

Measuring the Impact of Reforms in Education
A Research Agenda for Southeast Asia

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1- Introduction

According to the document “Education and Training in the East Asia and Pacific Region” (World Bank, 1998), the 21 clients in the region can be classified in three differentiated groups, based on the Human Development Report Education Index (HDREI). Those groups are: (a) countries with very low income and poorly educated populations (i.e., Cambodia, Lao PDR), (b) poor countries with relatively good educational outcomes (i.e., China, Vietnam, Indonesia and Philippines) and (c) relatively rich countries with well-educated populations (Thailand, Malaysia and Korea). From the countries with active programs with the World Bank, there are eight with GDP lower than two thousand dollars. Their similarities in income do not match with their performance in terms of HDREI, which varies from 0.35 (Cambodia) to almost 0.9 (Philippines) in a 0-to-1 scale.

From those numbers it is possible to obtain two general conclusions. The first one indicates that there are clear reasons, different than wealth, affecting outputs in education (such as budget constraints, human and physical capacities, etc.), which leaves room for effective reform efforts. The second general conclusion is that either the characteristics or the implementation of the reforms carried out by the governments with the Bank’s support have had extremely different results. The latter calls for a comparative analysis that identify the true impact of reforms, separating it from issues related to the socio-political-macroeconomic start point of each nation as well as their factor endowment in education.

The goal of this paper is to suggest several methodological principles to take into account in the process of measuring the impact of reforms in education. Three main aspects are specially considered: (1) in the same way that the literature agrees on using a “production function” approach as a method to explain determinants in educational outputs (in quality or quantity), reforms in education may be seen as changes in the “technology” applied in such production function. (2) Broadly speaking, any goal pursued related to educational outputs requires policy strategies and instruments. However, the effectiveness (or the impact) of such policies are subject to the basic conditions before the reform, i.e., the same policy might have two different levels of achievements due to different sets of basic conditions related to socio-cultural and economic frameworks. (3) Any reform affects educational outputs indirectly, through its effects on the existent incentives in the structure of markets involved (i.e., teachers’ labor markets, post-graduation labor markets). Each reform (seeing it as the creation of a regulatory framework for education or a direct-intervention in markets) affects those structures and triggers changes in their actors’ conducts. On time, performance is involved. Therefore, measures of intermediate outputs in the educational system may help to test broader impacts on outputs.

The following sections are organized as follows: Section 2 presents some background information on the changes in teachers’ work conditions during the past decades and their impact on educational outputs. Section 3 discusses the literature on the area, showing the main outputs generally studied, alternative research approaches and results. Section 4 provides a methodological proposal, based on the lessons learned from the literature. Section 5 briefly discusses data

requirements and limitations of some of the approaches reviewed. In Section 6 a preliminary research agenda for the Southeast Asia region is discussed, based on the recent experiences of regional reforms, countries' goals, data requirements and needs of policy tools. Finally, Section 7 includes a series of papers used in this literature review and/or recommended for further reference.

2- Background Information

During the approximately forty-year period from the end of the Second World War until the 1980s the world gross national product tripled and education went through a period of almost unfettered expansion (Carnoy and Welmond, 1997). By the mid-1980s, however, the situation had changed. In the 1970s, the phenomenon of "stagflation" had replaced rapid and stable economic growth and this was followed by the greatly reduced rate of global economic growth in the 1980s.

The global recession, the rise in real interest rates due to the drop in the rate of inflation, and the declining terms of trade for the exports of debtor economies produced the global debt problem and a severe threat to the integrity of the international financial system (Gilpin, 1987). Supervised by the International Monetary Fund and the World Bank harsh structural adjustment packages mandating severe cuttings in government spending to balance budgets, eliminating trade barriers and social subsidies, tightening money policies, devaluing currencies, and dismantling barriers to foreign investment were forced on debtor (all developing) countries.

The strategy urged on the developing countries resulted in less government spending on education, especially in primary schooling. The most drastic cuts were in Africa where per capita expenditure on education fell approximately by 50%. The problem was reinforced by the fact that while cutbacks were being made on educational expenditure, the number of children up to the age of 15 in these countries is still growing relatively quickly, leading to an increasingly ill-educated young population. This situation, in time, harms the possibility of economic recovery, because nowadays a skilled workforce is vital in view of the services, and production processes required in this global economy (Development Cooperation Information Department, 1994). Clearly, the impact of economic adjustment on education has broadened the gap between developing and developed countries. Moreover, the danger of a widening gulf between "information rich" and "information poor" countries is of particular concern. While all of Africa has barely more telephones than the city of Tokyo, over 85 per cent of 14-year-olds in Scotland, England and the Netherlands have a computer at home (UNESCO, 1998).

The failures of structural adjustment in social areas might have appeared less serious if the adjustment packages would have scored economic success. But they did not and the World Bank reacted to mitigate the most adverse effects on education and, at the same time, to make the sector more efficient and equitable during that period. First, by increasing the amount available for lending to the education sector through investment and adjustment loans, including some specifically designed to implement major structural reforms in education. Second, it promoted a specific set of

educational reforms by enhancing the learning environment, improving the preparation and motivation of teachers, and strengthening the educational management (Carnoy, 1995).

Carnoy has analyzed the changes in teachers' work conditions during the past decades due to changes in the world economy. He considers three types of reforms that have been required of the education sector: (1) reforms driven by changes in demand for skilled workers ("competitiveness-driven reforms"), (2) reforms driven by the need of lowering public budget ("finance-driven reforms"), and (3) reforms driven by the need to increase social mobility and equalization ("equity-driven reforms").

The first ones were organizational reforms aimed at increasing educational quality (as measured mainly by students' performance on standardized test scores) by decentralization (or centralization); improvement of resource allocation and management; and improvement of recruitment and training of teachers. Decentralization means passing the control of curriculum and teaching methods to municipalities and, in some places, to the principals and teachers of the school themselves on the assumption that if they see themselves as responsible for the delivery of education, the quality will improve. Centralization, on the other hand, means having centrally imposed requirements regarding academic achievement on the grounds that they tend to raise overall performance (e.g., the United States Congress move towards requiring students to meet certain minimum standards for high-school graduation and towards raising average student achievement to the highest world levels in mathematics and science by the year 2000). The improvement of educational resources allocation and management aims at increasing teachers' efforts and powers of innovation to produce high academic achievement with approximately the same set of physical assets and pupil population as lower-achieving schools. And the most effective way of producing high academic achievement is through reforms that improve the recruitment and retention of high-quality teachers and include the provision of pre-service and in-service training to maintain and develop their skills and interests.

