorities use their own resources to finance the accountability process, there is a large variation in capacity to regulate education finances across different *Entidades Territoriales Certificadas* (ETC).

In Chile, the fulfillment of the financial and administrative obligations of schools and schools' operators are controlled, supervised, and audited by the Educational Superintendence, which is an independent agency. Every publicly-funded school receives at least one visit a year by the Educational Superintendence's inspectors. These inspectors verify the accuracy of school records, which are used for funding allocations, and whether schools are complying with budget regulations. Schools that fail to comply with these rules are penalized with a monetary fine that is proportional to the severity of the violation and, ultimately, they may stop receiving public funding.

In addition to these examples of vertical and horizontal accountability, all the school systems considered have mechanisms of bottom-up financial accountability. They have transparency laws that require governments at different levels of authority to publish budget data and provide detailed information to the public upon request. While most countries publish budget data at the national,

subnational, and local levels, Chile innovates by collecting and publishing expenditure data at the school level.

The role of school councils in these countries is also important to hold authorities accountable for the use of school funding. Notably, schools in Peru usually have parent associations that monitor the timely distribution of pedagogical material, report if any material is stolen, receive information from the principal about the financial management of the school, and denounce any irregularity regarding school resources.

Despite these accountability mechanisms, school systems in Latin America are not free from corruption. For instance, in 2012, the Education Superintendence of Chile reported leaks and misuse of billions of pesos associated with transfers from the *Subvención Escolar Preferencial* Law (Preferential School Voucher Law – SEP). These instances of corruption reduce the amount of money spent on education and, therefore, affect each countries' capacity to improve student outcomes.

3.2 Performance-based accountability

Performance based accountability is another way to hold authorities accountable by enabling multiple stakeholders to monitor whether resources are translated into results. With increased implementation of student assessments, school systems may opt to publish test scores in report cards or rank schools or regions based on their academic performance. Availability of data on school performance is crucial for bottom-up accountability, allowing parents and students to demand greater effort from schools and lobby authorities for better public education (Bruns et al., 2011). Empirical evidence suggests that test score reporting can lead to an improvement in the academic achievement of students, especially those from disadvantaged backgrounds (Hastings and Weinstein, 2008; Andrabi et al., 2015).

Information accountability can affect school budgets in two ways. First, high performing schools tend to receive more voluntary transfers than low-ranked schools. Figlio and Kenny (2009) show that schools in Florida that received the state system's lowest grades experienced a drop in private contributions by more than two-thirds. They also found that donations to schools serving low income and minority families are more negatively affected by receiving a poor grade than donations to schools serving more privileged families. The authors did not find, however, that receiving a high score increased the level of voluntary contributions to the school.

Another way in which information accountability can impact school budgets is through school choice. In places where parents can choose the public school their child attends and where school resources are contingent upon attendance, schools that attract more students have a larger budget. The evidence on whether schools in fact improve their productivity to retain more students is mixed. Most studies find that awarding students a voucher does not significantly increase their academic performance or school efficiency (see Epple et al., 2017 for a recent review on the effect of vouchers). Studies also show mixed results regarding the effect of charter schools on student achievement, particularly for reading test scores (Betts and Tang, 2016). The evidence is also mixed on the effect of private voucher schools on student achievement in Chile (Bellei, 2009; Elacqua, 2015). Critics argue that positive achievement effects are often associated with small and selective charter schools and that, in general, there is no significant difference in quality between public and charter schools (Carnoy et al., 2005).

There are other ways in which accountability is more directly related to school funding. Higher level authorities may use financial rewards and/or sanctions to incentivize school systems or schools to perform better. One example is Chile's SEP Law, which ranks schools according to their performance and delivers sanctions to schools that are consistently low ranked, including closure. Elacqua et al. (2015) found that low-performing schools in Chile respond to these accountability pressures by adopting time-efficient measures to improve test scores in the short-term, such as reallocation of effective teachers to grade levels that are evaluated by Chile's high-stakes testing systems *SIMCE*. Another example of vertical performance-based accountability is when school funding formulas condition financial transfers on performance. For example, in Colombia the funding formula that determines the amount of resources transferred from the central government to local authorities includes a performance component that allocates more funds to higher performing regions. To our knowledge, there is no robust empirical study that evaluates the impact of performance-based funding formula on school effectiveness.

Another example of performance-based accountability is financial transfers to schools via bonuses. Unlike performance-based funding formulas, bonus programs are additional monetary rewards provided to top performing schools or schools that meet specific performance thresholds. Bonus programs may also base rewards on the performance of individual teachers. Most empirical studies on pay-for-performance programs have been in the US. In this country, both schoolwide bonus programs—e.g. in New York (Springer and Winters, 2009; Fryer, 2011), in Chicago (Glazerman et al., 2010), and in North Carolina (Vigdor, 2008)—and individual teacher rewards—e.g. in Nashville (Springer et al., 2010)—have not been found to have had a significant impact on student achievement. Experimental evidence from developing countries is more promising: bonuses aimed at both schools and individual teachers were found to improve teacher effort and student achievement (Duflo and Hanna, 2005; Muralidharan and Sundararaman, 2009; Glewwe et al., 2010).

Bonus programs have gained popularity in Latin America. In 2008, the Brazilian state of Pernambuco introduced a performance pay system that awarded an annual bonus to all school employees if they met individual school level targets. Schools' targets are based on their IDEPE (Pernambuco Index of Educational Development) score, which combines information on test scores in the SAEPE (Pernambuco state level learning assessment) and pass rates in primary and secondary education. Ferraz and Bruns (2012) found that the bonus program was particularly successful for schools that had more ambitious targets. Moreover, schools that just missed receiving the bonus one year had larger improvements in test scores than schools that barely achieved the bonus.

In 2015, Peru implemented a nationwide teacher bonus program, *Bono Escuela*, that ranked schools on the basis of their performance on the national standardized test. Schools were ranked within groups of similar school districts (UGELs), instruction time, and location (urban and rural). Every teacher and principal who ranked in the top 20 percent of their group received a fixed payment of over a month's salary. Obrero and Lombardi (2017) found no effect of the *Bono Escuela* on students' performance. They hypothesize that teachers in Peru had no guidance on how to improve their instruction to raise their students' scores on the standardized test.

School autonomy over inputs may explain some of the differences in impact of bonus programs. Loeb and Strunk (2007) used US data to explore whether accountability systems are more effective in states with greater local control. They measured local control by a set of indicators, including local citizen governance over revenue raising and principal's autonomy over

school policies. They found that accountability policies were more effective in states with stronger local control. However, the authors observed that states with weaker local control implemented stronger accountability policies. This finding is relevant to the policy debate because the ability of actors to respond to accountability pressures appears to depend on how much control they have over their resources. In Brazil and Peru, schools have very little autonomy over their inputs (for example, their curriculum and teacher hiring). In Latin America, Chile is the country where schools have in general more flexibility to control their resources. The bonus program in Chile is discussed in section 4.1.

Besides having more control over their finances and resources, it is also important that local authorities have the technical capacity to act on the accountability pressures. This is particularly important when rewards are based on outcome measures (e.g. student achievement) rather than input measures (e.g. teacher attendance). With respect to the latter, schools not only have a clearer idea of what to do but they also have more control over the criteria being assessed. When accountability programs are based on student performance, schools must be equipped with the right tools to improve service delivery; otherwise, accountability pressures are unlikely to succeed.

3.2.1 Performance-based accountability in Latin America

Standardized testing has become increasingly popular in Latin America over the last decade. However, countries vary considerably with respect to the unit of assessment and the publication of test results. Moreover, some countries have higher-stakes accountability policies in which financial consequences are attached to performance in these standardized assessments.

Among the countries analyzed, Argentina has the least number of assessments. The country has a standardized student assessment, *Aprender*, and the results are only public at the subnational and national levels. The City of Buenos Aires also has standardized assessments of student learning at the primary and secondary levels (FEPBA or *Finalización de Estudios Primarios de Buenos Aires,* TESBA or *Tercer Año de Escuela Secundaria de Buenos Aires*, and FESBA or *Finalización de Estudios Secundarios de Buenos Aires*). There is no consequence to schools and teachers if students perform poorly on these standardized assessments, and subnational governments are forbidden by law to publish school level test score results.

On the other end of the spectrum are Chile and Colombia. These countries have school and/or student assessments whose results are public at the school level and they also have standardized teacher evaluations. Moreover, in both systems, performance on these assessments has some form of consequence for local authorities, schools, teachers and students. Chile has a national assessment that tests all students from grades 2-10, some years on a biannual basis, *SIMCE*. Schools are ranked in four categories based on their average performance compared to similar schools and based on their progress. Schools ranked in in the lowest categories are required to design specific strategies to improve their results. Schools ranked 4 consecutive years in the lowest category can lose public funding. Public school teachers are also required to participate in the National Teacher Assessment and those who perform poorly can be fired by the municipalities.

Colombia also has a comprehensive system of performance-based accountability. In 2015, Colombia introduced an index of school performance, the Synthetic Education Quality Index (*Índice Sintético de la Calidad Educativa* or ISCE), which combines information on student

achievement, grade progression, efficiency, and learning environment at the school level. Top scoring schools receive a monetary incentive and private schools with high levels of performance gain more autonomy to charge tuition fees. In addition to this school level assessment, Colombia has a standardized student assessment called *SABER*. SABER test scores are one of the criteria used by the central government to allocate resources to territorial entities (see more information about these criteria in section 4). Finally, Colombia also administers a test to teachers, the *Evaluación de Desempeño*, and those who score poorly for two consecutive years are required to retire from teaching.

Peru also has school, teacher, and student assessments, all with consequences for poor performance. However, the results of these assessments are only public at the subnational and national levels. The country has two evaluation systems for schools, the *Semáforo Escuela* and the *Monitoreo de Prácticas Escolares*. Transfers from the central to local governments (UGELs) are conditional on the results of the *Semáforo Escuela* and other education quality indicators. Peru also has a standardized student assessment with consequence for schools: test scores on the *Evaluación Censal de Estudiantes* determine whether schools are qualified to receive a monetary bonus. Lastly, in 2017, the country introduced a teacher evaluation, *Evaluación de Desempeño Docente*, and teachers who score below a certain level must go through professional development training and may be fired if poor performance persists.

Unlike Peru, Colombia, and Chile, Brazil does not have a high-stakes accountability system at the national level. However, some states and municipalities reward schools and teachers for superior performance. Brazil has also made a lot of progress at reporting their educational results at different levels. Microdata from *Prova Brasil*, the country's standardized student assessment, are published online at the student and school levels. Brazil also has developed a school level index, the *Indice de Desenvolvimento de Educação Básica* (IDEB), which gives scores to all public schools based on their performance on *Prova Brasil* and approval rates. Schools are not penalized or rewarded based on their performance on IDEB but their scores are publicly available. Pernambuco introduced a high-stakes accountability program. The state gives a bonus to high performing schools on the IDEPE, an indicator similar to IDEB but based on their local standardized assessment called SAEPE. In Brazil, there is no standardized assessment of teachers.

Table 3 summarizes the school, teacher, and student assessments in all five school systems. It indicates whether these assessments have consequences (high stakes) and whether the results are publicly available.

Table 3: Performance-based accountability systems in Latin America

	School assessments	Teacher assessments	Student assessments
Argentina	-	-	Evaluation: Aprender (national) FEPBA, TESBA, and FESBA (CABA).
			Results are public at the subnational and national levels.
			Law prohibits subnational governments from publishing school level results.
			No consequences.
Brazil	Evaluation: IDEB (Brazil) and IDEPE (Pernambuco).	-	Evaluation: Prova Brasil (Brasil) and SAEPE (Pernambuco).
	Results are public at the school level.		Results from Prova Brasil are public at the school level.
	Consequence: Top scoring schools in Pernambuco receive bonus.		
Chile	-	Evaluation: National Teacher Assessment	Evaluation: SIMCE
		Consequence: Low scoring teachers can be dismissed.	Results are public at the school level.
			Consequence: Low scoring schools are monitored for improvement and can lose funding if they do not improve.
Colombia	Evaluation: ISCE	Evaluation: Evaluación de Desempeño	Evaluation: SABER
	Results are public at the school level.	Consequence: Low scoring teachers may be dismissed.	Results are public at the school level
	Consequence: Bonus for top scoring schools and more autonomy to charge fees for top scoring private schools.	-	Consequence: Performance in SABER is used as allocation criterion in the transfers from the central government to territorial entities (SGP Calidad and SGP Gratuidad).
Peru	Evaluations: Semáforo Escuela and Monitoreo de Prácticas Escolares.	Evaluation: Evaluación de desempeño docente.	Evaluation: Evaluación Censal de Estudiantes.
	Results are public at the subnational and national levels.		Results are public at the subnational and national levels.
	Consequence: Transfers from the central to the local level are conditioned on the results of Semáforo Escuela and other indicators.	Consequence: Low scoring teachers will receive training and may be dismissed.	Consequence: Top scoring schools receive a monetary incentive (Bonus Escuela).

In addition to these forms of performance-based accountability, which rely on standardized assessments, there are other strategies used by Latin American governments to pressure local authorities and schools. For example, in Brazil, voluntary transfers from the federal government to education programs are conducted only to states and municipalities that report detailed information on their education expenditures at the *Sistema de Informações sobre Orçamentos Públicos em Educação* (SIOPE).

Another interesting example of accountability in Brazil is the case of Pernambuco, which holds state schools accountable for their teacher allocation. Since 2017, the state rewards school leaders (principals and vice principals) whose institution has a high score on the Managerial Efficiency Index, which takes into account a) the use of teachers' time (whether they teach as many hours as their contract requires), and b) promptness in meeting deadlines required by the government of Pernambuco (e.g. report budget information and school records).

In sum, authorities who make funding decisions are usually monitored for complying with budgetary laws and regulations and for translating resources into outcomes. Empirical evidence suggests that financial accountability is a crucial tool to reduce corruption and mismanagement of education funds. Findings show that top-down accountability, including auditing processes, should be combined with bottom-up financial accountability that increases budgetary transparency, especially as auditing agencies in developing countries may be corrupt themselves. Results are less clear regarding performance-based accountability. For this case, more research is needed to investigate the effectiveness of different accountability initiatives, particularly in contexts where schools have limited resources and autonomy to improve service delivery.

4. Allocation rules

This section is divided into three sub-sections. The first sub-section introduces the debate about the mechanisms to allocate resources to different administrative levels (subnational or local governments) and to schools, specifically centered in the comparison of funding formulas vs other more discretionary mechanisms. The second sub-section presents the debate about the specific design of the school funding formulas, around the three main functions of them: market regulation, promoting equity and creation of incentives. Finally, the third sub-section reviews the evidence about the allocation rules used in a group of Latin-American countries.

