Investigating the role of educational systems on learning inequalities with international assessments. The case of early tracking

Analisi del ruolo dei sistemi scolastici sulle diseguaglianze negli apprendimenti con le indagini internazionali sulle competenze.

Dalit Contini

Abstract. This paper discusses the empirical strategies employed in the literature to evaluate the effect of institutional features by exploiting cross-country institutional variability with international assessments and focusing on the effect of early tracking on learning inequalities. To control for country-level confounding factors, Hanushek and Woessmann (2006) proposed a simple two-step difference-in-difference strategy using assessments administered at different age/grades. Other scholars extended this approach to analyze the effect of early tracking on learning differentials across social groups, using individual level models pooling together the data from different countries and assessments. However, since test scores delivered by international assessments are not vertically scaled, strategies based on individual-level models may deliver severely biased results. Instead, the scaling problem does not affect the two-step approach.

Abstract *In questo lavoro si discutono alcune strategie analitiche impiegate nella recente letteratura socio-economica per valutare l'effetto di caratteristiche dei sistemi scolatici - e in particolare dell'età in cui gli studenti effettuano il passaggio dalla scuola comprensiva percorsi scolastici differenziati - sulle diseguaglianze negli apprendimenti con le indagini internazionali sulle competenze. A causa di problemi di scala, alcune di queste strategie conducono a risultati fortemente distorti.*

Key words: educational inequalities, international assessments, schooling systems, cross-country analyses, vertical scaling.

---

[1] Dalit Contini, University of Torino, dalit.contini@unito.it

1 Motivation and summary

The development of international surveys on children's learning like PISA, PIRLS and TIMSS – delivering comparable achievement measures across educational systems – has revealed large cross-country variability in average performance and in the degree of inequality across social groups. A key question is whether and how institutional differences affect the level and distribution of educational outcomes. By exploiting the institutional variability existing at the cross-national level, international assessments allow to investigate empirically the role played by the characteristics of school systems (Hanushek and Woessmann 2011 and Woessmann 2016).

The age of tracking is the institutional feature that has raised the greatest debate. Tracking occurs when children choose between (or are placed into) schools-types delivering educational programs with different curricula and learning targets. The age of formal tracking varies greatly across countries: between age 10 in many German regions and age 16 in UK and in Nordic European countries, and up to age 18 in USA and Canada. Arguments in favor of early tracking relate to the potential advantages of instruction with homogeneous groups of children whereas opponents argue that it fosters educational inequalities.

The effect of tracking on achievement has been the object of extensive investigation. Some studies exploit educational reforms put into effect in some regions or countries. However, specific institutional reforms are implemented only in few countries and typically at once, so the impact of institutions can rarely be investigated in this way. Moreover, one should rely on before and after comparisons that may confound the effects of policies with other country and cohort effects (Brunello and Checchi, 2007); even when they have high internal validity, the findings may not be easily generalized to different contexts. Other studies exploit the cross-country institutional variability and utilize international learning assessments to estimate individual-level models of achievement, on data pooled together from all countries (e.g. Schuetz et al. 2008, Horn 2009, Chmielewski and Reardon 2016). However, evaluating the impact of institutions exploiting cross-country variability is problematic with cross-sectional data (as international assessments are), because of the difficulty to control for unobserved system-level factors potentially affecting inequalities at all schooling stages. To address this issue, in their seminal paper Hanushek and Woessmann (2006) analyzed the effect of early tracking on the children's achievement variability with a simple two-step difference-in-difference strategy, exploiting international assessments administered at different age/grades. Their finding is that variability increases in early tracking relative to late tracking countries. Other scholars adapted this approach to investigate how early tracking affects learning differentials between social or ethnic groups. Pooling together the data from all countries and assessments, they estimate individual-level achievement models with individual- and country-level explanatory variables, reaching contradictory results (eg. Waldinger 2007, Ammermueller 2013, Ruhose and Schwerdt 2016).

In this paper, we compare two-step and pooled individual models in terms of their capacity to deliver meaningful findings on the effect of institutional features on achievement inequalities across social groups. More specifically, we show that since test scores delivered by international assessments are not vertically equated (i.e. are not measured on the same scale as children grow older), strategies based on individual-level models may deliver severely biased results; instead, the scaling problem does not affect the two-step approach. In addition, we substantiate the methodological discussion by analyzing the effect of tracking on learning inequalities in reading literacy with recent data, using both the individual pooled models employed in the literature and two-step estimation. New evidence that early tracking contributes to increasing the gap between children of different social backgrounds is provided.

References

1. Ammermueller, A. (2013) Institutional features of schooling systems and educational inequality: cross-country evidence from PIRLS and PISA, German Economic Review, 14(2): 190-213
2. Brunello G., D. Checchi (2007) Does school tracking affect equality of opportunity? New international evidence, *Economic Policy*, **52**, 781-861
3. Chmielewski A. K., Reardon, S.F. (2016) Patterns of cross-national variation in the association between income and academic achievement, *AERA Open* 2(3): 1-27
4. Hanushek, E.A., Woessmann, L. (2006) Does educational tracking affect performance and inequality? Differences-in-differences evidence across countries, *Economic Journal*, **116**, C63-C76.
5. Hanushek, E.A., Woessmann L. (2011). The Economics of International Differences in Educational Achievement. pp 89-200 in: *Handbook of the Economics of Education*, Vol. 3, edited by Hanushek E.A., Machin S., Woessmann L. Amsterdam: North Holland.
6. Horn D. (2009) Age of selection counts: a cross-country analysis of educational institutions, *Educational Research and Evaluation*, 15(4), 343–366
7. Ruhose J., G. Schwerdt (2016) Does early educational tracking increase migrant-native achievement gaps? Difference-in-difference evidence across countries, *Economics of Education Review*, 52, 134–154.
8. Schuetz, G., Ursprung, H.W., Woessman, L. (2008) Education policy and equality of opportunity, *Kyklos*, **61**(2), 279-308
9. Waldinger, F. (2007). Does ability tracking exacerbate the role of family background for students' test scores? *Working Paper of the London School of Economics*
10. Woessmann L. (2016) The importance of school systems: Evidence from international differences in student achievement, *Journal of Economic Perspectives* 30(3), 3-32