Economic Analysis and Policy 52 (2016) 1–10

Contents lists available at ScienceDirect

Economic Analysis and Policy

journal homepage: www.elsevier.com/locate/eap

Full length article

Nonlinearity in intergenerational income transmission: A cross-country analysis

Maria Berrittella *, Valentino Dardanoni

Dipartimento di Scienze Economiche, Aziendali e Statistiche, Università degli Studi di Palermo, Viale delle Scienze, 90128 Palermo, Italy

ARTICLE INFO

Article history:
Received 11 March 2016
Received in revised form 15 June 2016
Accepted 15 June 2016
Available online 4 July 2016

JEL classification:
D31
I24
J62

Keywords:
Becker–Tomes model
Credit constraints
Education
Income inequality
Nonlinearity

ABSTRACT

The aim of this paper is to explore nonlinearity in intergenerational income transmission. We use a set of occupational tables in different countries to test nonlinearity. We also empirically address how policy variables can affect nonlinearity. Our findings suggest that concavity is supported in those societies with less credit constraints, but with more poverty and income inequality; education has an increasing effect on convexity.

1. Introduction

The seminal Becker and Tomes (1979, 1986) model is indisputably the main theoretical framework used by economists to understand the determinants of intergenerational income transmission. As Goldberger (1989) argued, they suggest a microeconomic analysis of family behavior drawing economists into areas formerly reserved to anthropologists, demographers and sociologists, and they also provide a rational choice interpretation to the mechanical model of intergenerational transmission developed by Galton (1886).

Using the theoretical framework of the Becker–Tomes (BT henceforth) model, a rich literature has focused on how to measure intergenerational income transmission, how to compare it across countries and over time.[1] A large set of empirical studies investigates the determinants of intergenerational income elasticity, that measures the degree to which a society gives equal opportunity of success to all its members, irrespective of their family background. If we consider that a higher intergenerational income elasticity implies a lower degree of social mobility, we have that the individuals from the lowest class have more difficult to move upward in the social class they were born (Solon, 1992; Zimmerman, 1992). The intergenerational income elasticity seems to vary with differences in factors relating to financial markets, education, human and social capital (Blanden et al., 2007; Bratsberg et al., 2007; Cardak et al., 2013; Chetty et al., 2014).

In the last decade, much attention has been given to *nonlinearity* in intergenerational income transmission. Couch and Lillard (2004) and Mazumder (2005) find a concave relationship for the US. Using quantile regression estimates and Canadian

* Corresponding author.
E-mail addresses: maria.berrittella@unipa.it (M. Berrittella), valentino.dardanoni@unipa.it (V. Dardanoni).

[1] See Solon (2002) and Black and Devereux (2010) for survey analysis.

http://dx.doi.org/10.1016/j.eap.2016.06.005
0313-5926/

data, Grawe (2004) finds that convexity occurs at the top of the income distribution; while a S-shaped relationship occurs at the bottom of the income distribution. Bratsberg et al. (2007) find that the pattern of intergenerational income persistence is linear for the US and the UK, and convex for the Nordic European countries.

Comparatively, as less attention has been given to the determinants of *nonlinearity* in intergenerational income transmission, the aim of this paper is to empirically investigate this neglected aspect in literature. Estimation methods, variable definitions and sample selection rules often differ widely across the previous empirical studies, including data from different samples, and comparability of results may be tricky. Thus, we use a set of occupational mobility tables provided in Ganzeboom et al. (1989a), which allows a comprehensive cross-country comparative analysis. This set of mobility tables has also the distinctive advantage of employing a consistent and well defined classification of socio-economic status. In details, we first present a simplified version of the BT model and the assumptions on the parameters that may yield nonlinearity; second, we explain the computational method to derive a test of nonlinearity in income transmission from the occupational mobility tables; then we estimate the determinants correlated with nonlinearity. Our main findings show that concavity occurs in less rich countries and with higher income inequality; convexity is related to those countries with more credit constraints, but with redistributive policies aimed to increase the human capital.

2. The Becker–Tomes model

As the BT model is very well known, we recall here only its essential elements using the approach in Solon (2004):

- the parent derives utility from their own lifetime consumption, C_{t-1}, and their child lifetime income, y_t

$$U_{t-1} = (1-\alpha)\log\left(C_{t-1}\right) + \alpha\log\left(y_t\right) \tag{1}$$

  where $0 < \alpha < 1$ denotes a coefficient of parent's altruism;
- the parent allocates his income y_{t-1} between his consumption, C_{t-1}, and investment in child's human capital, I_{t-1}

$$y_{t-1} = C_{t-1} + I_{t-1} \tag{2}$$

- the technology translating parental investment into child's human capital, h_t, is

$$h_t = \theta I_{t-1} + e_t \tag{3}$$

  where $\theta > 0$ is a parameter indicating the efficacy of investments in the child's human capital, and e_t denotes child's initial endowment, influenced by nature and nurture, but orthogonal to I_{t-1};
- the child's income, y_t, depends on human capital

$$y_t = \mu + ph_t \tag{4}$$

  where μ is market luck and p is the rate of return on human capital;
- the child's initial endowment in Eq. (3), e_t, evolves through family generations according to a $AR(1)$ process

$$e_t = \delta + \lambda e_{t-1} + v_t \tag{5}$$

  where $0 < \lambda < 1$ denotes the heritability coefficient and v_t is a stochastic error term.

Maximizing parent's utility of Eq. (1) under the budget constraint of Eq. (2) and using Eqs. (3)–(4), gives the optimal level of parent's investment in child's human capital

$$I^*_{t-1} = \alpha y_{t-1} - \frac{1-\alpha}{p\theta}(\mu + pe_t). \tag{6}$$

Substituting Eq. (6) in Eqs. (3) and (4) we obtain the intergenerational income transmission equation

$$y_t = m + by_{t-1} + \alpha p e_t \tag{7}$$

with $m = \alpha\mu_t$ and $b = \alpha p\theta$.

Since e_t follows the AR(1) process, as defined in Eq. (5), the OLS estimate of the slope coefficient β in the linear regression of y_t on y_{t-1}, that is the intergenerational income elasticity, is

$$\beta = \frac{b+\lambda}{1+b\lambda} = \frac{\alpha p\theta + \lambda}{1+\alpha p\theta\lambda}. \tag{8}$$

Eq. (8) helps understanding estimated β's across countries and times in terms of the underlying structural parameters. In particular, the intergenerational income elasticity β is an increasing function of the heritability coefficient λ, the altruism coefficient α, the productivity of the educational system θ, and the return to human capital p.