4.1 Formula vs non-formula debate

There is an ongoing debate about the advantages and disadvantages of various mechanisms that determine the amount of funding allocated to administrative levels (subnational or local governments) and to schools. Following OECD (2017) and Levacic and Ross (1999), there are four main approaches to funding allocation:

- Administrative discretion: This is based on the decision of an administrative authority, who decides the amount of resources that each school needs. While it might involve the use of objective indicators, the final allocation is not necessarily based on these calculations and would not be universally applied to all schools in the system.
- Incremental costs: This takes into consideration historical expenditure to calculate the allocation of resources with minor adjustments (e.g. changes in enrollment, school facilities, input prices). Administrative discretion and incremental costs are often combined.
- Bidding and bargaining: Regional and local governments or schools compete for additional funding programs or make a case for additional resources.
- Funding formula: The relevant authority uses a formally defined procedure (a formula) to determine the level of public funds allocated, based on a set of predetermined criteria, which in most cases are input-, output- or performance-oriented. These predetermined criteria are impartially applied to each recipient (e.g. sub-central authority or school). In some cases, the funding formula relies on a mathematical expression, which contains several variables, each of which has a coefficient attached to it to determine school budgets. Formulas typically contain four main groups of variables: i) basic: student number and grade level-based; ii) needs-based; iii) curriculum or educational program-based; and iv) school characteristics-based.

The use of funding formulas has increased in step with the decentralization process in several education systems throughout the 90s and the increase in the information available at the school and student level. Some of the first countries to introduce funding formulas at the national level were the UK, New Zealand, the Netherlands, and at the sub-national level Australia, Canada, Sweden, and the USA. In more recent years, several developing countries have adopted funding formulas (Fazekas, 2012).

There are several arguments in favor of funding formulas over other methods. First, formula funding can better promote equity, because it assures equal treatment of administrative units and schools. In contrast, administrative discretion and historical criteria can lead to idiosyncrasies in funding due to incremental adjustments and political or non-educational criteria (Levačić, 2008). Second, formula funding of schools may increase efficiency of school spending as it eliminates the accumulated inefficiencies of historical criteria. Lastly, formula funding has the potential to

increase transparency in the system, given administrative units and stakeholders can anticipate the amount of resources schools will receive (Levacic et al., 2000, Levačić and Downes, 2004).

At the same time, challenges arise with the use of formulas. First it has been argued that formulas are suboptimal when allocating resources to certain types of expenditure, such as less permanent spending categories, like infrastructure. In such cases project based funding is more common (Levačić and Ross, 1999; OECD, 2017). Second, a trade-off exists between simplicity and transparency of the rule and its accuracy considering specific local characteristics (OECD, 2017). Third, formulas require methods to estimate the cost of education provision, but there is no clear understanding of the causal relationship between education costs and student performance (Fazekas, 2012). Fourth, and especially relevant in low-income countries, information at the student, teacher, and school level is not always available.

4.2 The debate surrounding specific allocation rules

How to design funding formulas is the source of fierce debate, the crux of which revolves around how the formula is shaped by the specific policy objectives an authority wishes to pursue. Following Levacic and Ross (1999), funding formulas may aim to support three broad functions:

- Market regulation (supporting broader school choice policies). The more this function is emphasized, the greater the proportion of total school funding is allocated on a per-student basis.
- Promoting equity (both horizontal equity, i.e. treatment of recipients whose needs are similar, and vertical equity, i.e. different funding levels for recipients whose needs differ).
- Directive function to promote certain behavior. This is a tool for authorities to set specific incentives and support specific policies. For example, resources can be a function of the attendance rates or the results on standardized tests by local authorities or schools.

Lithuania provides an illustration of the three functions. The country introduced a school finance reform in funding distribution in 2001, including a central funding formula to allocate funding for teacher and other pedagogical staff salaries. The specific goals of the reform included an emphasis on reducing rural-urban gaps (equity), enhancing parental school choice and the development of the private school sector (market regulation) and promoting the optimization of school supply, considering the decreasing number of students (directive) (OECD, 2017; Herczynski, 2011).

Another interesting case is Chile. In 1981, the military regime changed the funding formula for public and private schools from an input based system, based on historical school budgets, to a per-student formula (Donoso and Schmal, 2002). Public schools continued to receive funding from the central government, but municipalities were paid for each student enrolled in their schools. Private schools – nonprofit and for-profit – that did not charge tuition received the same per-pupil payment for every student. These policies were introduced to increase the autonomy of public schools and promote efficiency by encouraging competition for students. To increase the equity in per-student spending, in 2008, the government introduced a weighted voucher *(Subvención Escolar Preferencial)* for socioeconomically disadvantaged students (≈60 percent over the base subsidy) tied to higher standards and consequences for low performing schools.

a) Debate about per student vs input-based formulas

In an input-based system, a government agency sets the allocation rules for personnel and other spending categories, based on number of classrooms, so that each class has the inputs required to teach the curriculum (including, but not limited to, teaching and classroom support staff). One of the main critiques of this design is that it encourages educational authorities to reduce class size and maximize the number of teachers and resources received. To reduce this incentive, in some input-based systems, minimum class size rules are enforced to define the teaching and administrative staff numbers as well as other inputs. Also, input based systems can incentivize excessive construction of new schools (Abu-Ghaida, Alonso and Sánchez, 2011). And finally, there is evidence that in some systems, input-based budgeting creates a planning process closely resembling a combination of historic funding, bidding and discretion (World Bank, 2004).

Advocates of per-student funding maintain that schools have incentives to use resources more efficiently, especially for personnel, in order to create savings to use on other spending categories (Levacic and Ross, 1999). They also argue that this design fosters competition among schools, increases school autonomy, improves transparency and accountability, and will lead to increased coverage and student achievement (Abu-Ghaida, 2011).

One potential impact of introducing per-student formulas is the reduction in the size of school networks, number of teachers and an increase in student-teacher ratios. Although there is no causal evidence of the impact of changes in student formulas on efficiency, the above-mentioned effects were observed in a group of Eastern European countries who reformed their governance structures by decentralizing education and turning to a market-based economy after the fall of the Soviet Union. Although the rationalization of school supply can reduce total costs, per-student funding can jeopardize the financial viability of small and rural schools, especially during a period of marked demographic decline (Abu-Ghaida, 2011). In contrast, input-based mechanisms are less sensitive to variations in enrollment in the short run.

There is a growing empirical literature on the impact of per-student formulas and competition on student achievement. In a literature review of the impact of school vouchers, Epple, Romano y Urquiola (2017) found that the evidence available on both small-scale (states in USA, Colombia and India) and large-scale (Chile, Denmark, Holland, New Zealand and Sweden) programs suggests that competition induced by vouchers leads public schools to improve, but the existence of sorting, composition effects and confounding policies such as accountability, makes it difficult to disentangle a causal effect. An emerging literature purports that vouchers can be designed to limit adverse effects from stratification by SES, while preserving positive effects related to competition (OECD, 2016).

b) Allocation rules and equity

The school finance debate has increasingly focused on the details of implementation because there is a growing consensus that educational equity is a desirable policy goal (Rubenstein, 2016). First, there are several criteria that can be included in funding formulas to address differential needs - for example, student characteristics (e.g. socio-economic disadvantage, non-fluency in the language of instruction, low educational achievement, disabilities, and learning difficulties), the provision of a specialized curriculum (e.g. arts, sports or different vocational fields) or school characteristics related to costs (e.g. schools in rural or remote areas with significantly lower class

sizes, schools with higher maintenance costs) (OECD, 2017; Levacic and Ross, 1999). Second, there is a trade-off between the simplicity and transparency of the indicator to target specific student characteristics and its accuracy (Levacic, 2006). Relatively simple indicators can leave out a significant part of the target population or may include non-targeted population (Coady, Grosh and Hoddinott, 2004). For more precise targeting to local contexts, more complicated indicators need to be established (e.g. based on socioeconomic information at the student and household level or estimated using advanced statistical techniques), but the increased complexity makes them less transparent and harder to understand for a wider public (Fazekas, 2012).

For allocation of resources from central government to subnational or local governments, there are several mechanisms to assign the extra resources to areas most in need (see more details about equalization funds in section 1). Jackson et al. (2016) classify different funding formula revisions to increase equity and adequacy in the US context: i) Foundation formulas: guarantee a base per student expenditure, estimate the district's required local contribution to fund this base and provide the difference between the expected contribution and the foundation level; ii) Spending limits: prohibit per student expenditure levels above a predetermined amount.; iii) Rewards-for-effort plans: incentivize local expenditure through provision of additional state funds to match locally raised funding (e.g. co-participation); and iv) Equalization plans: equalize expenditure level by taxing all districts and redistributing funds to lower-income districts. In the case of transfers to schools, two broad approaches are employed to allocate funding that recognizes differing needs: i) the inclusion of additional funding in the main allocation mechanism for specific schools (e.g. including different weights); or ii) the provision of targeted funding from different grants external to the main allocation mechanism (OECD, 2017; Atkinson et al., 2005).

The evidence available shows that adjustments for school or student needs have the potential to increase equity in the allocation of resources. For example, Ladd and Fiske (2011) found that schools in the Netherlands with high proportions of weighted students (students with low education parents who receive a higher voucher) have almost 60 percent more teachers per pupil as well as more support staff per teacher. Neilson (2013) and Murnane et al. (2016) assess the effect of the change in the funding formula for education in Chile in 2008. Their results show that the reform improved the educational outcomes, especially amongst the poorest students, which improved equity in learning outcomes. In the US, Lafortune et al. (2016) studied the impact of post-1990 school finance reforms on absolute and relative spending and achievement in low-income school districts. They show that reforms led to sharp, immediate, and sustained increases in spending in low-income school districts. Jackson et al. (2016) compare the adult outcomes of cohorts in the US that were differentially exposed to school finance reforms. Their results reveal that a 10 percent increase in per-pupil spending each year for all twelve years of public school leads to 0.31 more years of education completed, about 7 percent higher wages, and a 3.2 percentage-point reduction in the annual incidence of adult poverty. Notably, these effects are much more pronounced for children from low-income families. The spending increases were associated with marked improvements in measured schooling inputs, including reductions in student-to-teacher ratios, increases in teacher salaries, and longer school years (increased number of school days).

c) Allocation rules and incentives

Allocation rules may incorporate incentives for subnational and local governments and schools, linking resources to specific outputs and outcomes (e.g. dropout rates, outcomes in

national standardized tests, management indicators, etc.). But, there are three main reasons why the funding formulas are based more on schooling inputs and costs than on outputs and outcomes. First, while incentives have the potential to increase efficiency, accountability can also have undesired and unintended consequences. For example, some evidence shows that they can increase spending gaps between schools with different levels of student achievement and introduce perverse incentives that may result in lower quality standards (OECD, 2017). Second, in some systems there is a lack of reliable information to estimate the responsibility of individual schools or administrative levels. Furthermore, even the most developed student measurement systems leave out important cognitive and noncognitive outcomes (e.g. citizenship, music, art, physical fitness) (Guthrie, 2006).

In our literature review we did not find evidence on performance incentives built into funding formulas in Latin America. However, there are some evaluations of collective incentives for teachers in Latin America in which specific transfers are linked with school performance. In Chile, for example, there is a special transfer called SNED (*Sistema Nacional de Evaluación del Desempeño*) introduced in 1996. Schools that achieve the highest score within a "comparable" group of schools in this evaluation are allotted a per-student subsidy to increase teacher and support staff salaries for all teachers in the school, for two years. The schools are compared within homogeneous groups according to location and SES and the methodology to select schools is based on results and improvements on the national standardized test (SIMCE) and other indicators of management at the school level. Rau and Contreras (2012) found that treated schools (public and private subsidized schools competing for additional resources) outperform control schools (private fee-paying schools not eligible to receive the funding). Their results indicate a significant effect of between 0.14 and 0.25 standard deviations for language and math test scores.

Another example is the bonus program in Pernambuco, Brazil. Each of Pernambuco's state-managed schools receive annual targets for improvement in their student test scores and pass rates (IDEPE index). The size of the bonus for each school depends on how well it performs in against its annual performance targets. In the first three years, it has averaged 1-2 months' salary for most school personnel. Schools failing to achieve at least 50% of their targets do not receive a bonus. Bruns and Ferraz (2011) find that the program has had a positive impact on student outcomes: compared to Northeastern Brazilian states and non-program municipal schools in Pernambuco, the schools that implemented this program have seen a substantial increase in their learning outcomes over two years (0.08-0.1 s.d. in math). The improvements in test scores were larger for children with lower socio-economic backgrounds.

4.3 Allocation rules in LAC

We reviewed the allocation rules used in the systems included in the study. *Table 4* and *Table 5* show a summary of the allocation rules in LAC.

Formula vs non-formula debate

Colombia uses well-defined formulas to transfer resources from the national government to the Territorial Entities[42] (The *Sistema General de Participaciones* (SGP) represents 65% of total spending), and national rules that define the salary spending allocation between schools, because pay scale and teacher needs are defined at the central level. Certified entities (ETC) have more discretion to allocate resources between the remaining spending categories and between schools. Currently, the Ministry of Education is evaluating the introduction of changes in the formula to allocate SGP resources. One of the mains criticisms of the current methodology is its inability to project the real costs of providing education services, so the national government had to create a transfer (*Complemento*) as a mechanism to finance the deficit.[43] According to Pineros (2016), this mechanism reduced the incentives for ETCs to increase enrollments and improve the efficiency in spending because the central government covers the difference between the allocation and the cost of the payroll.

Chile also has a formula for most of the spending categories that account for approximately 80% of total revenues.[44] The voucher subsidies are transferred directly to school owners (*sostenedores*), that can be public (municipalities) or private, and are allocated based on student attendance rates. Currently, IDB is supporting the Ministry of Education (MINEDUC) to develop a proposal to improve the voucher design. A focus of the new proposal is to highlight the differences in costs faced by schools operating in more difficult contexts. Although over the last decade a series of mechanisms have been incorporated to address some of these differences (e.g. base funding for small rural schools and an additional subsidy for full-day and for disadvantaged students), under the current formula many small urban schools are unable to pay minimum payroll and operational costs. According to a recent report by the IDB, small and medium-sized schools in urban zones have greater difficulties covering operating costs with the subsidy (IDB, 2018). The study also found that public schools have less flexibility to manage their budget than private subsidized schools, because a higher percentage of their funding comes from transfers earmarked for certain spending categories, such as the Preferential Subsidy (SEP) voucher, which is based on the number of disadvantaged students.

In the case of Peru, most of the education budget is transferred from the Ministry of Education (MINEDU) to the regional governments based on historical criteria and annual negotiations. Despite this, the central level defines objective criteria for the transfer of resources to schools. For example, resources for teaching staff are transferred according to referential class size and enrollment rates, resources for school maintenance are allocated according to an explicit

[42] These formulas are updated yearly and presented in documents published by the National Department of Planning (DNP). More information on the formula is available at the National Department of Planning (DNP) https://www.dnp.gov.co/programas/inversiones-y-finanzas-publicas/Paginas/Sistema-General-de-Participaciones---SGP.aspx

[43] Unlike the transfer that is based on a per-student formula, the complement is more discretionary because there are negotiations between the ETCs and the central government. Each ETC makes a mid-year projection, to estimate the annual personnel costs and the resource needs. The Complement went from $COL 400 billion in 2002 to $COL 1.7 billion in 2014, 3 times more than at the beginning of the period. In the same period, the participation of the Complement went from 3.6%, by 2014 already approaching 12% within this category (Piñeros, 2016).

