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School Funding Formulas: Review of Main Characteristics and Impacts

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SCHOOL FUNDING FORMULAS - REVIEW OF MAIN CHARACTERISTICS AND IMPACTS

OECD Education Working Paper No. 74

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ABSTRACT

This study provides a literature review on school funding formulas across OECD countries. It looks at three salient questions from a comparative perspective: *i)* What kind of school formula funding schemes exist and how are they used, particularly for promoting the needs of socially disadvantaged pupils?; *ii)* How do school formula funding regimes perform according to equity and efficiency standards?; *iii)* What are the unresolved issues?

Formula funding of schools, as opposed to administrative discretion and bidding, relies on a mathematical formula containing a number of variables (*e.g*. number of pupils), each of which has attached to it a cash amount to determine school budgets. Across OECD countries there are four main groups of variables in such formulas: *i)* student number and grade level-based; *ii)* needs-based; *iii)* curriculum or educational programme-based and; *iv)* school characteristics-based. Sometimes output and outcome-related variables are also used.

The performance of formula funding compared to alternative funding regimes is dependent on the details of the formula and on the wider education policy environment. Formula funding systems typically advance transparency and accountability at low administrative costs and in combination with matching complementary policy tools they can also contribute to equity and efficiency.

Currently, there are several ongoing debates across OECD countries: First, there is an inherent trade-off between transparency/simplicity and sensitivity to local conditions/complexity. Second, knowing how much educating to a given standard costs is problematic and subject to heated debates. The main reason for this is that the causal relationship between education costs and student performance is largely unknown and even the identified impacts appear to be relatively small. Third, even though resources are allocated according to need estimation, they might not be devoted to these needs. Fourth, it is still undecided whether the introduction of school formula funding regimes has changed actual school funding practice.

RÉSUMÉ

Cette étude présente un examen de la littérature sur les formules de financement des établissements scolaires dans les pays de l'OCDE. Elle aborde trois questions qui méritent l'attention : *i)* Quels types de programmes de financement des écoles selon une formule préétablie existe-t-il et comment ceux-ci sont-ils utilisés, en particulier en ce qui concerne les besoins des élèves socialement défavorisés ? ; *ii)* Quels résultats ces mécanismes de financement des écoles fondé sur une formule préétablie permettent-ils d'obtenir eu égard aux normes d'équité et d'efficience ? ; *iii)* Quels sont les problèmes pendants ?

Le financement des écoles selon une formule préétablie, par opposition au pouvoir discrétionnaire de l'administration et au système de soumissions, s'appuie sur une formule mathématique contenant plusieurs variables (par exemple le nombre d'élèves) dont chacune est attachée à une somme permettant de déterminer le budget des établissements. Dans les pays de l'OCDE, il existe quatre grands groupes de variables dans ce type de formule : *i)* le nombre d'élèves et les niveaux scolaires ; *ii)* les besoins ; *iii)* le programme d'études et le programme des activités éducatives et ; *iv)* les caractéristiques de l'établissement. Parfois, des variables liées aux résultats et aux réalisations sont également utilisées.

L'efficacité du financement selon une formule préétablie par rapport à d'autres modes de financement dépend des détails de la formule retenue et de l'environnement général dans lequel opère la politique de l'éducation. Ces systèmes de financement ont en général pour effet de promouvoir la transparence et la responsabilisation pour un coût administratif faible et, associés à des outils complémentaires bien adaptés, ils peuvent aussi favoriser l'équité et l'efficience.

A l'heure actuelle, plusieurs débats sont en cours dans les pays de l'OCDE. Premièrement, il y a un arbitrage à faire systématiquement entre, d'une part, la transparence et la simplicité et, d'autre part, la prise en compte des conditions et de la complexité au niveau local. Deuxièmement, la question de savoir à combien revient un enseignement d'un niveau de qualité donné est délicate et fait l'objet de vifs débats. La principale raison en est que la relation causale entre le coût de l'éducation et les résultats obtenus par les élèves est en grande partie inconnue et que les effets identifiés semblent être relativement peu importants. Troisièmement, même si des ressources sont allouées sur la base d'une estimation des besoins, il se peut qu'elles ne soient pas employées à la satisfaction de ces besoins. Quatrièmement, on ne sait pas encore si l'introduction de mécanismes de financement des écoles fondé sur une formule préétablie a changé les pratiques de financement des établissements.

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1. INTRODUCTION

1. Funding schools by formula – *i.e.* a mathematical formula which contains some variables (*e.g.* student numbers) to which a cash amount is attached in order to determine school budgets - is nothing new. It has been around since the late 1960s and 1970s, however, the early applications were used only for allocating money for a specific sub-group of schools. In the 1990s, some countries such as UK, the Netherlands, and New Zealand widened their application to their whole school system which was accompanied by a radical decentralisation of the schooling system. Since then, formula funding has been applied in many different forms and to several further countries in Europe such as the Netherlands, Finland, and Hungary (Levacic, 2008b) and in developing countries such as Sri Lanka (World Bank, 2005).

2. Due to this spread of formula funding, a large academic literature has evolved over the last two decades. While much of the literature concerns a given national context and contributes to domestic debates there are a small number of comparative studies (Alonso and Sánchez, 2011). These latter, however, remain largely descriptive and only very brief on the evaluation side (*e.g.* Ross and Levacic, 1999), or address specific questions such as corruption (*e.g.* Levacic and Downes, 2004). By implication, there is only very little comparative work on how formula funding regimes score according to various equity and efficiency standards (Bischoff, 2009, Levacic 2008b); furthermore, domestic debates on such issues are often fragmented without any common framework for analysis.

3. In order to reflect the spread of formula funding regimes across the world and to harness the scope for developing a synthesis based on domestic and comparative scholarship, this study provides a literature review on formula funding regimes. More specifically it aims to answer three broad questions in a comparative perspective:

1. What kinds of school formula funding schemes exist? How are they used, particularly for promoting the needs of socially disadvantaged pupils?

2. How do school formula funding regimes perform according to equity and efficiency standards?

3. What unresolved issues and long standing dilemmas are reflected in the literature on school formula funding?

4. The literature review screens scholarly studies on allocating money through funding formula directly to schools, thus it excludes formula funding schemes between different levels of government. The impact of formulas on incentives and school finances can be clearly distinguished from other allocation mechanisms whereas this is not the case when redistribution by formula takes place between different levels of government. It also excludes the question of how the total education budget is determined and focuses on the distribution of available public money. But in cases where allocation issues are closely intertwined with revenue raising issues the perspective is widened for a more coherent analysis.

5. The literature review covers OECD countries and EU member states but makes occasional references to developing countries as well. Much emphasis is put on countries where the evaluation of formula funding regimes is rich such as USA, UK, Australia, and New Zealand. Since resources did not

allow for collecting additional sources from the countries themselves and translating them, the review could only take into account studies in English, German, and Hungarian.

