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**Article**

## Institutional Comparisons in Educational Production

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# INSTITUTIONS FOR BETTER EDUCATION

## INSTITUTIONAL COMPARISONS IN EDUCATIONAL PRODUCTION

LUDGER WÖßMANN \*

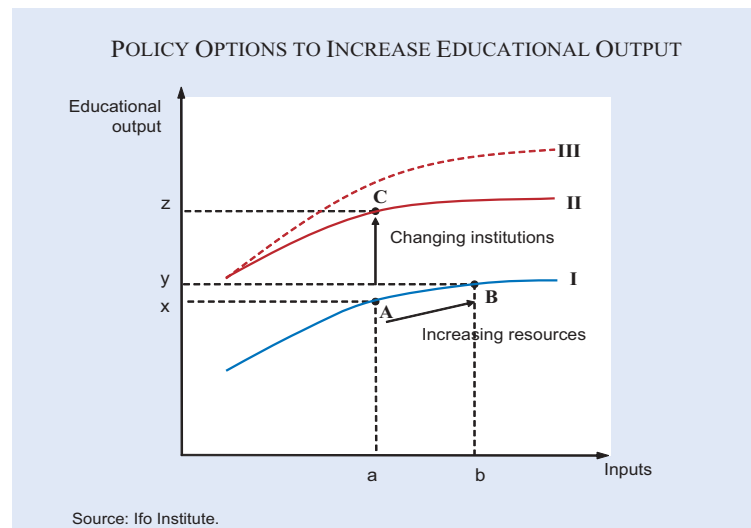
Education is a fundamental determinant of individuals' and societies' economic performance. This gives vital importance to the question of how high educational performance can be achieved. Economists like to think about the process which generates educational performance as a production process. This is not a disregard of humanistic views of the specific value of each human being. Instead, with all esteem for the dignity of each individual, thinking in terms of educational production can help to understand, and hopefully ultimately improve, how education systems work and how student learning might be furthered. Thus, think of how the "output" of the education process – students' learning achievement – is "produced" by several "inputs" in the education process – e.g., the students' family background, class sizes and teacher characteristics.

### Education production functions

The figure depicts such "education production functions". For example, at point *A*, an amount *a* of inputs is transformed into an amount *x* of outputs. Traditionally, economic research on educational production has focused on how an increase in the amount of resources that schools are endowed with affects educational output. Such resource

increases might take the form of smaller class sizes, classrooms equipped with better facilities, better-educated, higher-experienced or better-paid teachers. Unfortunately, an extensive literature on the effects of resources on student performance comes to the conclusion that resource effects are very small at best at the levels of resource endowment currently reached in developed countries (e.g., Gundlach et al. 2001; Hanushek 2002; Wößmann 2004; Wößmann and West 2004). Substantially increasing the amount of resource inputs from *a* to *b* has generally been found to increase educational output only slightly – say, to point *B*, where output is increased from *x* to *y*. The returns to additional spending are very small on the existing education production function *I*. The education system is producing at a level of strongly decreasing returns. The education production function is virtually flat.

This lack of evidence on substantial resource effects begs the question of how, then, student performance can be increased. In this production-function perspective, an obvious possibility would be, instead of moving along a given production function, to shift the whole production function upwards. If we found a way not to produce on function *I* any longer, but rather to shift to function *II*, we could produce at point *C*, which has much higher educational output *z* at the given input level *a*. In order to reach such a higher production func-



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tion, the whole way in which educational production takes place has to be transformed, giving rise to different institutions of the education system.

(As an aside: Some reforms might not only shift the production function upwards, but also make it more steeply sloped, such as production function *III*. At such a production function, we would not only get higher output at given input, but also, any given movement along the new production function would result in a larger increase in output. That is, institutional reforms might also lead to a production function where each additional input is transformed more productively into outputs, so that on the new production function, spending more money might be more worthwhile.)

### **Institutions and educational performance**

Fortunately, substantial research in the economics of education over recent years has moved in the direction of analyzing which institutional structures might shift the education production function upwards, allowing to produce higher educational outputs at given input levels. Institutional economics quite generally suggests that by determining the incentives that the actors of a system face, institutions (the rules and regulations of a system) can have a large impact on the system's output. More specifically, if the actors in the education process are rewarded for producing better student performance and if they are held accountable for not producing high performance, this will improve performance. The need for proper institutional frameworks may be particularly crucial in educational production, because public schools dominate the production of basic education all over the world. Like other command and control systems, public school systems per se may arguably not set major incentives for improving students' educational performance or for containing costs.

Recent research has focused on three groups of institutions that may be able to create performance-conducive incentives: choice, accountability and teacher incentives. Further focus has been placed on the preparation of students at the pre-school level and the selectivity of the education system. The contributions in this Forum of the DICE Report on "Institutions for Better Education" span topics in all these areas, and the DICE Report has also previously reported on research

on specific institutional effects in educational production. To provide a frame-setting overview of the institutions relevant in educational production and to put the different contributions in perspective, the following paragraphs briefly refer to recent contributions on the topic.

### *Competition, parental choice and school autonomy*

Competition in the education system, which allows for parental choice among autonomous schools, can create incentives for schools to improve performance (cf. Hoxby 2003a for a recent collection of research on school choice). Thus, school vouchers (coupons for the attendance of private schools), discussed in DICE Report 4/2003, are one institutional feature that enhances school choice and has been shown to improve the educational performance of disadvantaged children in the United States (Peterson 2003).