[44] The subsidy system in Chile has 24 different transfers with different assignment criteria. Among the 24 transfers there are two central subsidies that are important to analyze separately, the per-pupil subsidy (*Subvención de escolaridad*) and the preferential student subsidy (*Subvención Escolar Preferencial*). These two transfers account for almost 70% of the overall governmental K-12 funding.

formula, and pedagogical material is distributed by MINEDU according to forecasted enrollment. The subnational level is responsible for the distribution of resources from the UGEL to schools. Specifically, the distribution of resources from general taxes (*Recursos Ordinarios* - corresponding to 86% of total public spending in education) for each level of government is approved in the budget law for the corresponding fiscal year. This law requires approval by Congress the prior year based on a proposal made by the Ministry of Finance. The proposal reflects negotiations between each level of government and the Ministry of Finance, as well as the priorities of each administration, although historical trends hold an important weight on the budget. The lack of objective criteria in the allocation of a large share of the budget can introduce inequities; imbalances of negotiating power may be particularly apparent when comparing the case of Lima with other regions since MINEDU is directly responsible for Lima's schools and the Metropolitan Lima DRE is located at MINEDU. Moreover, in the case of Metropolitan Lima, the executing units are part of MINEDU so transfers to them are not limited by the restrictions imposed in the budget law.

In Argentina, at the national level, most of the transfers are regulated by formulas or explicit criteria that allocate funds to each province. The National Teacher Incentive Fund (FONID) is a fixed sum given to teachers according to the number of working hours. The Salary Compensation Program is transferred to the provinces that do not meet minimum national teacher salary and receive an allocation to make up for that difference. The formula used for the allocation of funds of the National Technical and Professional Education Fund has two components. The first component (70%) is an estimation of the size of the education sector of the province, corrected using the percentage of tax revenues received from the central level (*Coparticipación*). The second component (30%) refers to the socioeconomic and educational achievement of the province, and only the provinces that are above the country average receive funds through this component.

However, at the national level, the main discussion with respect to allocation rules is the criteria to distribute tax revenues to provinces (*Coparticipación Federal de Impuestos*), which defines the distribution of a group of taxes according to a set of rules defined by the law. The resources are not earmarked, so each province defines how much to allocate to education. Until 1980, there were criteria for the definition of percentages for each province (65% population, 25% development gap and 10% dispersion of population), but in more recent years, a historical criterion has been used.[45] The lack of objective criteria and the political influence in the distribution of resources is one of the main criticisms of the Argentine system (Gobierno de la Ciudad Autónoma de Buenos Aires, 2015). There is evidence that the distribution of resources benefits provinces that have less capacity to collect taxes locally. For example, more developed provinces, such as the City of Buenos Aires, the Province of Buenos Aires, Mendoza, Córdoba or Santa Fe receive less resources from national taxes compared to less developed provinces, like Catamarca, Formosa and La Rioja (See Figure *3*). Southern provinces (for example, Tierra del Fuego and Santa Cruz) benefit the most from the status quo. However, there are noteworthy inconsistencies, such as the considerably larger amount of resources that Tierra del Fuego receives compared to similar provinces such as Chubut or Santa Cruz and less developed provinces such as Misiones or Salta.

[45] Law 23.548 (1988) applied fixed percentages that consolidated the rates applied during the period of crisis (1985-1987) with strong influence of the negotiation power of each province. This distribution is the one that is currently applied, with some slight modifications.

Currently, the national government, in consultation with the provinces, is working on a bill to reform the federal tax co-participation system.[46]

In Rio de Janeiro, funding from intergovernmental transfers relies on formulas based mainly on student enrollments (Fundeb, salario-educação and *Programa Nacional de Alimentação Escolar*, which represent approximately 40% of the total budget). No objective criteria define the allocation of resources from the municipal government to schools. However, there are some restrictions in the allocation of resources: i) Municipal (and state) governments are mandated to spend at least 60% of Fundeb resources on teacher salaries; ii) the Fiscal Responsibility Law (*Lei de Responsabilidade Fiscal*) determines (among other things) the order of priority for budgets: (i) payroll; (ii) old contracts; and (iii) other expenditures. Staff payments are estimated based on a municipal pay scale and the staff needs for each school. Recently, the Federal Government has formed a commission of experts, including members from the IDB Education Division team to redesign the Fundeb formula, with the objective of introducing equity criteria that consider the socioeconomic and geographical context of states and municipalities.

Per student vs input-based formulas

Most of the systems in LAC included in this conceptual note use input-based formulas to transfer resources to local authorities and to schools (e.g. to transfer salaries or to allocate infrastructure resources). However, there are some exceptions. For example, Chile, Colombia, and Brazil have formulas based on a per-student transfer.

In the case of Colombia, the objective of the formula design was, first, to incentivize territorial entities to increase enrollment rates, given that the distribution of SGP resources is tied mainly to total enrollment. The second objective was to increase the efficiency in distribution and resources. Some studies have shown that the former school finance system in Colombia, based on an estimated cost of service provision (input-based system), was highly inefficient (Pineros, 2016).

In Chile, the current formulas are based on per-pupil enrollment and attendance rates at the school level. One of the explicit objectives of the vouchers when introduced in 1981 was that competition for students would increase the efficiency of public schools, because enrollment losses would have a direct effect on schools' education budgets. However, the empirical evidence is mixed on the effects of competition on school efficiency. For example, Bravo, Mukhopadhyay and Todd (2010) show that the voucher reform increased high school (grades 9–12) graduation rates by 3.6 percentage points and the percentage completing at least two years of college by 2.6 percentage points. However, the evidence on the impact of vouchers on student achievement is less conclusive. While some studies show that competition between public and private schools increases aggregate educational achievement (Gallego, 2002, 2013; Auguste and Valenzuela, 2006), others find no evidence that choice improved educational outcomes (Hsieh and Urquiola, 2006).

In Brazil, Fundeb, *Salario-Educação*, PNAE and *Programa Dinheiro Direto na Escola* (PDDE) rely on formulas that are based mainly on total enrollment, adjusted by weights that consider special education needs, location, curriculum, and the level (primary or secondary) of the school (preschool, primary or secondary).

[46] Source : http://www.lanacion.com.ar/1988017-la-reforma-de-la-coparticipacion-federal

Allocation rules and equity

All the systems included in this technical note have transfers with weights that take into account the location of the school (urban/ rural) and whether the school serves students with special needs. However, only two systems incorporate the socioeconomic demographics of the school explicitly in their funding formulas. Colombia includes the ETC population's SES (*Necesidades Básicas Insatisfechas* Index) in three formulas that allocate resources for all the spending categories, with the exception of staff salaries. The formula also considers the school location (urban and rural) in SGP transfers to compensate for cost differentials. Chile created a differentiated subsidy (SEP) for disadvantaged students (weighted voucher). The subsidy is 60-70% of the base voucher for students classified as low-income (priority) by the Ministry of Education and 30% for students classified as middle-income (preferential). Additionally, the general voucher (60-70% of total spending) includes weights for the characteristics of schools (difficult to access and rural areas, extended school day). In Peru, only the national school meals program (Qali Warma) includes specific SES criteria, but all the transfers consider the location of the schools (rural vs urban). In Argentina, the Teacher Salary Compensation Fund is allocated to provinces that do not reach the minimum salary established by the national Ministry of Education. Also, with the objective of increasing the equity in the distribution of resources, the size of the subsidy for private schools in the City of Buenos Aires is a decreasing function of the fees charged up to a specific threshold above which schools cannot receive public funds.[47]

Allocation rules and performance incentives

The use of allocation rules based on outcomes is uncommon in the region, and in the few cases where they are used, they represent a low percentage of total expenditure.

In Colombia, the two transfers for school inputs that do not include staff (SGP *Calidad* and SGP *Gratuidad*) use outcomes-based criteria. In both cases, the resources allocated to territorial entities increase with the average score on standardized tests (SABER 11), decrease with the dropout/repetition rates, and increase with the annual variation of the two outcomes. In Chile, the two main transfers (general and weighted voucher) are calculated based on attendance, to motivate school owners to improve attendance rates. Chile also has a school-based performance incentive: SNED that identifies high performing schools comparing them to similar schools according to location and socioeconomic status. The methodology to select schools is based on results and improvements on the national standardized test (SIMCE) and other management indicators at the school level. In Peru, the Bono Escuela gives monetary incentives to teachers and principals in public primary and secondary schools whose school performed among the top 25% on the national standardized test ECE. In Peru, there is also a transfer from MINEDU to the Executing Units of the subnational level. The transfer amount is based on the achievement goals set by MINEDU. These resources can be used in a relatively wide array of concepts (maintenance, equipment, security, basic services). Neither Argentina nor Brazil have allocation rules that use outcomes or outputs as criteria.

[47] Provincias have autonomy to set the rules to allocate these resources, but the national law Decreto Nº 2542/91 establishes that the size of the subsidy considers characteristics of the schools, including the price, location, and student SES.

Table 4: Allocation rules in five Latin-American countries (formulas)

School system	Transfer objective	Administrative level		Level of education				Basic unit	Allocation criteria													
											Student characteristics			School characteristics				Outputs and outcomes			
		From	To	PP	P	GS	TS		Total enrollment/ population	School staff (head counts)	Special education needs	SES	Minority	Location	Curriculum	Vocational education	School level	Attendance rate	Dropout rate/Repetition rate	Scores on tests	Improvement
Argentina	Technical Education Fund (1)	N	SN				x		x			x									
City of Buenos Aires	Staff salaries	SN	S	x	x	x	x	T		x	x			x	x	x	x				
	Unique Decentralized Education Fund (2)	SN	S	x	x	x	x	Sc	x			x			x		x				
	Subsidies to Privately Managed Schools (3)	SN	S	x	x	x	x	T		x							x				
Chile (1)	General and pro-retention subsidies	C	SGB	x	x	x	x	S			x			x	x	x	x	x			
	Free of charge subsidy	C	SGB	x	x	x	x	x										x			
	Complement for teacher salaries	C	SGB	x	x	x	x	T				x		x							
	Students with special needs and disadvantaged	C	SGB	x	x	x	x	S				x					x	x			
	Staff salary incentives in top performing schools (SNED)	C	SGB	x	x	x	x	S										x	x	x	x
Colombia	Staff salaries (SGP) (1)	C	SN/L (2)		x	x	x	S	x		x			x							
	All spending categories except salaries (SGP Calidad)	C	L		x	x	x	S	x			x	x	x					x	x	x
	All spending categories except salaries (SGP Gratuidad)	C	S		x	x	x	S	x					x		x	x		x	x	x
	School Meals Program (SGP)	C	L		x	x	x	Sc	x			x							x		
	Infrastructure, equipment, transport and meals (Regalias) (2)	C	SN/L		x	x	x		x			x									
	Staff salaries (SGP)	SN/L	S		x	x	x	T	x	x	x		x	x	x	x	x				
Brazil	FUNDEB (1) (2)	SN	SN/L	x	x			S	x		x			x	x	x	x				
	FUNDEB - National level complementary amount	N	SN/L	x	x	x	x	S	x		x			x		x	x				
	Salário Educação - State/Municipal quota (3)	C	SN/L	x	x			S	x												
	Programa Dinheiro Direto na Escola (PDDE) (4)	C	Sc	x	x			S	x					x							
	Programa Nacional de Alimentação Escolar (5)	C	SN/L	x	x			S	x						x		x				
	PNATE (Support to school transportation)	N	SN		x	x	x	S	x												
Rio de Janeiro	School staff salary	L	Sc	x	x			T		x											
	School meals (6)	L	Sc	x	x			S	x												
Pernambuco	School staff salary (teaching, administrative and support)	SN	Sc	x	x	x	x	T	x		x				x	x					
	School meals (1)	SN	SN/SGB/Sc	x	x	x	x	S	x					x	x		x				
	Transportation (PETE) (2)	SN	L		x	x	x	S	x					x							
Peru	Economic incentive based on performance (Bono Escuela)	N	Sc		x	x		S											x	x (1)	x

Source: Own elaboration

Notes:

Administrative level: N: national; SN: Sub-national; L: local; SGB: school governing body; S: school

Level of education: PP: pre-primary; P: primary; GS: general secondary; TS: Technical secondary

Basic unit: S: student; C: class; T: teacher; A: Attendance; Sc: School; SS: school site

Colombia:

(1) For those Territorial Entities whose transfer is not sufficient to pay staff, a special item was created (Complement) (≈12% of the total)

(2) In Colombia the education is administrated by Certified Territorial Entities that can be Departamentos (Sub-national level) or Municipios (local level)

(3) Resources from the exploitation of natural resources

Chile:

(1) Based on OECD (2017) The Funding of School Education
Connecting Resources and Learning

(2) This is a special subsidy directed to schools that are free, non-profit, and receiving the weighted voucher (SEP Law)

Argentina:
(1) It is constituted by 0.2% of the Budget of the National Public Administration. This fund finances the infrastructure, the equipment, the inputs and some specific pedagogical interventions for the technical schools of public management.

(2) Fund for learning resources, equipment, transportation, maintenance and extra-curricular activities

(3) To pay teacher salaries

(4) The size of the subsidy decreases with the fees applied by schools

Rio de Janeiro:
(1) The basic unit of the FUNDEB formula is number of students. The FUNDEB weights: a) level of education (early education, primary, etc.), b) full-time or part-time classes, c) rural vs urban, d) specific education types: vocational high school, special needs, indigenous education, adult education.

(2) FUNDEB resources are the main source of money for many municipalities (not for Rio). 60% of FUNDEB money needs to be spent on teachers.

(3) Salário educação is the third main source of funding in Rio de Janeiro. This source of money cannot be used to pay staff.
(4) PDDE: funds that go directly to schools. It used to be a more important source of money but nowadays, with the recession, PDDE transfers are not constant (e.g. in 2016 schools received PDDE money from 2014)

(5) PNAE is a federal program that allocate resources to states and municipalities for school meal purchase. In Rio, PNAE only covers about half of the total spending with school meals.
** By curriculum and school level, we mean "modalidade e etapa escolar", usually: a) level of education (early education, primary, etc), b) full-time or part-time classes, c) adult education, d) indigenous education, e) special needs education.
(6) School menus are determined by Instituto de Nutrição Annes Dias (INAD), an agency that is responsible for food and nutrition in all Rio's public institutes (e.g. public hospitals, schools, etc). Process: 1) INAD determines school meals every week -> 2) Schools need to follow the menu determined by INAD and determines how many meals they need -> 3) CREs authorize the schools' request -> 4) schools request the meals (this process is transparent and followed by the CREs). SME takes care of contract / bidding. CREs execute and supervise the school food budget.

Pernambuco

(1) Full-time, technical and indigenous students receive more meals.

(2) There are a range of different programs for transportation, but PETE is responsible for a 70% of the expenditures in transportation.

Peru:
(6) Payment between S./1,000 and 3,000 to teachers and principals of public primary and secondary schools whose school performed among the top 25% in the students'evaluation (and between 1,000 and 2,000 for those in the preceding 10%). The different amounts depend on the school grade.

