Psychosocial Intervention xxx (2017) xxx–xxx

Psychosocial Intervention

www.elsevier.es/psi

Education-earnings linkage for assessing societal benefits of interventions for children and youth in Sweden

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ARTICLE INFO

Article history:
Received 24 May 2017
Accepted 22 June 2017
Available online xxx

Keywords:
Child development
Cost-benefit
Program evaluation

ABSTRACT

Some long-term societal benefits of early psychosocial interventions supporting children and youth at various developmental risks can be estimated with school results as a mediatory. In this paper we develop causal education-earnings links for educational achievement thresholds at the end of the nine-year compulsory school (CS) and the three-year upper secondary school (USS) in Sweden. Gross earnings are calculated with age profiles estimated on micro-level register data for the whole population. We also estimate the indirect costs of education (forgone earnings) with this data and find that they can be ignored. For the base case, we calculate the expected net present value of meeting minimum requirements for transition from CS to a national USS-program to €112,000 (SEK 1.1 million) and for graduation from such a program to €163,000 (SEK 1.6 million).

Vínculo educación-ingresos para evaluar los beneficios sociales de las intervenciones para niños y jóvenes en Suecia

Palabras clave:
Desarrollo infantil
Coste-beneficio
Evaluación del programa

RESUMEN

Pueden calcularse algunos de los beneficios sociales a largo plazo de las intervenciones psicosociales precoces que respaldan a los niños y jóvenes con ciertos riesgos evolutivos utilizando los resultados escolares como hilo mediador. En este documento desarrollamos vínculos causales educación-ingresos para los umbrales del logro educativo al finalizar la escuela obligatoria (EO) de nueve años de duración y la escuela secundaria superior (ESS) en Suecia. Se calculan los ingresos brutos con los perfiles de edad estimados en un registro de datos a micronivel para la totalidad de la población. También calculamos los costes educativos indirectos (ingresos no percibidos) con estos datos, y encontramos que pueden ser ignorados. Para el caso básico, calculamos el valor actual neto previsto del logro de los requisitos mínimos para la transición de la EO al programa nacional de ESS de 112,000€ (1.1 millones de coronas suecas) y para la graduación en dicho programa de 163,000€ (1.6 millones de coronas suecas).

Introduction

Impact evaluations of psychosocial intervention programs for youth at developmental risks (for instance victims of school bullying, youth with mental health issues or foster children) are usually based on immediate or short-term follow ups, leaving it an open question whether the programs provide long-term societal benefits that make the programs worth spending of limited public budget money. To estimate such societal values it is necessary to predict long-term effects. This can be done, to some extent, by using the causal link between education and life-course earnings as a mediatory. In this study we develop such a linkage with data for the whole Swedish population.

The leading benefit-cost model for analysis of public policies targeting individuals at risk is a model that has been developed and is continuously updated by the Washington State Institute of Public

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http://dx.doi.org/10.1016/j.psi.2017.06.001

Policy (WSIPP, 2016) for producing internally consistent estimates of benefits and costs of public policies for the Washington State legislature. Models in other US states and in the UK are to a large extent adaptations of this model (Little & Edovald, 2012; Pew, 2013), but these approaches have not so far spread out of the Anglo-Saxon world. The US models include an education-earnings link based on analysis of cross sectional annual data for earnings by age and educational status as reported in the US Census Bureau's March Supplement to the Current Population Survey (CPS). Similar calculations are made also for several European countries on an annual basis by the OECD in the yearbook "Education at a glance" (OECD, 2016). The WSIPP and OECD approaches have similarities and differences both in estimation of effects from education on life-course earnings and in calculation of the costs of education that to some extent reflect limitations of the source data. For instance WSIPP accounts for age but not gender, while OECD has it the other way around. OECD accounts for the opportunity cost of education from forgone earnings, while WSIPP ignores this item. Having access to register data for the whole Swedish population we are here able to overcome some of these limitations, not just with respect to inclusion of both age and gender. In particular, we find that in the Swedish context, the OECD approach to estimating the indirect costs of further education from forgone earnings exaggerates the opportunity cost component for secondary education.

In this study we develop links from two educational achievements to the net present value (NPV) of life-course gross income from earnings using micro-level data for the whole population in Sweden 2013. These achievements are (1) being eligible at the end of the nine years compulsory school (CS) to a national program in the three years upper-secondary school (USS), i.e., fulfilling some criteria based on the final credits from CS, and (2) graduation in USS. The first of these achievements is an educational milestone which can be observed with data from national registers in Sweden.