6. The method for locating relevant studies was on the one hand standard internet search with search engines Google and Google Scholar with the combinations of keywords: formula, funding, financing, school, education, *formel, finanzierung, schule, ausbildung, formula-finanszírozás*; on the other hand, the network of references was followed up in the case of chosen key publications: Ladd and Hansen (1999), Ross and Levacic (1999), Levacic and Downes (2004), Hanushek (2006a).

7. Based on the identified studies and scholarly contributions it seems that the literature on formula funding is very much tied to national contexts where specific debates emerge, as said before. Among these, by far the most heated and polarised debate is in the US where the adequacy of funding formulas in several states (*e.g.* New York, Texas, Kansas, Missouri, North Dakota, Wyoming) has frequently been questioned in court resulting in significant changes in spending levels and formula design (Augenblick *et al.*, 2002, 2003, AIR/MAP, 2004, Duncombe and Yinger, 2000, Imazeki and Reschovsky, 2004, Evans *et al.*, 1999). On the other hand, several authors (*e.g.* Costrell *et al.*, 2008, Loeb, 2007, Hanushek, 2008, 2006b) question the validity and reliability of the underlying "costing out" studies of court judgments claiming that there is too little firm knowledge to reliably derive school resource needs for educating students to a given standard. In the UK, a similar, but a much less polarised debate has arisen which explores the influence of Local Education Authorities on defining the details of the funding formulas thus on adequacy of funding (West, 2009, Levacic, 2008a, Simkins, 2004, West *et al.*, 2000). This also touches upon the fundamental question whether applying formula funding schemes for schools has changed the essentially political bargains and negotiation behind determining school budgets (Agyemang, 2010, Edwards *et al.*, 1997, Levacic, 1992). Nevertheless, in both countries there is a growing concern that even if public authorities can determine and allocate the adequate amount of resources it is unclear how schools spend the resources, particularly in settings where they are free to manage the allocated block grants. In Australia, it has been suggested that the transparency of the funding formula has deteriorated through incremental adjustments to the degree that it constrains stakeholders from understanding how school funding works (Levacic and Downes, 2004).

8. Due to the fundamental nature of these debates and to support an informed answer to the key questions set out above, the review proceeds as follows: first, formula funding for schools is defined while paying particular attention to the diversity of the design elements and the links between the funding scheme and the wider educational context (*e.g.* school autonomy). Second, evaluation philosophies are spelled out with which the major evaluation findings are presented. This account pays particular attention to the degree of convergence on key questions such as adequacy and efficiency. Third, some of the most central dilemmas and unresolved debates are elaborated upon which, naturally, are closely related to evaluation questions. Lastly, final conclusions are drawn by pointing out the scope for cross-fertilising the existing literatures and tracing the main directions towards which research is heading.

2. WHAT IS FORMULA FUNDING?

2.1. Brief definition

9. Levacic (2008b) following the European Commission (Office for Official Publications of the European Communities, 2001, Ch.3.) states that formula funding for schools is a mathematical formula which "contains a number of variables (items such as number of pupils in each grade, area of school, poverty […]), each of which has attached to it a cash amount" (Levacic, 2008b, p. 206).

10. Another formulation, according to Caldwell *et al.* (1999), is that formula funding is "an agreed set of criteria for allocating resources to schools which are impartially applied to each school" (Caldwell *et al*., 1999, p. 9).

11. Throughout this review, the first formulation is employed, though, only those formula funding regimes are considered which apply to all or almost all schools of the given jurisdiction dwelling on the second formulation. The reason is that the literature devotes distinct attention to nation-wide or school authority-wide formula funding regimes by separating them from other allocation mechanisms such as historic funding or administrative discretion. The central feature of historic funding is that each year schools receives the amount it received in the previous year adjusted by a small percentage typically upwards (*e.g.* Wildawsky, 1978, Peters, 2001, Ch. 7.). Under administrative discretion, an administrative authority, *e.g.* ministry of education or local/regional education authority, decides on the allocation to schools based on best judgment. The administrative discretion method might also involve indicators or formulas, still it is distinct from formula funding of schools because the ultimate responsibility of deciding on the allocated amounts rests with the ministry or local/regional authority which is free to disregard the information conveyed by indicators (Office for Official Publications of the European Communities, 2001, Ch.3.).

12. The application of this definition also implies that simple per capita allocation schemes are taken into account in reviewing the literature. But most attention is devoted to more complicated formulas which incorporate additional variables, for example, to advance resource equity.

13. Even though some authors only consider formula funding regimes which are tied to decentralisation and thus to a large degree of freedom for schools to spend allocated funds as they wish (Levacic and Downes, 2004), here a broad conception is used. In line with the first formulation of the definition, formula funding can be applied to more centralised education systems as well; the key is the mechanism of allocation rather than how the money is spent.[1]

2.2. History

14. As mentioned, school funding formulas have been around already since the late 1960s and 1970s. The countries which applied such a system to some of their education programmes were, for example, the USA (United States Department of Health, Education, and Welfare, 1976), Australia (Ross, 1983), France

1. Nevertheless, it must be noted that, by and large, decentralised school management goes together with formula funding and the combination of centralised school management and formula funding is rare.

(Direction de l'Evaluation et de la Prospective, 1993), and the United Kingdom (Plowden Report, 1967). A significant shift occurred in the early 1990s when some countries radically decentralised their school systems by widening the autonomy of schools to manage resources they are granted (Eurydice, 2007). This meant that formula funding had to be applied throughout the whole school system. Countries instituting such changes were the UK, New Zealand, the Netherlands, and on the sub-national level Australia, Canada, Sweden, and the USA (Levacic and Downes, 2004).

15. In Europe, in the early 2000s 13 countries employed formula based school funding regimes along with significant financial delegation to schools (Levacic, 2008b). However, only in England and the Netherlands is the formula funding scheme nation-wide. Furthermore, it is gaining popularity in transition and developing country contexts not least because of the promotion activity of the World Bank (Alonso and Sánchez, 2011); country examples cover Bulgaria, Moldova, Azerbaijan (Bischoff, 2009, Levacic, 2008b, Club Economika 2000, 2005) as well as Sri Lanka, Mongolia, and Armenia (Arunatilake and Jayawardena, 2008, World Bank, 2006).

16. Since the 1990s, formula funding regimes have changed substantially by being extended and becoming more complicated and in some cases by radically simplified, highlighting some of the inherent trade-offs and debates around formula funding for schools (for more on this see later). Nevertheless, there is still a clear trend in how formulas are constructed: countries are moving away from simple, pupil number-based formulas towards taking into account differences in learning needs of students, varying curriculum goals of education programmes, and different cost of schools sites (Ross and Levacic, 1999). Of these three elements the most pronounced shift is towards the first one by emphasising equity objectives (Ladd *et al.*, 1999). In some countries the role of scientific and supposedly objective cost calculations play an increasing role in defining the details of the funding formula (Hanushek, 2006b, Yinger, 2004a, Ladd and Hansen, 1999).