Table 5: Allocation rules in five Latin-American countries (non-formulas)

System	Transfer objective	Administrative level		Level of education				Allocation mechanism							Typical criteria
		From	To	PP	P	GS	TS	Administrative discretion	Negotiations	Incremental increase	Line item	Program- based	Project-based	Other (specify)	
Argentina	Infrastructure and equipment	N	SN	x	x	x	x	x	x				x		
	Teacher Incentive (FONID) and Salary Compensation Fund (1)	N	SN	x	x	x	x							x	Number of teachers and working hours and average salary
City of Buenos Aires	Nurturing Assistance and Community Action (2)	SN	S	x	x	x	x							x	Number of students
Colombia	Infrastructure, equipment, transport and meals (Regalias)	SN/L (1)	Sc		x	x	x						x		
	Public-private contracts (Contatacion servicio educativo) (2)	SN/L	Sc		x	x	x					x			Total enrollment
	SGP Calidad	SN/L	Sc		x	x	x	x							
	Infrastructure (Ley 21 1982)	C	SN/L		x	x	x						x		
	School meals Program (PAE)	C	SN/L		x	x	x					x			poverty rate, dropout rate, net enrollment rate, Indigenous and victims of armed conflict enrollment
	School meals Program (PAE)	SN/L	Sc		x	x	x					x			location, Indigenous and victims of armed conflict enrollment
Peru	Teaching staff	N	SN/L		x	x	(1)			x					Total enrollment, school level, school type, area
	Administrative staff, support staff, pedagogical material, basic services	N	SN/L		x	x				x	x (2)				Total enrollment, school level, school type, area
	Building and furnitures' maintenance, pedagogical material	N	Sc		x	x				x (3)					Total enrollment, area, school infrastructural conditions
	Building maintenance, basic services, equipment	N	SN/L		x	x					x			x (4)	Total enrollment, area
	National school meals Program (Qali Warma)	N	Sc		x	x						x (5)			Poverty rate, indigenous population
Rio de Janeiro	Infrastructure* (1)	L	CREs/Sc	x	x			x				x	x		Bottom-up demand or specific projects that Secretaria wants to put forth.
	Equipment and pedagogical material (2)	L	Sc	x	x							x			
	Transport (3)	L	CRE									x			
Pernambuco	Infrastructure	SN	SN	x	x	x	x	x				x	x		Bottom-up demand or specific projects that Secretaria wants to put forth.
	Security and cleaning	SN	GRE	x	x	x	x	x							
	Pedagogical material	N	SN/Sc	x	x	x	x	x				x			National Textbook Program (PNLD) purchases and distributes didactic textbooks to elementary and high school students
	Equipment material	SN	GRE	x	x	x	x	x				x			
	Basic Services	SN	GRE	x	x	x	x	x				x			

Source: Own elaboration

Notes:

Administrative level: N: national; SN: Sub-national; L: local; SGB: school governing body; S: school

Level of education: PP: pre-primary; P: primary; GS: general secondary; TS: Technical secondary

Colombia:

(1) In Colombia the education is administrated by Certified Territorial Entities that can be Departamentos (Sub-national level) or Municipios (local level)
(2) A Territorial Entity can hire a private organization to provide the education service when there are not enough seats in public schools. But it is restricted to non-profit institutions and they cannot charge beneficiary students.

Peru:

(1) Peru does not have technical secondary as part of its basic education system
(2) The amount is transferred according the level of execution of the last transfer and it is adjusted considering the number of students, the area (urban/rural), number of shifts, and whether the school adopted the extended school day or not.

(3) MINEDU compute an Allocation Index (based on administrative information) that is used to determine the amount of resources to be allocated to each school for building maintenance.
(4) The MINEDU transfers additional resources to the UGEL (through the Regional Governments), and to the DRE and UGEL of Metropolitan Lima, according to a pay-for-merit mechanism. These resources are transferred to the regions according to the number of students.
(5) Purchases are financed through transfers of financial resources to Buying Committees (representatives of Local Governments, Health Networks, Interior Government and parents). The program considers differentiated attention according to the poverty quintiles.

Argentina:
(1) Extra to teacher salaries (mainly paid by the subnational level) given by the national level. The Compensation fund tries to reduce salary differences between provinces and is allocated considering the minimum wage level established at the national level

(2) School meals program

Rio de Janeiro:

(1) Municipality determines how much money goes to infrastructure after they pay employers and after they pay for old contracts (investments such as infrastructure is the lowest priority). However, the department of education can send money to CREs and they can have the discretionary power to determine how they are going to use this money.
(2) Two scenarios: 1) SME can initiate a program and start a research across CREs to see which schools need the equipment or CREs and schools come up with a list of materials they need at the beginning of the year and SME analyzes their request

(3) Only one area of Rio uses school transport

5. Teacher allocation

Evidence consistently shows that teachers are the school factor that most influences student learning (Coleman, 1966). Using US data from the 1970s Hanushek (1992) suggests that the effect of being taught by a high-quality teacher is comparable to an additional year's worth of learning. More recently, teacher quality has been associated with better life outcomes as an adult. Using school district and tax records for more than one million children in the US, Chetty, Friedman, & Rockoff (2014) found that students taught by high quality teachers are more likely to attend college, earn higher salaries, and less likely to have children as teenagers.

In the LAC context, recent research by the IDB in Ecuador evaluates the impact of teachers on the learning of kindergarten students using an experimental design. More than 24,000 students and 450 teachers were randomly assigned to different classrooms. The study found that higher quality teachers improve student learning in early literacy, math, and executive functions, considering abilities such as working memory, attention, and cognitive flexibility (Araujo, Carneiro, Cruz-Aguayo, & Schady, 2016).

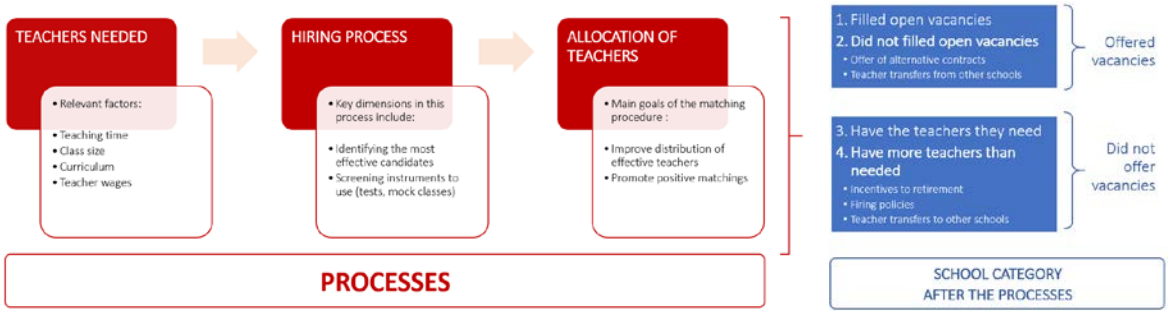
We review the literature on teacher recruiting processes in public schools focusing on three key stages: i) defining the total number of teachers required by each public school; ii) hiring and screening processes; and iii) rules used to allocate the hired applicants into available vacancies in schools. These activities are either determined at the school-level (decentralized) or at a given level of the government (centralized). In instances of decentralized decision-making, schools define the teachers they need, design their own hiring process, and applicants apply directly to schools. Mulkeen (2007) argues that these decentralized systems are market-driven in that schools that are 'more attractive' to candidates usually fill their vacancies with the most qualified teachers, while schools less able to attract candidates might face teacher shortages. However, most school systems in LAC have opted for centrally coordinated processes that define needs, hire teachers, and allocate hired teachers to schools. This review focuses on the latter design.

We discuss policies to address potential teacher imbalances in schools. In many cases, after the recruitment process occurs there are still schools with more, or less, teachers than needed. Some schools that failed to fill their vacancies through the formal processes might need to introduce some other actions to attract more applicants. When this occurs persistently, schools persistently do not attract enough applicants or retain their teachers long term are often considered "hard-to-staff" schools. An extensive literature describes this phenomenon and assesses the effectiveness of different types of policies designed to attract teachers to these schools. Conversely, schools that are over-staffed have teachers that are working fewer hours than their contracts define. In some cases, schools might be over-staffed due to structural reasons, such as a downward trend in the school age population, and school systems design policies to adjust staff numbers in overstaffed schools (Asim, Chimombo, Chugunov, & Gera, 2017).

For those schools that are not able to fill all their vacancies in the formal recruitment process, we discuss the main policies governments have introduced, such as incentives to attract more applicants, alternative contracts for professionals without a degree in education (temporary teachers), and incentivizing teacher transfers from other schools. In the case of overstaffed schools with more teachers than needed, we discuss policies such as transfers, teacher dismissal, and incentives to retire.

Figure 5 summarizes the flow of processes from the first stage, in which the number of teachers needed in each school are defined, to the last stage in which hired teachers are allocated to different schools. The figure also shows the four possible school categories at the conclusion of these processes.

Figure 5: Diagram of teacher recruitment and school status



Source: authors of this report

This section is divided into five subsections. The goal is to describe the entire process from defining the number of teachers needed, to the policies addressing imbalances after allocating hired teachers, reviewing the effectiveness of key dimensions in each stage. After this introduction, subsection 5.1 presents the main dimensions considered when systems define the teachers required by each school. Subsection 5.2 discusses the design of the hiring process and practices that are used to identify the most qualified applicants. Subsection 5.3 focuses on the matching process between hiring teachers and available vacancies. Finally, subsection 5.4 reviews policies to address teacher imbalances within schools.

5.1 Determinants of teaching body size required per school

The number of teachers required by the school system and by each school depends on many factors other than costs; the two most salient are: i) curriculum and ii) school organizational model. The former defines the minimum requirements regarding subjects and time of instruction; the latter defines the type of professionals required in the teaching process, workload, and class size. Williams (1979) and Morduchowicz (2011) present a simple exercise to show how different policies related to curriculum and school organization affect the number of required teachers. Building on their work, we have developed a similar exercise to demonstrate how teacher requirements differ between 5 hypothetical schools responding to the same legislative requirements. First, we assume that there are 5 schools with the same number of enrolled students that must decide how many math teachers to hire, by choosing combinations of class size, instruction time, and workload. Second, we also assume that the legislation allows class sizes between 20 and 25 students, instruction time for math between 20 and 30 hours a week, and teacher contracts assuming teaching time of 20 or 40 hours a week (part-time vs full-time teachers). Given this legal framework, schools can decide how to organize their activities and compute the number of teachers they need.

Table 6 shows the teachers needed in five hypothetical schools with 200 students and differing organizational structures. School A decides to set the school size at 25 students per class,

to offer 20 hours of math instruction per week, and to offer 40-hour-per-week contracts to teachers. Given this combination, the school needs 4 math teachers. School B decides to set the same teaching time per class and offer contracts of 40 hours per week, but to have smaller class sizes (20 students). In this case, 5 math teachers are needed. In school C, the only difference with school A is the decision to offer more hours of math a week (30 hours per week). This decision increases the number of math teachers needed to 6. In school D, administrators decide to keep the same class size and weekly teaching time per class as school A, but they hire only part-time teachers. This doubles the math teachers required. Finally, School E decides on a class size of 20 students, weekly math teaching time of 30 hours, and to hire only part time teachers. In this school, 15 math teachers are required.

Table 6: Math teacher requirements in five hypothetical schools

School	Number of students		Class size		Number of classes		Weekly teaching time per class		Total teaching time		Teaching time per teacher		Number of required teachers
A	200	÷	25	=	8	·	20	=	160	÷	40	=	4
B	200	÷	20	=	10	·	20	=	200	÷	40	=	5
C	200	÷	25	=	8	·	30	=	240	÷	40	=	6
D	200	÷	25	=	8	·	20	=	160	÷	20	=	8
E	200	÷	20	=	10	·	30	=	300	÷	20	=	15

Source:

While this simulation is simple, it helps to understand the outcomes of different regulations. For example, currently funding of primary schools in Argentina is subject to regulations setting minimum and maximum class size to 15 and 25 students respectively. In Chile, changes in the curriculum in 2010 increased the minimum teaching hours a week from 5 to 7 for language arts, and from 5 to 6 for math. In Peru, recent legislation has extended the teaching time per teacher. Full-time secondary teachers used to be hired for 24 hours a week, but as of 2017 they are hired for 30 hours a week.

This simple exercise, while useful, also omits many relevant factors. Other teacher policies can affect the number of teachers needed in each school. These include the ratio of teaching and non-teaching hours, the number and diversity of subjects included in the curriculum, multiple shifts employing the same teachers, collaboration from ancillary personnel such as administrative personnel, counselors or psychologists that might alleviate teachers' workload, and teacher training. For example, in Lithuania when computing the full-time equivalent (FTE) for teachers in public schools, which is the unit they use to measure their workload, they not only make assumptions of 25 students per class, 18 teaching hours a week per teacher, and 50 hours a week needed for classes per classroom, they also assume that teachers will use 5 days a year for in-service training (Alonso & Sánchez, 2011).

Another major factor with which to augment the theoretical 'optimal number of teachers' exercise, is teacher hiring costs. Most decisions about school organization are constrained by these costs. The OECD report, Education at a Glance (2016), presents the salary of teachers per student to give a sense of how expensive it is to hire a teacher in different systems considering the country's wealth. This indicator is comprised of the same three factors presented in *Table 6* but adds teacher' salary. Following the simple example above, we can show that once teacher hiring costs are considered, the incentives for schools might change. Assuming an hourly wage of $11.72 for full-time teachers (average teacher salary per hour reported by Chile and Mexico in Education at

Glance 2014) and $9.97 for part-time teachers (85% of a full-time teacher), *Table 7* shows that school D delivers schooling for the 200 students at the lowest cost by having more students per class and hiring part-time teachers.

Table 7: Associated costs of hiring math teachers' in each of the five hypothetical schools

School	Weekly teaching time per teacher		Teaching hourly wage		Number of teachers		Weekly teaching costs	% of the highest budget
A	40	·	$ 11.72	·	4	=	$ 1,875.88	63%
B	40	·	$ 11.72	·	5	=	$ 2,344.84	78%
C	40	·	$ 11.72	·	6	=	$ 2,813.81	94%
D	20	·	$ 9.97	·	8	=	$ 1,594.49	53%
E	20	·	$ 9.97	·	15	=	$ 2,989.68	100%

$11.72 corresponds to the average teachers' salary per hour reported by Chile and Mexico in the Education at a glance report (2014) assuming that teachers work 160 hours a month. $9.97 corresponds to the 85% of $11.72 to reflect that hiring part time teacher is usually cheaper than hiring full time teachers

Source: Author's simulation.

The cost dimension is relevant when defining the number of teachers, and there is extensive regulation of public school costs. In the case of teacher salaries, there are several regulations that set maximum limits, defining financial sources, and setting rules for salary increases. For example, in some systems like Brazil and Colombia, a fraction of the money transferred from the central government is earmarked and can only be spent on teachers' salaries, imposing constraints on local governments' budgets and managerial decisions.