The second type of reforms were focused on three areas: the shifting of public funding from higher to lower levels of education, the privatization of secondary and higher education, and the reduction of cost per student at all schooling levels. These reforms strongly supported by the World Bank (1990), claim that public education in developing countries should focus on expanding and improving basic education because the social rate of return to resources invested at that level is higher than to resources invested at the secondary and higher levels. As public funds are insufficient to finance the expansion of secondary and university education, increased finance of schooling through user fees will help to expand those levels. And the more privatized the level of schooling, the greater the user fee component in its funding. To reduce the public cost of schooling at all levels, reforms supported by the World Bank include, among others, holding down the overall salary bill, increasing class size, reducing the requirements on formal qualifications and recruiting teachers with little or no pre-service training, and making greater use of teaching in shifts (using double or triple shifts). According to the World Bank, this state of affairs would reduce salary costs and would have no effect on pupil achievement.

The last type of reforms aimed at providing the lowest-income groups with high-quality basic education, and reaching to certain groups who lag behind educationally, such as women and rural populations. The World Bank (1990) consistently argued on the need to expand basic education in developing countries by shifting public resources from higher levels of education to primary education, favoring low-income groups in the delivery of educational services.

The rich countries and most of the Asian new industrialized countries have tended to focus on the organizational and equity-driven reforms. However, the debtor countries (particularly in Africa and Latin America) were required to focus almost exclusively on finance-driven reforms. In developed countries, for example, school decentralization reforms aims basically on shifting management control over schools. In Africa, Asia, and Latin America, the main objective is to shift government's financial responsibilities, reducing central government spending and public spending in general.

Unfortunately such reforms have had economic and educational effects which fail to increase educational quality and equity. The explosive mix of economic crisis and structural adjustment resulted not only in cuts in public spending but in lowered incomes as well, affecting the low-income groups more than the higher-income ones. And concerning education, as the decrease in income was accompanied by pressures to replace reduced public spending with increased private funding to schools, there was a fall-off in the demand for schooling¹.

Moreover, a particularly aggravating threat to the achievement of quality in education was the World Bank's emphasis on specifically reducing public expenditure on teachers' pay. There is certain logic from a finance-driven reform perspective, because teacher compensation is the most important component of total public expenditure on education. However it has not helped public teachers' standing because they have been increasingly perceived as the main impediment to educational improvement in most countries' schools, ignoring the fundamental political realities involved in raising the quality of education, that to improve teachers' skills and commitment inevitably requires a heavy dose of public sector involving and financing (Carnoy, 1995).

3- Annotated Literature

During the last three decades many studies based on educational production functions have examined the relationship among the different inputs into and outcomes of the educational process, trying to find a direct relationship between spending programs and student outcomes². However,

¹ Carnoy (1995) presents the Chilean case. According to a task force reporting in 1994 on the state of education, there had been no significant changes made in the 1980s in the curriculum or pedagogy as a result of the 1980 reform. Moreover, it appears that for pupils from low-income families, who represent a large proportion of all primary school students, decentralization, cuts in spending, and privatization have lowered the quality of their education.

² In economic theory, a production function is the mathematical relationship between output of a firm or economy and the inputs or resources used to produce that output. An educational production function, for example, can depict the achievement of a given student at a particular point in time as a function of the cumulative inputs of family,

their inconclusive results have led lately to the search of different methods of estimating the specific factors determining student performance.

The history of educational production function analyses begins with the “Coleman Report” (Coleman et al., 1966), a massive survey of educational attainment under the leadership of James Coleman. The report’s conclusions were controversial. They appeared to demonstrate that differences in schools had little to do with differences in students’ performance, and that family background and the characteristics of other students in the school seemed much more important.

The problem faced by this group of researchers was to explain educational test scores with school district spending and community income levels as inputs. The difficulty (and the report’s flaw) was that those inputs were highly correlated, making it difficult to tell whether school spending or community income was responsible for the variation in test scores³.

The production function approach has not been universally accepted, particularly among education researchers who tend to analyze students’ performance on tests, rejecting quantitative evaluations of education and schools due to concerns about conceivable analytical problems, or because they believe that educational outcomes cannot be quantified at all.

Generally speaking, production function analyses are systematic, quantitative investigations relying on econometric methods to separate the various factors influencing outcome. Knowledge of the production function and the prices for each of the inputs allows decision-makers a straightforward solution of the “least cost” set of inputs. Educational production functions, however, are unknown and must be estimated using imperfect data; moreover, some important inputs cannot be changed by decision-makers, and any estimates of the production function will be subject to considerable uncertainty (Hanushek, 1986).

Most studies concentrate on public education for lack of comparable data on the private sector. Although there is a number of studies of schooling in developing countries, much of it produced by the World Bank (1990; 1991; 1993; 1996) and other international organizations (Inter-American Development Bank, 1998; Asian Development Bank, 1998), mostly are carried out for developed countries.

A majority of studies measure performance by standardized achievement test scores, although significant numbers have employed other quantitative measures such as student attitudes, school attendance rates, continuation into college or dropout status, etc. (Hanushek, 1996).

While standardized test scores are the most commonly used measure in investigating

peers, and schools and teachers. Or it can depict the aggregate performance across school buildings or districts, etc.
3 Correlation is a statistical measure of the closeness of the variations in the values of one variable to the variations in the values of another. In general, the higher the correlation of the variables, the harder to disentangle their separate effects on the dependent variable.

educational process there still remains some uncertainty about their appropriateness as outcome measures. Standardized tests employed by schools lack external validation in terms of labor market skills or other subsequent outcomes because they are designed mostly to examine students on specific knowledge; rank students in terms of skills or knowledge; or predict performance (in future schooling). However, recent studies have tended to find considerable evidence that test scores are increasingly related to labor market performance (Bishop, 1991; Betts, 1995)⁴.

By far the most common approach in education production relationships is to analyze cross-sectional variations in measures that can serve as proxies for future performance⁵. And a typical starting point has been investigating how schooling affects labor market performance and other post-schooling activities.

There are some fundamental difficulties with existing research into post-schooling outcomes. First, the concentration on quantity differences, or pure time spent in schooling activities, as opposed to quality differences. This concentration on quantity of schooling is explicable in terms of availability of data. However, treating all time spent in schooling activities equally neglects the possibility that time in school might very well have different value from that spent in other settings. Attempts to incorporate qualitative measures of schooling into labor market studies have been severely limited by availability of data, by the necessity of using fairly unusual samples, and by the dependence on restrictive assumptions about school operations. Second, the presumption of the improved performance of the more educated remains unclear. There is not enough available data to determine conclusively whether the belief that more educated individuals are able to perform better more complicated tasks is valid or not (Hanushek, 1986).

A general line of research has been to incorporate measures of the characteristics of individuals' schools directly into earnings functions or to include measures of specific school resources or characteristics of teachers in the earnings models (Hedges, Laine, and Greenwald, 1994; Burtless et al., 1996; Goldhaber and Brewer, 1997; Hanushek, 1997).

The most reliable estimates come from the real resources that are the prime determinants of variations in spending per pupil: teacher-pupil ratio, teacher education, and teacher experience. Teachers' education and experience are the primary determinants of variations in teachers' pay and, when combined with the number of pupils for each teacher, indicate how instructional spending per pupil varies. These data are available in databases that supply background and performance information for individual students, providing a solid basis for estimation of achievement relationships (Hanushek, 1996).

