Immigration and the Survival of the Welfare State

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Abstract

This paper analyzes the political sustainability of the welfare state in a model where immigration policy is also endogenous. In the model, the skills of the native population are affected by immigration and skill accumulation. Moreover, immigrants affect future policies, once they gain the right to vote. The main finding is that the long-run survival of redistributive policies is linked to an immigration policy specifying both skill and quantity restrictions. In particular, in steady state the unskilled majority admits a limited inflow of unskilled immigrants in order to offset growth in the fraction of skilled voters and maintain a high degree of income redistribution. Interestingly, equilibrium immigration policy shifts from unrestricted skilled immigration, when the country is skill-scarce, to restricted unskilled immigration, as the fraction of native skilled workers increases. The analysis also suggests a new set of variables that may help explain international differences in immigration restrictions.

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1 Introduction

This paper analyzes the political sustainability of the welfare state in a model where immigration policy is also endogenous. In the model, the skills of the native population are affected by immigration and skill accumulation. Moreover, immigrants affect future policies, once they gain the right to vote. The main finding is that the long-run survival of redistributive policies is linked to an immigration policy specifying both skill and quantity restrictions. In particular, in steady state the unskilled majority admits a limited inflow of unskilled immigrants in order to offset growth in the fraction of skilled voters and maintain a high degree of income redistribution. The paper also makes a methodological contribution to the literature on dynamic political choices in macroeconomics that can be studied analytically. First, foresighted, infinitely-lived agents choose a vector of policies by majority vote. Secondly, the model allows for a time-varying skill distribution and a general production function, which can generate a variable skill premium.

There is rising concern in many countries about the future of the welfare state. Traditionally, economists have focused on the financial viability of the policies that constitute the so-called welfare state. A recent trend in macroeconomics, pioneered by Hassler et al (2002), has started to pay attention to the issue of its political sustainability. In these models, the evolution of the income (and skill) distribution of the electorate plays a leading role.

Often, *the* other main concern in countries worried about the sustainability of the welfare state is immigration, as consistently revealed by survey data for most European countries.[1] Indeed, the fraction of foreign-born in the population of these countries has increased rapidly over the last few decades. The recent experience in countries with large immigration during the last century reveals the important role that the vote of immigrants (and their children) plays in current politics. In the US, Latinos are already the largest minority, which has influenced substantially political parties' platforms in recent national and local elections.

Thus, immigration can potentially have an important effect on the future policies adopted in the host country and, in particular, the size of its welfare state.[2] Motivated by this observation, this paper explores the determinants of the survival of the welfare state, viewed as an income redistribution mechanism, taking into account the effects of immigration on the labor market and on future policies. Conceptually, this paper views immigration policy as a decision on admission to a political community, an approach only recently pointed out by immigration economists, e.g. in

[1]For instance, Brucker et al (2002) contains an analysis of 1997 Eurobarometer data.

[2]Clearly, immigration may also affect the composition of public expenditure, although this aspect will be ignored in the present analysis.

Hanson et al (2002), but very prominent among immigration researchers in Sociology and Political science.[3]

In the fashion of the dynamic political economy models of Hassler et al (2002), I use the notion of Markovian majority vote equilibrium and provide analytical results. From the technical standpoint, the model has several novel features: (1) multidimensional voting (on the degree of redistribution and on the relative size and average skills of immigration flows), infinitely-lived voters, and a general production function, which is able to generate a time-varying skill premium, as in Krusell, Quadrini and Rios-Rull (1997).

In the model, the skill distribution of the native population evolves over time, as a result of skill accumulation and immigration. At each period, the native population chooses immigration and income redistribution policies by majority vote, taking into account that immigration will affect labor market outcomes and the skill distribution of next period's electorate. In the model, skilled workers are always richer than unskilled ones. In addition, one's wage can be increased by admitting immigrants with complementary skills. I assume that there is a pool of potential immigrants, containing both skilled and unskilled workers. Voters anticipate that immigrants will become citizens after one period and vote according to their own economic interests, just like the other voters. As a result, a trade-off arises between the effects of immigration on current wages and on future policies. In the model, in the absence of immigration, the welfare state will be abandoned once the native population becomes skilled enough. In this scenario, I address two main questions. Can the welfare state survive when immigration policy is endogenous? If so, what are the corresponding immigration flows?