Most of the regulations regarding salary increases affect the type of teachers (full vs part-time) that schools end up hiring rather than the number of teachers. In general, school systems in LAC set salary increases for years of working experience, academic credentials and location of schools. The three first dimensions attempt to reward factors related to teacher effectiveness and influence who schools hire. The latter aims to attract applicants to work in rural or isolated areas by offering a higher salary, since these areas often face teacher shortages.

Rural and isolated schools are also treated differently when defining the number of teachers needed and the funding they require. As the number of students in these schools tend to be below regulated class size standards, two different strategies and policies have been implemented to assure an appropriate teaching staff for all children. First, some systems consolidate schools by closing small ones in a given school network and in parallel renovating and providing transport to reach the remaining schools. Second, governments alter the funding formula to avoid penalizing small class sizes in these areas, and even in some cases increase subsidies to these schools in order to attract desirable teachers. For example, in the country of Georgia during the 2000s, the government began to consolidate school networks by closing small schools and providing free transportation for students travelling to the remaining 'consolidated' schools. Between 2004 and 2007, the number of schools with 20 or fewer students decreased by 90%. This consolidation process was implemented in parallel with the introduction of a higher subsidy amount for schools located in rural and isolated areas.

Armenia opted for a different strategy. In 1997, the government introduced a per capita finance (PCF) scheme that was extended nationwide in 2001. Instead of consolidating schools as in Georgia, they created protected schools. The government opted to protect schools that fulfilled one of two geographical criteria: no other schools within a 5-km radius and schools in the area contiguous to the PCF scheme defined radius. In 2006, further adjustment coefficients to the general formula were introduced to better meet the needs of smaller schools.

LAC countries have introduced a diverse set of policies for isolated schools. In 2013, the Minister of Education of Ecuador announced a plan for the reorganization of the educational supply which included a significant decrease in the number of available schools, from 19,000 to around 5,000 in a period of eight years. This policy sought to renovate the school infrastructure and consolidate school networks, thus reducing the number of small schools. In Chile, a system using vouchers based on enrollment gives isolated schools with an enrollment of 17 or less students a base funding unrelated to the number of students enrolled to assure they can fund the personnel and materials needed to deliver the educational service.

Regulations of the factors that determine the number of teachers to be hired at public schools aim to balance the policy goal of offering the highest quality education possible with budget constraints, promoting implementation of policies at the lowest possible cost. One example that highlights this balance is the regulation of class size. Most systems establish a range because they want to avoid large class sizes that could be detrimental to learning, but they also want to avoid small class sizes that entail high costs. Once policymakers agree on this balance, the number of teachers needed can be defined. Once the number of required teachers is set, the government starts the hiring process. In the next section we discuss this process and how it works in the countries analyzed in this technical note.

How is the number of teachers needed in public schools defined within LAC?

When defining the number of teachers needed, school systems also decide on contract types. Most systems reviewed combine two types of teaching contracts: (i) *permanent* contracts, which grant stability and aim to strengthen teacher commitment to the school community, and (ii) *temporary* contracts, which allow more flexibility to transfer or dismiss teachers. The only exception is Rio de Janeiro, which hires all teachers on a permanent basis and offers substitute teaching positions to permanent employees.

Once the types of teaching contracts are defined, the systems organize service delivery by combining policies that affect the demand for teachers. The most relevant of these are regulations of teacher wage, instruction time, and class size. These regulations intend to balance quality and cost-saving goals. *Table 8* presents information on variables regulating primary school education in the analyzed systems. The different combinations of these variables end up defining the organizational models of public schools and the quantity of teachers needed. For example, among the analyzed systems, Colombia pays the highest salaries to their teachers, offers only full-time positions, and has a regulation defining larger class sizes. This way of organizing the system might require fewer teachers compared to systems with lower teacher wages like Chile, smaller class sizes like Peru, or part-time positions like Argentina.

Table 8: Comparative information about key variables defining the number of teachers needed

	Argentina (CABA)	Colombia	Chile	Pernambuco	Peru	Rio de Janeiro
Who defines the number of teachers needed	Provincias following rules defined centrally	ETC proposes and MEN approves	Municipios	State	Comision de Racionalización - comprised by DRE, UGEL, and school principals	Municipio
Teachers needed defined by a formula	No	No	No	Yes	No	No
Types of contracts offered to applicants	1.Titulares 2.Interinos 3.Suplentes	1.Titulares (80%) 2. Provisionales (20%)	1.Planta 2.Contrata 3.Honorarios	1.Permanent (48%) 2. Temporary (52%)	1.Nombrados 2.Contratados	Only Permanent
Class size - minimum	15 to keep functioning; 18 to open a new class	No, but there is a referential number of students per class in each ETC of 30	No	No	No, but there is a referential number of students per class of 25	No
Class size - maximum	35	No, but there is a referential number of students per class in each ETC of 30	45	25 (1st grade); 30 (2nd and 3rd); 35 (4th and 5th)	No, but there is a referential number of students per class of 25	30 (1st-3rd grade); 35 (4th-6th grade)
Class size - actual size	21.5	24	24.8	34.9	14.9	22.1
Length of the school day	Minimum of 4 hours	5	7.6	5.9	6	4 hours part-time; 7 hours full time
School days a year	190	200	266	203	184	212
Teacher working time (hours a week)	37.5 (full-time); 21.5 (part-time)	40 (full-time); (no part-time)	44 (full-time, 39%); < 30 (7%), 30 (9%), 31-37 (16%), 38-43 (29%)	40 (full-time); 30 (part-time)	30 (full-time); (no part-time)	40 (full-time); 30-22.5-16 (part-time)
Teaching time (% of working time)	50 to 70%	75%	75%	67%	80%	67%
Teacher starting salary as % of GDP per capita	13.32%	24.95%	9.62%	not available	10.00%	not available
Wage compression	210% - after 22 years	182% - after passing 4 scales	217% - after passing two scales in at least 25 years	not available	210% - after passing 8 scales	not available
In-service training as part of working time	not available	not available	No	not available	No	not available
Teacher assistants in classrooms	not available	not available	Yes	No	Yes	not available

Source: Author's elaboration

5.2 Teacher hiring process

Other chapters in this report (see section 2) provide a more detailed understanding of the consequences of locating the authority to design the teacher hiring process at different government levels. In this section, we focus on the relevance and design of the hiring process. Ideally, an efficient selection system can attract highly qualified applicants and identify the candidates with the highest future teacher effectiveness. Improving the hiring process has the potential to be a cost-effective policy because it can help avoid the costs of remedial programs by preventing students from being exposed to ineffective teachers (Staiger & Rockoff, 2010) and can reduce the probability of costly dismissals of ineffective teachers (Rothstein, 2015).

Recent research in the US has assessed the most effective practices for screening applicants. Some studies have tried to examine whether schools value applicant characteristics that are related to effective teachers. Hinrichs (2014) designed and implemented an experiment that involved sending schools fictitious resumes with randomly-chosen characteristics to determine what characteristics schools value when hiring new teachers. The results suggest that an applicant's academic background has little impact on the likelihood of hiring success at private and charter schools, although public schools respond more favorably to candidates from more selective colleges. The results also suggest that candidates with higher performance in teacher-training programs were not more likely to be hired.

In a similar study, Ballou (1996) uses data from more than 50,000 US bachelor graduates applying to schools between 1976 and 1991 and found that applicants from more competitive colleges were not more likely to receive a teaching position. The author maintains that this result does not seem to be related to interest on applicants' behalf, inflexibility about the positions they accept, or negative selection into the pool of prospective teachers.

Recent studies have examined the predictive power of screening intruments on future teacher effectiveness. Goldhaber, Grout, & Huntington-Klein (2017) examined the relationship between two screening instruments used by Spokane Public Schools to select classroom teachers: recommendation letters and mock classes. They examined three teacher outcomes: value added, student absences, and attrition. They used data on all applicants in the district, including those who were not hired, allowing them to estimate sample selection-corrected models. They found that ratings on the screening instruments significantly predict teacher value added in math and attrition but not absences. An increase of one standard deviation in screening scores is associated with an increase of about 0.06 standard deviations in student math achievement and a decrease in teacher attrition of 3 percentage points.

Jacob et al. (2016) study the relationship among applicant characteristics, hiring outcomes, and teacher performance in Washington, DC public schools. Their findings revealed that several characteristics, such as applicants' college grades and performance on a mock teaching lesson, strongly predict teacher effectiveness. Applicants' academic achievement measures such as scores when applying to college, grades in college, and college selectivity are significantly positively related to student performance, with substantial effect sizes of 0.15 to 0.25 standard deviations. They also find that performance in three screening instruments (written assessment, interview, and audition) are all positive predictors of teacher performance, with effect sizes of roughly 0.3 for the written assessment and interview and an effect size of 0.12 for the audition. In contrast with prior studies, they do find that teachers with a graduate degree have higher performance scores, at least among newly hired teachers. Interestingly, they find that these measures are not associated with the likelihood of being hired.

Many systems in the LAC region have made changes to their hiring processes. In 2002, the hiring process of Colombian public-school teachers was reformed with the introduction of a selective entry competition and additional quality incentives. In a recent study, Brutti & Sanchez (2016) estimate how the new quality-screened teachers impact students' high school performance. Although it is not a direct assessment of the efficiency of the hiring process or the quality of the screening instruments, it sheds lights on the the potential that reforming the hiring process has in the LAC context. The authors exploit the fact that the new regulation applied only to newly hired teachers, whereas those already employed in 2002 remained exempt, creating a mix of New-Regulation and Old-Regulation teachers in Colombian schools. Using data at the school-year-subject level, and eliminating any school-level confounders, they report a positive and significant, although not very large, effect of New Regulation teachers on student performance.

Mexico has also recently reformed its teacher hiring process. The new system was first implemented in 2014-2015. Annually, there is a national, centrally-administered system that uses different screening instruments such as written tests and requiring applicants to create a lesson plan. The available evidence is limited but suggests that the quality of hired teachers has also improved in Mexico. For example, Estrada (2015) analyzed the effects of this new hiring process in secondary schools in small communities and found that selected teachers have higher results on

standardized tests compared to teachers hired by a parallel system. However, these standardized tests do not predict future teacher effectiveness.

While these reforms seem to be contributing to the identification of better candidates, they also reveal the low quality of many of the applicants. For example, in Colombia only 17% of applicants in the last hiring process passed the screening tests. Similarly, the proportion of applicants who passed the screening test in Ecuador, Mexico and Peru, are 20%, 50%, 13% respectively. Moreover, many positions are being filled by applicants who did not pass the screening process. Some estimations show that 30% of positions offered in Colombia between 2008 and 2013 were filled by applicants who did not pass the screening tests and 59% of positions offered in the 2015 contest in Peru were given to applicants who did not pass the screening tests.

Teacher hiring process in LAC countries

The City of Buenos Aires and Chile are the exceptions in terms of recently reforming their hiring process. In CABA, the system for screening applicants has been in place for several decades and is based only on the candidates' curriculum vitae, which may not be correlated with teacher quality (Hanushek & Rivkin, 2010). In Chile, the process also has been in place for a few decades[48] and is conducted locally by each municipality, following a standard procedure involving a committee comprised of principals, teachers and the head of the department of municipal education.

Peru, Colombia, Rio de Janeiro, and Pernambuco have more elaborated multistage teacher hiring processes which employ various screening instruments, many of which are linked to future teaching effectiveness in the existing literature (see *Table 9*). However, these more sophisticated screening processes are highlighting that a significant share of applicants do not meet minimum criteria to become teachers. The challenge in these systems is to find a way to use this information to drive discussion of policies that aim to increase the quality of teacher training delivered by universities or to justify policies that admit candidates with credentials but without teacher certification (e.g. Enseña Colombia).

[48] However, there are two recent laws involving changes to the hiring process. First, the New Public Education bill (passed in 2017), gives more authority to principals in the hiring process, specifically in defining the professional background and skills required for the teaching position. Second, the Teacher Development System bill (passed in 2016), gives priority to those applicants that have already worked as teachers and were qualified as "Experts" in the teacher progression system.

Table 9: Teacher hiring process in LAC countries

	Argentina (CABA)	Colombia	Chile	Pernambuco	Peru	Rio de Janeiro
Who hires teachers	Provincias through classification boards	Each ETC joins to a centrally coordinated process	Municipios	State	Region - School/UGEL	Prefeitura
Frequency	Once a year	Not regular	Varies by needs of each municipio	Not regular	Every 2 years	Not regular
Year of last process	2017	2016-2017	Varies by municipio	2017	2017	2017
Stages in the process	1	3	Varies by municipio	2	2	4
Screening instruments	Teaching degrees; Experience; Other degrees; Training courses; Publications	Stage 1: Tests of teaching aptitude, subject knowledge, and psychometric values; Stage 2: Degrees, Experience, Publications; Stage 3: Interview with local authorities	Varies by municipio	Stage 1: Examination tests: basic and specific knowledge; Stage 2: Degrees	Stage 1 (Centralized): Tests of logic reasoning, reading comprehension, and pedagogical skills; Stage 2 (Decentralized): Classroom observation, Interview and CV	Stage 1: Two academic exams; Stage 2: CV evaluation; Stage 3: Training course; Stage 4: Class observation
Positions offered	not available	20,188	Varies by municipio	2,458 (2015 contest)	19,631	not available
Applicants	not available	272,444	Varies by municipio	36,450 (2015 contest)	192,000	not available
Positions not filled	not available	not available	Varies by municipio	not available	not available	not available
Positions filled with applicant not passing tests	not available	not available	Varies by municipio	not available	59%	not available

Source: Own elaboration

5.3 Allocation of teachers to schools

Once the teachers are hired, different criteria can be used to match hired teachers and schools. The matching process can affect the equity of the distribution of effective teachers. Most evidence for the US and Latin America suggests that effective teachers tend to work in higher SES schools. Centralized teacher allocation systems[49] offer an opportunity to create rules that match hired teachers to schools in a manner that helps reduce or even reverse teacher sorting which benefits wealthier families.

Luschei, Chudgar & Rew (2013) analyzed the distribution of effective teachers in Mexico and South Korea and found that the distribution of qualified teachers in South Korea is skewed toward disadvantaged children, while Mexican teachers tend to be distributed in a way that favors more advantaged students. Specifically, in South Korea students living in rural areas and in schools with lower parent education levels have greater access to better educated and more experienced teachers. The authors explain that the policy of mandatory teacher rotation every five years in South Korea works as an equalizer because every teacher ends up working in schools with different backgrounds. This system prevents the concentration of one type of teacher in a specific type of school and gives more flexibility to authorities when allocating hired teachers. In the South Korean system, the applicants apply to a region and, if they are hired, the regional authorities choose the schools for the teachers based on school needs.

Singapore also allocates hired teachers at the Ministry of Education's discretion. China is moving in the same direction. In 2001, the administration of regular teacher deployment was moved from the township (or local school district) to the county government. This policy was

[49] In decentralized teacher-allocation systems, applicants apply directly to schools and each school defines the matching procedure among the hired applicants. The market drives the teacher allocation and the most common policies implemented to avoid teacher sorting are targeted subsidies and teacher incentives to work in schools in poor or rural areas.

complemented with a mechanism to promote the rotation of teachers in primary and middle schools. Since 2010, the rotation of teachers and principals has been regulated, attempting to increase rotation within each county.