⁴ Almost all studies of earnings that include both quantity of schooling and achievement differences find significant effects of quantity that are independent of achievement differences. This implies that measured differences in achievement do not adequately measure all skill differences. At the same time, however, test scores have an important use in selecting individuals for further schooling and thus may relate directly to the "real" outputs through the selection mechanism (Hanushek, 1986).

⁵ Cross-sectional analysis is defined as a statistical analysis of the unique observations on different units at one point in time. In this study, for example, variables used are post-schooling salaries, access to schooling, and equity in education.

However, some aspects of the educational process are inherently difficult to disentangle from the characteristics of individual teachers' skills (such as classroom management, communication skills, etc.). Many educational decisions are made mainly by teachers, and they are difficult to observe and measure and, quite possibly, not easy to reproduce. The concept of skill differences simply recognizes that individuals with the same measured characteristics make a series of important production decisions (reflected in behavior, process choices, etc.) that are difficult to identify, measure, and model. And recognition of skill differences does alter the interpretation of teacher and school inputs. It is still reasonable to consider the impact of the explicit measures of teacher characteristics, because many school decisions such as hiring and salary are based on a set of these characteristics. The estimated impacts of these measured attributes, however, indicate the inability either to predict or develop more skilled teachers according to the attributes identified. And this means that if schools are maximizing student achievement (or trying to), then the preceding evidence indicates that schools are inefficient because they pay for attributes that are not systematically related to achievement (Hanushek 1986 and 1996)⁶.

In summary, some educational researchers have concluded that the production function studies give little evidence that variations of resources have anything to do with present variations in student outcomes because of the inefficiency of schools as schools are currently operated (Hanushek et al., 1992; Lamdin, 1995; Hanushek and Jorgenson, 1996).

On the other hand, some other researchers maintain that there exists a clear connection between educational resources and performance if the right specification of the production function (including the functional form, level of aggregation and relevant control variables (either at the student, class, school, or state level)) is used⁷. For example, Krueger (1999) has shown in the only large-scale randomized experiment on class size ever conducted in the United States that, on average, performance on standardized tests increases the first year students attend small classes; that test score advantage of students in small classes expands in subsequent years; and that class size has a larger effect for minority students and low achieving students.

Moreover, the findings of Card and Krueger (1992 and 1996) indicate that variations in school resources are related to earnings differences among workers as well. Using earnings data from the 1980 census, the authors find that men who were educated in states with higher quality schools

⁶ There is a distinction between economic efficiency (the correct choice of input mix given the prices of inputs and the production function) and technical efficiency (operating on the production frontier). The previous evidence relates directly to economic efficiency.

⁷ Specification error of the production function can result in two ways. First, we may have the proper variables in the model but specify the functional form of the relationship improperly. The regression model assumes that the relationships between the independent variables and the dependent variable are both linear and additive. If these assumptions are violated, the least square estimators will be biased. The second form of specification error occurs when one estimates a model with the wrong independent variables. Either one or more variables that should have been in the model are omitted, or one or more variables that should not have been included are, or both. The most important thing to recognize about specification error is that, to a substantial degree, it cannot be dealt with at the level of data analysis. Specification error is at heart a question of whether the regression equation corresponds to the process being modeled and estimated. This means that a researcher needs a sufficiently well developed theory to know which variables should be in the equation and a set of indicators that measure those variables.

have a higher return to additional years of schooling, and that rates of return are also higher for individuals from states with better educated teachers and with a higher fraction of female teachers.

The current debate over the lack of an overall relationship between resources and performance may derive from the fact that the appropriate specifications of the educational production function are uncertain (Card and Krueger, 1996; Krueger, 1999), or may arise within the existing structure and operating procedures of schools (Hanushek et al., 1994; Hanushek, 1996). In any case, no one can deny that a different organizational structure with different incentives could produce very different results, particularly related to teachers' pay (Ballou and Podgursky, 1997). Ballou and Podgursky (1997) claim that the quality of teaching depends more on whether schools can systematically choose and retain the best teachers from the pool than on increasing teacher salaries. Moreover, they maintain that certain key features of the labor market for teachers (the institution of tenure and other forms of job security, costly barriers to entering the profession in the form of certification requirements, and procedures for recruiting and hiring job applicants that overlook valuable signals of teaching effectiveness, etc.) should be altered to expand and improve the pool of potential teachers and, then perhaps raising teacher salaries would have significant effects on student learning.

In most countries (developed and developing alike) salary schedules of teachers employed in public education are rigidly linked to the education levels completed by the teacher and number of years of teaching experience rather than individual teachers' educational output. Carnoy and Welmond (1997) have shown that teachers' compensation is based largely on the overall economic level and economic growth of a country, and that as gross national product per capita increases governments have raised teachers' salary. Yet, the determination of teachers' pay varies among countries. Whereas in most developed countries the value the teaching profession commands is one of the determinant of its higher wages, in developing countries teachers' pay tend to be more affected by gender, school location, public versus private teachers, and unionization. And depending on these factors, they will be lower or higher than expected (Inter-American Development Bank, 1998; Liang, 1999).

Liang (1999) examines the case of teacher pay in 12 Latin American countries. He found out that, although on average approximately two-thirds of the teacher workforce are females, male teachers are the ones to be systematically paid more. Even though it is unlikely that official pay scales explicitly reward male gender, it well may be that the gender bias exists on the hiring side. This means that when determining who gets the administrative slots within the educative system (which implies longer working hours but are better paid) it is possible that a higher percentage of male teachers get them.

There is a difference between public and private education in Latin America. In general, the private education sector in Central America is not very well developed whereas in South American countries, the concept of private schools is more on the line with the traditional elite type where teachers are relatively better compensated. This could be the reason why in Central America public teachers are paid more than private teachers, while in most South American countries private

teachers enjoy a considerable higher salary than their public sector counterparts⁸.

Regarding wage differentials for working in difficult areas, his findings show that none of the 12 countries compensate this situation, and that there is no encouragement for teachers to serve in rural or other less developed parts of the country. This pattern contrasts sharply with that of the rich countries where salary adjustments are awarded for school location. One possible explanation could be the cumulative effect of reduced access to in-service training and fewer opportunities for administrative advance over time that eventually add up to “disadvantaged” areas teachers earning less than their “advantaged” areas counterparts. Such an adverse incentive structure has led to the impoverishment of the pool of teachers in rural areas. Due to the lack of measures taken first to attract and then to retain good teachers in those areas, the results are that they tend to be less experienced and with fewer years of schooling than the average teacher of urban areas. On the other hand, when comparing the magnitude of the coefficient associated with the rural variables, Liang found out that the discrimination against rural areas in general is much worse in the non-teaching sector than in the teaching sector.