2.3. Variables and coefficients of school funding formulas

17. The few comparative studies on formula funding of schools (Bischoff, 2009, Levacic, 2008b, Levacic and Downes, 2004, Ross and Levacic, 1999) provide a straightforward categorisation of the different variables[2] (*e.g.* pupil number, socio-economic background of pupils) and coefficients (*i.e.* the cash amounts which multiply the variables to determine funding allocation).[3] But these studies say little about how the coefficients in the various formulas are determined by decision makers, particularly on the nature of political discussions revolving around exact cash amounts, relative importance of different variables, and what indicators to use.

18. There are four main groups of variables used in school funding formula in OECD countries: *i)* basic, student number and grade level-based, *ii)* needs-based, *iii)* curriculum or educational programme-based, *iv)* school characteristics-based. Each of these may serve different policy goals, for example needs-based variables are well placed to advance equity goals by providing additional funding for schools teaching pupils whose first language is different from the language of the instruction. In addition, sometimes output and outcome related variables are also used.

Basic variables of student number and grade level

19. The basic, student number and grade level variables are the most widely used: student numbers constitute the only variable, for example, in Poland (localities of Kwidzyn and Swidnik) and Brazil (state

2. Or "dimensions" in the terminology of Levacic and Downes (1999).

3. Throughout the discussion of variables and coefficients of school funding formula mainly these three authors are followed.

of Rio Grande do Sul) (Levacic and Downes, 2004). Most formulas allocate monies to schools mainly on a student number basis (*e.g.* in England it has been 75% of total formula funding since 2002-2003 (West, 2009)) which is typically adjusted according to grade or age level. The latter is meant to correct for the different teaching requirements of different student cohorts by the standard curriculum. The available indicators are straightforward in principle, *e.g.* full-time equivalent number of enrolled pupils at each grade level or number of courses thought. But they are problematic in practice since schools have to plan at least one year ahead thus actual number of students or courses are unknown when the budget allocation takes place. Furthermore, when financial year and school year don't overlap sufficiently, which is the case in several countries, then mechanisms must be in place to secure financial stability for schools even if coefficients of the formula are altered, for example. These complications are well exemplified by England, UK where the academic year runs from September to August but the financial year from April to March. As a result, throughout one financial year schools pursue five-twelfths of one academic year and seven-twelfths of the subsequent academic year. Nevertheless, all the budget allocations are based on projections of expected enrolment numbers prepared by the local education authorities together with the school in question. Furthermore, the fluctuation of student numbers throughout an academic year is addressed by including in the formula a retention rate of 95% which is later corrected to reflect actual student numbers (Levacic and Downes, 2004, Levacic, 2008b).

Needs-based variables

20. Needs-based variables are included in school funding formulas in order to take into account the additional resource needs of teaching pupils with learning disabilities or who come from disadvantaged socio-economic backgrounds. The additional resources are meant to provide further help for such pupils by offering them, for example, additional teaching time, specialised learning material, and smaller classes. This is meant to advance equity and adequacy of education (*e.g.* Duncombe and Yinger, 1999) although the schools often have discretion over the use of these additional funds. In many countries, learning disabilities are assessed by institutions which are separate from schools and they provide accessible and reliable data on learning disabilities which are widely used as indicators in funding formula (Levacic *et al.*, 2000). Disadvantaged pupil background can be measured in several different ways, countries most typically use readily available measures such as free school meal eligibility in the USA (*e.g.* Yinger, 2004b, 2000, NCES, 2004) or the UK (PricewaterhouseCoopers, 2009, Hobbs and Vignoles, 2007) and census data on home language, aboriginality, and family background for example in Victoria, Australia (Caldwell and Hill, 1999). Furthermore, test results are also used frequently, particularly for determining proficiency in the language of instruction and low achievement in major subjects (*e.g.* England, UK) (West, 2009, Marsh, 2002). Each of these measurements has its strengths and weaknesses which might benefit some schools and students while disadvantaging others.

Variables of curriculum and education programme

21. Curriculum or education programme-based variables acknowledge the different resource implications of enhanced and specific education programmes such as music, languages or sports education. Higher costs can arise from additional courses, more expensive teaching materials, higher salaries for specialist teachers, and so forth. Indicators are derived from the list of designated programmes and the unit of measurement can be the school or the course itself. The use of these variables exhibits large differences between countries applying formula funding for schools: some countries such as Sweden (localities of Nacka and Sigturna) or Poland (localities of Kwidzyn and Swidnik) make very little use of them (Levacic, 2008b) whereas others such as England, UK apply them on a much larger scale (Simkins, 2004). In some cases vocational education is financed through the general school funding formula with the additional costs of the vocational curriculum reflected in variables of this type (*e.g.* New Zealand) (Pole, 1999).

School characteristics-based variables

22. School characteristics-based variables reflect the cost differentials arising from the size of the school, the relative isolation of the school's community, physical aspects of the school premises, and local price levels. School size substantively changes the per pupil costs of education: small schools are typically more costly per student than larger ones. Isolated and rural communities tend to incur higher costs due to extra travelling expenses, for example. Some school buildings are older or too big which costs more to sustain. Regional price level differences impact most cost factors often including teacher salaries as well as more obviously factors like heating costs. Indicators for these differences derive from official statistics such as number of pupils enrolled in the school, population density of the school district, age of the school building, and regional price level. For example in Alberta, Canada small schools receive an additional block grant if school size is the result of necessity that is they are either far from other schools or the nearby schools don't have sufficient capacity to take on its students. This allocation, nevertheless, runs parallel to the block grant received by schools if their School Board Administration is sufficiently small (less than 3 000 enrolled students) (Alberta Education, 2009).

Outputs and outcomes

23. From the above discussion it is clear that formula funding of schools has historically been based almost exclusively on schooling inputs rather than on outputs and outcomes. Some exceptions are when schools are allocated funds on the basis of degree completions, abstention rates, or courses delivered (see for example the taximeter system used in Denmark (Jespersen, 2002) or the Learning and Skills Council funding formula in England, UK (LSC, 2006)). Even when student achievement in major subjects or the language of instruction on standardised testing is taken into account, it is meant to identify additional resource needs rather than to finance performance such as the value added of the school in a given year. The reason why formula funding regimes are generally not based on performance measures can be found at least partially in that sufficiently detailed and reliable datasets are missing in many of the countries and even if they are available it is generally difficult to explicitly link measured performance to school effort (Levacic, 2008b). Furthermore, even the most developed student measurement systems leave out important results of schooling such as co-operation skills, tolerance, and other traits necessary in democratic societies (Guthrie, 2006). Finally, experiences with performance targets in other policy sectors often point at perverse incentives and gaming (Hood, 2006, 2007, Smith, 2003).

