A Theory of Intergenerational Mobility with Government

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Abstract

In this project, I aim to investigate the role of *taxation* and *public education provision* on *intergenerational mobility* of earnings and human capital. In doing so, I plan to extend Becker et al. (2018)'s parsimonious model by introducing government. This prospective model environment featuring taxation and public and private education options in households' choice set induces a fraction of parents to optimally choose cost-free public education for their children instead of privately investing in their education. Further, the pool of parents choosing public education increases over the tax rate. As a result, the model-generated intergenerational income elasticity prediction decreases over the tax rate, as also seen in the cross-country data. These real-world compatible predictions of the model render the prospective model suitable to explore the role of economic policy on intergenerational mobility in a versatile theoretical setting.

Keywords: *Social Mobility; Income Persistence; Human Capital; Education; Public Policy*

1 Introduction

The transmission of economic status across generations — *intergenerational mobility* — has recently become one of the major concerns in the study of economic inequality.[1] The rapid increase in the availability of high-quality microdata has been a pivotal factor contributing to a plethora of empirical studies on the subject. The empirical estimates reported in these studies show that intergenerational mobility differs immensely across countries.[2] While numerous empirical studies are analyzing these differences, the number of theoretical works investigating the cross-country differences in intergenerational mobility is yet limited. In this project, I aim to offer a simple theoretical framework to address these cross-country differences. To this end, I show that differences in the level of taxation and public education provision can contribute to the understanding of the cross-country variation in intergenerational mobility.

Cross-sectional income inequality and intergenerational earnings mobility are negatively correlated across countries, coined as "*The Great Gatsby Curve*" by Krueger (2012). Figure 1 depicts this phenomenon for a subsample of OECD countries. Figure 1 ranks countries by income inequality (on the horizontal axis) and social (im)mobility (on the vertical axis).[3] Countries characterized by relatively high income inequality and low intergenerational mobility (e.g. the United States and the United Kingdom) are located in the northeast quadrant of the Great Gatsby curve whereas countries characterized by low income inequality and high intergenerational mobility (e.g. the Nordic countries) are located in the southwest quadrant.

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[1]For instance, two seminal economics journals, the *Scandinavian Journal of Economics* and the *Economic Journal*, both published a special issue on intergenerational mobility in 2017 and 2018, respectively. See Corak (2013) and Black and Devereux (2011) for recent elaborate discussions on the empirics of intergenerational mobility.

[2]For an elaborate discussion on the empirics of international differences in intergenerational mobility, see Narayan et al. (2018).

[3]The social (im)mobility variable in Figure 1 is the frequently used "intergenerational earnings elasticity" estimate, which is proxied by the regression coefficient $\widehat{\beta}$ from the standard ordinary least squares regression $y_{c,i} = \beta y_{p,i} + \varepsilon_i$, where $y_{c,i}$ and $y_{p,i}$ denote children's and their parent's log real income, respectively. Income inequality (on the horizontal axis) is proxied by the Gini coefficient of parents' income. See Corak (2013) for more on the measurement of social mobility.