In Latin America teachers are paid less but they are not underpaid if the number of hours they work are taken into account. This means that an across-the-board salary increase may not have a big impact on recruiting and retaining better teachers (IADB, 1998; Liang, 1999). Liang’s study indicates that teachers in Latin America are motivated by job characteristics other than pay. The reason may be that people who opt for a teaching career are more likely to want to work for fewer hours. Besides, people entering a teaching career face much less uncertainty about what their income and job tenure will be than non-teachers.

In the non-teaching labor market earnings differentials reflect not only the higher risk associated with a job with less security and predictability in lifetime earnings, but differences in individual productivity that are observable and rewarded. In the teaching sector, on the other hand, inadequate professional development opportunities and few rewards for knowledge and skills are barriers to improve teachers’ performance. Furthermore, there is some evidence of inefficient incentive structures for teachers in developing countries, with teacher characteristics that produce improved student achievements commanding only weakly higher pay, while other teacher traits that have few discernible learning benefits for the students having strong salary pay-offs for the teachers (Kingdon, 1996)⁹.

⁸ Piras and Savedoff (IADB, 1998) report that teachers in Bolivia earn more on average than workers with similar characteristics in the private labor market. Being a teacher in the public sector assures a significantly higher level of hourly wages than for people with comparable education, experience, location, and gender. However, teachers who work in private schools earn on average 31% over those working in the public sector.

⁹ Kingdon investigates which specific institutional variables are the most significant in boosting student learning in India, controlling for household characteristics, since institutional (schools and teachers) variables are more responsive to policy intervention than student home background. The paper conclusion is that much of the educational data and debate in India has been on measures that, according to her data, are dubious indicators of school quality because teachers are not rewarded for characteristics that were found to be significant influences on student achievement.

This does not mean that incentives based upon student outcomes are not possible or do not exist. Reports on programs instituted around the world using financial incentives to boost teachers' performance have shown some preliminary success. It has been found that teachers in schools that use merit pay are generally supportive of it and that it has a positive impact on student performance (Ballou and Podgursky, 1993; Ladd, 1999, Liang, 1999)¹⁰.

But virtually most studies of measurement of determinants of student performance have ignored the overall structure and organization of the educational system. Carnoy (1995) has analyzed the quality of education among debtor and creditor countries looking at three types of structural reforms that were provoked by changes in the world economy in the past decades. He found out that the disparities in performance have increased because "finance-driven" reforms tend to be "short-sighted", undermining a country's perspectives of producing and delivering higher quality education, while the "competitive-driven" and "equity-driven" reforms in place in developed countries have had the opposite effect on their education sector.

4- Methodological Proposal

4.1- Actors and Goals in the Educational System

As seen in the previous chapter, not much is known about the impacts of reforms in education in developing countries. This paper draws attention to some issues to be taken into account in developing a research agenda in that direction. In the third section, this paper reviewed the literature on education and economics of education to compile a list of potential intermediate and final impacts of payment reform that could be monitored as part of an evaluation project (completion rates, students' exams, teachers' qualifications, wages and training, among others). This review is not intended to be exhaustive, but to present enough evidence to justify consideration of several issues in the research agenda. Along this section, some methodological aspects are considered in the definition of an agenda to evaluate reforms in education in order to identify unmet needs, and to help in articulating focused policy recommendations.

Specifically, the paper suggests studying the effects of payment mechanisms,

¹⁰ Ladd (1999) presents evaluations on the Dallas school accountability and incentive program that indicates a significant impact on student performance through the uses of financial incentives for teachers. Liang (1999) illustrates the *Carrera Magisterial* program in Mexico. The program is designed to create a system of teacher compensation based on professional skills, teacher performance, and the constant upgrading of teacher skills. The program is voluntary for all primary and secondary teachers and participating teachers are subject to an annual global evaluation and their salary increases are linked to the results of the evaluation. By 1997, 50% of all teachers were participating in the program. However, impact on student performance still remains to be assessed. Ballou and Podgursky (1993) examined data from the 1987-88 Schools and Staffing Survey and found out that teachers in districts that use merit pay do not seem demoralized by the system or hostile toward it. Moreover, teachers of disadvantaged and low achieving students are generally supportive of merit pay.

decentralization, teachers' training and other aspects related to the organizational reform of the educational system in terms of its market structure as well as in the way providers are organized. The main argument is that changes triggered by a reform provokes rearrangements in the provision modes -- e.g. risk shifting among schools, admission rules, competition, fee structures -- which affect educational outputs. These changes in the structure of provision are particularly important in developing countries, where mixed public-private systems interact in a more stratified environment, affecting each other, and generating quality gaps and misallocation of resources.

The question of how to provide the most cost-effective interventions in education has been of increasing interest to school managers and providers, parents and students, and the government. Reforms in education in general, and provider payment systems in particular, have been central to this discussion. These mechanisms are defined as the way in which money is distributed from a source of funds such as the government or other stakeholder to schools and teachers.

Any contact between a teacher and his/her payer (parent, government or donor) involves a problem of asymmetric information against the latter. The student attends school to learn, but the payer does not know if the quality and the quantity of the instruction received are the right ones. The reason is that the payer is not able to separate between the effort carried out by the teacher and the effort/skills of the student. Only results (sometimes) can be evaluated. In addition, the organization of the educational system as well as the availability of inputs (textbooks, didactical material, etc.) has influence on the final result, which is the level of apprenticeship of the student. Moreover, if the performance of the educational system is evaluated through more general indicators, i.e., wages earned at the labor market by students after they leave school, the impact of teachers' efforts or qualifications is still more difficult to assess, and therefore to reward.

Therefore, based on an informational problem, the goal of a reform on education is to improve the learning process by aligning the goals of teachers and students with the government's, which for simplicity is assumed to be the improvement of students' standard of living. The question is how to align, or to bring closer, the preferences of all parties involved.

Provider payment mechanisms are one of the tools to deal with this problem. Payment mechanism are defined as a type of contract among two or more players – schools, teachers, parents, and other stakeholders, like the government -- that creates specific incentives for the provision of education, minimizing the risk of opportunistic behavior of any of them. In the case of a provider payment mechanism, it helps to take care of some aspects of the lack of symmetry in information across actors, by defining rules such as prizes based on results, vouchers, criteria for students' transfers between schools or rejections, among others. Although this topic is in the agenda of any educational system, it is even more important in developing countries' reforms, where the shortage of resources requires taking the most of the investment in the area.

In addition, there are several non-monetary incentive schemes to be taken into account in the "production of education." Much of the literature on efficiency wages is devoted to this kind of argument: the performance of workers (in this case, teachers) is not only associated to the economic

retribution for their work, but also by non-monetary factors, like on-the-job training, better working conditions, access to infrastructure, and reputation, among others.

The design of a reform in developing nations is focused in one main issue, which is how to separate the provision of services from the financing structures. The main idea that rests behind this argument is that the concentration of both tasks under the same institution may allow for a lack of monitoring, concentration of power without control, and therefore, opportunistic behavior with negative effects on the effectiveness of the services provided. Contractual agreements between providers and financiers are instrumental to separate both functions, giving room for more control. If those agreements are defined under the right incentive structures, the provision of the services will improve, while causing a better allocation of resources. Several recommendations are related to this principle: subcontracting and private participation in the provision of services, vouchers, support to NGO participation in the supply of education, and public-private partnerships are good examples.

