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Modeling an immigration shock

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ABSTRACT

In this paper, we model an overlapping generation economy affected by an unexpected immigration shock and determine how households may insure themselves against "immigration risk". We use the model to study the impact of immigration on (i) the welfare of different generations, (ii) the distribution of income among factors of production, and (iii) the optimal design of the intergenerational welfare state. In particular, we construct a system of public education and public pensions that mimics the efficient complete market allocation. We also consider the impact of immigration shocks in a small open economy. In this case, our model suggests that the external capital flow can act as a substitute for the missing private insurance markets. Our analysis delivers a set of predictions that we find useful for understanding certain aspects of the Spanish experience between 1996 and 2008.

1. Introduction

In most developed countries the combination of declining fertility rates and increasing life expectancy makes immigration flows increasingly important. In fact, immigration is the main source of population growth in most developed countries. In addition, in a densely populated world subject to strong climatic pressures and socio-economic changes the probability of large population displacements is greater than ever before. All these facts make it increasingly important that our institutions be able to handle the economic effects of large migration shocks.

We are therefore interested in the following questions. What are the intergenerational economic effects of a large immigration flow? How do households insure themselves against it? How does an immigration shock affect the welfare of the various generations in the receiving country, both current and future? In particular, how does immigration impact intergenerational arrangements such as public education and pensions, which make up the core of existing welfare states? To begin answering these questions, we develop a simple theoretical framework with overlapping generations that live for three periods. They accumulate human capital in the first, work in the second and retire, to live off the return from their

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investments, in the third. Such investments are both in the physical capital and in the resources lent to the young people to accumulate human capital.

We model the immigration shock as an increase in the size of the middle-age generation that engenders, among other things, a reduction in the average human capital of the labor force. In other words, the immigrants are new middle-aged workers who are somewhat less skilled than the average natives. The shock lasts one period after which the economy moves along its new growth path with a larger number of less productive middle-aged workers. We assume that the children of the immigrants integrate perfectly: after one period, the children of immigrants accumulate as much per-capita human capital as the offspring of the native workers with the same level of skill. In the context of our model, one period lasts approximately 25–30 years.

Because we are interested in determining how households would insure themselves against such "immigration risk," we assume financial markets are sequentially complete in the baseline model. Because there are always two possible states of the world in the next period—one with and one without immigration—there are two financial assets agents buy from and sell to each other in every period. One asset pays one unit of consumption only when there is an immigration shock, the other pays a unit of consumption only when there is no immigration shock. Through these two assets, which are accessible to all individuals living in the country, young and middle-aged people insure themselves perfectly in such idealized world. Specifically, young people, who will be middle-aged and working in the next period, want to insure themselves against the negative impact that the arrival of immigrants may have on their wages; they do so by purchasing insurance from the currently middle age people. The latter, who are saving for retirement, use the extra payoff they would receive from their capital investment, if the immigration shock were realized in the next period, to provide such insurance. The elderly do not accumulate further assets because we assume that they must die without debt and there is no bequest motive.

The buying and selling of insurance takes place at the same time and through the same instruments that the middle aged and young use to lend/borrow to/from each other. More precisely, middle-aged individuals invest in physical capital (by purchasing assets issued by the competitive firms that carry out production in the next period) and in human capital (by purchasing assets issued by the young agents to finance their own education). Because the capital invested in the firms pays off more when there is immigration, it compensates for the lower payoff from the human capital investment accruing to the middle age. This assures that both young and middle age people implement as much consumption smoothing as it is feasible in the benchmark complete markets economy; this consumption takes place when they are middle age and elderly, respectively.

This does not imply perfect consumption smoothing or that some ex-ante notion of efficiency is satisfied at the equilibrium of our benchmark model. This is because agents cannot insure against the risk of being born in a period of high immigration beforehand. This is a feature of the world that is well captured by OLG models. Young agents born in a period with a positive immigration shock are worse off than they would be otherwise because they must compete with the offspring of the immigrants both to borrow funds for investing in human capital this period and in supplying labor to the market in the next period. We assume that this type of risk cannot be insured away either. It would be insurable if parents were altruistic and internalized the future welfare of their children via bequests. Instead, we assume that parents are selfish and do not leave anything to their children. Hence, the latter must bear the cost of being born in the "wrong" period. The extension to the case in which a bequest motive leads parents to purchase insurance for the future generations is an interesting venue for future research.

The key channels through which immigration affects welfare in this economy are that it increases the labor supply of unskilled workers in the face of a predetermined stock of physical capital and skilled workers. This lowers the wages of unskilled workers and increases both the return on physical capital and the wages of skilled workers, which shifts income from one part of the population to another. In this sense, factor prices move around because we have assumed that there is zero mobility of both physical capital and skilled labor in the benchmark model. If there were perfect mobility of capital and skilled labor, both factors of production would flow into the country from the outside on the footsteps of unskilled immigrant labor and the capital intensity ratios would remain unchanged. In this case, factor prices would be unaffected by immigration, which would amount to nothing more than an increase in the size of the economy. Under constant returns to scale in production, which we assume, this does not affect the welfare of the native agents. The capital intensity ratios and the wage per unit of human capital remain constant. Hence, the salaries of the native do not change at all. This unrealistic case is trivial, and we do not study it.

Nevertheless, if there are frictions in the international financial markets and capital adjustment is not instantaneous, i.e., it takes time for the capital stock of the country to be built up to restore the initial capital intensity ratio, then immigration causes a redistribution between generations as outlined above. The latter observation suggests that the larger is the trade deficit following an immigration shock, the quicker will be the adjustment toward the old capital intensity ratio and the smaller the redistribution away from native workers and toward native owners of capital. This is an interesting result because it suggests that the trade deficit following an immigration shock (hence, the borrowing from abroad it entails) can substitute for the missing internal insurance markets.

We are not the first to study the link between immigration and trade deficits. Other authors have explored this relationship in quantitative dynamic general equilibrium models. Izquierdo et al. (2010) and Gavilán et al. (2011) constructed and calibrated large-scale overlapping generation models for Spain, a country that has received a massive inflow of immigrants in recent years.[1] Both papers indicate that low real interest rates and large immigration flows were the

[1] Between the late nineties and 2007–08, the foreign-born population of Spain (traditionally, a country of emigrants) increased from 0.35 million (1% of the total population) in 1995 to 5.22 million (11% of the total population) in 2008.