



Pergamon

Economics of Education Review 20 (2001) 27–40

Economics of
Education Review

www.elsevier.com/locate/econedurev

The efficiency–equity trade-off of schooling outcomes: public education expenditures and welfare in Mexico

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Received 14 April 1998; accepted 13 April 1999

Abstract

We analyze how a central government allocates resources to states in the education sector. In particular, we use two relevant criteria in the decision-making process: the equity–efficiency trade-off and unequal concern with respect to the characteristics of states. We perform empirical tests of Mexican state-level education expenditure by the Federal Government and examine changes in allocation patterns by comparing 1980 and 1990 cross sections. A two-sector model is considered in a welfare maximizing context, which allows for a theoretical as well as econometric solution for jointly determined educational expenditure and production. This joint modeling is important, and we provide for a straightforward and easily replicable solution. The addition of the roads sector provides an instrument for endogenously determined expenditure in schooling production. We find that the Federal Government trades some efficiency for gains in equity, but in doing so treats states differently, and that results have changed over time. © 2001 Elsevier Science Ltd. All rights reserved.

JEL classification: I22; O15; O54

Keywords: Educational finance; Efficiency; Expenditures; Resource allocation

1. Introduction

The connection between educational attainment and economic development, as well as the effect education has on distributional concerns, have been widely accepted in the development literature (e.g. Lau, Jamison, Liu & Rivken, 1993; Park, 1996; World Bank, 1991). The trade-off between efficiency and equity implicit in the way in which governments allocate educational resources across geographical areas has also received attention (Behrman & Birdsall, 1988).

But analysis and measurement of the efficiency–equity

trade-off face various theoretical and methodological difficulties. First, most attempts have modeled only the distribution of *expenditures* (see for example, Crouch, 1996; Marais, 1995), whereas the distribution of educational *outcomes* are truly the measure of interest. Second, models measuring the efficiency–equity trade-off almost uniformly contain unaddressed problems of endogeneity.¹ Behrman (1996, p. 347) states that failing to control for unobservables is one of the major flaws of much analysis of schooling policies in developing countries: “A major question for centralized policy makers

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¹ The paper by Behrman and Birdsall (1988) contains an example of both difficulties, as does much of the basic analytic work on the determinants of education expenditure by development institutions (see for instance World Bank, 1998).

and for analysts is whether it is possible to control for unobservables and for the relevant behavioral incentives in analysis of school policies.” He goes on to list instrumental variable approaches as among the most promising and calls for more research in this area. This study helps to answer that call (see also Akerhielm, 1995).

We therefore model and estimate a welfare function that reveals the efficiency–equity trade-off resulting from the allocation of primary and secondary school expenditures by the Federal Government in Mexico. In doing so, we quantify the trade-off with respect to the educational outcomes observed in the 31 states, and we develop a methodology that considers the simultaneous determination of educational expenditures *and* outcomes. In addition, we explicitly account for the correlation between expenditure and average student endowments in the schooling production function.

In particular, we analyze the Federal Government’s allocations to states, and we explore two criteria often considered relevant in the decision-making process: (1) the equity–efficiency trade-off and (2) different treatment of states based on their socio-economic and political characteristics. The underlying structural welfare relation cannot be estimated directly because welfare is not observed; however, our analysis derives expressions in terms of behavioral input and output variables in order to unveil critical parameters of the welfare function.² This is important because official policy statements from the Government never reveal such parameters³ and, while qualitative analysts such as Morales-Gómez and Torres (1990) have shown a keen acumen in discerning such parameters, such political analyses need sound quantitative studies to support them in the policy arena. In short, while other Latin American countries (e.g. Chile) have made advances in using formula grants to allocate educational resources transparently to sub-national jurisdictions, Mexico has not. Our analysis shows that the Mexican allocation pattern does not obviously incorporate rational or effective allocation patterns.

We follow a model developed by Behrman and Craig (1987) and Craig (1987) in which a government with central authority allocates fixed total resources in a sector among the various localities under its control. In order to control for endogenously determined production of the public service, in their case crime prevention, Behrman and Craig (1987) use an instrumental variable approach whereas Craig (1987) uses 3SLS to estimate the whole public service expenditure–production system. In contrast to Behrman and Craig (1987), our model involves

the simultaneous determination of two public service sectors, education and roads, which will allow for various different solutions to the endogeneity of production problem. Specifically, while it is straightforward to address the simultaneous determination of educational expenditures and outcomes, this is only possible if, in the schooling production function, average student endowments are not correlated with educational expenditures. Since we cannot reasonably make this assumption, we must use expenditures from another public service, such as roads, to serve as an instrument for educational expenditure. This joint modeling is important and we provide for a straightforward and easily replicable solution. We thus hope to help fill the gap highlighted in Behrman (1996) (p. 348) by providing a useful “statistical procedure to control for choices in the presence of unobserved variables.”

We hypothesize that this central government allocates resources in the education sector *as if* to maximize a social welfare function, considering public service outcomes as a function of inputs.⁴ The model yields the distributional concerns (*vis-à-vis* localities under its control) of the central government implicit in the observed choice of outcome allocation.

We test the model on Mexican state-level data from 1980 and 1990.⁵ We also provide an empirical exploration of several phenomena widely analyzed by political scientists in a more qualitative manner, such as the influence of voting behavior and political opposition on federal allocations.⁶

2. A model of Mexican literacy and schooling

Education in Mexico has traditionally been a centrally financed public good. The Federal Government is responsible for approximately 80% of total expenditure

² This concise description of our objectives is due to an anonymous referee.

³ See for instance Partido Revolucionario Institucional (1976) and Secretaria de Educacion Publica (1989) for official policy statements relevant to the two time periods studied.

⁴ In using this ‘*as if*’ statement we follow a long tradition in political economics, reviewed excellently in Inman (1987).

⁵ Mexico is a federation of 31 states and the Federal District (DF). Our study deals strictly with the states, largely because the DF has a different and complex institutional education structure.

⁶ For instance, Morales-Gómez and Torres (1990) (p. 51) assert: “Educational financing in general has been used to counteract radical trends emerging from the political conflict permeating society. In this sense, educational policies and programs are used as powerful tools for the political cooptation of leaders, and to eliminate sources of dissatisfaction and conflict in certain social sectors.” These same authors state (p. 173) that: “although education is expected to produce human capital, in practice it is designed to produce political capital for the [Mexican] State and the elites.” See also Dresser (1994).

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