Decentralization is also a way to separate financing roles from the provision of services, while providing higher levels of management, responsibility and decision making at the decentralized level. In all cases, the way of defining incentives to pay for teachers' efforts is in the center of the debate.

The economic literature refers to these types of contracts under imperfect information as agency theory. The agency theory considers the contractual relationship between two actors: a *principal* and an *agent*, where the former hires the latter to perform a task or service. The goals of both actors do not match necessarily, then agents -- knowing the impossibility of perfect monitoring/knowledge of their actions -- do not fulfill principals' goals if there is a contradiction between theirs and the principals'. Principal-agent theory suggests that under these circumstances the perfect contract does not exist, but the best possible deal is found if principal generates incentives such that the agent's best choice is to align both goals as much as possible. Those incentives are related to payment mechanisms, and to the development of a handful of non-monetary incentives.

Five main actors are affected by provider payment reforms in education: schools, teachers, students, parents and payers (the parents themselves, the government or donors). Each actor has its own set of goals that may or may not coincide with the others. Depending on how they are used, provider payment mechanisms may exacerbate differences in these goals or may offer a mean to bring closer the goals of each actor.

A partial solution to this problem might be to select provider payment methods that align (or strike a compromise among) the goals of the principal and the agent. In other words, provider payment methods may offer a mechanism to compromise between players with different goals and may also offer financial incentives to encourage players to achieve these contracted goals.

Finally, recent efforts done by international organizations, donors, governments and research institutions have been devoted to the study of issues related to incentives and performance in social sectors. In many cases, comparisons between health and educational services have been done,

pointing out the “relative higher information asymmetry” of physicians over patients than the one of teachers over parents and students and, therefore, the more difficult structure of health care services provision and regulation.

Even when this perception is probably true, there is an additional element in educational services that has to be taken into account. In the case of health care, the patient is the client, and sometimes the payer – if there is not insurance or government. Therefore, the main issues in health are (a) the relation between patient and doctor, i.e., how the doctor creates derived demand or not, (b) how the payer has to define incentives in order to avoid the chance of moral hazard from this doctor-patient encounter.

In the case of education, there is a separation between the person who demands education services and the individual to be educated. Prices or quality of the education may affect parents’ behavior, even if they are not payers, but children’s incentives are not included in the structure of incentives and payments. It is difficult to admit that an infant has the ability to rationalize that avoiding leisure today will improve his/her lifestyle tomorrow. Following this argument it could be possible to include the idea that in education, moral hazard can show the opposite effect than in health, and “under-dedication” from students can end up with higher repetition rates (over-consumption), or by the opposite, higher dropout rates (under-consumption).

In short, teachers, as the agents in the structure of education, are the main “input” in the learning process. In order to perform effectively, they need economic and non-economic incentives, as well as to receive the tools (in-service training, textbooks, etc.) to improve their tasks. These tools are also – together with the motivation from the family and the environment – the set of conditions to motivate and to develop the abilities of the pupils. The performance of the teachers’ educational duties is part of the functioning of a market in education, where schools, either in a competitive or a cooperative way, constitute the supply. The parents and the government are the demand, who define the incentives and are the principals in the structure of education. Under this scheme, reforms in education play the role of redefining the set of economic and institutional rules of the game, in order to achieve cost-effective results. However, the effects of reforms are subject to the characteristics of the market of education as well as some other aspects, related to the context where the interaction of these actors takes place. Next section provides a conceptual framework to analyze it.

4.2- Initial Conditions and their Influence in the Outputs of Reform

The design of a research agenda on provider payment mechanisms in developing countries, and their effects on outputs in education requires considering two sets of elements. The first set includes the knowledge of the typical reactions in performance triggered by each reform scheme. The second set considers the limitations and the constraints that arise from the study of less developed nations’ educational systems, and that may affect not only the effects of the incentives present in a reform, but also the research possibilities. They can be summarized in three main issues. They are: (a) data availability, (b) awareness of the basic conditions from where the reform departs, and (c)

awareness of the broader diversity -- within and between nations -- present in developing countries in comparison with developed nations, and how it affects the linkage between monetary and non-monetary incentives and outputs in education. Such diversity can be seen in terms of nutritional and health status, location of schools, distribution of income, regulation and institutional frameworks, etc.

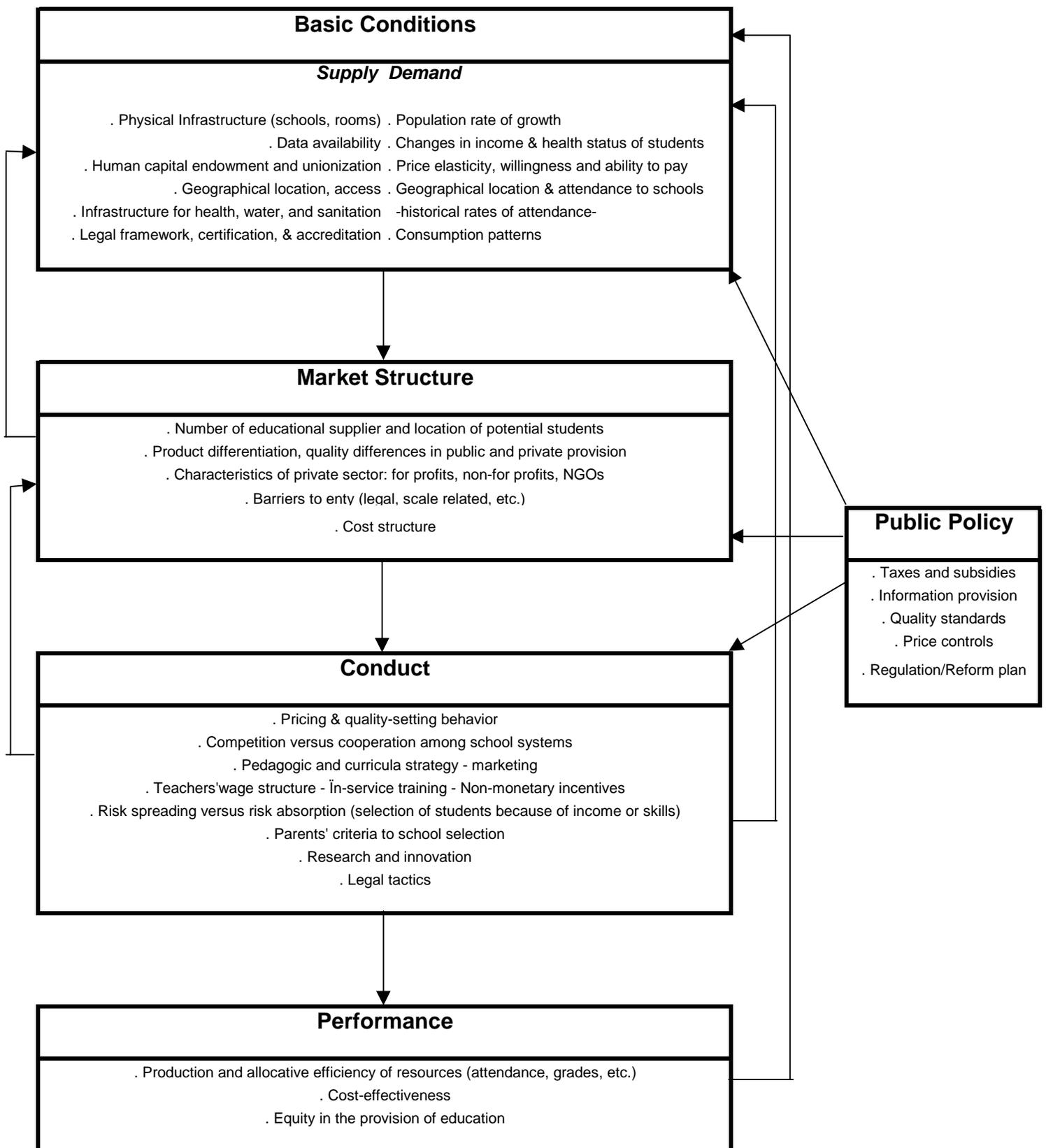
As mentioned before, incentive mechanisms are contracts among several players. However, these contracts are not isolated; they are applied to contexts with different students' and teacher/school characteristics, as well as alternative sets of institutional rules and resource endowments. Therefore, different contract structures may impact differently on educational markets. Likewise, a different context may alter the effectiveness of a contract.