Figure 1: The *Great Gatsby* Curve
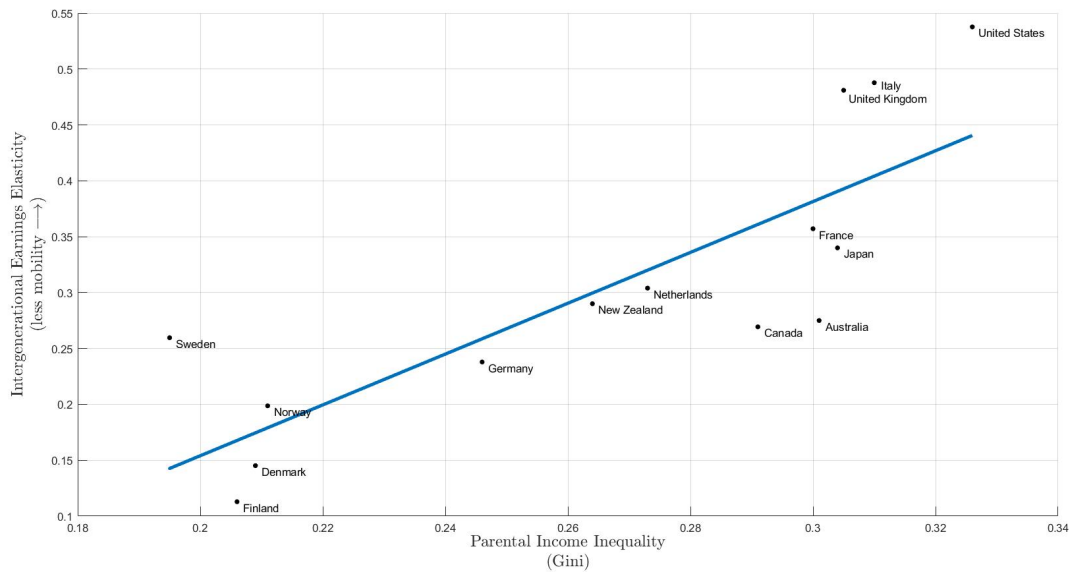
Notes: The x-axis displays income inequality (measured by the Gini coefficient via household incomes in 1985). The y-axis displays intergenerational earnings elasticity (estimated via the data of children born during the 1960s). *Source*: Corak (2013). For an extended and updated version, see Narayan et al. (2018) and GDIM (2018).

Noticeably, the countries located on the two ends of the Great Gatsby Curve also differ immensely by *how they finance their higher education.* Figure 2 displays *public* and *private* tertiary education expenditures (as a percentage of GDP) for a subsample of OECD countries. The Nordic countries, which are located on the southwest part of the Great Gatsby curve, rely immensely on public resources to finance higher education, so much that public education expenditure constitutes at least 87.5% of their total tertiary education expenditure. On the contrary, this ratio is merely around 30% for the United States and the United Kingdom, which are located on the northeast part of the Great Gatsby curve.

Given their comparable development levels, these countries' drastic differences in their composition of tertiary education financing and intergenerational mobility deserve special attention. This project aims to address this issue theoretically. To this end, I first extend Becker et al. (2018)'s overlapping generations model by introducing government. In this setting, parents can transfer resources to the next generation through education investment and financial bequests. The distinguishing feature in Becker et al. (2018) is the existence of *complementarities* between parental human capital and education investment in children's skill formation. The transmission of economic status across generations arises from these *complementarities* and optimal education investment decisions of parents. Yet, this state-of-the-art model lacks government, and as such, it is silent on the role of economic policy in shaping intergenerational mobility. My extension introduces a uniformly provided public education, which is financed by proportional income taxation, thereby offering insights on the role of public policy.

Figure 2: Tertiary Education Composition by Country
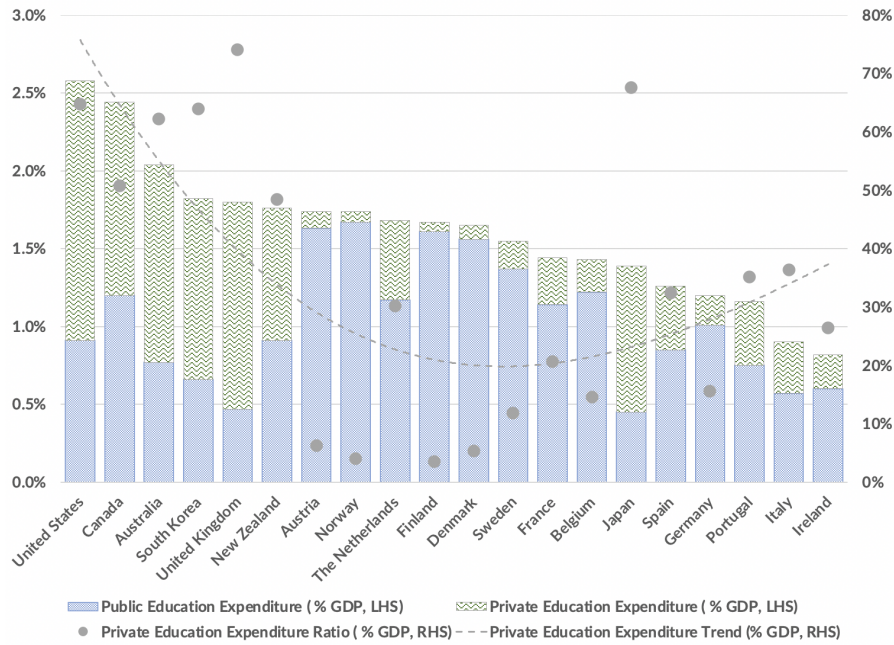
Notes: The reference year is 2017. *Source*: Education at Glance 2019, OECD

