



# Relying on the private sector: The income distribution and public investments in the poor

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## ABSTRACT

What drives governments with similar revenues to provide very different amounts of goods with private sector substitutes? Education is a prime example. I use exogenous shocks to Brazilian municipalities' revenue during 1995–2008 generated by non-linearities in federal transfer laws to demonstrate two things. First, municipalities with higher income inequality or higher median income allocate less of a revenue shock to education and are less likely to expand public school enrollment. They are more likely to invest in public infrastructure that is broadly enjoyed, like parks and roads, or to save the shock. Second, I find no evidence that the quality of public education suffers as a result. If anything, unequal and high-income areas are more likely to improve public school inputs and test scores following a revenue shock, given their heavy use of private education. I further provide evidence that an increase in public sector revenue lowers private school enrollment.

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## 1. Introduction

What drives governments with similar revenues to publicly provide very different amounts of goods with private sector substitutes? Education and health care are prime examples; in almost all countries, the public and the private sectors simultaneously provide versions of each. Because access to them may have profound impacts on growth and poverty, it is important to understand what factors lead governments to provide more of the public version versus relying more on the private version. This is especially so since the poor frequently cannot afford a private version. I show that in areas with higher income inequality or higher median income, governments allocate less of an exogenous revenue shock to goods with private substitutes (specifically, education) and more to goods without private substitutes (like parks and roads), which are more broadly enjoyed. Unequal and high-income areas are also more likely to save a revenue shock, running a budget surplus rather than raising consumption in the short run. Importantly, however, I find no evidence that the quality of public education suffers due to this lower propensity to invest in it. If anything, unequal and high-income areas are more likely to use a revenue shock to improve

public school inputs and standardized test scores, since their heavy use of private education ensures that public education resources are spread less thinly.

My results are consistent with the political economy models of Barzel (1973), Besley and Coate (1991), Epple and Romano (1996), Glomm and Ravikumar (1998), and de la Croix and Doepke (2009). They hypothesize that areas with more income inequality have more people who consume private sector versions of publicly-provided goods. Because they are consuming private versions, they vote for low spending on the public sector counterparts. Under majority voting, the government thus provides less of goods with private substitutes. This contrasts somewhat with Meltzer and Richard (1981, 1983), Alesina and Rodrik (1994), and Persson and Tabellini (1994), who predict that the size of public expenditures increases with inequality, as mean income rises relative to the income of the median (decisive) voter. I partly reconcile these models by showing empirically that the *type* of public investment matters. Government investment in education, which has private substitutes and predominantly benefits the poor, behaves according to the first set of political economy models. Government investment in broadly-enjoyed public goods that lack private sector substitutes (like parks, roads, and other infrastructure) behaves according to the Meltzer–Richard model. My results are also consistent with work modeling control over public policy increasing in income. As inequality grows, the bottom half of the income distribution

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becomes less able to make the government invest in publicly-provided goods that the poor use. Prominent studies in this vein include Pande (2003), Foster and Rosenzweig (2003), Keefer and Khemani (2005), Bardhan and Mookherjee (2006), Banerjee and Somanathan (2007), Araujo et al. (2008), and Karabarbounis (2011).

This paper's primary contribution is an empirical analysis of how an area's income distribution affects how its government allocates revenue between goods with and without private substitutes. It also examines the public service quality implications of this differential propensity to invest. I focus on education in Brazil, which has abundant private substitutes. The strength of my analysis stems from exploiting a change in Brazil's school finance law which generates exogenous variation in revenue.

I focus on education spending in Brazil for three main reasons. First, Brazil has over 5,000 municipalities with enormous discretion over how much to invest in education. This makes it an ideal setting to understand how the local income distribution affects public investment. Second, Brazilian municipalities differ greatly in their income distributions but have similar institutions and constraints that make them comparable. Finally, education is the single largest item in the municipal budget (accounting for about 30% of revenue) and is the chief municipally-provided service with abundant private substitutes.<sup>1</sup> This allows me to cleanly capture tradeoffs between investment in goods with vs. without private substitutes by focusing on education.

The analysis faces a significant challenge to identification. Unobserved factors that affect revenue levels may also influence citizens' preferences over goods. For example, if highly-educated individuals place a relatively high value on education and have more taxable income, revenues may be higher precisely where public education is most valued. Endogenous household sorting is likely to exacerbate identification problems. I circumvent these problems by exploiting a 1998 change in Brazil's education finance law that generates exogenous variation in municipalities' revenue. Specifically, I form a simulated instrumental variable that encapsulates the credibly exogenous variation in revenue generated by the law, but which excludes variation due to municipalities' own actions. I instrument for actual (endogenous) revenue with the simulated instrument, thereby testing how different municipalities spend an exogenous shock to revenue, all else equal.