There are several interesting findings. First, the long-run survival of redistribution is linked to an immigration policy implying both skill and quantity restrictions. In particular, an unskilled majority (the poor) uses immigration policy to offset growth in the fraction of skilled voters in the population, in order to maintain the political support for redistribution. In addition, the quota on unskilled immigration is (locally) increasing in the rate of skill accumulation.

The results provide a new insight into the nature of time-consistent immigration policy, an issue previously not dealt with in the literature. Interestingly, equilibrium immigration policy may vary with the fraction of skilled workers in the native population. The equilibrium studied exhibits an endogenous shift from unrestricted skilled immigration, when the country is skill-scarce, to restricted entry of unskilled immigrants beyond a threshold level for the fraction of skilled natives.

The analysis also identifies a new motive behind immigration restrictions, which might help

[3]See Cornelius et al (1994) and DeSipio (1996).

explain why so many countries restrict immigration and the wide social support for such policies. Voters are concerned about the effects of current immigration flows on future redistribution. In steady state, the unskilled majority does not admit more skilled immigrants because it would lead to a reduction in future redistribution. Moreover, there is an additional steady state, with a skilled majority. In this case, the majority would adopt an *identical* immigration policy, that is, the same restricted entry to unskilled immigrants. Despite the potential for higher current consumption, skilled voters choose not to admit more unskilled immigrants in order to keep redistribution low in the future.

Finally, I examine the dynamics of immigration and redistribution when immigrants do not affect domestic policies. This would be the case if immigration were only temporary or if citizenship is only passed from parents to children (jus sanguinis), rather than obtained by naturalization or birthplace.[4] In this case, equilibrium immigration policy is always characterized by skill restrictions with no quantity constraints. An unskilled majority admits all available skilled immigrants and vice versa in the case of a skilled majority. In this case, the size of immigration flows is solely determined by availability (supply) considerations.

The above theoretical findings have some interesting empirical implications. First, they suggest a hypothesis for why immigration policy is typically more restrictive in Europe (as a whole) than in the US. The reason may be a higher politically feasible degree of redistribution. More generally, the analysis identifies a set of factors that may help explain international differences in immigration restrictions, as well as why these restrictions vary over time. These are differences in skill accumulation and differentials in fertility and political participation rates by skill levels.

The present paper is related to several strands of literature. A rapidly growing body of literature studies the evolution of the size of government using a dynamic political economy approach. Krusell, Quadrini and Rios-Rull (1997) and Krusell and Rios-Rull (1999) study the Markov perfect equilibria of a model with infinitely lived and perfectly foresighted voters to try to account quantitatively for the evolution of the size of the US government. The model I propose shares the previous features of their model, but allows for analytical solutions. In that sense, it is more in the spirit of Hassler et al (2002, 2003) who study the political sustainability of the welfare state in an overlapping-generations model that can be solved analytically. In their model, the dynamics of skill accumulation and the size of the government are also closely related. Immigration is absent in these models.

[4]Laws regulating access to citizenship at birth are based on two legal principles. According to the *jus soli* principle, the child of an immigrant automatically gains citizenship if born in the country. Alternatively, a child inherits citizenship from his parents, independently of where he was born (*jus sanguinis*). Bertocchi and Strozzi (2004) provide an excellent historical account of the evolution over time of citizenship laws at birth in many countries.

The present work is also related to dynamic models that aim at quantifying the economic effects of immigration. Storesletten (2000) characterizes the immigration policy that would maximize the fiscal gains for the US, taking as given current demographics, tax rates and expenditure levels. Implicit in his analysis, voters presume policies to be unaffected by the their current immigration choices. Ben-Gad (2004) analyzes the effects of immigration on the receiving economy in a model with endogenous capital-accumulation and heterogeneously skilled agents. As mentioned earlier, Klein and Ventura (2004) use a two-country model with capital accumulation, capital mobility and differences in total factor productivity to evaluate the welfare effects of eliminating the (exogenously given) immigration restrictions.