Therefore, payment mechanisms or any kind of incentives are just one important component in the educational system. They, along with other basic conditions – e.g. infrastructure, health and income patterns, urban concentration – redefine the incentives for providers. Schools and teachers react to the new payment mechanisms in different ways, reshaping the structure of the markets in education and affecting their development. The incentives, in turn, modify players' strategies and performances in terms of quantity and quality of learning.

This view is the one of the *structure-conduct-performance* paradigm, supported by the traditional industrial organization perspective (Sherer and Ross, 1990), which has been used as a referential framework to study market behavior in a broad sense. According to this approach, *market structure* (i.e. number and characteristics of schools and teachers and their market shares, degree of product differentiation, characteristics of the private sector) determines firm *conduct* (price setting strategies, investments in capital and research, marketing methods), which in turn affects market *performance* (efficiency, cost-effectiveness, profits, equity). Basic conditions, as educational patterns, human and geographical location of factors, simultaneously influence market structure and supplier conduct. However, it is known that the influences between one element and the others are not always unidirectional: performance feeds back to structure, and changes in conduct affect the basic conditions that link with the structure of the market. Figure 1 shows the typical setup of the structure-conduct-performance paradigm, which was slightly altered to fit the case of markets in education.

There are many alternative changes in school strategies. Always depending on the characteristics of their facilities, educational institutions may decide to specialize in a group of children or social or geographical groups. They may prefer to keep certain type of students, shifting the rest to other schools in order to avoid risks of unexpected costs and assure their reputation.

Figure 1: The Structure-Conduct-Performance Paradigm in Educational Markets



The replication of this analysis has direct implications for an applied research agenda on provider payment mechanisms in developing countries – characterized by mixed public-private structures --. This could be especially useful in those countries where the public sector plays a double role of financier and non for-profits provider of education, competing at the provision stage with for profits private institutions. These types of exercises would help to measure the effectiveness of payment mechanisms under different ownership models, or alternatively, the effectiveness of different payment schemes under similar ownership structures.

Two main issues can be rescued from the structure-conduct-performance approach in the design of a payment mechanism research plan. First, the impact of provider payment reforms can not be considered in isolation: the payment mechanism might provide the direction of the change, but not its intensity; other factors define a significant portion of the impact. This is important when comparative studies (across nations, provinces, levels of education, etc.) are performed. These studies require to be controlled by each case basic conditions, to avoid over or underestimation of the effects of each policy.

The second issue is that the impact of a provider payment mechanism on educational outputs is the result of a sequence of linked reactions provoked by the policy through the system. It leaves room to measure intermediate outputs of the provider payment reform, such as changes in children motivation techniques, increase or decrease in transfers of students across institutions, as well as effects on the internal organization of schools and their effects on the market structure for education.

The arguments introduced in this section show how broad are the possibilities of analyzing the impact of payment mechanism and other reform tools on educational outputs, as well as how important are the data requirements to perform them. On the other hand, these studies also introduce the discussion about how to isolate the payment mechanism effect on education from other influences – i.e., demographic and skill characteristics, availability of schools and teachers --, or how to properly introduce the framework within which the linkage between payment and outcome takes place. Every country has information available related to different outputs in education, as well as data about input endowments, like teachers, rooms, schools, or budget availability. However, additional efforts are needed in order to organize a system of indicators that would be able to account for the institutional and organizational changes that occur due to a reform. Those indicators may be key elements to measure the impact of a specific policy within a reform strategy, providing information to correct or reinforce the strategy planned by decision-makers.

4.3- Indicators of Reforms in Education: Measuring effectiveness

The traditional analysis of indicators in education (number of students, completion rates, etc.) only allows for the observation of the change, such as if we are comparing two pictures taken in two different moments on time. However, they do not tell the way that different components of the reform affected them.

As an example, let us consider that from time 0 to time 1 the completion rate grew. Let us

assume also that during that period, a new training scheme was instrumented, and that there was a cut in funds for education at the central level, providing higher autonomy to municipalities. The policy-maker may be interested in knowing which one of the components of the reform – if any – affected the output in education in order to acknowledge the effectiveness of each component from the policy perspective. The policy-maker would also be interested in recognizing if the increase in the completion rate is the result of the reform or is due to some external factor, such as a raise in the GDP per capita.

Therefore the main argument behind the construction of a set of indicators is that the “production of education” can be seen as a result of the interaction of several inputs (teachers, books, financial resources) as well as managerial aspects (related to the capacity of the school to make decentralized decisions, for example) and external factors (as the existence of competition among schools, poverty, skills, urban population, etc., of the pupils), which is consistent with the approach introduced in the prior section.

In this way, the indicators of the reform are part of the set of explanatory variables used to understand changes in educational outputs. Once the statistical analysis is performed, the set of coefficients found will be able to explain the impact of each group of variables (inputs, reform, external factors) on the performance of the sector.

In other words, the purpose of building a set of indicators to monitor and evaluate the reforms in education is not only to show the results of the educational sector, but also to follow the changes occurred through the application of each component of the reform. Given that any reform has different dynamic components, i.e., decentralization, participation of the private sector, changes in payment mechanisms, teacher training, it is important from a policy viewpoint, to identify and separate the effects of each one of them.

