

Why Public and Private Schools Coexist: A Microeconomic Model of Household Choice and Government Policy

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ABSTRACT: This paper studies the interaction between the private and the public sector in determining the supply and segmentation of education in modern economies. We develop a theoretical model in which the private and the public sector offer education as a relatively homogeneous good. In our model, the distribution of preferences for the private and public choices determines the stratification of the choice of education. Our analysis shows that increases in income taxation reduce the demand for private and public education but increases tax revenue and the supply of the public sector, showing a tradeoff between access to education and welfare changes associated to the net incidence of taxation and the supply of a public good. In our model, the private sector helps to improve the efficiency in the supply of education while the government intervention improves access leading to a more equitable allocation of resources in education. In our analysis income tax rates are associated to the proportion of households choosing both education in the private and public sector, which might help to evaluate the efficacy of government intervention in education.

KEYWORDS: education, public goods, education systems, government intervention, market competition.

JEL Classification. I23, H41, H11, I25

1. INTRODUCTION

Education plays an important role in modern economies. It enhances productivity, builds human capital, and fuels innovation and economic growth. Yet its importance extends well beyond private economic outcomes. Education also fosters civic engagement, strengthens social cohesion, and helps transmit democratic values across generations. For these reasons, it should not be considered only as a private investment in individual achievement, but as a public good. Therefore, government involvement is necessary because relying solely on market forces would lead to a level of education below what society needs.

In modern economies, both the public and private sectors supply education. This paper focuses on how these two sectors interact, how they compete, and how their relationship shapes educational outcomes. Understanding this interaction is essential for understanding educational outcomes and all its direct and indirect consequences for individuals and the society as a whole. In addition, due to government intervention, it is important to understand the direct and unintended consequences of government intervention.

Scholars have recognized that the high costs of education and the concentrated distribution of income and high poverty rates in many economies, might also imply that the market choice in the supply of education might exclude many individuals who can not afford to acquire education. Hence, for equity reasons, there is a rationale for government intervention in which central and subnational governments offer subsidized public education.

The fact that in modern economies, there is an interaction between the private and the public sector implies the need to study the competition between these two choices to understand the educational outcomes in modern economies, such as educational coverage, rates of efficiency, impact of education in labor markets, etc. Another issue of interest for students of economics of education is the strategic interaction between private firms and public institutions in determining educational

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outcomes. Finally, for regulation and policy issues, it is relevant to study the interdependence between private and public institutions in educational outcomes. In this paper we are interested in studying the competition between the private and the public sector to understand coverage of education and the market segmentation in which some individuals choose to demand education from the private sector while others choose education supplied by the public sector.

In this paper we provide a theoretical model in which the supply of education is characterized by a private and a public sector. The private choice is determined by market forces in which firms have to be profitable in the long run, while the public sector uses broad taxation to offer their services. In our model, public education is financed partly through taxes and offered at a subsidized price. Private education, by contrast, operates under market conditions and charges at least its marginal cost. Households choose between the two. This framework captures the segmentation widely observed in real-world education systems, where income and preferences play a central role in determining school choice.

In this paper we are interested in the total amount and the composition of the supply of education. Our model suggests that the distribution of students across public and private sectors depends on fiscal policy, relative prices, income, and household preferences. A higher effective tax rate increases the share of students in the public sector by expanding the resources available for subsidized education. In contrast, raising the price of public education limits access and reduces public enrollment. These forces together generate an equilibrium in which both sectors coexist, each serving different groups of the population based on their income and willingness to pay.

This equilibrium of our model also emphasizes a policy trade-off between fiscal capacity, accessibility, and efficiency in the allocation of resources of our economy. Expanding public education through higher taxes or larger subsidies can improve equity and social inclusion, but it may also impose budgetary pressures on both households and the government. Increasing reliance on private provision might enhance choice, but it can also increase inequality in the access of education and lead to social stratification.