Coefficients

24. Even after fixing the variables and indicators to be used in a school funding formula the difficult question remains: what monetary values or coefficients to attach to each indicator. Each variable of a funding formula can be related to specific underlying costs (*e.g.* additional costs of providing an enhanced musical curriculum and the grant given to schools per such programme),[4] nevertheless, these exercises always leave considerable room for political discussions and bargain. The main reason is that deciding on the expected quality of schooling is by nature a political decision (cf. Hanushek, 2006b), and we simply don't know enough about how school outcomes are achieved to scientifically and objectively calculate cost implications of delivering particular expected outcomes (Hill, 2008, Hanushek, 2003, 1999, Krueger, 2003, Vignoles *et al.*, 2000). Furthermore, because each formula funding system involves a political conflict over resources and accountability, there is typically pressure to retain some political discretion over determining coefficients (Agyemang, 2010, 2009, Edwards *et al.,* 1996). In some countries such as the US, scientific studies exercise a huge impact on how schools are financed (Hanushek, 2006a, Fischel, 2006, Yinger 2004a, Lukemeyer, 2003) whereas in other places incrementalism based on historical costs and political bargains are still the main institutional mechanism which define the crucial details of the applied formulas

4. For some details on this see Abu-Duhou *et al.* (1999) who discuss the technique of activity led funding.

(West, 2009, Agyemang, 2010, Levacic, 2008a). Thus, it is a crucial open question to what degree and under what circumstances do formula funding schemes change the political process of resource allocation and actual funding flows (for more on these see section four).

2.4. The use of school funding formulas in their wider policy environment

25. The use and impacts of school funding formulas greatly depend on the characteristics of the wider policy environment they are embedded in: first, the proportion of school funds allocated through a formula, *i.e.* the comprehensiveness of the formula. Second, how autonomous the schools are in managing the allocated funds. Third, the existence of targeted programmes outside the formula. Fourth, the nature of the education quasi-market if it exists.

Comprehensiveness of the formula

26. Deciding upon the characteristics of the formula itself such as indicators and coefficients still leaves several crucial questions of a school formula funding regime open which significantly impact on the performance of the funding scheme. Among them, the most essential one is how comprehensive the formula is, *i.e.* which budget items are funded within the formula. In fact, even the most extensive and complete formula funding systems such as in England, UK or Victoria, Australia retain some public money outside the formula (Levacic, 2008b, Levacic and Downes, 2004). These monies typically cover expenditures which have uneven incidence such as major capital works, which result from statutory responsibilities of education authorities, and which involve economies of scale at a higher level than the school such as training for teachers, career counselling. However, in most countries formula funding covers a much smaller proportion of school spending, the single most important issue in this respect is teacher salaries since they constitute around 65-95% of total school budget. In several countries such as Bulgaria or Sri Lanka, staffing costs are outside the formula (Club Economika 2000, 2005, Arunatilake and Jayawardena, 2008, World Bank, 2005). In some cases, the school financing formula determines no more than a small percentage of school budgets; see for example Rio Grande du Sol, Brazil where the formula allocates around 3% of total school spending (Levacic and Downes, 2004). This variability in the relative importance of school funding formulas indicates that when it comes to evaluation (section three) the weight of the formula in overall funding needs to be taken into account.

Schools' autonomy to manage

27. As has been said, schools can be funded through formula in both decentralised and centralised school management systems which, nevertheless, exercises a crucial impact on how the funding regime shapes the behaviour of schools and eventually the results of teaching. Furthermore, even if schools have the autonomy to manage their resources within a decentralised education system, the resource elements of funding formulas can be earmarked for specific purposes (*i.e.* compartmentalised or divided formula) which constrains the school's room for manoeuvre. Examples include the separate formulas for staffing in the Netherlands and New Zealand (Levacic, 2008b, Pole, 1999).

Targeted programmes outside the formula

28. Since in many countries schools enjoy wide autonomy in how they spend the allocated public money, a crucial question is how they spend it. It is of particular interest whether schools actually spend the extra funding they receive for teaching pupils from low socio-economic background on educating these pupils. Several amendments of the English formula derive from frustration on the part of the government about the ways schools spend their resources. This resulted in a great number of targeted programmes outside the funding formula accompanied by stronger accountability measures (Kendall *et al*., 2005, DfES and HM Treasury, 2005, Simkins, 2004). Similarly, in the US adequacy litigations and court decisions

often address the issue of implementation at the school level; several state legislatures have found it hard to ensure that the extra funding for in-need students is actually spent on improving their education (Odden *et al*., 2009, Odden and Picus, 2007, Hanushek, 2006b, Ladd and Hansen, 1999). In response to this challenge, countries have implemented accountability measures at the school level which greatly vary in their capacity to control schools (Levacic and Downes, 2004).

Education quasi-markets

29. School funding formulas and self-management of schools are frequently part of an education quasi-market which puts pressure on schools to compete for pupils to differing degrees. The formula is typically the centerpiece of such markets since it determines the financial framework for competition and the benefits derived from attracting additional pupils. Adjusting the formula to attach more benefit for educating pupils with learning disabilities or of disadvantaged families is a typical tool for policy makers to advance equity objectives within a competitive framework (Levacic *et al.* 2000). The regulatory environment of the education quasi market, therefore, has large effects on the impact of the formula.

3. EVALUATION OF FORMULA FUNDING REGIMES

3.1. Objectives and evaluation criteria

30. In the covered literature, a wide range of objectives or evaluation criteria exists: more than 15 distinct versions of them could be identified. However, here only a shorter list is employed including only those criteria which attracted significant scholarly attention and international comparisons are possible. These are the following: *i)* equity; *ii)* adequacy (effectiveness); *iii)* efficiency; *iv)* transparency; *v)* accountability; and *vi)* administrative costs.

Equity

31. Equity is prone to several alternative and complementary explanations of which three are chosen here: wealth neutrality, horizontal equity, and vertical equity. Wealth neutrality as a school finance equity principle requires no relationship between the resources devoted to educating children and the fiscal capacity (*e.g.* property value, level of personal incomes) of the local education authority supporting that education (Ladd and Yinger, 1994). This is a relevant criterion in countries where local financing of schooling is important relative to funding coming from higher, particularly federal, levels of state administration.

32. Horizontal equity within the education domain usually refers to the equal treatment of equally situated pupils. Naturally, the meaning of "equally situated" can be contested; frequently it is applied to the same positions within an education system in different geographical locations or more generally to children belonging to the same broad categories such as general education, at-risk, or special educational needs (Berne and Steifel, 1984, 1994, Hertert *et al*., 1994).

33. Vertical equity in education research is the notion that students should be differentially treated according to their different learning needs and characteristics. Obviously, in order to apply this concept one has to identify the relevant "differences in learning needs" which is typically defined in terms of educational input needs to achieve a defined level of performance (Berne and Stiefel, 1999).

Adequacy

34. The increased focus on educational outcomes in the late 80s and early 90s, particularly in the US, has led to the concept of adequacy which specifies the level of educational inputs (*i.e.* resources) that is sufficient to meet a pre-defined, absolute output standard (*e.g.* test score on standardised tests). The main departure in the adequacy debate from equity is the focus on absolute levels rather than relative or distributional measures (Berne and Stiefel, 1999). This distinction has been hugely influential at US courts and thus on education finances in several states (Minorini and Sugarman, 1999).

Efficiency

35. Besides equity and adequacy, another objective pursued by education policy makers is efficiency defined as achieving the highest possible educational output from a given amount of resources. This concept is elaborated by defining its two different types: *i)* external efficiency and *ii)* internal efficiency.

36. The concept of external efficiency relates the amount of educational outputs such as individual gains in life-time earnings due to the attained degree to the amount of resources used throughout the education process. It is typically the domain of various cost-benefit analyses in education research.