The model is also related to a young but growing literature on the political economy of immigration policy. Benhabib (1996) constructs a model where agents with heterogeneous capital holdings choose immigration policy by majority vote. In his model, there is an exogenously given supply of potential migrants with different endowments of capital. His results suggest that immigration policy will display cycles over time, with long periods of relatively low (capital-rich) immigration followed by brief periods of massive (capital-poor) immigration. Roemer and Van der Straeten (2004) study the consequences of the rise in xenophobia in some European countries for the size of their welfare states. In their model, voters' preferences over immigration and government policies are exogenous. Instead, in the present model voters' preferences are endogenous to the model. Voters' attitudes toward immigration reflect their preferences over streams of consumption. Razin, Sadka and Swagel (2002) extend the work of Metzler and Richard (1981) by including an exogenous flow of immigrants and study the connection between immigration and income redistribution in a static model.

The present work is also related to a recent empirical literature on the determinants of voters' attitudes toward immigration. Brucker et al (2002) provides an excellent collection of immigration studies for Europe, with an emphasis on the interaction with the welfare state. Scheve and Slaughter (2001) and Hanson et al (2002) investigate US data. Mayda (2003), and O'Rourke (2003) carry out cross-country analyses. In all these studies, particular attention is given to the role of the respondent's education level on her attitude toward immigration. It is usually found that voters with lower education levels tend to be more in favor of immigration restrictions. However, even a majority of highly educated voters support restrictions.

This paper is also tied to a new strand of literature that studies franchise extension. Choosing an immigration policy is also a decision on enlarging the set of citizen voters in a country. Some recent contributions to this literature are Acemoglu and Robinson (2000) and Lizzeri and Persico (2003).

In these models, some elite decides on whether to allow other (poorer) members of the country to vote from then on, taking into account the consequences on future policies. More generally, admission decisions have been studied by the literature on club formation. A recent contribution to this literature is the paper on dynamic club formation by Barberà, Maschler and Shalev (2001). In their model, a set of voters decides on admission to the club, taking into account that the new club members will participate in future admission decisions. One of their main findings is "voting for your enemy" behavior, where some club members vote in favor of admission of candidates that reduce their current payoff (enemies), due to the anticipation that the new comers will support some desired policies in the future. This behavior captures the essence of the main result in the model of the next section.

The paper is structure as follows. Section 2 presents the model. Section 3 studies the autarky scenario. Section 4 introduces immigration policy. Section 5 analyzes the case where immigration only affects labor market outcomes. Section 6 discusses some empirical implications of the results and section 7 concludes. All proofs are in the appendix.

2 Model

One consumption good is produced by a competitive firm using two complementary inputs: skilled and unskilled labor. Let $F(L_1, L_2)$ be the production function, a continuous, smooth and constant-returns-to-scale function satisfying the following standard properties: $F_i > 0$, $F_{ii} < 0$ for $i = 1, 2$ and $F_{12} > 0$. Observe that if we define $k = L_2/L_1$, the previous assumptions imply that $F_1(1, k)$ is a strictly increasing function of k and $F_2(1, k)$ is a strictly decreasing function of k. The respective derivatives (with respect to k) are $F_{12} > 0$ and $F_{22} < 0$. To save on notation I will use $F_i(k)$ to denote $F_i(1, k)$, for $i = 1, 2$.

The economy is populated by many agents with two possible skill levels. Unskilled agents will be denoted by $i = 1$ and skilled agents by $i = 2$. These workers can be either natives (born in the country) or foreign-born (immigrants). Let $N_i(t)$ be the number of native agents of skill level i in period t and, similarly, $I_i(t)$ will denote the number of immigrants of type i who entered the country in period t. All agents evaluate consumption streams according to utility function

$$E_t \sum_{j=0}^{\infty} \beta^j u(c_{t+j}),$$

where u is an increasing and concave continuous function. I will interpret these preferences in a dynastic sense. So c_t denotes the consumption of a worker at time t, c_{t+1} her only child's consumption and $\beta \in [0, 1)$ is the degree of altruism between parents and children. The expectation refers to uncertainty about the skill levels of the offspring. Each type-i agent is endowed with one unit of labor, assumed to be supplied inelastically. Bequests are not allowed.[5]

In every period, the government redistributes income from the rich to the poor. This is done by means of a proportional income tax, levied on all workers, and a universal transfer. Let $r_t \in [0, r_b]$ denote the tax rate in period t. Taxes are paid by all workers, regardless of whether they were born in the country or not. The collected tax revenue is redistributed to all workers equally in a lump sum fashion, so the government runs a balanced budget in each period. The net result of the tax and the transfer is that rich agents are net contributors to the welfare state while poor agents are net recipients. Mostly, in what follows I shall set $r_b = 1$, a convenient simplification. Since labor supply is inelastic and there are no bequests, taxation is non-distortionary. I shall assume that, given immigration and redistribution policies, prices and allocations follow a competitive equilibrium.