From a policy perspective, our model emphasizes the importance of fiscal design and pricing decisions in achieving both equity and efficiency in education outcomes. The equilibrium relationships derived in the model (linking the share of public education to tax rates, tuition levels, and production costs) provide a useful benchmark for evaluating the total amount and composition of the supply of education in modern economies. Our model provides estimates that relate the amount of income taxation to the role of the government in offering education services

The rest of the paper is as follows: section 2 includes a review of the literature. Section 3 includes the theoretical model. Section 4 concludes.

2. LITERATURE REVIEW

Public and private schools often coexist, and researchers have long tried to understand how and why this happens. A large part of the literature points out that education creates value in two ways. It benefits individuals through higher earnings and better opportunities, but it also benefits society more broadly. Classic studies by Becker (1964) and Ben-Porath (1967) describe education as an investment in skills and human capital. More recent work highlights education as a public good because of its broad social benefits, such as higher productivity, stronger civic participation, and more robust institutions over time (Hanushek & Woessmann 2012; Ponce et al. 2018; Hankla et al. 2019). Because these benefits go beyond the individual, governments often step in through subsidies, taxes, or direct provision, giving rise to mixed public-private education systems.

Another stream of research looks at how families choose between public and private schools. This work suggests that households compare costs, quality, income constraints, and personal preferences when making their decisions (Manski 1992; Epplé & Romano 1998). Since families differ in income and priorities, these choices naturally lead to sorting: higher-income households, or those placing a higher value on private school quality, may choose private schools even when public education is heavily subsidized. Our paper builds on this idea by explicitly modeling willingness to pay and linking it directly to the school choice decision.

A third line of research focuses on how public policy and fiscal rules shape education markets. Influential models by Epplé and Romano (1996, 1998) show how taxes and subsidies affect how students are split between public and private schools, sometimes widening and sometimes reducing inequality. Later studies add features such as crowding, peer effects, and differences in school quality, emphasizing the trade-offs between fairness and efficiency (Glomm & Ravikumar 1992; Nechyba 2000). Our contribution is to offer a simple and transparent framework that clearly shows how public school coverage depends on taxes, tuition levels, and education costs.

More recent work brings politics into the picture. These studies argue that support for public education depends on income inequality, how people perceive school quality, and broader beliefs about the role of the state (Bussemeyer 2015). Where inequality is high or demand for differentiation is strong, private education tends to expand. Where governments are strong and redistribution

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is widely supported, public education tends to be more extensive. Our model fits well with these insights by showing how changes in preferences or relative prices shift enrollment between sectors.

Finally, empirical evidence is consistent with the main mechanisms in our model. Across many countries, higher public subsidies tend to increase enrollment, higher private tuition pushes families toward public schools, and wealthier households are more likely to choose private education. By capturing these patterns in a simple theoretical model, our paper helps clarify how school choice works in mixed education systems.

3. MODEL

Assume an economy with households who wish to acquire education. Households in this economy seek education because it adds utility to their lives, that is, they see education as a good. Households have preferences regarding education and consider education obtained from the public and private sectors as relatively homogeneous goods. In this economy, there are $h = 1, 2, \dots, N$ households, where N is the total population. To simplify the analysis, we assume that households consume only one educational good. The preference structure of a representative household h is given by $U_h = \alpha_h E_g + \beta_h E_p$, where E_g and E_p are the levels of education obtained in the public and private sectors, respectively, and α_h and β_h are parameters reflecting the intensity of preferences for education offered by the public and private sectors, respectively.¹

If α_h increases, the preference of the household for public education increases, meaning the household obtains greater subjective value from education in the public sector relative to the private sector (considering similar units of education, i.e., if $E_g = E_p$). Conversely, if β_h increases, the household gains greater subjective value from private education (again, assuming similar educational units).