37. Internal efficiency captures the relation between the produced education outputs such as the amount of degrees awarded or test scores and the resources utilised in the teaching process (Lockheed and Hanushek, 1994). This concept is apparently closely tied to adequacy since it must first be established what is the minimum necessary (efficient) level of resources to attain additional units of educational output in order to define the sufficient level of resources for achieving a given educational standard.

Transparency

38. The criterion of transparency implies that the funding system should be understandable and the relevant information such as sources of funding, how resources are spent should easily accessible for stakeholders (Ross and Levacic, 1999). This also contributes to accountability of schools to the public and the authorities.

Accountability

39. Accountability refers to the way in which education institutions should be held responsible for the quality and quantity of their products such as student's knowledge, skills, and test scores (Kirst, 1990). This also implies that schools provide true and discernible information on their functioning.

Administrative costs

40. Administrative costs refer to the costs incurred by schools as well as government agencies administering schools (*e.g.* local education authorities, ministries of education) when meeting obligations to provide information on their actions, either to public or private actors.

3.2. Methods of evaluation

41. Evaluating formula funding regimes is problematic even given clear evaluation criteria. Often, the comparison of a formula funding system with its alternatives is impossible because it is difficult to assess what would have happened in the absence of formula funding. When school formula funding is introduced across a country which is the case for example in the UK or the Netherlands, then there is no comparison showing how the education system would have looked like had the new funding arrangement not been introduced (Schenker-Wicki, 2008). This problem can be at least partially circumvented when only some of the localities introduce formula funding whereas many others not - for example in Poland, Bulgaria, Sweden or Finland. Unfortunately, there is no study, to the best knowledge of the author, which exploits this potential comparison. Furthermore, the lack of sufficiently detailed data also makes it difficult to carry out evaluation in many countries.

42. Some studies explore the mechanisms determining the design of the school funding formula (*e.g.* Agyemang, 2010, Carr and Fuhrman, 1999) and the impact of the formula on the schools' functioning (*e.g.* Goetz and Odden, 1999, Levacic, 1998) through qualitative methods, mainly interviews. These are mainly geared towards the evaluation criteria of equity, efficiency, transparency, and accountability.

43. A much larger body of research employs descriptive statistical methods in combination with document analysis based on guiding theoretical background (*e.g.* West, 2009, Li, 2008, Angus *et al.*, 2001); international comparative studies fall in this category as well (Bischoff, 2009, Levacic, 2008b, Levacic and Downes, 2004, Levacic *et al*., 2000, Ross and Levacic, 1999). These evaluations cover all the criteria used in this paper.

44. A significant strand in the literature, particularly in the US, employs regression techniques to establish whether school formula funding regimes fulfill the requirements of adequacy and equity (*e.g.* Hermann, 2008, Imazeki, 2007, Duncombe, 2006, Gronberg *et al*., 2004) and sometimes refer to efficiency, but only in conjunction with other policy variables such as external examinations or quasi-market (Woessmann 2003, Bradley and Taylor, 1998).

45. Due to the considerable work on adequacy of school funding formula which is often termed as costing out studies it deserves special attention. Adequacy studies generally employ four different methods: *i)* successful schools approach; *ii)* professional judgment approach; *iii)* evidence-based (or state of the art) approach; and *iv)* regression-based (or cost function) approach (*e.g.* Loeb, 2007, Duncombe, 2006). The successful schools approach aims at determining the minimum sufficient, *i.e.* adequate, level of funding for reaching an absolute output standard by identifying the schools which are successful in reaching that standard and calculating the adequate level of funding based on their programme-level costs (*e.g.* Perez *et al.*, 2007, Myers and Silverstein, 2005, Augenblick *et al.*, 2002). The professional judgment approach rests on a panel of respected educators who are asked to assess the costs of reaching a given educational standard[5] in order to arrive at an adequate funding figure for different pupil compositions (*e.g*. AIR/MAP, 2004, Picus *et al.*, 2003, Augenblick *et al.*, 2002). The evidence-based approach comes close to the former, but instead of consulting practitioners it focuses on a selected set of successful education interventions as captured by the education evaluation literature (*e.g.* Duncombe, 2006, Odden *et al.*, 2005, 2003). Regression-based approaches apply multiple regressions on historic spending and school characteristics data to determine the relationship between spending and student outcomes which, in principle, can lead to the measurement of adequate resources (*e.g.* Imazeki, 2007, Gronberg *et al.*, 2004, Duncombe *et al.*, 2003). Nevertheless, each of these methods is subject to much methodological controversy with practical policy consequences particularly in the US (for more on this see section 4).

46. Thus, the evaluation of formula funding of schools had been pursued through a wide variety of methods in a broad set of countries. Evaluation exercises would be further enhanced not only by better data, but also by reaching agreement on underlying theoretical constructs (*e.g.* adequacy debate below); furthermore, in several occasions employing more elaborate statistical techniques is imperative.

3.3. Selected results on evaluation of formula funding regimes

47. While international comparative studies on school formula funding are few in number, whereas there are considerable domestic debates on the issue in several countries, most notably in the US and the UK. The below review of results builds on both strands of literature, implying that many of the results discussed are not directly comparable because they reflect specific national policy environments and also because the design and scope of formula funding are very different.

Equity

48. In principle, formula funding of schools promotes horizontal equity – *i.e.* equal treatment of equally situated pupils -better than alternative allocation mechanisms, such as administrative discretion of public authorities and bidding. The reason is that it assures equal treatment of similarly situated pupils through the impartial application of the same indicators and coefficients to determine school budgets of all or almost all schools. Whereas administrative discretion and bidding over time lead to idiosyncrasies in funding due to incremental adjustments and political games (cf. Levacic, 2008b). However, formula funding may very well lead to inequities if there are considerable cost differences between schools which are not reflected in the formula such as characteristics of premises or local price levels.

5. An alternative of this method is when educators are not convened for discussions and reaching consensus rather a much larger number of practitioners is surveyed (*e.g.* Sonstelie, 2007).

49. Empirical investigations of horizontal equity show a generally positive picture. Clearly, the application of a uniform formula within a given territory typically assures horizontal equity, however, different levels of administration and additional funding play a crucial role here. In those countries where school funding is distributed from the highest administrative level responsible for schooling and direct local contribution to education costs is relatively low then the horizontal equity criterion is met; examples cover Alberta and Ontario in Canada where each local education jurisdiction receives funding according to the same indicators and coefficients which they distribute to schools according to their locally set formula (Li, 2008). This also implies wealth neutrality. However, if local revenues play an important role in school financing which constitutes an additional element compared to the monies distributed by the formula then horizontal equity and wealth neutrality are violated. For example, in Hungary even though municipalities receive most of their resources through a formula from the central budget, differences in local capacity to raise addition revenues and local preferences result in horizontal inequity (Hermann, 2008); similarly, locally raised funds pose a risk for horizontal equity in New Zealand (Pole, 1999) and in several US states[6] (Yinger, 2004b, Ladd and Hansen, 1999, Evans *et al.*, 1999). Interestingly, a significant violation of horizontal equality derives in England from the fact that the central government allocates education resources to local education authorities on a historic basis, so even if these authorities assure horizontal equity within their own areas there are significant spending differences between authorities (Levacic, 2008a).