In my proposed model setting featuring public and private education options available in households' choice sets, higher public education provision reduces intergenerational income and human capital mobility. The intuition behind this result is that when public education provision is large enough, some fraction of parents optimally chooses cost-free public education for their children, instead of privately investing in their education. Besides, the pool of parents choosing public education increases over the tax rate. As a result, the model-generated intergenerational income elasticity prediction decreases over the tax rate, as also seen in the cross-country data. These real-world compatible predictions of the model render the prospective model suitable to explore the role of economic policy on intergenerational mobility in a versatile theoretical setting.

As briefly discussed, there is extant literature on the empirics of intergenerational mobility. However, theoretical studies on the subject are limited. As an exception, Becker et al. (2018) proposes a model environment for the scrutiny of the theory of intergenerational mobility. This state-of-the-art model, however, lacks government. As such, albeit motivated by the Great Gatsby curve, Becker et al. (2018) does not attribute cross-country differences to differences in economic policy. As another exception, Durlauf and Seshadri (2018) offers a theoretical framework that focuses mainly on within-country and not cross-country variation in intergenerational mobility. A final recent exception is by Torul (2020), which attributes transatlantic differences in economic distributions and intergenerational mobility to differences in taxation and public policy. However, Torul (2020) works with a heterogeneous-agent incomplete market model that can only be solved computationally, thereby lacking analytical results. This project aims to propose a versatile and parsimonious model setting that can offer theoretical insights on the role of economic policy.

2 Model

Following Becker et al. (2018), the model economy is populated by a continuum of agents who live for two periods: 1- childhood; and 2- adulthood. Each parent (p) has a single child (c), so the population is constant. During their adulthood, parents use their human capital (h_p) to earn income ($y_p = r h_p^\sigma$ with $r >$

0, $\sigma > 0$), which they use to finance their 1- consumption (c_p); 2- children's private education investment (e_c); 3- bequest to their children (b_c). During their childhood, children form their human capital ($h_c = (e_c + \overline{E})^\alpha h_p^\beta$), which they use the next period to generate earnings. Government provides an equal level of public education investment ($\overline{E}$)) to each child alongside parents' private investments. To finance public education provision, it levies a proportional income tax (at the rate τ) on income, so that parents' post-tax income becomes $(1-\tau)y_p$. Because government runs a balanced budget, total tax revenue does not exceed the expenditure on public education ($\overline{E} = \mathcal{T} = \int_0^1 \tau y_{i,p} di$). In a Beckerian way, the preferences of parents not only depend on their own consumption but also depend on the well-being of their offspring, given by: $V(Y_p) = u(c_p) + \delta Y_c$ with $\delta \in (0,1)$ where $Y_p = (1-\tau)y_p + b_p$ denotes total after-tax monetary resources including bequests b_p. The timeline of events is depicted on Figure 3.
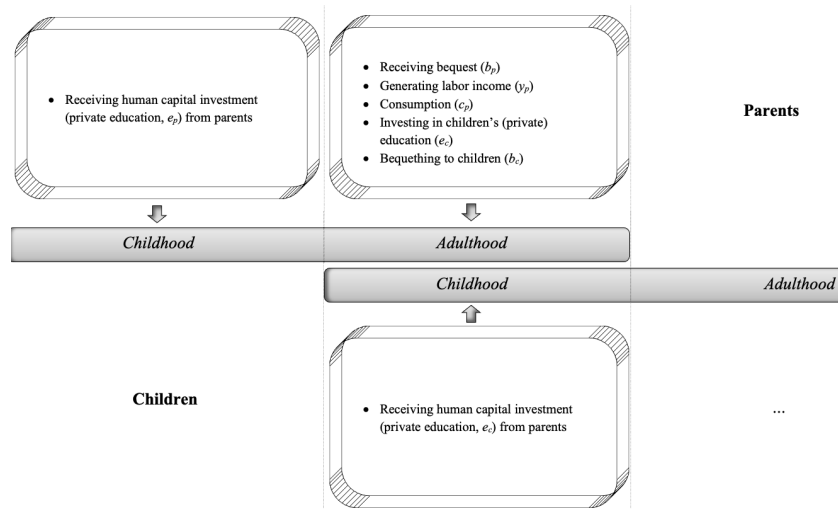