This preference structure reveals that the willingness to pay for private education by any household h equals $\frac{\beta_h}{\alpha_h}$. The condition is the marginal rate of substitution between education provided by the public and the private sector, and indicates that the higher the marginal utility of education obtained in the private sector (the higher β_h), the greater the willingness to pay for private education. Conversely, a household with a low willingness to pay for private education has a high marginal utility from public education (high α_h). If α_h is sufficiently high or β_h sufficiently low, the household's willingness to pay for private education approaches zero, making public education the likely choice. Conversely, if α_h is low or β_h is high, the household will have a high willingness to pay for private education and will opt for it even if public education is feasible, subsidized, and low-priced.

Households also select the type of education based on the prices of public and private options and their income. We assume that households in this economy have the following budget constraint $p_g E_g + p_p E_p = y_h(1 - \tau)$ for every h , where y_h is the household's gross income, τ is an income tax levied by the government, and p_g and p_p are the prices of public and private education, respectively. The expenditure on public education is $p_g E_g$, and on private education, $p_p E_p$. Households pay an income tax that finances the public provision of education.

If the household chooses private education then $E_g = 0$, and the maximum level of private education affordable is $E_p = \frac{y_h(1-\tau)}{p_p}$. Conversely, if they choose public education, $E_p = 0$, and they can afford $E_g = \frac{y_h(1-\tau)}{p_g}$. Thus, the demand for public and private education depends on preferences, prices, and income.

We assume that private education is more expensive than public education, which is subsidized, i.e., $p_p > p_g$. Therefore, the type of education that a representative individual h selects in this economy is related to their willingness to pay for private education, denoted by WP_p , which is given by $WP_p = \beta_h/\alpha_h$, their income, and the prices of the available options.

In this economy, the opportunities for substituting private education with public education are determined by the relative price P_p/P_g . The higher this relative price, the more expensive the private option is compared to the public one. Proposition 1 characterizes the demand for public education E_g^d and private education E_p^d , which are given as follows:

Proposition 1. The demand for public education E_g^d is given as follows:

¹Alternatively, we could use a more general preference structure given by $U_h = \ln(x_h) + \alpha_h E_g + \beta_h E_p$, where x_h is a private good. However, our analysis and conclusions are not affected; it only makes the model's solution more complex. Therefore, for mathematical simplicity, we assume a preference structure given by $U_h = \alpha_h E_g + \beta_h E_p$.

$$E_g^d = \begin{cases} \frac{I_h(1-\tau)}{P_g} & \text{si } \frac{\beta_h}{\alpha_h} \leq \frac{P_p}{P_g} \\ 0 & \text{si } \frac{\beta_h}{\alpha_h} > \frac{P_p}{P_g} \end{cases} \quad (1)$$

And the demand for private education is characterized as follows:

$$E_p^d = \begin{cases} \frac{I_h(1-\tau)}{P_p} & \text{si } \frac{\beta_h}{\alpha_h} > \frac{P_p}{P_g} \\ 0 & \text{si } \frac{\beta_h}{\alpha_h} \leq \frac{P_p}{P_g} \end{cases} \quad (2)$$

Case 1: Demand for Public Education: If the willingness to pay for the private option is lower than the relative price of the private option vis-à-vis the public option, then the individual chooses to study in a government institution. That is, if $\frac{\beta_h}{\alpha_h} \leq \frac{P_p}{P_g}$, then $E_g^d = \frac{I_h(1-\tau)}{P_g}$ and $E_p^d = 0$. To see this, observe Figure 1, which illustrates this result through a map of indifference curves U_0 , U_1 and U_2 and the slope of the budget constraint.

