Skill-Upgrading and the Savings of Immigrants

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27. June 2006

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June 27, 2006

Abstract

This note derives positive and normative implications about the effects of immigration on welfare and the skill composition of the labor force in receiving economies. The main channel through which immigration affects labor-market outcomes is the availability of new loanable funds for investment, which results in endogenous skill upgrading.

Given their high training costs and their lifelong working period, immigrants self-select as net lenders, which facilitates the upgrading of both new generations of natives and migrants. Under sufficient altruism towards future generations, this induces a Pareto-improvement among the current generations of natives.

1 Introduction

Both legal and illegal immigration from LDCs conform a reality acquiring unprecedented dimensions today in most developed countries. Accordingly, there has been a substantial deal of controversy about to what extent does the average native worker gain or lose from the new migratory flows.

Two recent empirical exercises that obtain quite opposite conclusions are Borjas (2003) and Ottaviano and Peri (2006). The main reason why the second of those papers estimates a net average gain, unlike the first one, is the multiplicity of channels by which immigrants can affect natives' labor market outcomes. Apart from the downward pressure on native wages, Ottaviano and Peri's structural model allows for a consideration of between-worker complementarity and the entry of new firms in response to higher profitability.

*I am indebted to Klaus Desmet, Juan J. Dolado, Michael Manove and Dilip Mookherjee for their generous comments. The usual disclaimer applies.

Our purpose in this paper is exploring an alternative (potential) channel by which the immigration surplus can be enlarged. Unskilled immigrants are often accused of draining funds from the welfare systems of developed countries, while they contribute very little with taxes given their low upgrading prospects. In this paper we explore a different avenue by which they could - at least partially - offset that effect as net suppliers of loanable funds.

We show how immigrants - since they find cultural barriers that increase their training costs - usually work during their whole life-cycle, without a formal acquisition of academic training. Moreover, an altruistic motive leads them to carry savings forward into the future from the beginning of their life, which increases the amount of loanable funds available in the financial system. Therefore, they can provide the young cohorts of natives with savings to finance their educational expenses. Those favorable financial conditions lower the ability requirement for those who try to become skilled, which raises the skill composition in the native economy.

If the productive complementarity is mild enough, wage rates hardly vary with immigration, but the extra upgrading increases the proportion of natives holding high wage jobs. In this sense, our channel refutes Borjas (1994)'s statement that "an immigration surplus arises *only when the native wage falls* as a result of immigration".

The main idea that the paper is currently meant to transmit is the following: It is very likely that - given their higher training costs - immigrants will remain stuck in their relative position of inferiority with respect to earnings and upgrading. But, *precisely because of that stickiness* - and since they will probably work during the whole life cycle - they can provide natives with better wage prospects, even in the absence of wage-premium rises.

2 Related literature and justification of the setup

There is a long history of attempts to account for the different economic performance of immigrants relative to natives. Initially, migrants´s apparent success to eventually outperform their native counterparts was justified with self-selection arguments: the human-capital and demographic characteristics of both groups were not homogeneous. However, in the late 80´s Djajic (1989) and Galor and Stark (1990) inaugurated a line of research by which *incentives in the host country* - as opposed to self-selection - were highlighted as the reason for the higher local savings of migrants relative to otherwise identical natives.

The differential incentives faced by migrants came from a probability of return migration: migrants saved more than natives because lower future wages increased their future marginal utility of wealth, and the extra precautionary savings were useful for migrants to outperform comparable native-born. The novelty of our approach is that *it applies even to permanent residents* who will never intend to return. That is, a higher savings propensity does not need to hinge on the possibility of return migration and an earnings differential.

Moreover, Cornelius (1990) reports that the maturation of social networks of unskilled migrants in the US is making permanent migration a prevalent phenomenon: "the shift from a migrant population consisting mainly of highly mobile, seasonally employed 'lone males' [...] towards a more socially heterogeneous, year-round, *de facto permanent* Mexican immigrant population in California accelerated in the 1980's". This fact adds some relevance to the potential channel we identify.

Concerning the empirical literature, Jones and Smith (1970) report that the *local* (i.e. net of remittances) savings rate of migrant workers in Great Britain in 1965 was about 2% above the UK average. For France, the average local savings of foreign workers in 1970 was 50% higher than those of a French person with the same income (Granier and Marciano (1975)). Further evidence is reported in MacMillen (1982).