Figure 3: Timeline of the Model

Formally, the parent p solves the following optimization problem:

$$\max_{\{c_p, e_c, b_c\}} V(Y_p) = \mathbb{E}[u(c_p) + \delta (\overbrace{\underbrace{(1-\tau)r h_c^\sigma}_{(1-\tau)y_c} + b_c}^{Y_c})]$$

subject to

$$c_p + \frac{b_c}{R} + e_c = (1-\tau)y_p + b_p \equiv Y_p \ \& \ h_c = (e_c + \overline{E})^\alpha h_p^\beta$$

The solution to the above problem generates either an *interior* or a *corner* solution. The interior solution takes the form:

$$e_c^* = \underbrace{\left(\frac{r\alpha(1-\tau)\sigma}{R}\right)^{\frac{1}{1-\alpha\sigma}} h_p^{\frac{\beta\sigma}{1-\alpha\sigma}} - \overline{E}}_{\equiv \tilde{e}_c} \quad \text{if } \tilde{e}_c \geq 0$$

The corner solution requires that $e_c^* = 0$ if $\tilde{e}_c < 0$. In other words, parents with different human capital (and income) levels find different education solutions: parents with limited human capital (i.e. those below a certain human capital threshold, $\tilde{h}(\tau)$) do not want to bear out-of-pocket education costs, so they rely solely on cost-free public education for their kids. Parents with a human capital above the threshold $\tilde{h}$, however, are not content with the level of public education provision, and they would like to complement public education with additional private education at the above interior solution as in Becker et al. (2018).

Together with the law of motion for human capital and the income-generation process, these two education solutions yield that intergenerational transmission of income follows:

$$\log(y_c) = \begin{cases} \frac{1-\beta}{1-\alpha\sigma}\log(r) + \frac{\alpha\sigma}{1-\alpha\sigma}\log\left(\frac{(1-\tau)\alpha\sigma}{R}\right) + \frac{\beta}{1-\alpha\sigma}\log(y_p) & \text{if } h_p > \widetilde{h}(\tau) \\ (1-\beta)\log(r) + \alpha\sigma\log(\overline{E}) + \beta\log(y_p) & \text{if } h_p \leq \widetilde{h}(\tau) \end{cases}$$

This analysis demonstrates that intergenerational earning elasticity among parents choosing private education is $IGE_{\text{Private}} = \frac{d\log(y_c)}{d\log(y_p)} = \frac{\beta}{1-\alpha\sigma}$ whereas the same elasticity among parents choosing public education is $IGE_{\text{Public}} = \frac{d\log(y_c)}{d\log(y_p)} = \beta < \frac{\beta}{1-\alpha\sigma}$. That is intergenerational income transmission is stronger (and income mobility is weaker) under the prevalence of private education, and intergenerational income transmission is stronger (and income mobility is stronger) under the prevalence of public education. Once distributional properties imposed, it is fairly straightforward to show that a higher tax rate τ generates 1- a higher level of public education $\overline{E}(\tau)$; 2-a lower human capital threshold $\widetilde{h}(\tau)$; thus under a given distribution of parental human capital, 3- a higher fraction of parents choosing public education and a lower fraction of parents choosing private education. Therefore, the model would generate a higher average intergenerational earnings elasticity (IGE) under a low tax regime, and a lower IGE under a high tax regime. Again, it is also straightforward to show that a progressive tax system would reduce intergenerational income elasticity among parents choosing private education. These predictions are compatible with the Great Gatsby curve and the tertiary education compositions of the discussed group of countries.

During my research visit in the United States, I would like to enrich and *close* the model. That is, I plan to explore more about the long-run predictions of the model. To this end, I would like to present and discuss my findings, gather feedback and suggestions from prominent economists to improve the formulation of my prospective model.

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