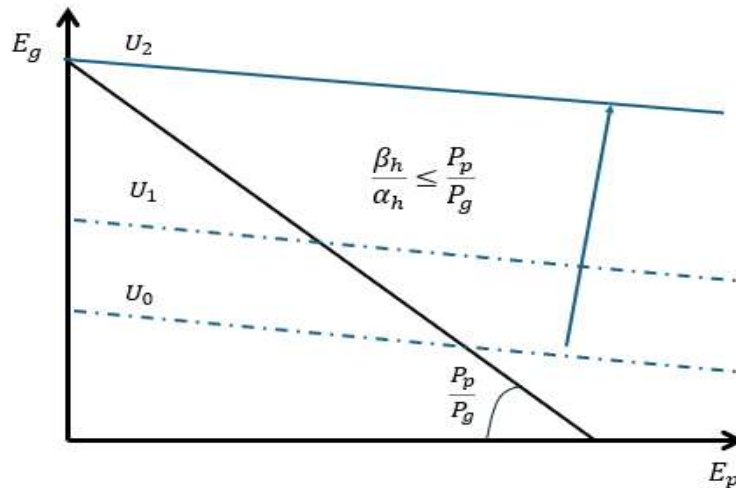


Figure 1. Demand of Public Education $E_g^d = \frac{I_h(1-\tau)}{P_g}$ and $E_p^d = 0$.

In Figure 1, it can be seen that under the structure and relative prices such that $\frac{\beta_h}{\alpha_h} \leq \frac{P_p}{P_g}$, the indirect utility evaluated at the point where the individual demands public education, that is, $E_g^d = \frac{I_h(1-\tau)}{P_g}$, and $E_p^d = 0$ (that is U_2) is greater than the indirect utility in the case where the individual demands private education, i.e., $E_g^d = 0$, and $E_p^d = \frac{I_h(1-\tau)}{P_p}$. Since the indirect utility of public education is $U_g = \alpha_h \frac{I_h(1-\tau)}{P_g}$, while the indirect utility of the private option is $U_p = \beta_h \frac{I_h(1-\tau)}{P_p}$, and because $\frac{\beta_h}{\alpha_h} \leq \frac{P_p}{P_g}$ implies $\alpha_h \frac{I_h(1-\tau)}{P_g} \geq \beta_h \frac{I_h(1-\tau)}{P_p}$, it follows that it follows that $U_g \geq U_p$.

Case 2: Demand for private education: If the willingness to pay for the private option is greater than the relative price of the private option vis-à-vis the public option, then the individual chooses to study in a private-sector institution. That is, if $\beta_h/\alpha_h > P_p/P_g$, then $E_p = \frac{I_h(1-\tau)}{P_p}$, and $E_g = 0$. The figure shows that for the case $\beta_h/\alpha_h > P_p/P_g$, the private option provides a higher level of utility than the public option, that is, $U_p > U_g$.

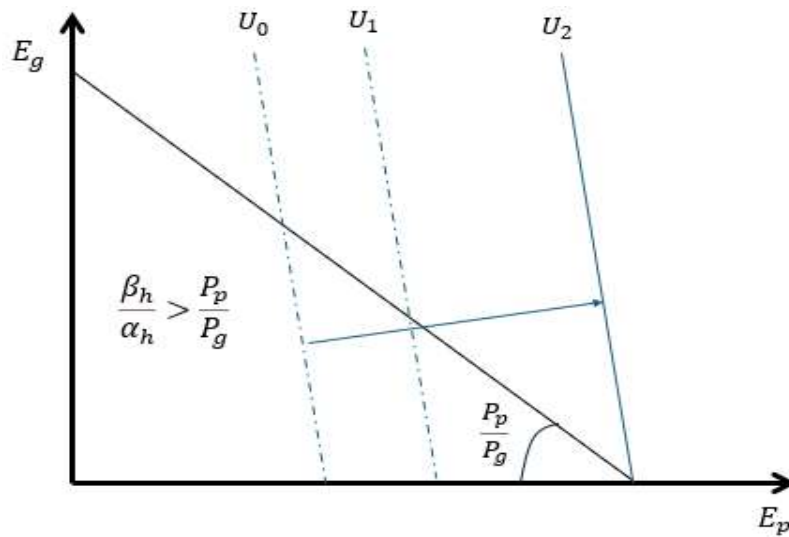


Figure 2. Demand for Private Education $E_g = \frac{I_h(1-\tau)}{P_p} \text{ y } E_p = 0$