50. But the studies reviewed here only look at the school district level or the school level resource differentials so there is a paucity of information on how money allocated to schools is actually spent. Furthermore, many of the characteristics of the micro-environment of schools (*e.g.* exact characteristics and resulting costs of the school site and wages on the local labour market) are not investigated due to the lack of data.

51. Theoretically, school funding formulas are well suited to advance vertical equity if 'proper' indicators of student need and coefficients are included in the formula. However, the meaning of 'proper' in this context is subject to heated debates and it is unclear whether devolved funds which must be spent by schools in the centrally designed way are better in advancing vertical equity.

52. The meaning of the 'necessary' or 'proper' level of vertical differentiation among students by learning needs is subject to constant political and scientific debate, implying that there is no clear benchmark according to which evaluation could proceed. Thus, the empirical evidence on the relation between formula funding and vertical equity is inconclusive. Most countries make considerable efforts to channel additional funds to schools educating disadvantaged and special education needs pupils (Levacic, 2008b, Angus *et al*., 2004, Levacic and Ross, 1999). But despite these efforts pupils from low income families sometimes receive fewer education resources: on some examples in the US see Baker (2001). A significant debate emerged in the UK on the role local education authorities play in redirecting centrally distributed funds to schools and how they promote vertical equity. There is a consensus that the education authorities in England provide considerably less additional funding for disadvantaged students through their local funding formulas than intended by the central government (West, 2009, Levacic, 2008a). This has led the central government to provide separate funding directly to schools, decreasing the freedom of schools to decide on how to spend the allocated money, and often not based on formula (Simkins, 2004). This again highlights that the actual spending of allocated resources in schools is crucial for equity considerations and that our knowledge of this is relatively limited in most of the countries (*e.g.* West, 2000). This underscores the importance of the wider policy environment of formula funding, particularly school autonomy and means of control as well as the role played by different administrative layers of the state (Roza *et al.*, 2008). Even though it seems to be a straightforward question to what degree to

6. Although significant improvements were made in the US to several states' funding formula which generally moved towards more wealth neutrality and horizontal equity (*e.g.* Ladd and Hansen, 1999).

differentiate between lower and higher grade students, there is a wide variation among countries: some provide more funding for elementary students than secondary, whereas some others equalise between the two categories, still the most typical case is that secondary school students receive more funding (Levacic, 2008b, Downes and Levacic, 2004, Odden, 1999). In all formula funding systems which aim at vertical differentiation among pupil groups, a crucial issue is the indicators to use for categorising pupils. This raises concerns from school leaders and teachers because any of the readily available and most frequently used indicators is imprecise and it typically fails to measure the severity of need (Loeb, 2007, Angus *et al*., 2004).

Adequacy

53. Ideally, adequacy is promoted by school formula funding according to the same logic as in the case of vertical equity; the main difference is that proper indicators and coefficients are determined so that a given absolute performance standard is reached. Similarly, whether targeted and centrally designed school interventions are more effective in reaching the set standards is an open question.

54. The issue of adequate school funding received attention almost exclusively in the US where it is intensely debated for more than a decade[7] (Berne and Stiefel, 1999); it has only been touched upon in some other countries such as the UK (Levacic, 2008a, Simkins, 2004) and Norway[8] (Falch *et al.*, 2008). In the US, due to the varying methods employed by researchers (see section 3.2.) their findings are rather divergent, moreover, several scholars question the scientific quality of the results (for more on the debate revolving around the methodology see section four). There have been studies carried out in almost all US states, whereas among the most widely researched states can be found California[9], New York (*e.g.* Duncombe *et al.*, 2003, Duncombe and Yinger, 2000), and Texas (*e.g.* Imazeki and Reschovsky, 2004, Gronberg *et al.*, 2004, Reschovsky and Imazeki, 2000). Most of these studies find that school financing arrangements fall short of adequacy not only in overall levels but also in terms of how they are distributed across the state. These results are often accompanied by court decisions on state education finance systems (Huang *et al.*, 2004, Minorini and Sugarman, 1999). The US-wide studies arrive at a more pronounced conclusion: even though most of the states fail to meet adequacy standards, a considerable proportion of them – about 40% of states - scores fairly well (Odden, 2009). Among the states with the most exemplary funding system are Texas and Virginia (Baker, 2001). But there is not much known about how schools actually use allocated funds because the reviewed studies are based on data from the district level. This shortcoming is particularly troubling since influential court decisions are made based on their findings (Hanushek, 2006a).

Efficiency

55. In principle, formula funding of schools advances efficiency of school spending by allocating only the minimal necessary resources thus eliminating the accumulated inefficiencies of historical (incremental) funding. This claim is naturally predicated on whether education authorities are in the position to determine the level of minimal necessary resources with reasonable precision - a debated issue (see section 4). A further argument put forward in the literature is that formulas promote efficiency by allowing schools to control their resources and make the best use of them, this statement, nevertheless, assumes that formula funding is combined with a high degree of school autonomy. However, formula

7. Some early contributions used the term output equity for denoting essential the same concept as adequacy (Berne and Picus, 1994).

8. Although it must be noted that Norway doesn't have a school funding formula regime.

9. A large scale research project on California school finance can be found through Stanford University's "Getting Down to Facts" project: *http://irepp.stanford.edu/projects/cafinance-studies.htm.*

funding does not have a positive impact on efficiency if the funding authority cannot reasonably determine necessary resource levels and/or political conflict and bargaining prevail in defining the coefficients and indicators of the formula. Furthermore, even if formula funding of schools is combined with school autonomy it is unclear what motivations would lead schools to economise on their resources (Schenker-Wicki, 2008).

56. Thorough analysis of the efficiency impacts of school funding formulas are largely missing from the literature. There is some evidence that local governments can promote efficiency through school funding formulas by providing incentives for efficient school sizes and reduce over-capacities. In Tallin, Estonia the introduction of school funding formula led to a decrease in the number of small, inefficient schools while the quality of schooling also improved on a range of indicators (*e.g.* extracurricular activities, class sizes) (Levacic, 2011). Nevertheless, there is some more research on the impact of school funding formula in combination with school autonomy in those countries which implemented both already 10-20 years ago (*e.g.* US, UK, Australia). This research indicates no clear conclusions. In England, UK, scholarly work on efficiency of school management of resources is mixed, though positive evaluations appear to be somewhat stronger (Levacic, 2008a, Audit Commission and Ofsted, 2000, Levacic, 1998). Although, the importance of historic funding on the central level and the widely varying practice of local education authorities in designing their formulas make such claims weaker. Similarly, in Australia and New Zealand research indicates that self-management of schools has been somewhat successful in increasing efficiency of resource use (Levacic *et al.*, 2000, Caldwell and Spinks, 1998). In the US, scholarly work points to the possibility that by increasing funding for disadvantaged pupils to an adequate level the efficiency of school district spending might be lowered because underfunded schools tend to work harder and more thus more efficiently to achieve comparable results with those schools which are similar to them in other respects (Yinger, 2004b). In contrast to these, it is indicated by international comparative research that school financial autonomy and formula funding in themselves are insufficient to raise student performance accountability measures external accountability measures such as central examinations are necessary for the positive results (Hanushek and Raymond, 2004, Grundlach and Woessmann, 2003).