The general case in LAC lies in sharp contrast with South Korea, Singapore and China. First, most LAC systems rank applicants according to their score on the screening tests and allow applicants to choose the schools of their choice (e.g. Brazil, Peru, Colombia). Second, if hired teachers perform well in their initial years, they have the option of being tenured and gaining stability in the specific vacancy (e.g. City of Buenos Aires, Ecuador). One way to increase equity and efficiency in the teacher allocation process is through the use of technological platforms and formal matching algorithms that can take into consideration teacher preferences and policies that increase priority for teacher allocation to certain schools. Since the 2008-2009 school year, Scotland's school system has used a two-round matching mechanism to match new teachers and schools. All newly qualified teachers are required to complete a period of probationary teaching service before being awarded with a certification. The entry to the one-year induction period is performed by an online system that matches and allocates student-teachers graduating from Scottish universities to local school authorities. This system matches each local authority's vacancy with student-teachers' preferences. Each student-teacher is asked to rank 5 local authorities, or they can alternatively tick a preference waiver box indicating that they are willing to work anywhere in Scotland. Those who choose the preference waiver option are paid a higher wage.

The main criteria used to allocate applicants to schools in all systems reviewed for this report are the scores applicants obtained in the screening process and applicants' preferences (see *Table 10*). Applicants with a higher score usually get to choose the school of their preference. In the case of Pernambuco, applicants get to choose the municipality, but not the school. In this system, the applicant is allocated to schools according to the municipality's needs. In Rio de Janeiro, applicants that did not perform well in the first stage of the hiring process (written tests) and were included on a waiting list can re-apply to understaffed regional entities within Rio (CREs). They can then be immediately allocated to schools by the CREs.

Recent evidence shows that certain features of the match between teacher and school characteristics can lead to improved learning outcomes. For example, Goldhaber et al. (2016) explored this topic in Washington State, US and found that teachers appear to be more effective when the student demographics of the school where they work are similar to the student demographics of the school in which they did their student teaching. There is also some evidence that shows that students learn more when taught by a teacher of the same race and gender (Dee, 2005). Allocating teachers based on their students' race could be controversial, but improving the efficiency of teacher-school matching could reduce future teacher turnover by promoting positive matches (König, 2014).

Table 10: Allocation of applicants in LAC countries

	Argentina (CABA)	Colombia	Chile	Pernambuco	Peru	Rio de Janeiro
Allocation to local government or schools	School	School	Local government	Local government	School	School
Criteria to allocate applicants	Those with highest application score choose the school they want	Those with highest application score choose the school they want	Varies by needs of each municipio	Those with highest application score choose the municipalidad they want	Those with highest application score choose the school they want	Those with highest application score choose the school they want
Priority to specific local governments/schools	No	No	Varies by municipio	No	No	No
Priority to specific applicants	No	No	Varies by municipio	No	Yes - those with disabilities and former army members	No
Tie breakers for same application scores	Not available	Not available	Varies by municipio	Not available	1.Classroom observation score; 2.Pedagogical knowledge test score; 3.Reading comprehension test score	1.Objective test score; 2.Discursive test score; 3.Portuguese test score (part of objective tests); 4.Oldest applicant
Allocation in a public audience	Yes	Yes	Varies by municipio	No	Yes	No
On-line allocation	No	No	No	No	No	No
Induction	No	Yes	Yes	No	Yes	Not available
Probationary period	No	Yes	No	Yes	No	Yes
Tenure	Yes	No	Yes - Immediately after being hired	No	Yes - Immediately after being hired	Yes

Source: Own elaboration

5.4 Policies to address teacher imbalances

After hired teachers are allocated to schools, there may still be teacher requirement imbalances. While some schools might have more teachers than needed, others could face problems filling the vacancies. In this section, we describe the policies that address teacher imbalances.

a) Hard-to-staff schools

Hard-to-staff schools are those that experience difficulty filling teaching positions and retaining teachers. These are generally schools located in low-income neighborhoods and in rural areas. These high poverty schools often have high rates of turnover, which often lead to teacher shortages and make it more difficult to attract new teachers. Simon and Johnson (2016) in a study of turnover in high poverty schools in the United States suggest that high turnover is not only a result of student characteristics and teacher preferences but also of school organizational dysfunction. Although students' race and SES are associated with teacher turnover, organizational factors such as administrative support, teacher input in decision making, salary, and aspects of school culture are associated with higher rates of turnover even when controlling for school location, level, and student and teacher demographics. Forms of motivating teachers to work in hard-to-staff schools attempt to address these concerns by offering economic incentives, housing, professional development opportunities, trying to improve the working conditions, and recruiting from rural areas (Vegas and Umansky 2005; Chudgar and Luschei 2013; Boyd et al. 2005). Most policies to combat teacher imbalances in LAC have focused primarily on how to attract teachers to hard-to-staff schools through salary incentives and by offering alternative paths to teaching.

The primary strategy to attract teachers to hard-to-staff schools is to offer monetary incentives to new teachers. The literature suggests that for this type of policy to be effective, the incentive needs to be sizeable. One of the most cited programs is the Governor's Teaching Fellowship, which was introduced in California between 2000-2002. The objective was to attract academically talented novice teachers to low-performing schools and retain them for at least four years by offering a $20,000 bonus incentive. For each of the four years, new teachers that participated in the program received $5,000, which represented a 15.1% annual premium over the 2000 to 2001 average starting salary of $33,121 for California teachers (American Federation of Teachers, 2002). The program increased the likelihood of highly qualified applicants who chose to work in hard-to-staff schools.

Similar salary incentives are being used in many countries in LAC, including in Chile, Colombia, Mexico, Peru, and Brazil. However, there is limited evidence to determine if these incentives are effective. Some systems have also offered non-monetary incentives. For example, Peru and Mexico offer teachers the opportunity to advance in their career path more rapidly if they choose to work in rural areas. However, there is still limited evidence on how these policies impact teacher decisions, retention, and student achievement.

An alternative strategy aimed at attracting teachers to understaffed schools is through Teach for All programs that offer alternative paths to teaching for professionals from other disciplines. Evidence from LAC suggests that these alternative certification programs do attract talented professionals from other disciplines to teach in public schools (Ganimian, Ho and Alfonso 2015). However, the evidence of the effectiveness of the teachers attracted through these alternative paths in Latin America is limited. Alfonso et al. (2010) find that in schools with teachers from Enseña Chile there was an improvement in language, arts, math and non-cognitive abilities. The evidence on retention of teachers attracted through these programs is also limited.

Another policy is to offer teachers working in well-staffed schools salary increases to transfer to hard-to-staff schools. The Talent Transfer Initiative is a unique example of this type of policy. The program was implemented during the years 2009 and 2011 in 10 school districts from seven states in the US and consisted in offering highly effective teachers an increase of 18% of their annual salary (US$ 20,000) for the first two years if they taught in a low-performing school. Only 5% of effective teachers transferred, and an evaluation of the program suggested that the amount of the salary increase may not have been sufficient to incentivize most teachers. However, among those who transferred to hard-to-staff primary schools, retention was high, and the program was effective at increasing students' learning (Glazerman, Protik, Teh, Bruch, & Max, 2013).

While attracting new applicants and effective teachers already working in other schools to hard-to-staff schools is critical, more evidence is needed on the effectiveness of different policies to improve working conditions for teachers. Retaining effective teachers once they are working in hard-to-staff schools is just as critical as attracting them to the schools.

b) Over-staffed schools

In some cases, when demographic trends or competition from private schools generates a sharp reduction in public school enrollments, the number of teachers in a public school may need to be adjusted to avoid teachers working less than their contract hours. For example, beginning in the 1990s county school districts in West Virginia faced a funding crisis. Significant outmigration

resulted in decreased school enrollment and prompted the state legislature to change the state school aid formula, forcing school districts to lay off large numbers of low-seniority employees. The state legislature's perception that public schools were overstaffed, as well as insufficient property taxation and a statewide economic downturn made an increase in teacher layoffs unavoidable (Meckley, 1991).

Some school systems try to incorporate measures of understaffed and overstaffed schools to improve the deployment of new teachers when newly hired teachers are allocated to schools by central authorities. For example, Malawi has a two-stage system of teacher allocation, where central-level officials recruit teachers into the system and allocate them to districts, while district-level officials allocate teachers to individual schools.

What are the policies used to address teacher imbalances in LAC?

Most of the systems reviewed cannot move teachers from overstaffed to understaffed schools (*Table 11*). In Peru, it is legally possible to transfer teachers across schools, but in practice it is uncommon. In Pernambuco, transfers are limited to temporary teachers, which represent over 50% of the total number of teachers. In 2017, the government developed a computerized system to identify temporary teachers who should be working more hours based on their contracts. Initially, the system validates the number of hours required in each school and the availability of all teachers. Next, the system identifies teachers who are not working the hours stipulated in their contracts. These teachers can be reallocated to other schools in the state or dismissed. This system is limited to temporary teachers but has been effective at promoting transfers and dismissals of mostly inactive teachers. For example, in 2017, the system identified close to 5,000 inactive temporary teachers who were eventually dismissed.

Another relevant policy related to teacher imbalances is the incentives to attract teachers to work in hard-to-staff schools. All the systems reviewed have introduced monetary incentives for teachers to work in hard-to-access schools. Few systems (e.g. Chile and Peru) have introduced incentives to work in disadvantaged schools or those located in areas with high rates of violence. In Chile, Mendez (2016) finds that incentives to work in hard-to-staff schools attracted mostly young teachers to these schools.

Table 11: Policies to address teacher imbalances in LAC countries

	Argentina (CABA)	Colombia	Chile	Pernambuco	Peru	Rio de Janeiro
Permanent teacher transfers	Only upon teacher request	Only upon teacher request	Only upon teacher request	Only upon teacher request	Yes - they can be declared as "excess personnel" and be transferred	Legally yes - but not in practice (escola de origen)
Monetary incentives to work in isolated schools	Yes	Yes - 15% of base salary	Yes	Yes - 12% of salary	Yes - 3.5 to 25% of base salary	Yes - 15% of base salary
Non-monetary incentives to work in isolated schools	No	No	No	No	Yes - faster progress in teaching career	No
Monetary incentives to work in poorer schools	No	No	Yes	No	Yes - 15% of base salary	No
Non-monetary incentives to work in poorer schools	No	No	No	No	No	No
Monetary incentives to work in schools located in high-crime areas	No	No	No	No	Yes - 15% of base salary	No
Non-monetary incentives to work in schools located in high-crime areas	No	No	No	Yes	No	No
Reasons for teacher dismissal	Only by disciplinary decisions	Only by disciplinary decisions	Up to 5% of lowest performing teachers	Only by disciplinary decisions	If they fail the teaching evaluation process	Only by disciplinary decisions

Source: Own elaboration

6. Conclusion

Education spending has increased significantly in Latin America and the Caribbean (LAC) over the last few decades. Concurrently, student performance in the region has improved and some countries have narrowed the socioeconomic learning gap. However, education systems in Latin America still lag significantly behind most developed countries on international assessments of student learning, and socioeconomic achievement gaps in the region are some of the widest in the world. The economic crisis in many Latin American countries presents a challenge for governments to continue making progress in education with reduced budgets.

Efficient school finance strategies are pivotal policy tools to improve education quality and equity in the context of limited resources. Despite the relevance of school funding policies for educational outcomes, there is little systematic and comparative evidence on education finance policies in Latin America. This conceptual framework addresses this gap by providing a comprehensive description of the mechanisms through which school funding in Latin America is governed, distributed, and monitored. We use unique survey data to examine eight governments in the region: the federal government of Argentina, the City of Buenos Aires (Argentina), the federal government of Brazil, the State of Pernambuco (Brazil), the municipality of Rio de Janeiro (Brazil), Chile, Colombia, and Peru.

This framework explores five key dimensions of school finance systems: (i) sources of funding and the transfers between different levels of government (i.e. national, subnational, local, and schools); (ii) decision-making authority at different levels of government; (iii) information and accountability systems; and (iv) resource allocation rules.

There is a growing body of literature on sources of funding devoted to better understanding the implications of fiscal decentralization on efficiency and equity in educational systems. On the one hand, scholars argue that local funding creates responsiveness to local needs, because local governments are more knowledgeable of local demands and may provide more efficiently goods and services to schools. On the other hand, when local governments are the main source of funding, critics are concerned that inequities in per pupil spending may emerge across jurisdictions. Through a rich dataset gathered in the region, the evidence shows that there is a clear disparity in per pupil spending between local levels of government mostly driven by differences in local resources. In Argentina, for example, the highest per student expenditure, in the province of Tierra de Fuego, is three times larger than the average and almost five times higher than the province with the lowest per pupil spending (Santiago del Estero).

In this context, to address potential inequities, school finance reforms have incorporated equalization funds as a compensatory tool to overcome such imbalances worldwide. The United States, Poland and Sweden are examples of systems that have instituted these types of policies. In Latin America, to reduce spending discrepancies across subnational units, Brazil and Argentina transfer funds that include compensatory elements. Brazil relies on a federal complement that aims to provide additional resources to those states and municipalities that do not reach a minimum per pupil spending value. In Argentina, specific funds were designed to equalize differences in teacher

salaries across provinces. However, the data presented shows that those instruments have not been sufficient to compensate the inequities in spending across subnational governments.[50]

We find overall low levels of school autonomy in the LAC systems reviewed, with the exception, in some systems, of autonomy over teacher hiring, infrastructure, and minor operational expenditures. Within LAC, the systems analyzed are subject to varying levels of autonomy, with Colombia and Peru exhibiting the lowest levels of local autonomy.

Chile´s public education governance reform (*Ley de Nueva Educación Pública*), which was enacted in 2017, is an exception to the decades of political decentralization reforms in LAC. The objective of the reform is to remove the management of public schools from municipalities and create a new and larger local systems of public schooling where the national government plays a central role in the provision of educational service.[51] Prior to the reform, critics pointed out the high levels of geographical inequities in the distribution of both resources and school management capacities across municipalities. The new Chilean public education system has a similar governance structure as the Peruvian system where the local administrative units (i.e. the UGEL in Peru, the Local Educational Services in Chile) have the managerial responsibilities of running schools but reduced autonomy on most educational policy decisions. For instance, even though between 2007 and 2012 the budget share managed by local governments in Peru increased by 183% (Ministry of Economics and Finance, 2013), these transfers of responsibility have not been accompanied by the management capacity necessary to provide services equitably, efficiently, and transparently. Recent evidence shows that this has contributed to an increase in the between-region disparities in the quality of local services (Contraloría General de la República, 2014). The IDB is currently developing a study to assess the impact of the 2001 Colombian public education decentralization process[52] on intra-municipal equity, academic results, and efficiency indicators.

All countries surveyed in this conceptual framework have introduced some accountability mechanisms to ensure that budget regulations are followed, including vertical and horizontal forms of accountability (internal and external audits) as well as bottom-up accountability (e.g. transparency laws). However, further research is needed to examine how effective these mechanisms are at preventing corruption and misuse of resources in education. Moreover, most countries report budget data at the national, subnational, and local levels, masking microlevel inequalities in per-pupil spending. However, Chile is an exception. The country's Educational Superintendence collects and publishes expenditure data at the school level. Outside of Latin

[50] The Bank is currently working with an education advocacy group in Brazil – Todos pela Educacao – and a group of specialists, to design a proposal to reform Fundeb in order to reduce, among other factors, disparities in the country's school funding system.