Preference Distribution and the Choice between Private and Public Education

Households have a distribution of preferences, that is, there exists $\beta_1/\alpha_1, \dots, \beta_H/\alpha_H$. We assume, without loss of generality, that there exists $J \in \mathbb{R}: h = 1, \dots, J < N$ such that these households have a representative income given by y_J and satisfy a set of preferences such that $\beta_h/\alpha_h \leq P_p/P_g$, while for households indexed by $h = J + 1, J + 2, \dots, N$, have a representative income given by y_{N-J} and satisfy a set of preferences such that $\beta_h/\alpha_h > P_p/P_g$. Therefore, the J individuals in this economy demand education services from the public sector, while the remaining $N - J$ individuals demand education from the private sector.

Proposition 1. *If in this economy there exist $J \in \mathbb{R}: h = 1, \dots, J < N$ households whose preferences satisfy $\beta_h/\alpha_h \leq P_p/P_g$, then the market demand for public education is:*

$$EM_g = J \frac{y_J(1-\tau)}{P_g} \quad (3)$$

And the market demand for private education is:

$$EM_p = (N - J) \frac{y_{N-J}(1-\tau)}{P_p} \quad (4)$$

Proposition 1 states that a percentage of individuals who will choose the public option over the private one, and this proportion is given by the ratio J/N . The choice of public education is positively related to the representative income of these households, y_J , negatively related to the tax rate, τ , negatively related to the subsidized price P_g , and depends on the structure of individual preferences between public and private education options.

The model can explain why a percentage of individuals choose the private option over the public one, even though the price of public education is significantly lower than that of private education (since governments in modern economies subsidize public education). This proportion is given by the ratio $(N - J)/N$. The choice of private education is positively related to the representative income, y_{N-J} , negatively related to the tax rate, negatively related to the price P_p , and it also depends on the structure of individual preferences between private and public education options. Individuals must have a strong preference, or willingness to pay, for private education in order to decide to pay a higher price for the private option relative to public education, that is, the condition $\beta_h/\alpha_h > P_p/P_g$ must hold, along with a sufficiently high income.

It is worth noting that changes in the distribution of preferences affect the relative demand for private and public education. Keeping income levels and prices constant, the model predicts that if there is a change in the structure of preferences for public and private education, specifically, if the number of individuals whose marginal utilities satisfy $\beta_h/\alpha_h \leq P_p/P_g$ decreases (i.e., if J decreases), then the demand for public education falls while the demand for private education rises (see equations 3 and 4 in Proposition 1).

This model also indicates that reductions in income or increases in the tax imposed by the government reduce the demand for education in both the public and private sectors (see conditions 3 and 4). However, this effect is differentiated and depends on the prices of the public and private options.

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Regarding price effects, the model suggests that if the price of private education increases while the distribution of preferences among individuals remains constant, where J individuals satisfy the condition $\beta_h/\alpha_h \leq P_p/P_g$ and $(N - J)$ individuals satisfy $\beta_h/\alpha_h > P_p/P_g$, then only the demand for private education falls (see equation 4), while the demand for public education remains unchanged. Conversely, if the price of public education increases but the distribution of preferences between J and $(N - J)$ households remains the same, then only the demand for public education decreases (see equation 3), while the demand for private education remains unchanged.

From Proposition 1, it can also be identified that there are price effects associated with changes in the distribution of individual preference ratios in the economy. For example, assume there is a change in the price of private education P_p such that the number of individuals satisfying the condition $\beta_h/\alpha_h \leq P_p/P_g$ increases. In this case, the increase in P_p causes some individuals who previously demanded private education at the old relative prices to switch to public education, thereby increasing the demand for public education, and therefore J rises and $(N - J)$ falls.