Briefly, the law—"Fund for the Maintenance and Development of Fundamental Education and Valorization of Teaching" (FUNDEF)—forced each of Brazil's 26 states to gather 15% of each of its municipalities' revenue in a state fund. Each municipality in the state then received a share of the state's fund equal to its share of public school students in the state (with students at different grade levels weighted differently in different years). Because redistribution took place only within states (and also because of various nonlinearities in the rules), similar municipalities experienced very different changes in their finances. I form a simulated instrument which is the predicted revenue of municipality  $i$  in year  $t$ . I predict revenue using time variation and discontinuities in the law's parameters applied to municipalities' pre-law (1997) school enrollment and finances. Thus, only the law-induced changes—not municipalities' responses—are incorporated in the simulated instrument.

The main results of the paper are as follows. An exogenous revenue increase boosts municipal spending and raises public school enrollment rates. However, more unequal and higher-income municipalities are significantly less likely to expand education spending and public school enrollment. The funds they do not spend on education are more likely to end up in public infrastructure like parks and roads, which lack private substitutes. They are also more likely to save a revenue shock rather than raising short-run consumption.<sup>2</sup> Examining the implications of

these differential spending patterns for public service quality, I find that unequal and high-income areas are actually *more* likely to use a revenue shock to raise the average quality of public education. While they invest less in education, their more modest increases in public school enrollment more than offset this, leading to greater overall improvements in school quality. Thus, there is no evidence that this lower propensity to invest in education harms the poor. I further provide evidence that an exogenous increase in public sector revenue lowers enrollment in private primary schools.

The remainder of the paper is organized as follows. In Section 2, I put the paper into context by describing contrasting predictions in the theory literature. In Section 3, I describe education finance and the political system in Brazil, including the 1998 FUNDEF law and subsequent revisions to it. In Section 4, I outline the empirical strategy and data. In Section 5, I present the empirical results. Section 6 concludes.

## 2. Theoretical context

A large body of theory literature considers the impact of the distribution of income on the demand for publicly-provided goods and income redistribution more generally. This literature is somewhat divided in its predictions. One strand—described in the seminal work of Meltzer and Richard (1981, 1983), and expanded on by Alesina and Rodrik (1994) and Persson and Tabellini (1994)—proposes that under majority rule, an increase in mean income relative to the income of the median voter increases total public spending. An increase in inequality of this type raises public spending by lowering the median (decisive) voter's tax price of raising revenue.

In contrast, a second and still burgeoning strand of the literature focuses on the existence of private sector substitutes for publicly-provided goods. Papers in this vein include Barzel (1973), Besley and Coate (1991), Epple and Romano (1996), Glomm and Ravikumar (1998), de la Croix and Doepke (2009), and Gutiérrez and Tanaka (2009). Their models use a variety of approaches but follow a similar logic. If education quality is a normal good, the existence of private education leads parents past a threshold income to enroll children in private school. This is the income at which the cost of private school is just offset by the utility gain from higher-quality education. In societies with more unequal income or with higher median income, more people are past this threshold and use private schools. They thus oppose spending on public education, leading to less public education under majority voting.<sup>3</sup> This is in contrast to government provision of goods like infrastructure, which lack private substitutes.<sup>4</sup> Related to this literature, Suárez Serrato and Wingender (2011) model a positive valuation of government services that is larger for unskilled workers. Interestingly, De la Croix and Doepke (2009) model inequality raising public education quality, since greater use of private education lowers the number of children that must be educated publicly.

Existing empirical work has not definitively supported or rejected the Meltzer–Richard model. A number of cross-country studies suggest that inequality is associated with less public spending (Lindert, 1994, 1996; Perotti, 1996; Benabou, 1996; Rodríguez, 2004; Moene and Wallerstein, 2001; Schwabish, Smeeding, and Osberg, 2006). Several historical studies also find that unequal

<sup>1</sup> State and federal governments are the main providers of other goods with private substitutes.

<sup>2</sup> A budget surplus can also increase access to credit and lower future taxes (Ball and Mankiw, 1995). In Brazil, municipal taxes come primarily from two sources: Taxes on Services (ISS) and Real Estate Taxes (IPTU). The first is a head tax paid by self-employed individuals and enterprise owners. The second is a property tax. Both tax rates vary by municipality.

<sup>3</sup> A related literature analyzes the effects of the distribution of income on redistribution more generally. Casamatta et al. (2000) describes how a positive level of social security is politically sustainable since retirees and workers with medium wages form a majority coalition supporting it. Belletini and Ceroni (2007) describe how the poor (liquidity constrained) and the rich may form a coalition to push for low taxes, meaning that the median income voter is not pivotal.

<sup>4</sup> While Stiglitz (1974) showed that preferences are not single-peaked when private education is available, several approaches address this and obtain existence of a majority voting equilibrium: imposing a single crossing property in a median voter model (Epple and Romano, 1996; Gutiérrez and Tanaka, 2009), identifying the decisive voter (Barzel, 1973; Glomm and Ravikumar, 1998), and using a probabilistic voting model (de la Croix and Doepke, 2009).

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