[51] The new system creates administrative units (*Servicios Locales*) that are given the role of providing technical-pedagogical and managerial support to the schools under their responsibility (Art.17, Ley de Nueva Educación Pública).

[52] Starting in the 1980s, Colombia has been undergoing a progressive decentralization process. The reform in 2001 enforced administrative decentralization, reallocating local authorities' responsibilities towards the delivery of public services. Regarding the management of public education, the enactment of Law 715/2001 changed the allocation of responsibility over the service to either municipalities or departments. Municipalities with one-hundred thousand or more inhabitants in the year 2002 became "certified in education", meaning responsible for the public education service in their territories. The education transfers from the central government started to flow into their treasuries. Municipalities with fewer than one-hundred thousand inhabitants were not certified, and their public education is run by the departments they belong to. From receiving a narrow share of transfers and being subject to departmental supervision, certified municipalities transitioned into a situation of full managerial and financial autonomy, while non-certified ones gave up their already limited powers to the respective department.

America, a notable example is the Every Student Succeeds Act (ESSA) in the United States, which requires school districts to report per-pupil spending at the school level and to disclose within-district variation in educational resources.

With regards to performance-based accountability, all the LAC governments reviewed have introduced standardized assessments of students, schools, and/or teachers. However, they vary in the extent to which they publish school level test results and in the extent to which financial consequences are tied to performance. Chile, Brazil, and Colombia publish student assessment scores at the school level; Peru and Argentina only publish test results at the national and subnational levels. Brazil and Argentina do not have a national system of high-stakes accountability, but some school systems in Brazil (e.g. Pernambuco) give financial rewards to top scoring schools. Chile, Colombia, and Peru have introduced high stakes accountability for both school and teacher assessments. The limited evidence on the effectiveness of these high-stake accountability reforms in Latin America shows a consistent positive impact on educational outcomes and school and teacher behavior. Moreover, in some of these systems—notably Colombia, Peru, and Pernambuco—schools are held accountable for their performance, but have little control over their resources. More research is needed on the effectiveness of performance-based accountability initiatives in Latin America, where some school systems have limited resources and autonomy to improve service delivery.

Several systems in the region have evaluated the introduction of objective criteria to increase transparency, efficiency, and equity in the distribution of resources. For example, Argentina and Peru are currently designing proposals to introduce funding formulas for transfers from the central government to authorities at the regional and local levels, to replace rules based more on historic criteria and discretionary mechanisms. In contrast, Colombia and Chile have a more developed and centralized system of funding formulas. In both cases, the IDB is working with the government to propose changes to consider specific challenges. For example, in Chile, the per-pupil voucher subsidy, created in 1981, and adjusted several times over the last few decades to account for student and school characteristics, does not provide sufficient funds to small schools which represent over half of schools in the country. Most of these schools face financial problems to operate exclusively with the per-student subsidy. The proposal is also exploring ways to make parts of the voucher formula more flexible. In Colombia, the IDB is developing a proposal to introduce incentives to increase efficiency in the management of resources in the Territorial Entities and to reduce the percentage of funding outside of the SGP formula. In Brazil, the IDB is co-chairing a working group, with a local NGO, to develop a proposal for the legally mandated 2020 reform that will introduce more equity in the allocation of Fundeb funds.

There is limited evidence on the optimal design of funding formulas. In Chile, for example, there is mixed evidence that competition for students, generated from the per-pupil voucher, has increased educational outcomes and efficiency. All the systems consider differences in costs between rural and urban schools and incorporate criteria to distribute more resources to isolated and difficult to access schools, but only Colombia and Chile have specific criteria to compensate low-SES schools. In the case of Chile, there is evidence that incorporating equity weights in the funding formula has helped to improve the equity in resource allocation and in student outcomes. Finally, the use of allocation rules based on student outcomes is not common in the region, and they represent a low percentage of the total expenditure in the few systems that have adopted them. The outcome-based formula in Colombia provides an opportunity to evaluate the impact of these mechanisms.

Lastly, our evidence on teacher allocation suggests that there are still efficiency and equity challenges. For example, regarding efficiency, the systems reviewed all rely on face-to-face procedures to allocate hired teachers to schools. Improving this procedure by following Scotland's experience with a computer-based matching mechanism to assign new teachers to schools could improve the efficiency of the teacher allocation process. This system is based on an algorithm that uses each local authority's vacancy list and applicants' preference list to allocate teachers to vacancies.

The evidence on equity shows extended teacher sorting in LAC that hinders learning opportunities for students from disadvantaged backgrounds. The incentives to address the teacher shortage in hard-to-staff schools are limited or non-existent in most systems and insufficient or ineffective in those systems that have introduced these types of incentives. For example, while most systems provide incentives to work in rural schools, only Chile and Peru provide incentives to work in disadvantaged urban schools. The incentive to work in disadvantaged schools is higher in Chile for high performing teachers.

This conceptual framework has also been a useful tool to guide our dialogue with governments in Latin America. Our findings have been used to inform policymakers about school funding challenges and to facilitate peer-learning among Latin American countries. Moreover, this study's detailed description of school finance systems in Latin America allows us to identify pressing areas for research. As we described above, we are conducting a series of empirical papers that focus on specific school funding questions identified in this conceptual framework. In addition, we will be administering the school finance survey in other Latin American countries. We are also working closely with several of the governments reviewed in this technical note to develop proposals to reform their national or subnational school finance systems. We hope that our work will assist Latin American governments to achieve better educational outcomes through data-driven solutions for school funding challenges.

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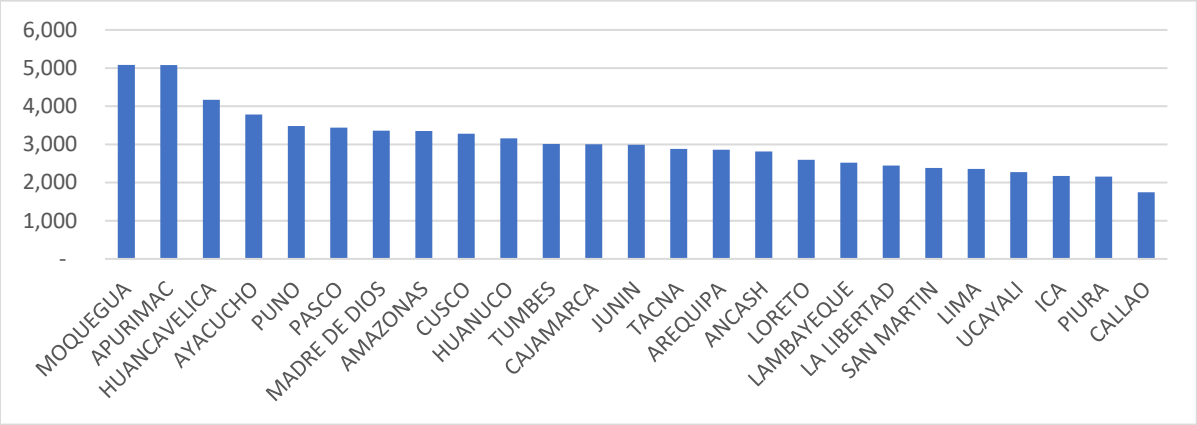
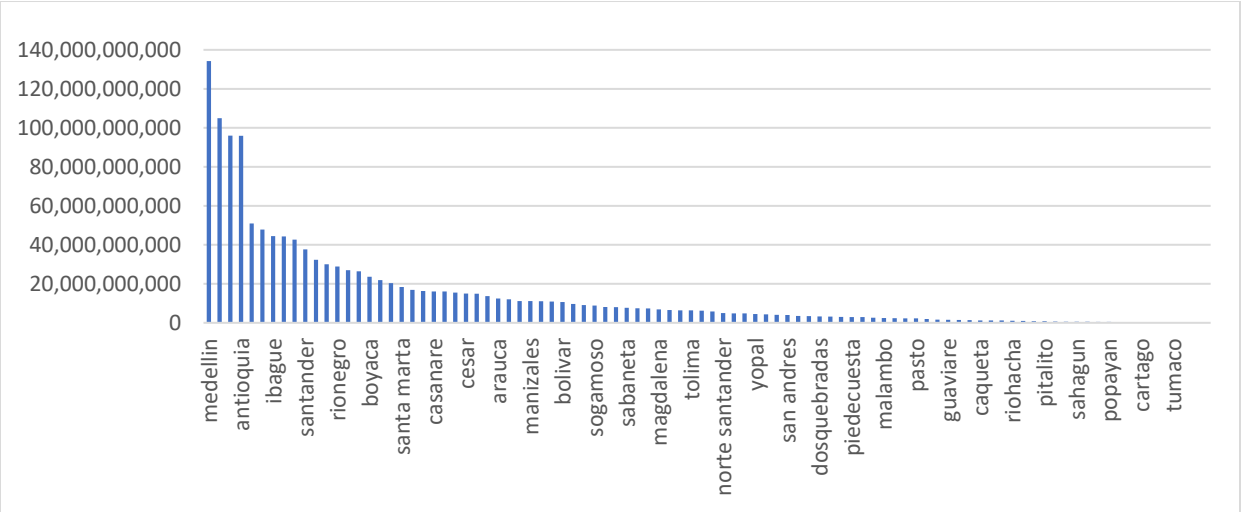
Appendix

Figure 6: Peru: Distribution of per pupil spending in basic education by Regional and local resources (2016)



Source: Ministry of Finance: Economic Transparency Portal. Students data from *Padrón Escolar* 2016.
Note: The graph includes all funding for basic education (preschool, primary and secondary) of local and regional governments. It also includes expenditure in basic education for the Ministry of Education (national government) for the executing units of Metropolitan Lima UGEL and DRE and the National Infrastructure Program (PRONIED). This excludes national spending in pedagogical materials (as they are bought in Lima but transported to each school) and operational costs of the Ministry of Education. Values are in 2016 Soles.

Figure 7: Colombia: Distribution of per pupil spending in basic education by by territorial entity (2016)



Source: Formato Único Territorial (FUT) 2016. FUT is a report that collects information on budget execution of income and expenses of territorial entities.

Figure 8: Sources of funding and Transfer of resources in **Argentina**

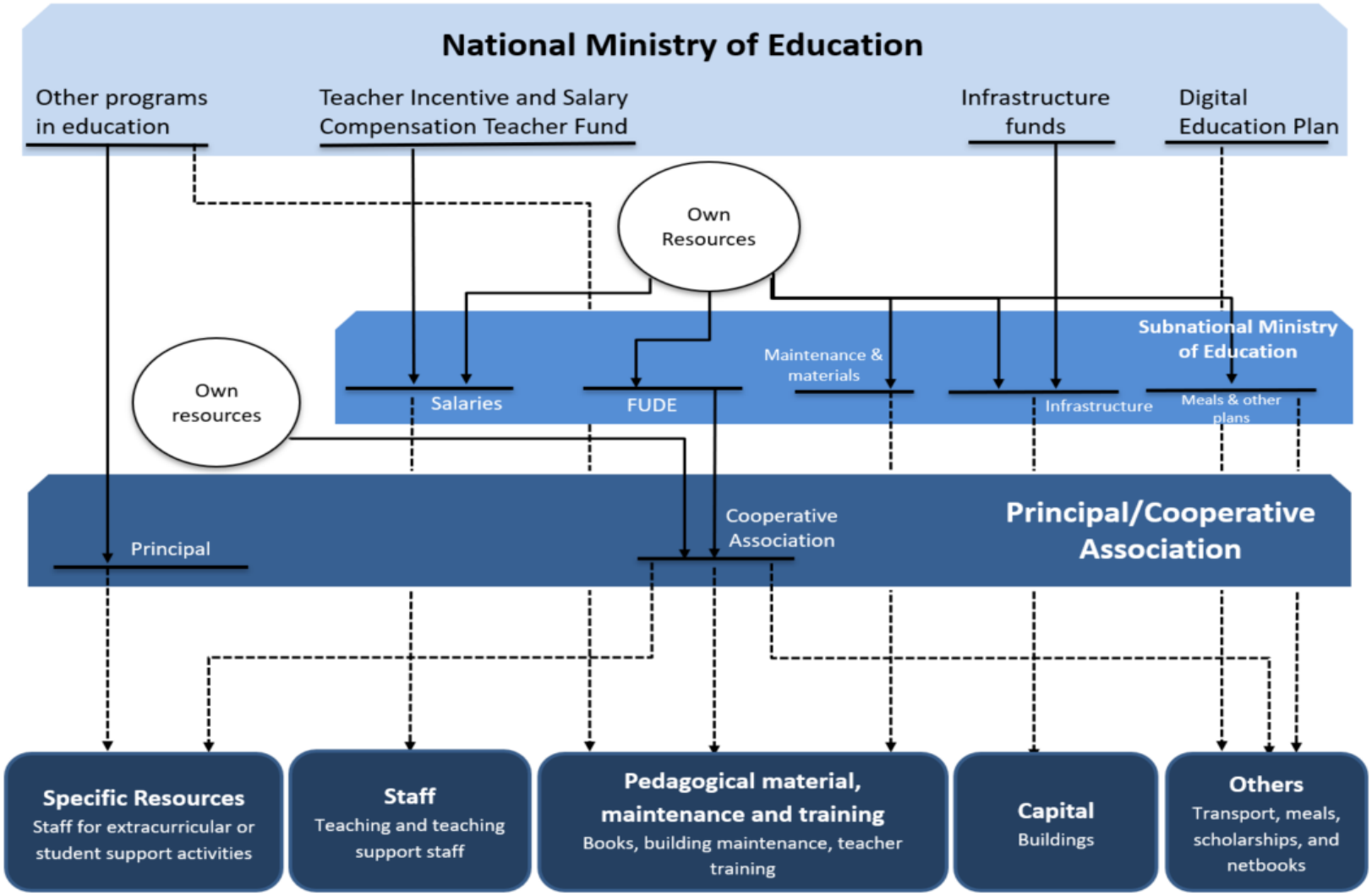
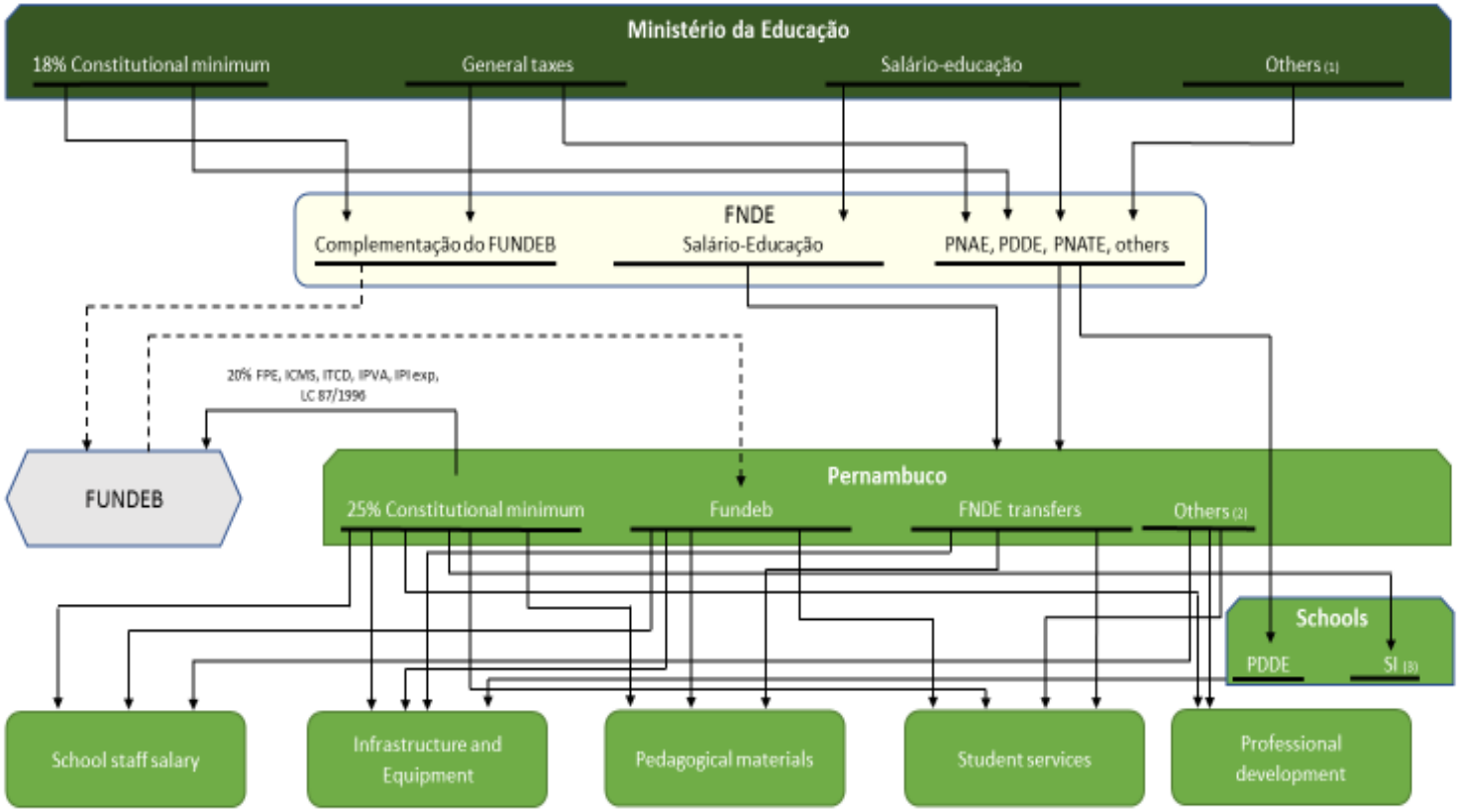


