Human capital spill-overs and the geography of intergenerational mobility ☆

Brant Abbott [a,*], Giovanni Gallipoli [b]

[a] *Queen's University, Canada*
[b] *Vancouver School of Economics, UBC, Canada*

A R T I C L E   I N F O

A B S T R A C T

We develop and estimate an equilibrium model of geographic variation in the intergenerational elasticity of earnings (IGE). The theory extends the Becker–Tomes model, introducing a production sector in which workers' human capital inputs are complements. In this setting the return to parental human capital investments is lower where skill complementarity is more intense, and this is reflected in less intergenerational persistence. We also show that education subsidies may be more desirable where skill complementarities are stronger, endogenously leading to a negative correlation between progressive public policy and IGE. Using microdata we construct location-specific measures of skill complementarity and document that patterns of geographic variation in IGE are consistent with this hypothesis. Geographic differences in skill complementarity directly account for roughly one fifth of cross-country variation in IGE, and possibly more if one allows for the indirect effect through government expenditure in public education.

© 2016 Elsevier Inc. All rights reserved.

1. Introduction

A large literature documents significant differences in the intergenerational earnings elasticity (IGE) across countries (e.g. Corak, 2006; Black and Devereux, 2011; Jantti et al., 2006). Recent work has also measured intergenerational earnings mobility across regions of the United States (Chetty et al., 2014) finding large and persistent differences. Existing research documents interesting correlations between IGEs and various measures of public education spending, inequality and returns to human capital investments (see Blanden, 2009). Yet, less is known about what drives these correlations and whether they are useful for understanding differences in intergenerational mobility across regions.[1] An exception to this is the theoretical

---

* Corresponding author.
E-mail address: abbottbrant@gmail.com (B. Abbott).

[1] Quantitative studies of intergenerational persistence often focus on the 'aggregate' mobility rate within a country (e.g. Restuccia and Urrutia, 2004; Lee and Seshadri, 2014, for the United States).

contribution by Ichino et al. (2010), who show how variation in political institutions can lead to variation in both public education policies and IGEs.

In this paper we suggest that geographic variation in intergenerational mobility rates may be partly due to technology. We show that production complementarities in workers' human capital directly affect the intergenerational persistence of earnings. Differences in strategic complementarity may also result in differences in the desirability of progressive public education policies, highlighting an additional (indirect) channel through which technology may affect IGEs.

When we examine cross-sectional data about the geography of intergenerational persistence, we find evidence supporting this hypothesis. We use this reduced-form evidence to motivate our structural analysis and we estimate a richer model of earnings' persistence in which different countries ('islands') are characterized by different degrees of skill-complementarity in production. The model is parameterized using US and international data. Results suggest that differences in the degree of skill-complementarity can directly account for about 20% of international variation in IGEs. In comparison, observed variation in the generosity of public policies can explain about 25% of observed variation in IGEs.

Our theory of mobility highlights the importance of supply side factors. We start from the observation that each country's industrial composition spans several sectors, and workers within each sector have different skill endowments. Workers' skills are more or less substitutable depending on the sector. For example, workers' skills may be fairly complementary in the manufacture of complicated machinery, while in other industries, such as health or education, each worker's productivity is less dependent on the skills of co-workers.

To the extent that endowments, location and historical circumstances result in differences in the relative size of each industry within a country, one will observe heterogeneity in the level of skill substitutability across countries. Comparative advantage in certain industries may therefore influence human capital investments, government policies, and mobility between generations. Countries where industries employ technologies in which skills are more complementary will exhibit more mobility (i.e., less intergenerational income persistence) in equilibrium. Moreover, in these countries government policies that equalize skills would be more desirable. We present evidence of these relationships in cross-country data.

A key feature of our theory is that imperfect skill substitutability in production generates strategic complementarity in parental investments in children's human capital. The existence, and importance, of such strategic complementarity (or 'education spill-overs') in the United States has been documented by Moretti (2004).[2] This means that the prevailing technology determines the degree to which a worker's own skills, as opposed to the skills of co-workers, determine her wage. In industries where skills are highly substitutable in production, a worker's wages are mostly determined by her own skills. Conversely, in industries where skills are relatively complementary in production, the skill levels of co-workers play a larger role through their effects on the overall productivity of the group.

This has direct consequences for the return to parental human capital investments. The more substitutable are skills, the greater the dependence of a worker's wage on her *own* skill attainment. Hence, the human capital investment made by parents will have a greater impact on their children's future earnings if they live in a country where skill substitutability is higher. Moreover, the greater returns to large human capital investments in countries where skill substitutability is higher will induce larger human capital investments among wealthy families.

Variation in the degree of skill substitutability may also have implications for the progressiveness of education and tax policies, and thus exert indirect effects on intergenerational mobility. As the degree of strategic complementarity in human capital investments increases, skills become more complementary and their homogeneity in the population induces significant improvements in the stock of human capital and aggregate productivity. A similar point has been made in the past by Arrow (1962) and Romer (1986). For this reason lower skill substitutability in production implies an increase in the desirability of policies that equalize skills, such as public education spending. Thus, the well-known association between progressive public policy and intergenerational mobility endogenously arises in such an environment. This observation highlights an additional channel through which skill substitutability may affect intergenerational mobility.[3]

Finally, a negative association between income inequality and economic mobility arises in the model, as the degree of income inequality is directly related to the substitutability of skills in production. This is consistent with empirical observations suggesting that countries with more inequality also experience less earnings mobility across generations, a relationship that has been dubbed the 'Great Gatsby' curve (see Krueger, 2012; Corak, 2013).

We begin the paper with an analytical example, which illustrates the mechanism. In this simple setting we consider only two periods, and let parental human capital levels be exogenous endowments. There are no heritable skills, thus a parent can only affect her child's outcomes by investing in her child's human capital. Altruism motivates parents to do so; however, the skill substitutability parameter in the aggregate production function moderates the relationship between children's future earnings and the human capital their parents bestow upon them. These simplifications lead to the stylized result that the IGE is proportional to the skill substitutability parameter. Furthermore, we show analytically that the optimal education subsidy and income taxation rates are decreasing in skill substitutability due to the lessening of strategic complementarity among skill investments.

---

[2] Moretti (2004) shows that spill-overs are larger between similar industries. His industry decomposition is finer, hence similar industries in his data mostly fall within the same coarse group at our level of aggregation.

[3] For a cross-country examination of the equilibrium effects of taxation on human capital accumulation, see Guvenen et al. (2014).