We calculate NPV from the incremental expected present value of gross earnings, net of public and private (opportunity) cost of education, from USS graduation. Following the WSIPP approach, incremental gross earnings are calculated from estimated age profiles based on micro-level register data for the whole Swedish population. This data also allows us to estimate the opportunity cost of education due to forgone earnings. A causality vs. correlation correction factor, based on Swedish studies, is used to account for selection effects. Further, we use cross-table statistics to compute the probabilities of graduation from USS and the expected time of USS education contingent on whether the eligibility threshold is passed or not.

Background

Introduction

The idea that wages includes an education premium was first suggested by Smith (1776/1974, pp. 203–204). The long pursuit for empirical estimates of the returns to education has been summarized in several papers (see for example Psacharopoulos & Patrinos, 2004). In general it is found that the rate of return to education is lower in more developed countries, lower for higher level of education and higher for women. On average the overall private rate of return to education is about 10 percent per year (Psacharopoulos & Patrinos, 2004). However the return to education differs depending on when it appears, and there seems to exist several "thresholds", such as completion of a certain degree, that offer a larger return then just passing an extra year (Heckman, Lochner, & Todd, 2008).

Furthermore, a correlation between education and subsequent outcomes can be the result of selection and does not imply causality. Several studies have therefore used quasi-experimental approaches, such as natural experiments and matching based on twin registers (e.g., Aakvik et al., 2010; Isacsson, 1999; Meghir & Palme, 2005) to estimate the causal effects of education.

In benefit-cost analysis, effects of interventions are assessed according to how they contribute to aggregated societal welfare. This means that all real benefits and costs are included irrespective of whether they are private or public. The focus of this study is on possible effects on productivity over the life course of individuals who have received support from programs for children and youth at developmental risks that may harm their school achievements. If a causal education-earnings link can be established such productivity effects can be predicted from program impact evaluations that directly or indirectly can be related to school results. To construct such a linkage it is necessary to estimate the education premium for gross earnings (i.e., total wage cost to employers and earnings from self-employment, as a measure of productivity), the portion of this premium that is causal, and direct and indirect education costs. This can then be used to calculate the expected net present value of future earnings, conditional on the educational achievement. Two well-established ways to do this, fully or partly, are approaches used by OECD and WSIPP, respectively. They will now be described.

The OECD and WSIPP approaches

Each year OECD estimates the private and public financial returns from investments in education for its member countries (OECD, 2016). The private benefit is defined as the difference in expected net present value of life time earnings of individuals with different levels of education (primary, secondary and tertiary levels). In calculating this value OECD accounts for differences in income tax, transfers (unemployment benefits), social contributions and the probability to get a job. The public benefit is defined as the change of the NPV of tax revenues and social transfers.

On the cost side both the direct and indirect cost of education is considered. The private cost of education includes direct education-related household expenditure and indirect costs; i.e., the opportunity cost of time from forgone earnings of time spent in school instead of in work. The latter component is calculated by OECD as the minimum wage for a full-time job, net of income tax, times the probability to get a job. It is further assumed that students do not have any income while in school. For the government the cost of education is the money per student spent on education and the forgone tax income while the student is in school. By adding the public and private return the social return to education can be held. The annual statistics provided by the OECD is presented separately for men and women. It can further be noticed that the OECD does not use a causality correction factor, does not account for mortality, and uses a 2 percent rate of discount.

The benefit-cost model used by WSIPP (2016) includes an education-earnings module that estimates the increase of life-course labor market earnings as a consequence of having a high school graduation or another year of education. The effect on earnings is calculated from analysis of cross sectional data (US Census population survey) for individuals aged 18–65 (including people with zero earning). While the approach is cross-sectional, data from several years, separated by year-dummy variables, is used so as to capture a whole business cycle. The most recent estimate is based on data from 2002 to 2010. With this data, age-earning profiles, contingent on educational status, are estimated by OLS regression.

Since the census does not include employee benefits (paid leave, supplemental pay, insurance, retirement and savings, and legally retired benefits) a correction for such earnings is made by estimating the ratio of employee compensation from the data "Employer costs for Employee Compensation" to wage and salaries (1.441). This is then added to the earnings from the census data.

Please cite this article in press as: Hultkrantz, L., et al. Education-earnings linkage for assessing societal benefits of interventions for children and youth in Sweden. *Psychosocial Intervention* (2017), http://dx.doi.org/10.1016/j.psi.2017.06.001