Figure 9: Sources of funding and Transfer of resources in **Pernambuco (Brazil)**



Notes:
(1) Others in the federal portion: oil royalties, lottery, rental resources and contests, etc.
(2) Others: Includes *convênios* with federal state; own resources beyond the 25% constitutional minimum.
(3) Suprimento Institucional – small amount from the Secretariat to the schools for basic services and

Figure 10: Sources of funding and Transfer of resources in **Rio de Janeiro (Brazil)**

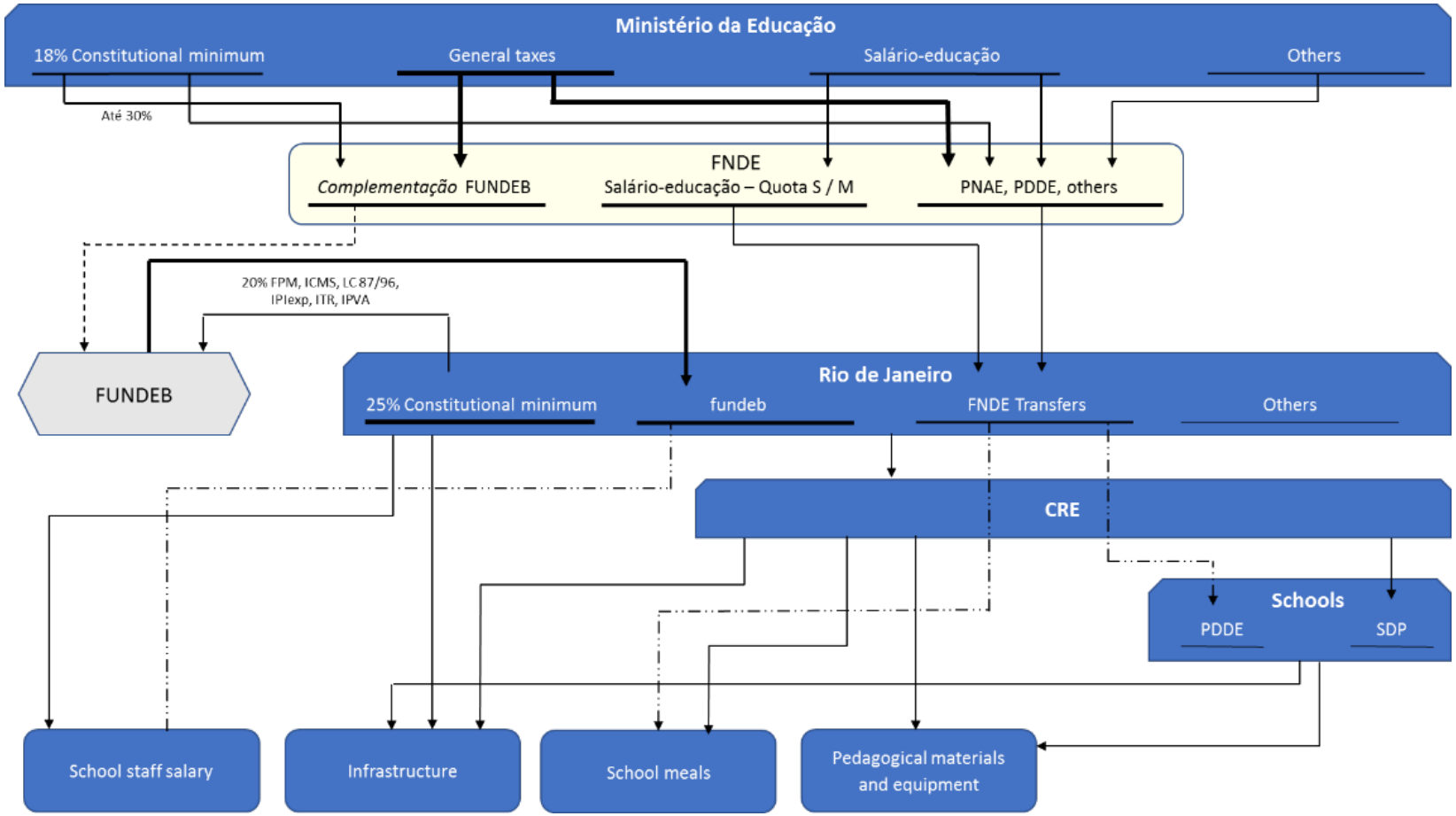


Figure 11: Sources of funding and Transfer of resources in **Peru**

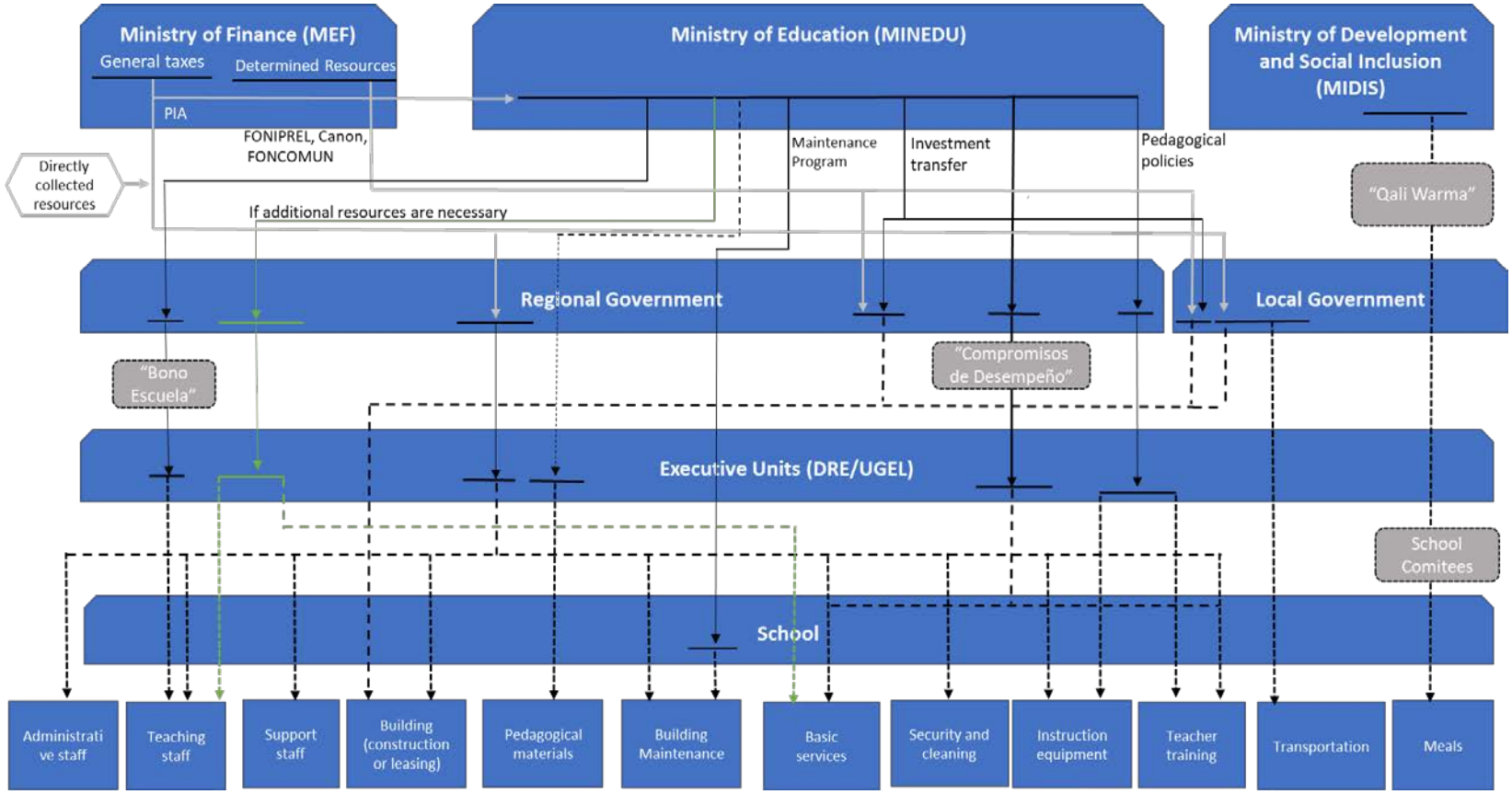


Figure 12: Sources of funding and Transfer of resources in **Colombia**

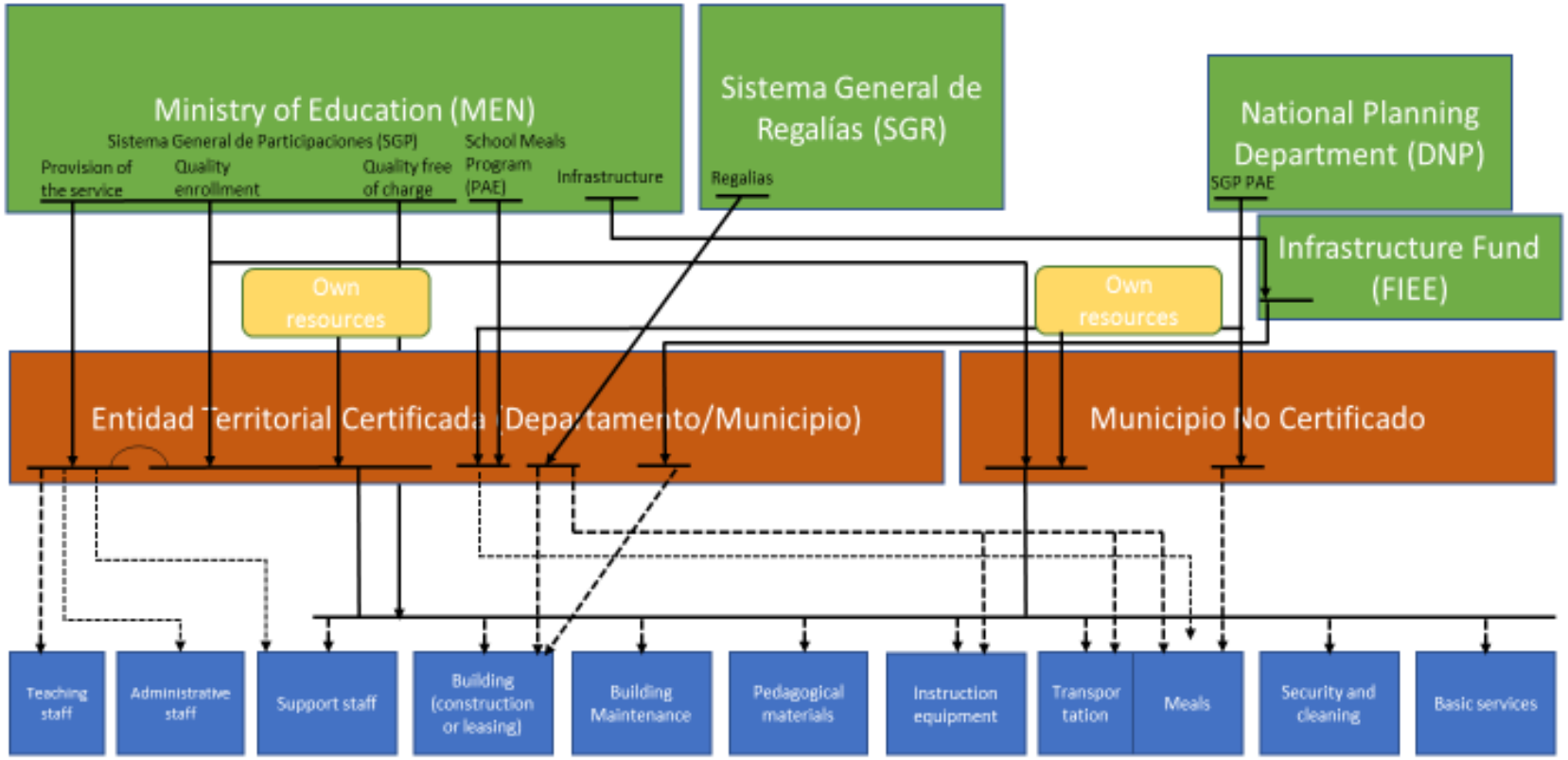


Figure 13: Sources of funding and Transfer of resources in **Chile**