The set of indicators to be built in order to capture the impact of each component of the reform policy has to fulfill several postulates. They are:

- The jurisdiction of the data collection (national, provincial, municipal, school level, public or private) must be consistent. In addition, the collection must be periodical, to allow comparisons across different periods of time, before and after the reform.
- The indicators must be univocal, which is, they should not allow for different interpretations.
- They must be feasible, that is, they should be possible, low in price, and easy to collect, in terms of the availability of resources and the experience of the institutions that carry out the task.
- They must be flexible, which is, they have to be easy to adapt to a dynamic framework such as a reform in education performed in successive stages (i.e., the indicator should be able to accumulate successive functions of decentralized units).

As mentioned before, there are four kinds of indicators:

- Those related to the results or outcomes to evaluate (i.e., completion rate, dropout rate, measures of quality).

- Those related to the reform itself, which will influence the educational outputs (decentralization, payment mechanisms, community participation, rol of private sector, etc.).
- Those that account for the installed capacity of the system in terms of human and capital resources, and financial endowment (i.e., number of teachers, number of schools, budget constraints).
- Those that are related to the context of the reform, which directly or indirectly affect its development and its impact (i.e., macroeconomic factors, income distribution, urban and rural population shares, among others).

These groups of indicators play different roles from the public policy perspective, because they are related to the goals to be fulfilled, the strategies chosen to pursue them, the tools that are used to instrument those strategies, and the context where the chosen strategy is carried out. In addition, several policies have impact on certain stages of the educational system, which in turn is the object of some other aspects of the reform. As an example, teachers' training directly affects the probability of better classes, which in turns may have influence, together with a voucher system, in the final outcome of education, such as better pupils' grades (Figure 2). A list of indicators related to the reform is presented in the Table 1. They are not exhaustive and not necessarily the same for each reform. However, they provide examples to be considered in a research design.

Variables that are independent of changes in the model of education, but occur simultaneously, could also have influenced educational outputs. Among these variables are population growth and barriers to access to education, associated with income inequalities or increase in the costs of didactic materials. All of these variables could affect results, independent of the success of any reform. Therefore, an increase in population on in costs could have repercussions on the ability of the national resources to meet demand for education, or alternatively, the lack of access to education could limit the use of available schools. In any case, it remains important from a public policy perspective to be able to identify the factors that are at play, affecting education results.

The participation and the degree of coordination/competition between public and private schools also play an important role in the effectiveness of the reform. These aspects are subject to the characteristics of the market, from the supply side, provoking strategic reactions that affect each other. As an example, differences in strategies between public and private schools within the same neighborhood may increase the rate of selection of students, based on the ability to pay or other indicator associated to students' skills – and therefore, affecting the costs of teaching – such as family income.

The availability of detailed data plays an important role in the definition of a research agenda. The more desegregated the level of information, the more accurate and valuable are the results originated in the study. Depending on the specific goals of the research agenda, output indicators can be built in order to account for the changes caused by the reform in different countries, municipalities, schools, etc. Next section is devoted to discuss the main characteristics of the databases used by the literature.