Supply of Education and the Competitive Equilibrium

In this section, the components of the educational supply in both the private and public sectors are analyzed, and the characteristics of a competitive equilibrium with public and private education are identified. In the case of the private sector, it is assumed that firms seek to maximize their profits, denoted by π_p , which represents the difference between revenues from educational services and the costs of producing private education. It is assumed that the marginal cost of producing one unit of private education is constant and equal to $c > 0$. Therefore, the net profit function in the private education market segment is given by $\pi_p = (P_p - c)E_p$.

For the public sector, net benefits are represented by π_g , defined as the difference between public sector revenues and the costs of producing public education. It is assumed that the marginal cost of producing one unit of public education is also $c > 0$. Public institutions are not assumed to maximize profits but rather to remain solvent in the long run. Hence, it is assumed that their net benefits equal zero, $\pi_g = 0$, implying that public institutions set their supply levels to cover their expenses.

The revenues of public educational institutions come from taxes and enrollment fees paid by those who choose the public option. In this case, the income–expenditure balance of public institutions is determined by the difference between their tax revenues, given by $H\tau I$, plus revenues from tuition and enrollment fees, $P_g E_g$, and the costs of providing public education, cE_g . We assume the price of tuition and enrollment fees P_g is lower than the marginal costs of producing public education. That is to say, $P_g < c \leq P_p$ which means that the public option brings a significant discounted price compared to the private choice in which P_g does not even cover the marginal costs of producing public education. While the private option, in absence of subsidies, needs to charge at least the marginal costs of producing private education. Thus, the net monetary balance of public educational institutions is $\pi_g = H\tau I + (P_g - c)E_g$.

Proposition 2. *The Nash-Cournot equilibrium for this economy with the mix of private and public education is as follows:*

- i. *The optimal level of public education is E_g^* such that $\pi_g = H\tau I + (P_g - c)E_g^* = 0$*
- ii. *The optimal level of private education $E_p^* \in \operatorname{argmax} \pi_p = (P_p - c)E_p^*$*

In what follows, we characterize the Nash-Cournot equilibrium for this economy in proposition 3.

Proposition 3. *The Cournot-Nash equilibrium satisfies the following: the proportion of individuals demanding education from the public sector is:*

$$\frac{J^*}{N} = \left(\frac{\tau}{1-\tau} \right) \left(\frac{P_g}{c - P_g} \right) \quad (5)$$

And the proportion of individuals demanding education from the private sector is:

$$\frac{N - J^*}{N} = 1 - \left(\frac{\tau}{1-\tau} \right) \left(\frac{P_g}{c - P_g} \right) \quad (6)$$

Proof.

By incorporating the long-run solvency condition for public sector institutions, $\pi_g = 0$, we find the number of individuals who demand education from the public sector which is $J^* = \left(\frac{\tau}{1-\tau} \right) \left(\frac{P_g}{c - P_g} \right) N$. The term, J^*/N represents the proportion of individuals who are being educated in the public sector, such that $0 < J^*/N < 1$, and is given by $\frac{J^*}{N} = \left(\frac{\tau}{1-\tau} \right) \left(\frac{P_g}{c - P_g} \right)$. Meanwhile, the proportion of individuals enrolled in the private sector is $\frac{N - J^*}{N} = 1 - \left(\frac{\tau}{1-\tau} \right) \left(\frac{P_g}{c - P_g} \right)$.

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Proposition 3 characterizes the proportion of individuals demanding education from the public and the private sector. Conditions (5) and (6) say that if the effective tax rate $(\tau/(1 - \tau))$ increases, the proportion of students enrolled in the public education option also rises. The intuition behind this result is that a higher effective tax rate translates into greater public revenues, which in turn enable an expansion of educational services and thus increase public sector coverage within the education system.

An increase in the price of the public education option P_g (even though it is satisfied that $P_g < P_p$ because the public option subsidizes access to education), marginally enhances the capacity of public institutions to expand their supply, while it reduces the supply of private educational institutions. In addition, following condition (5), an increase in the cost of education diminishes the ability of public institutions to expand their supply, thereby reducing public coverage.