Let $(N_1(t), N_2(t))$ and $(I_1(t), I_2(t))$ be, respectively, the skill distributions of the native-born workers and the just arrived immigrants in period t. Then period t's labor force is given by

$$L_i(t) = N_i(t) + I_i(t),\ i = 1, 2.$$

Note that competitive wages in each period are solely a function of the *ratio* of skilled to unskilled workers in the labor force, that is

$$k_t = \frac{L_2(t)}{L_1(t)}.$$

The following observation will play an important role in the analysis.

Observation. *Individual consumption levels depend solely on r_t and k_t:*

$$\begin{aligned} c_i(k_t, r_t) &= F_i(k_t) + r_t\left(f(k_t) - F_i(k_t)\right) \\ &= (1 - r_t)F_i(k_t) + r_t f(k_t), \text{ for } i = 1, 2, \end{aligned}$$

where

$$f(k_t) = \frac{F_1(k_t) + k_t F_2(k_t)}{1 + k_t}$$

is the output per worker. Moreover, f is an increasing as long as $F_1(k) \leq F_2(k)$.

[5] Incorporating an elastic individual labor supply function is feasible but complicates the expressions for the indirect utility function, which will play an important role in the voting problem.

Children's skills are determined stochastically and depend on parental skills. More specifically, I assume that intergenerational mobility in skills is governed by a two-state Markov chain with persistence. That is, let p_i be the probability of being *skilled* given parental skill level i and assume that $p_1 < 0.5 < p_2$. The skills of the children of immigrants are determined identically.[6] As a result, when we aggregate over all individuals,

$$\begin{pmatrix} N_1(t+1) \\ N_2(t+1) \end{pmatrix} = \begin{pmatrix} 1-p_1 & 1-p_2 \\ p_1 & p_2 \end{pmatrix} \begin{pmatrix} L_1(t) \\ L_2(t) \end{pmatrix},$$

where $L_i(t) = N_i(t) + I_i(t)$.

It will be useful to define the skilled to unskilled ratio among the natives in each period by

$$n_t = \frac{N_2(t)}{N_1(t)}.$$

Recall that wages are just a function of k_t. It turns out that we can express the law of motion for skills as a function of k_t too:

$$n_{t+1} = M(k_t; p_1, p_2) = \frac{p_1 + p_2 k_t}{1 - p_1 + k_t(1-p_2)},$$

which maps the skills of the labor force in a given period (the parents) to the skills of the native population in the next period (their children). To ease notation, I will denote $M(k_t; p_1, p_2)$ by Mk_t. The following observation summarizes the relevant properties of this mapping.

Observation. *As a function of k, M is increasing and strictly concave. Moreover, $M(0) = \frac{p_1}{1-p_1}$, $M(\infty) = \frac{p_2}{1-p_2}$, it has a unique fixed point at $k^a = \frac{p_1}{1-p_2}$, and its inverse function is*

$$k_t = M^{-1}(n_{t+1}) = \frac{n_{t+1}(1-p_1) - p_1}{p_2 - n_{t+1}(1-p_2)}.$$

For $k < k^a$, $Mk > k$ while for $k > k^a$, M is below the 45 degree line.

The following assumption identifies skilled workers as the rich and unskilled workers as the poor, which ties together the distributions of income and skills.

Assumption 1: *$F_2(k^h) > F_1(k^h)$, where $k^h \geq k^a$ is some sufficiently large skilled ratio.*[7]

[6] This assumption greatly simplifies the analysis and it is also roughly consistent with data on the educational attainment of the children of immigrants in the US. Disaggregation by ethnicity shows substantial variation, with some groups displaying higher skilled probabilities than natives and some lower ones. But overall, in the postwar period, there seems to be small difference between native-born and US-born.

[7] More precisely, we need $k^h \geq \max\{k^a, b(1)\}$, where $b(n)$ is a function describing the supply of potential skilled immigrants, to be defined shortly.