Figure 2: Dependent and Independent Variables in Education: Examples

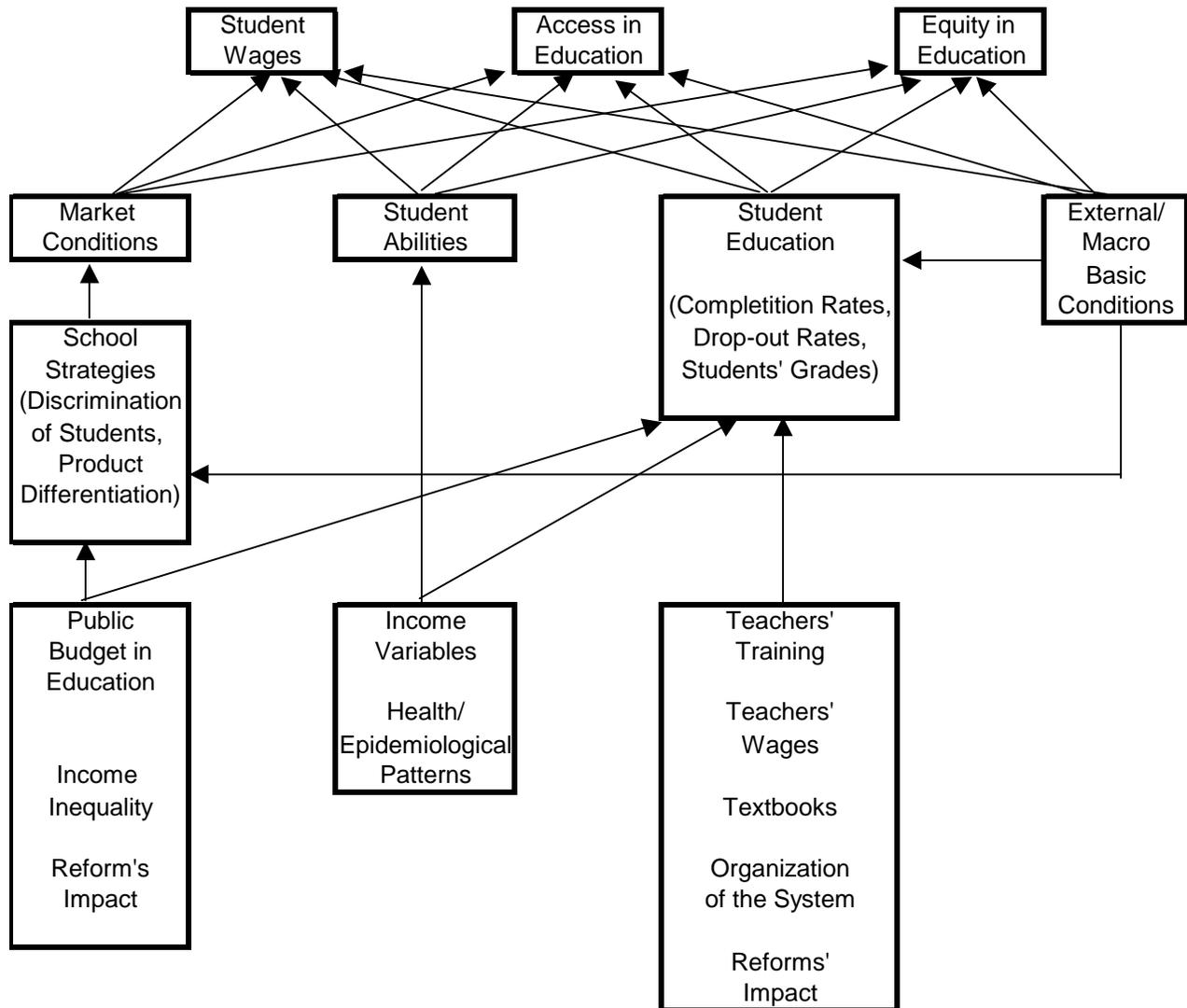


Table 1: Indicators of Reform

Area	Indicator
Budget Decentralization	<p>percentual change in the amount of dollars spent by the central government in teachers' wages (by department or rural/urban areas)</p> <p>percentual change in the amount of dollars spent by the central government in teachers' training (by department or rural/urban areas)</p> <p>share of the central public budget spent in transfers to private schools (by department or rural/urban areas)</p>
Management Decentralization	<p>percentage of teachers hired by local authorities, or school director</p> <p>number of months since decentralization (by municipality or department)</p> <p>percentage of the budget originated by central government funds (by department or by municipality)</p> <p>percentage of the human resources working at the local level that is paid by funds managed by the local authority</p>
School Authonomy	<p>percentage of the budget originated by vouchers (at school level)</p> <p>percentage of students rejected, by income level, by type of school</p> <p>percentage of students admitted from other schools, by type of school</p>
Provider Payment Mechanims	<p>percentage of teachers' wages that are related to performance (in average, by school, by type of school, by department, by measure of performance)</p>
Teachers Training	<p>percentage of teachers that participated in training activities in the last year (training activities can be divided between those related to curricular issues, to pedagogical issues, etc)</p>

5- Data Requirements and Limitations

Across countries, governments are seeking policies to make education more effective while searching for additional resources to meet the increasing demand for education. Databases and indicators represent the consensus of professional thinking on how to measure the current state of education locally and internationally. They provide information on the human and financial resources invested in education, on how education and learning systems operate and evolve, and on the returns to educational investments.

In this paper, salaries earned by students after they leave school, access to education, and equity in education are the dependent variables explained by market conditions; student abilities and educational status; and the external (macro basic) conditions. Indicators related to these variables can be found in local databases and international one. To obtain cross-country information the best available sources are household surveys, censuses, and information provided by the Ministries of Education and Economic Affairs.

But when international comparisons are called upon, sources of information are more difficult to get. To analyze student education, for example, the best source is the United Nations Educational, Scientific and Cultural Organization (UNESCO), particularly by the UNESCO Institute for Statistics (UIS). Its databases and indicators contain information regarding each national education system (institutions, teaching staff, and enrolment by level of education and by sex) from 1980 onwards; participation in education; internal efficiency (percentage repeaters, repetition rates by grade and sex, etc.), and indicators on human resources.

However, even when children are in school they are not necessarily in an environment conducive to learning. This fact is masked by most international educational indicators, which mainly concern enrolment figures. Such factors as the physical state of schools, the size of classes and the availability of teaching materials are not reflected. So, it is highly recommendable to include such information, which can be found in UNESCO World Education Report

One way to assess how much teachers are paid internationally is to make comparisons of current levels of teachers' compensation and how it changed during the last decades. Most information available is based on pay for teachers employed in public education. However, comparing public salaries across nations is relevant when, as is often the case, most teachers are employed by the public sector. This comparison would allow to analyze whether there is an internal consistency to government spending or not. Some sources of information are the International Labour Office (ILO), the Organization for Economic Cooperation and Development (OECD), UNESCO World Education Indicators, and USAID/UNESCO Global Education Database.

Information on educational expenditures per pupil (textbooks, didactic material, etc.) comes primarily from UNESCO's World Education Indicators, World Education Report and Annual Statistical Yearbook, and OECD's Educational Indicators. Data concerning the organization of the

system (teachers' number of classroom hours per year, teachers' education and experience, and certain key features of the labor market for teachers) is available for OECD countries, however, for developing countries it may be hard to get accurate data sources.

Sources of information for external/macro basic conditions, such as size of the economy (GDP, GNP per capita, or PPP GNP), distribution of income or consumption, etc. are the World Bank databases, particularly the World Development Indicators and the World Development Report. Moreover, both sources have information on public expenditure on education. UNESCO also provides indicators on financial resources (public expenditure on education as a percentage of GNP and as a percentage of total government expenditure, etc.)

To assess health/epidemiological patterns a good source is the World Health Organization (WHO), particularly WHO Statistical Information System and the World Health Report which contain information on basic health indicators, disease statistics, immunization, burden of disease activities, and health personnel. The World Development Indicators and the World Development Report also have information on health expenditure, services, and use, access to health services, etc.

Statistics and indicators related to educational systems, policies, and educational reforms implemented are available from OECD databases (Education at a Glance and Education Policy Analysis series). However, most information concerns OECD countries and only in recent years information on non-member countries has been included.

6- Conclusions and Recommendations for a Research Agenda

As introduced in section 4, changes in payment structure and the normative of the education sector trigger changes in the mode of provision. Each provision mode implies modifications in the organization of the supply, such as choice of teaching and pedagogic methods, responses to risk, definition of management strategies, etc. In turn, these organizational responses generate changes in outputs in education.

This sequential adjustment process leaves room to study --in a broader sense-- the changes generated by remuneration patterns as a chain of events, where intermediate outputs are signals of how schools and teachers respond to monetary incentives. From a policy viewpoint, this approach may be useful because it provides with a rationality to study intermediate outputs of the system, and contractual relations among parties as a way to learn about the effects of payment mechanisms on education.

The decentralization component of the reform distributes decision capabilities to the departmental and municipal authorities that were previously conducted at the national level while reorganizing the distribution and origin of government funds to local levels. Hence two elements

are at play in this decentralization strategy. On one hand, there is the need to generate the human resources required to manage the public system from the local level, and on the other hand, there is the need to organize the transfer of funds from the national level.

The view of a broader picture when studying effects on education due to different reforms or different reform contexts are important from the policy perspective. One research possibility is to perform a comparative analysis of changes in outputs in education in a context where there are two or more co-existent ownership structures in provision, or two or more co-existent payment schemes. An example of the first case is the public sector subcontracting different private institutions (i.e., for profits and non-for profits) to supply education to the poor, at the same time that those providers serve other private pupils. An alternative analysis is to choose two markets with similar structures but different public schemes of payment. In this case, the comparison can be applied to a typical fixed-budget financed public school against private providers subcontracted through vouchers by the public authority. In both cases (the one controlled by the provider, and the alternative controlled by payment structure) the use of demographic characteristics will control for differences among students. These kinds of experiments will give hints about the effectiveness of the payment mechanisms applied under different ownership models.

In all cases, the use of cross sectional analysis in a broad sense –by schools, by regions, by ownership structure, even by countries–, seems to be an interesting and informative approach, providing more accuracy to the results. The advantage it provides is a clear set of variables that represents the framework where the remuneration scheme takes place.

Finally, several measures of outputs in education can be analyzed in a relative way, allowing comparisons across countries, provinces, municipalities, educational levels, students' income levels, rural and urban regions, etc. Indicators related to equity, access and effectiveness can be defined in a way that allow for comprehensive comparisons, providing lessons learned about the impact of alternative reforms across comparative entities. Household surveys, censuses, and specific information of students and the educational system at the Ministry of Education would provide the inputs to develop a policy oriented research agenda that can constitute a valuable instrument for decision-makers.

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