Transparency and accountability

57. The introduction of formula funding regimes increases the transparency of school finances both for public authorities and external stakeholders because it makes it clear and explicit what is funded by what amount. The increased transparency of finances contributes to the accountability of schools particularly when indicators used in the formula are not manipulable by schools (Levacic, 2008b). But, increased transparency is not warranted solely by the formula because the formula as well as actual spending numbers must be published and made available for parents and other external stakeholders too (Levacic and Downes, 2004). If the formula is overly complex and thus difficult to understand by non-experts as is the case in several countries it cannot contribute to increased transparency and thus accountability.

58. Evidence on transparency of school funding formula is largely supportive: in most countries, the introduction of the formula funding regime increased transparency both for public authorities, schools, and parents (Levacic *et al.*, 2000, Levacic and Downes, 2004). Examples cover the US, England, UK, Victoria, Australia, New Zealand, Canada, and Brazil. But, in many instances – *e.g.* England, UK, Victoria, Australia, and New Zealand - the complexity of the formula limits transparency. In the case of Poland, the publication of education budgets and the financing formula is not always done on a regular basis (Levacic and Downes, 2004).

Administrative costs

59. Administrative costs of creating and maintaining school funding formula systems are generally modest and acceptable for countries, although complexity of the formula may increase costs (Ross and Levacic, 1999). However, introducing and administering a school formula funding regime requires considerable technical skills and administrative capacity, particularly when municipalities administer and control the funding regime, which is often a significant problem in developing and transition country contexts (see for example Hercynski and Herbst (2008) and Danchev and Ivanov (2009) on Bulgaria).

60. Overall, there is no clear-cut answer to the question of whether formula funding is superior compared to alternative funding regimes. It is very much dependent on the details of the formula and on the wider education policy environment. Nonetheless, formula funding systems typically advance transparency and accountability and in combination with well matching complementary policy tools they often contribute to equity and efficiency.

4. MAIN DILEMMAS AND UNRESOLVED QUESTIONS

4.1. Trade-off between transparency-simplicity and sensitivity to local conditions-complexity

61. In principle, the introduction of a school funding formula may bring about several desired results ranging from increased efficiency to transparency at low administrative costs. However, as empirical investigations show it is frequently difficult to balance competing goals, particularly when inherent trade-offs are present. In the case of formula funding, the most straightforward contradiction emerges between transparency-simplicity and sensitivity to local conditions-complexity (*e.g.* Levacic and Ross, 1999). As local costs of education and local specificities greatly vary, there is usually pressure on the designers of national or regional unified formula to incorporate many detailed cost differences. This has led to convoluted and thus obscure formula designs in several instances such as in Victoria, Australia in the late 90s and early 2000 (Angus *et al*., 2004, Levacic and Downes, 2004, Caldwell and Hill, 1999). Nevertheless, the alternative solution which is to allow for locally different formula designs does not necessarily escape the trade-off between transparency and sensitivity to local conditions either. For example, in England local education authorities design their school funding formula by consulting the schools within their district which again results in various pressures on them finally leading to a system overly complex and resembling a historic funding system in many respects (West, 2009, Simkins, 2004). It is difficult to resist such pressures because knowing exactly how much educating a given pupil costs (thus what is justified cost differential and what is not) is a problematic exercise in practice (see more on this below). This also calls into question the overly optimistic view of some authors who see needs-based formula funding of schools as having a "catalytic effect on education debate" (Ross and Hallak, 1999, p. 5.) because "the amount which is allocated to each school is directly derived from an analysis of what the school needs to spend in order to provide a specified quality of education" (Levacic and Ross, 1999, p. 26.).

62. In sum, there is an ongoing struggle between, on the one hand, more simplification and thus less weight given to local differences and, on the other hand, more complexity and thus more consideration to local specificities.

4.2. Knowing the cost of education to a given standard

63. There have been numerous attempts in several countries - ranging from Norway to the US - to measure how much it costs to educate pupils with a given background to a pre-defined standard. Techniques cover activity-led analysis[10] (Abu-Dohou *et al.*, 1999), successful schools approach, professional judgment method, evidence-based (or state of the art) approach, and regression-based (or cost function) measurements (*e.g.* Falch *et al.*, 2008, Hanushek, 2006b, Duncombe, 2006, Ladd *et al*., 1999). However, all these methods suffer from *i)* the variability in expected standards; *ii)* lack of adequate data; *iii)* our incomplete understanding of the casual relationship between education costs and student performance; and *iv)* that expected standards are typically higher than what schools currently achieve.

10. Activity-led funding consists of identification of the teaching and learning activities required to deliver a given educational programme, then determining the costs of these activities, and finally transforming the determined costs into the funding gormula (Abu-Duhou *et al.*, 1999).

Divergent expected outcome standards

64. The expected outcome standards vary not only according to different stakeholders, but also by different levels of government (Guthrie, 2006). For example, in the US, New York State aims at delivering a New York State Regents Diploma to all students whereas the constitutional requirement is 'only' sound basic education. These two requirements correspond to quite different educational output levels (Hanushek, 2006b). Furthermore, many of the outputs of education are not as readily measurable as literacy or math skills – think about, for example, tolerance towards diversity or civic values (Dee and Levine, 2004, Milligan *et al.*, 2004). By implication, if there are multiple expectations and goals which are nevertheless not necessarily consistent with each other it is unrealistic, and perhaps even undesirable, to expect that any measurement method would yield an objective and undisputed result (Costrell *et al.*, 2008).[11]

Lack of data

65. Students have diverse educational needs depending on their socio-economic background, cognitive capacities, and personal characteristics and these must be reflected in education costs (*e.g.* extended instructional times) if adequacy or output equity is to be achieved. Schools and school districts typically also face different cost of inputs of which, by far, the most important is the salary of teachers. They differ in the availability of teachers with the needed skills at the local labour market or the accessibility of alternative occupations for teachers. So to provide the same quality of instruction different schools have to spend different amounts on teachers. Furthermore, the capacity to use resources wisely in order to achieve the desired results is far from being equal across schools and school districts. But taking into account such differences in school funding is problematic because it easily creates incentives to appear or to become less efficient (Loeb, 2007). Accounting for all this diversity is not an impossible enterprise though a very difficult one since there are typically no satisfying data on each of these and the available measures are debatable (Holmlund *et al.*, 2009, Guthrie, 2006, Duncombe, 2006). This is why, for example, the World Bank is supporting better data collection together with formula based funding in several transition countries such as Russia (Kataoka, 2011) or Lithuania (Herczynski, 2011). Free school meal eligibility in the US and the UK is a widely used indicator of additional educational need in both research and education policy. But this binary variable does not show the severity of poverty and thus the magnitude of additional educational need (Hobbs and Vignoles, 2007, Loeb, 2007). Moreover, most of the studies can only be based on municipality or school district level education spending data which does not allow for any determination of the contribution of each educational activity to the desired output. So it is difficult to know which spending items are justified and which are not (Roza and Hill, 2006). This also calls into question if activity-led funding analysis is able to determine costs of delivering given educational programmes to a minimum standard.