Hoxby (2003b) summarises ample evidence from recent policy experiments in the United States that shows that school choice and school competition, among others in the form of vouchers and charter schools (relatively autonomous public schools that give parents additional choice), improve the performance not only of these schools, but also of the public schools that compete with them. Similarly, increased competition among US public schools has been shown to improve student performance (Hoxby 2000). Bradley and Taylor (2002) and Levačić (2004) find similar positive effects of school competition on the performance of English schools. Estimates of international education production functions, which exploit the substantial cross-country variation in institutional features, also show that the cross-country pattern of student performance is positively related to competition from privately operated schools and to school autonomy in personnel and process decisions (Wößmann 2003a).

In this Forum, Nechyba provides an additional analysis of the effect of school choice on school quality in the US school system (cf. also Nechyba 2000). In addition, Psacharopoulos compares private and public university systems. All these contributions to the research on institutional effects in educational production suggest that competition, choice and school autonomy may indeed be institutions that can shift the education production function of the figure upwards.

### *Testing and accountability*

Testing of and accountability for student performance are another way to create performance-conducive incentives, in particular by providing information to students, parents and potential employers (Bishop and Wößmann 2004). As cross-country research reported in DICE Report 4/2003 reveals, external exit exams are a powerful accountability device which improves educational performance and constitutes a precondition for decentralised systems of autonomous schools to function properly (Wößmann 2003b).

In this Forum, Figlio and Hanushek report additional evidence on positive performance effects of grading standards and accountability systems in the United States. The research by Hanushek shows that the introduction of state-wide accountability systems that measure school performance improved student performance in the United States (cf. also Hanushek and Raymond 2004). Figlio provides evidence that US students perform better where teachers have high grading standards (cf. also Figlio and Lucas 2004). Again, institutional features that introduce accountability by testing what students and schools deliver seem to be a way to shift education production functions to a higher level.

### *Teacher incentives*

Arguably, apart from the students themselves, teachers constitute the most important “input” in the education production process, in terms of both cost and content (Rivkin et al. 2004). Therefore, incentives for teachers to perform well may be expected to improve their effort and the quality of their teaching. Recent evidence by Lavy (2002) shows that contracts providing monetary incentives for teachers based on their students’ performance indeed improved student learning in Israel immensely. By contrast, the fact that teacher unions in the United States considerably reduce the productivity of educational production (Hoxby 1996) may give an indication of what happens in places where teacher incentives are weak. In this forum, Dolton summarises research on how school systems can recruit high-quality teachers.

### *Pre-school and selectivity*

Two additional institutional features of an education system that have received research attention

recently are the extent of pre-school programs and the selectivity of the education system. Surveying different human capital policies over the life cycle, Carneiro and Heckman (2003) stress the importance of early childhood investments. In issue 4/2003, the DICE Report has reported on early childhood education and care in different countries (Kamerman 2003). Tentative recent evidence suggests that the extent of pre-school education may be particularly important for the cross-country variation in equality of performance of children from different family backgrounds (Schütz et al. 2004).

The same is true for the selectivity of school systems in terms of the age at which they track their students into different school types by ability. Galindo-Rueda and Vignoles (2004) analyse the effects of changes in school selectivity in the British school system. Brunello’s contribution to this forum deals with the question of selective versus comprehensive school systems more generally.

In summary, recent research has gathered considerable evidence that institutional structures that create performance-conducive incentives through competition, accountability and teacher incentives can improve the output of the education process. As they are generally conceived to increase output at given input levels, they are a way to shift the education production function to a higher level, as depicted in the figure. The structure of pre-school education and the selectivity of the school system seem to be further institutional features which affect educational production in important, particularly distributive ways. Of course, there are considerably more details to how each institutional feature affects educational production in practice, and the cited references provide some information on such details. But the general importance of institutions for the success of educational production stands beyond doubt.

### **The European Expert Network in Economics of Education (EENEE)**

The research surveyed in this article suggests that institutional comparisons are an important way to enhance our understanding of crucial aspects of educational production. Consequently, there is considerable scope for learning from other countries, both because some countries have introduced institutional reforms not yet tried in other countries and because

important institutional features (such as central exam systems) often do not provide any variation within countries, precluding empirical analyses within individual countries. This is why the topic of this whole “Journal of Institutional Comparisons” (as well as of the CESifo Database for Institutional Comparisons in Europe, DICE), namely institutional comparisons, is such a vital issue. The contributions in this forum provide an application of this research method to the field of educational production.

A recent endeavour that tries to further such research on international institutional comparisons in the economics of education, in Europe and beyond, is the European Expert Network in Economics of Education (EENEE). EENEE is a network of leading European centres and experts on economics of education sponsored by the European Commission and coordinated at the Ifo Institute for Economic Research at the University of Munich. EENEE aims to contribute to the improvement of decision-making and policy development in education and training in Europe by advising and supporting the European Commission in the analysis of economic aspects of educational policies and reforms. In particular, EENEE is dedicated to creating an exchange platform for education economists and anyone interested in the economics of education in Europe which functions to a considerable extent through its website, [www.education-economics.org](http://www.education-economics.org). At this site, interested readers will be able to find numerous additional references and keep abreast with future work on the topic of this forum: institutional comparisons in the economics of education.

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