3 The Model

3.1 General Description

We portray a receiving country whose production function combines skilled (N_s) and unskilled industrial workers (N_u) in a perfectly-competitive environment. For simplicity, we have abstracted from the use of capital. Individuals supply a unit of labor inelastically, and there is no disutility from effort. The production function faced by any productive unit is specified as follows:

$$y = (N_u^{\varepsilon} + \delta N_s^{\varepsilon})^{\frac{1}{\varepsilon}} \tag{1}$$

where $\delta \geq 1$ is an indicator of technology bias towards skilled labor and $0 \leq \varepsilon \leq 1$, i.e. skilled and unskilled labor show a limited degree of complementarity. As a result of perfect competition and given (1), the skill-premium is given by

$$\omega = \frac{w_s}{w_u} = \delta p^{1-\varepsilon} \tag{2}$$

where $p = \frac{N_u}{N_s}$.

As in Galor and Zeira (1993)'s model, individuals live for two periods. In the first one they must decide whether to acquire skills by investing in education or to work as unskilled, whereas in the second period they work according to their skills, consume, have a child and leave a bequest. Our particular assumption is that individuals do not bequeath physical capital, but they transfer some units of human capital (x) that will reduce their child's training costs in case he/she decided to become skilled. That is, human-capital bequests are useful to reduce training costs provided that descendants acquire formal education.

We adopt the assumption of risk-neutrality of preferences and warm-glow altruism, in the form of parental interest in the future income enjoyed by the child. The assumption on risk neutrality is a strong one, because in that way the optimal transfer of human capital (x) is independent of parental wealth, which does not look realistic. Nevertheless, we are not interested in the dynamics of income inequality, but in a comparative-static exercise between two steady states with a different proportion of migrants. Under risk neutrality, there will be a unique steady state, which facilitates our work. Let us consider the following utility function

$$U_t = c_t + \beta E_t W_{t+1} \tag{3}$$

where c_t stands for current consumption and $E_t W_{t+1}$ for the expected income accruing to the next generation.

During his/her educational process, any individual must hire a quantity γ of skilled professors, though his own ability combined with the human-capital bequest allows him to reduce that upgrading cost. In other words, when deciding whether to upgrade skills in period one or not, individuals make the following comparison:

$$w_u + \frac{w_u}{1+r} \gtrless \frac{w_s}{1+r} - (\gamma - ax)w_s \tag{4}$$

where γw_s is a measure of the training costs, which depend on the skilled wage - as in Rigolini (2004) - because only skilled teachers can train unskilled labor force. The term ax represents the amount of training that the individual can skip due to the familiar transmission of human capital (x) and his/her idiosyncratic ability (a).

Unskilled individuals are supposed to work in both periods and save the initial earnings for the second one, since they only consume and bequeath in period two. The skilled ones borrow from the unskilled to pay for the training costs in the first period, and they repay their debt once they receive the skilled wage. Consequently, from (4), a native individual will decide to upgrade skills at time t iff

$$a \geq \frac{1}{x}\left(\gamma + \frac{\frac{2+r}{\omega_t}-1}{1+r}\right) = \bar{a}_t \tag{5}$$

whereas a similar expression $\bar{a}'$ holds for immigrants provided that we replace γ by $\gamma' \geq \gamma$.

Our assumption is that parents observe the realization of their child's ability and decide upon leaving a human-capital bequest (or not) on the basis of that realization. From (5), they know that their child will only upgrade iff $x \geq \frac{\phi}{a}$, where $\phi(\omega, r) = \gamma + \frac{\frac{2+r}{\omega_t}-1}{1+r}$ and a is the observed realization of the ability random variable. Therefore, following (3), parents will compare the current costs and future benefits of providing a bequest, which are shown in the following inequality:

$$-w_s\frac{\phi}{a} + \beta\left(\frac{w_s}{1+r} - w_u\left(1+\frac{1}{1+r}\right)\right) \gtrless 0 \tag{6}$$

For simplicity, we have assumed that parents derive utility from their child's *gross* earnings, before their debts have been repaid. It is also implicit in the previous expression that the parental decision-unit is atomistic, and they can not internalize the effect of their decisions on future wages. That is the reason why they do not expect next-period wages to change. Moreover, we can observe that parents will bequeath exactly what their child needs to become a skilled worker, and never more.