The percentage of individuals covered by public education, J^*/N such that $0 < J^*/N < 1$, is equal to the product $(\tau/(1 - \tau))(P_g/(c - P_g))$. Observe that $0 < (\tau/(1 - \tau)) < 1$, and $P_g/(c - P_g)$ may take a value between zero and greater than one. However, the product $(\tau/(1 - \tau))(P_g/(c - P_g))$ lies between zero and one.

The model thus provides an estimate of the share of the population served by the public sector. For example, if the effective tax rate in the economy τ equals 40%, then $\tau/(1 - \tau) = 0.667$. Assuming that the price of public education represents 35% of the production cost, we obtain $P_g/(c - P_g) = 0.35c/(c - 0.35c) = 0.35/0.65 = 0.3591$. Hence, in this hypothetical case, the coverage of the public education sector equals 35.96% of the total market.

4. CONCLUSIONS

Education plays a central role in modern economies as a driver of productivity and economic and social development. In modern economies, most education systems include a private and a public choice in the supply of educational services. This makes relevant the analysis of competition between these two sectors to understand the observed educational outcomes in many economies such as levels of coverage, the efficiency and equitable access of education, and the stratification of the market between the choices of education in the private and the public sectors.

A central concern of this paper is the effect on the supply and stratification of education services of a competitive equilibrium of two institutions, the private and the public sector, that interact to serve the demand of education in modern economies. While private sector incentives are aligned to profit making and the efficiency in the allocation of resources, the incentives of the public sector might be more concerned with access of poor families to education and equity issues. This particular interaction is interesting from the theoretical point of view of public economics to understand the interdependence and strategic interaction of these two institutions. This analysis is also relevant to understanding the efficacy of government intervention in the education sector.

In this paper we combine microeconomic foundations (preferences, relative prices, income constraints, and a competitive equilibrium), to offer a model to explain the coexistence of the private and public sectors and its effects in educational outcomes. In our competitive equilibrium, public and private education coexist, each serving distinct segments of the population, providing thus a theoretical model for the stratification commonly observed in educational systems worldwide. From a public policy perspective, the model shows some mechanisms through which governments can influence educational coverage and equity.

Our model suggests that an increase in the effective tax rate raises public revenues, enabling an expansion of public education supply and leading to greater coverage. However, higher taxes also reduce disposable income, which reduces the demand of households for private and public education, although the private choice might be more sensitive to changes in income taxation. This creates a policy trade-off between access to education in the public sector and household welfare. In addition, government intervention in the form of income taxation to fund the public supply of education might lead to a crowding out effect on the supply of education from market forces, reducing the choice set of households and their welfare.

Our analysis also focusses on the heterogeneity in the distribution of preferences for public and private choices in education. The greater the heterogeneity in preferences for education the more likely is that households choose the private choice even in the presence of significant subsidies offered by the government in the public option. Hence, in the context of significant heterogeneity of preferences for private and public choices in education, the more significant is the scope of redistributive taxation to obtain access to education from the public choice and efficiency in the allocation of resources from the private choice. The model then suggests that policy on education operates through fiscal and preference based choices, emphasizing the role of institutions but also market forces to obtain access and efficiency.

In our model we provide normative estimates of the role of government intervention (understood as a dual policy contemplating income taxation and the provision of a public good) and the competitive shares of private and public choices. This analysis can represent a useful benchmark to evaluate the efficacy of government policy in education, and the unintended crowding-out effects of government intervention in the private supply of education. Deviations from the proposed proportions of

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private vis-à-vis public shares in the supply of education might signal inefficient outcomes in the access of education. Consequently, the paper contributes to literature on public economics by demonstrating that the equilibrium between public and private provision of education is not the outcome of pure market forces, but rather a combination of public policy shaped by fiscal design, institutional constraints, and the social valuation of education.

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