This assumption guarantees that a positive skill premium, although it can vary over time. As a result, skilled workers are always richer than unskilled workers. Clearly, a positive skill premium would endogenously arise if agents made investment decisions over costly skills.

For now, we shall assume that the children of immigrants are born with voting rights (*jus soli*), as is the case in the US and in many other countries. So in most of the paper the words citizen, voter and native-born worker will be synonymous. However, in some countries citizenship is only transmitted from parents to children (*jus sanguinis*). As we shall see later, the *jus sanguinis* case can be analyzed as a specific case of the general model.

2.1 Endogenous Policies

This section describes the equilibrium concept employed in the paper. Formally, the equilibrium concept will be an adaptation of Markov perfect equilibrium to allow for majority vote and where prices and the consumption allocation follow a competitive equilibrium, given policies. The main feature of the model is that voters anticipate that the current immigration policy will not only affect the labor market, but also future immigration and redistribution policies, given that the children of immigrants will also vote.

Following the convention of the literature on dynamic games, I proceed by defining payoff functions and the set of feasible policies. Recall that consumption levels in each period can be expressed as a function of that period's skilled ratio in the labor force (which includes recent immigrants) and the tax rate. Thus, the payoff function for an i-skill voter is given by

$$v_i(k, r) = u[(1-r)F_i(k) + rf(k)], \;\; i = 1, 2.$$

That is, each worker's consumption level is a convex combination between her own wage and output per worker in the economy. The weights are given by the tax rate, r. When the tax rate is zero, and indeed for any tax rate, unskilled consumption increases in k. When the tax rate is one, both types of workers have the same consumption level, which increases in k.

Following Hassler et al (2002), I shall take as state variable the skilled-to-unskilled ratio in the *native* population, n. States with $n < 1$ are unskilled-majority states while states with $n > 1$ are skilled-majority states. When there is a tie, I will assume that the group that chose policies in the last period can choose them again. A convenient way of capturing this (status-quo) assumption is to define tie states $n = 1^-$ (when the unskilled can choose policies) and $n = 1^+$ (when the skilled can choose policies). I will denote the set of feasible states n by state space by $\Omega = [k^l, 1^-] \cup [1^+, k^h]$.

The special structure of the law of motion and these payoff functions implies that voters will be indifferent between any immigration pair giving to the same value of k. Thus, I shall restrict the policy space to pairs of (k, r). Note that for a given skill distribution of the native population, n, attaining some desired skilled ratio in the labor force, say $k < n$, requires admitting mostly unskilled immigrants. In particular, taking as given the skill composition of the (mostly unskilled) immigrant flow - perhaps because of the specific details of admission policies-, attaining the desired value of k implies choosing the *size* of the immigration flow, relative to the size of the native population. I shall often refer to the choice of k as the choice of immigration policy.

Let us describe now the set of feasible policies at each state $n \in \Omega$. I will assume that feasible tax rates are independent of the current state, namely, $r \in [0, r_b]$, where unless specified otherwise, $r_b = 1$. Instead, the set of feasible skilled ratios in the labor force, which includes recent immigrants, depends on the state: $k \in [k^l, b(n)]$, where $0 < k^l \leq n_0$ and b is a continuous and increasing function that satisfies $b(n) \geq n$ and $b(n_0) \geq k^l$. The lower bound is assumed to be state-independent. The interpretation is that there is a very large number of potential unskilled immigrants that are willing to migrate as long as they receive a minimum wage. At k^l, the unskilled wage they would obtain hits the outside option of the potential unskilled immigrants. In contrast, there is a limited amount of potential skilled immigrants and, as a result, the attainable skilled ratios (k_t) are some function of the pre-immigration skilled ratio in the host country (n_t). In particular, if no skilled immigrants are available we have $b(n) = n$. I will define the set of feasible policy pairs in state $n \in \Omega$ by $\Gamma(n) = [k^l, b(n)] \times [0, r_b]$.[8]

For a given pair of skilled ratios before and after immigration, respectively n_t and k_t, I will measure the *skill-content of immigration flows* by $\sigma_t = h(k_t) - h(n_t)$, the difference between the skilled *fraction* in the labor force (which includes the recently arrived immigrants) and the skilled *fraction* among native population.[9] Note that when immigration is mostly *unskilled* ($k_t < n_t$), σ_t is negative. In this case, lower values of σ_t (i.e. larger in absolute value) will be interpreted as *larger* inflows of unskilled immigrants. Conversely, when immigration is mostly *skilled* ($k_t > n_t$), σ_t is positive, with higher positive values of σ_t associated to larger inflows of skilled immigrants. Thus, σ_t also provides a measure of the *size* of immigration flows relative to the size of the native population.