If the previous inequality is non-negative, it will be worth for them to leave a bequest due to the high gross earnings of the offspring. This will happen only is the ability realization is high enough, i.e. given (6) there will be a bequest provided that

$$a \geq \alpha \equiv \frac{2+r-\omega(1-\gamma(1+r))}{\beta\left(\omega-(2+r)\right)} \tag{7}$$

Therefore, it is the boundary-value for the parent (α) the only relevant cutoff for the decision-making. Let us denote by α' the relevant cutoff value for immigrants, who only differ from natives because $\gamma' > \boldsymbol{\gamma}$.

The previous cutoff realization α reveals that our initial range of values for the ratio p must be such that the skill- premium varies within a certain interval: $2+r \leq \omega \leq \frac{2+r}{1-\gamma(1+r)}$. For $\omega < 2+r$ nobody would consider upgrading, and for $\omega > \frac{2+r}{1-\gamma(1+r)}$ everybody would. Only the intermediate values sort the population into groups as we wish. This requirement motivates the following assumptions about the range of values for p, δ and γ :

$$\begin{array}{ll} \textbf{Assumption 1:} & \left(\frac{2+r}{\delta}\right)^{\frac{1}{1-\varepsilon}} < p < \left[\frac{1}{\delta}\left(\frac{2+r}{1-\gamma(1+r)}\right)\right]^{\frac{1}{1-\varepsilon}} \\ \textbf{Assumption 2:} & \delta > 2+r;\ \gamma < \frac{1}{1+r} \end{array} \tag{8}$$

The labor force in the model can be native or immigrant. We assume that the amount of native population is normalized to 1, whereas a measure M of immigrants are already in the economy during the first period considered. The only distinction between any native and immigrant employee is the cost parameter $\gamma' > \boldsymbol{\gamma}$, which is higher for immigrants because of the need to learn the language and similar cultural barriers.

Where do teachers come from in this economy? Since they are skilled employees, they must get the same wage as the skilled industrial workers, i.e. all members of the skilled labor force must be indifferent between teaching or working for the industry. Moreover, there must be exactly the right amount of teachers to train next period´s skilled labor force. Therefore, if we denote the measure of teachers at time t by τ_t,then

$$\tau_t = \gamma(N^s_{t+1} + \tau_{t+1})$$

and hence, in steady state,

$$N^s = (1-\gamma)(N^s + \tau) \tag{9}$$

We also assume that a is a random variable that follows an exponential distribution with parameter θ (that is, the density function is $f(a) = \frac{1}{\theta}\exp(\frac{-a}{\theta})$). Therefore, from (9) we can derive the measure of skilled and unskilled labor among natives and immigrants in steady state as follows:

$$\begin{aligned} N^u_n &= 1-\exp(-\frac{\alpha}{\theta});\ N^s_n = (1-\gamma)\exp(-\frac{\alpha}{\theta}) \\ N^u_m &= M\left[1-\exp(-\frac{\alpha'}{\theta})\right];\ N^s_m = (1-\gamma)M\exp(\frac{-\alpha'}{\theta}) \end{aligned} \tag{10}$$

where the subindex n stands for native and m for immigrant.

From equations (2) and (10), we can obtain an expression that implicitly characterizes the steady-state wage premium as a function of itself:

$$\omega = \Phi(M,\omega) = \frac{\delta}{(1-\gamma)^{1-\varepsilon}}\left\{\frac{1-\exp(-\frac{1}{\theta}\alpha(\omega)) + M\left(1-\exp(-\frac{1}{\theta}\alpha'(\omega))\right)}{\exp(-\frac{1}{\theta}\alpha(\omega)) + M\exp(-\frac{1}{\theta}\alpha'(\omega))}\right\}^{1-\varepsilon} \tag{11}$$

It is easy to check from (7) and (11) that $\Phi(M, 2+r) = \infty$, $\Phi\left(M, \frac{2+r}{1-\gamma(1+r)}\right) = 0$ and the function $\Phi(M,\omega)$ is monotonically decreasing in the skill premium ω (since so are α and α'). That ensures the existence and *uniqueness* of its intersection with the 45-degree line, which determines a steady-state competitive equilibrium.

3.2 The availability of loanable funds

If we now depart from the usual small-open-economy assumption and consider an endogenous interest rate r, we can derive an *effect of immigration on the availability of loanable funds.* This happens because, in this setting, loans are supplied by unskilled workers who receive income from their first period of life - though they can not consume until the second period - and they are demanded by the skilled labor force to finance their individual training expenses.