Causal relationship between education costs and student performance

66. All these issues boil down to one underlying shortcoming: we know very little about the causal relationship between education costs and student performance (Costrell *et al*., 2008, Hanushek, 2008, 2006b, 2003) and even the captured links appear to be relatively small (Jenkins *et al.*, 2006). Thus, it is not possible to link school funding formulas to education outcomes in a reliable and reasonably precise way. This is illustrated, among others, by the education performance in those US states where courts mandated adequacy oriented finance reform throughout the last decade even though the implementation of court decisions has not been thoroughly effective in all cases (Yinger, 2004b, Yinger, 2004a, pt. 2, Huang *et al.*,

11. A wider discussion on the merits and demerits of measurement and quantification in fields laden with conflicting goals and heightened demand for accountability can be found in Porter (1995) or Hamm and Richardson (2001).

2004, Evans *et al.*, 1999). In New York or Wyoming student performance has not improved compared to the US average or the neighbouring states in spite of large increases in overall spending and more equalisation of spending (Hanushek, 2006b, 2005). Similarly, the evidence on whether the large recent infusion of funding into UK schooling system has been worthwhile, *i.e.* produced the desired enhancements in student performance is subject to heated academic debate (*e.g.* Holmlund *et al.*, 2009, Jenkins *et al.*, 2006).

Expected standards are typically higher than what schools currently achieve

67. Even if the shortcomings of available data and problems of varying standards and school characteristics were sorted out other critical problems would remain: expected standards are typically higher than what schools currently achieve (see for example England, UK (DIUS, 2008)). As there is no current knowledge on how to achieve them, forecasts must be used for such calculations. However, the often used simple linear extrapolation of observed (and often obscure) cost-performance relations is not sufficient in this case because it is unwarranted that simply increasing inputs (*e.g.* having more instruction hours) will enhance outputs (Loeb, 2007, Angus *et al.*, 2007, Hanushek, 2006b). For example, increasing overall funding for the school system can lead to lower efficiency (Yinger, 2004b); and also more money can conserve inefficient arrangements if not matched with conditions promoting more efficient spending (Hanushek, 2006b). Even though it must be noted that several authors defend the projections based on cost-function estimates by claiming that they prove to be reliable when tested against historical data (*e.g.* Duncombe, 2006). Furthermore, by projecting our present input-throughput-output relations into the future it is assumed that the technology of education will remain unaltered in the future. But since developed countries already spend heavily on school education, efficiency gains through non-monetary improvements such as curriculum enhancements, better trained teachers and better incentives may achieve more than just additional resource (Hirsch, 2006, Hanushek and Rivkin, 2006).

4.3. Impact of the wider policy environment

68. In most of the literature on school funding formula, school autonomy is a natural companion of formula funding which is at least partially due to the fact that most of the countries using a school funding formula also delegated a wide range of decisions to their schools. But given that resources are allocated according to need estimation through the formula are the resources devoted to these needs? There are divergent policy responses to this issue across OECD countries. On the one hand, the US court mandated school finance reforms typically have no specific requirements on how allocated resources should be spent (Costrell *et al.*, 2008, Yinger, 2004b, Huang *et al*., 2004, Lukemeyer, 2003). On the other hand, in England the dissatisfaction of the government with local funding formulas and the ways schools spend public money led to targeted funding programmes with constrained local freedom in spending decisions (Simkins, 2004, West *et al.*, 2000).

69. This concern of policy makers and researchers is fuelled by the paucity of information of school and programme level spending data (*e.g.* Angus *et al.*, 2007, Guthrie, 2006) and it is underpinned by the mixed results of motivation mechanisms supposed to make schools spend resources efficiently. Above all, the functioning of education quasi-markets, particularly their effect on low performing schools is essential in assuring efficient school spending which, however, is a controversial topic (Fuchs and Woessmann, 2007, Woessmann, 2006, Plank and Sykes, 2003).

70. Although overall education spending is outside our scope, there remains debate over how to preserve the desired characteristics of formula funding of schools in the face of diverse local budgetary and/or parental contributions. Some countries such as the US impose minimum tax rate requirements to assure that local contributions reach a minimum level and also provide additional support for low income localities (Huang, 2004, Yinger, 2004b, Hoxby, 2001). In other places such as New Zealand and Victoria,

Australia, increased parental contributions to schools raise equity concerns because they go counter to the desirable results brought about by formula funding (Angus *et al.*, 2004, Levacic *et al.*, 2000).

4.4. Rhetoric versus substantive policy change

71. Although it is not discussed extensively in the literature, the most essential and still undecided question is how the introduction of school formula funding regimes has changed school funding. Some scholars who host strongly optimistic views, claiming that it brought about a rational and evidence-based new era (*e.g.* Ross and Hallak, 1999, Levacic and Ross, 1999). Others claim that the actual practice of designing funding formulas is still close to historical and/or incremental funding mechanisms involving a great deal of political bargaining though the arguments used have changed substantively (West, 2009, Agyemang, 2010, Levacic, 2008).

5. FUTURE PERSPECTIVES

72. While the transfer of knowledge across administrative and cultural borders faces a range of obstacles (*e.g.* Freeman, 2006, Antal *et al*., 2001), it seems fruitful to cross-fertilise academic literatures as well as national policy making in several ways: First, policy making in countries using alternative school funding methods can be informed by the experiences of school formula funding regimes. Transfer can rely additionally on the much wider use of formula funding in other domains ranging from higher education to health care (*e.g.* Schenker-Wicki and Hürlimann, 2006, Smith, 2007, 2003). Second, the ongoing debate on adequate funding in the US may provide valuable insights for the countries currently running school formula funding regimes, particularly for other Anglo-Saxon countries. At the same time, the heated and unsettled debate about adequacy may make it difficult to transfer lessons. Third, analytical techniques and policy lessons may be successfully transferred to countries where the evidence base of education policy and supervision capacity of education authorities is still weak – for example Eastern European countries (Davey, 2002).

73. As for the future directions of the literature, some suggestions are due: First, the ongoing debate on adequate school funding in the US and its first signs in other countries (*e.g.* UK, Australia, Norway) are likely to draw significant public attention, research effort and spur much political debate in these countries. Second, this will be largely underpinned by considerable scientific activity to decipher the causal link between school resources and pupil performance, and to identify successful education interventions domestically and globally. Third, all these will be dependent, to a large degree, on the availability of sufficiently accurate and detailed data for longer time periods because without school level spending data a crucial element in input-throughput-output relationship remains unknown (Guthrie, 2006). Lastly, it would be desirable to gather more systematic evidence on how the politics of formula funding is actually done both on local and national levels.

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