The equilibrium interest rate r must be able to equalize demand and supply. It is straightforward to derive that the relevant equilibrium condition in steady state is

$$w_u\left[\left(1-\exp\left(\frac{-\alpha}{\theta}\right)\right)+M\left(1-\exp\left(\frac{-\alpha'}{\theta}\right)\right)\right]=w_s\left[(\gamma-\phi)\exp\left(\frac{-\alpha}{\theta}\right)+M(\gamma'-\phi')\exp\left(\frac{-\alpha'}{\theta}\right)\right]$$

where on the left-hand side we have the supply of loanable funds by the unskilled, and on the right-hand side we can observe the aggregate expenditure on training. The previous expression boils down to the following equality:

$$\frac{\omega-(2+r)}{1+r}\left(\exp\left(\frac{-\alpha}{\theta}\right)+M\exp\left(\frac{-\alpha'}{\theta}\right)\right)=\left(1-\exp\left(\frac{-\alpha}{\theta}\right)\right)+M\left(1-\exp\left(\frac{-\alpha'}{\theta}\right)\right) \quad (12)$$

Now we are ready to introduce our basic result:

Proposition 1 *Provided that ε is close enough to 1, M is close enough to zero and $\gamma' > \boldsymbol{\gamma}$*

then $\frac{d\alpha}{dM}<0$, $\frac{d\alpha'}{dM}<0$, $\frac{dr}{dM}<0$ and the aggregate labor income of natives increases with immigration.

Moreover, if β is large enough, additional immigration brings about a Pareto improvement for the adult native population.

Proof. *From (12) we can differentiate and solve for $\frac{dr}{dM}$ to obtain that*

$$\frac{dr}{dM}=\frac{\left[(\omega-(2+r))\exp\left(\frac{-\alpha'}{\theta}\right)-(1+r)\left(1-\exp\left(\frac{-\alpha'}{\theta}\right)\right)\right]}{\frac{\omega-1}{1+r}\left[(1+r)A+\exp\left(\frac{-\alpha}{\theta}\right)+M\exp\left(\frac{-\alpha'}{\theta}\right)\right]} \quad (13)$$

where

$$A=\frac{1}{\theta}\exp\left(\frac{-\alpha}{\theta}\right)\frac{\partial\alpha}{\partial r}+M\frac{1}{\theta}\exp\left(\frac{-\alpha'}{\theta}\right)\frac{\partial\alpha'}{\partial r}$$

We know that $\frac{\partial\alpha}{\partial r}>0$, $\frac{\partial\alpha'}{\partial r}>0$ and $A>0$. For (13) to be negative we also need the numerator to be smaller than zero, which requires $\alpha'>\ln\left(\frac{\omega-1}{1+r}\right)^{\theta}$.

Moreover, provided that M is close enough to zero initially, $\ln\left(\frac{\omega-1}{1+r}\right)^{\theta} = \alpha$*. Therefore we simply need* $\alpha' > \alpha$*. This last inequality holds iff*

$$\gamma' > \gamma$$

Then, $\frac{d\alpha}{dM} = \frac{\partial\alpha}{\partial r}\frac{dr}{dM} < 0$*. Since wages are invariant - by perfect substitutability - and* $\omega = \delta > 2+r > 1$*, the aggregate labor income of natives increases.*

Additionally, concerning a welfare evaluation, we can distinguish several groups of adult natives with respect to their attitude towards the migratory flow:

- Those parents who used to bequeath before will continue doing so, and will take advantage of lower bequests.

- Those unskilled parents who do not bequeath will have a lower consumption, given their lower returns from lending.

- Nevertheless, given that their descendants will unambiguously have a higher expected income, all parents will be better off if they are altruistic enough. ■

Migration provides a higher proportion of unskilled people who supply funds, which reduces r and also the cutoff values α and α' needed to access high-wage jobs. For the new flow of immigrants to provide a net supply of funds, they need to face high training costs in order to enlarge the pool of lenders more than the pool of borrowers. Our assumption of a low enough value of ε has been made to highlight the fact that we do not need a change in real wages to generate an immigration surplus, which is opposed to Borjas (1994)´s assertion.

4 Conclusions

This note establishes a formal link between the relative training costs of migrants and their savings behavior, with an immediate implication with respect to the skills of future generations. One of the innovative aspects of this work is the absence of any reference to return migration as a key to understanding the saving behavior of immigrants.

As a conclusion, we can emphasize that the complaint about the relatively poor performance of immigrants in the labor market may work as a blessing under the right circumstances, since the reason for their (relative) economic backwardness -i.e. their higher training costs - is also the key to some natives' gain from immigration.

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