As noted earlier, the process for skill accumulation can be characterized by an increasing function

[8] Ortega (2004) analyzes a similar model where $r_b = 0$ and $b(n) = k^u > k^l$.

[9] Function $h(x) = x/(1 + x)$ maps skilled-to-unskilled ratios into skilled fractions and $h(0) = 0$, $h(\infty) = \infty$, $h' > 0$ and $h'' < 0$. Alternatively, we could have simply defined $\sigma_t = k_t - n_t$.

mapping skilled ratios in the labor force in one period into skilled ratios in the native population one period later:

$$n_{t+1} = M(k_t; p_1, p_2) = \frac{p_1 + p_2 k_t}{1 - p_1 + k_t(1 - p_2)},$$

where M is an increasing function. Due to intergenerational persistence, admitting unskilled immigrants in one period translates into reducing the skilled ratio among the natives in the next period. As we shall see, immigration flows will be intimately related to the rate of skill growth across generations. It will be convenient to measure *skill growth* by $\gamma_t = h(n_{t+1}) - h(k_t)$. Observe that when $\gamma_t > 0$, there is skill growth: the average child is more skilled than the average parent. Clearly, there is skill growth in the economy if (and only if) $k < k^a$.[10]

We are now ready to state the equilibrium concept. Essentially, it is an adaptation of Markov perfect equilibrium that takes into account that policies are chosen by majority and that the consumption allocation and prices are a competitive equilibrium for any given policies. An equilibrium is a *policy rule* $(k, r) : \Omega \longrightarrow R^2_+$ that assigns a policy pair $(k(n), r(n))$ to each state $n \in \Omega$. Equilibrium requires the policy rule to prescribe, in each state, a policy pair that is optimal for the group in the majority. In addition, voters correctly anticipate the effects of current policy choices on the future state. More formally, we have the following:

Definition. *A majority-vote equilibrium is a tuple* (k, r, V_1, V_2) *such that*
i) Given $(k, r) : \Omega \to R^2_+$*, (ex post) continuation values are given by*

$$\begin{aligned} V_i(n) &= v_i[k(n), r(n)] + \beta[(1 - p_i)V_1(Mk(n)) + p_i V_2(Mk(n))] \\ &= v_i[k(n), r(n)] + \beta C_i(Mk(n)), \text{ for all } n \in \Omega \text{ and } i = 1, 2. \end{aligned}$$

ii) In all unskilled majority states, $n \leq 1^-$,

$$V_1(n) = \max_{(k,r)\in\Gamma(n)} v_1(k, r) + \beta C_1(Mk), \text{ for } i = 1, 2,$$

iii) and in all skilled majority states, $n \geq 1^+$,

$$V_2(n) = \max_{(k,r)\in\Gamma(n)} v_2(k, r) + \beta C_2(Mk), \text{ for } i = 1, 2,$$

where $\Gamma(n) = [k^l, b(n)] \times [0, r_b]$.[11]

[10] Again, we could define $\gamma_t = n_{t+1} - k_t$ too.

[11] I shall refer to $C_i(n)$ as the ex ante continuation value of an agent of skill level i, who still does not know her child's skills.

This definition has become relatively standard in the literature on dynamic political economy models in macroeconomics since the work of Krusell, Quadrini and Ríos-Rull (1997). As in their model, here voters' preferences are defined over infinite policy sequences. But, in contrast to their analysis, we can study the equilibrium analytically, in the fashion of Hassler et al (2002).

In the previous definition, note that voters are aware that the current immigration policy has a direct effect on the composition of next period's electorate, that is $n_{t+1} = M(k_t)$. This suggests the existence of an intertemporal trade-off. Consider the decision process of a skilled native voter. She realizes that admitting unskilled immigrants will have a beneficial effect on her current wage due to factor complementarity. However, such an immigration flow will increase the fraction of unskilled voters in the next period, which is likely to lead to the adoption of immigration and redistribution policies that go against the interests of (the children of) current skilled voters.

Let us state the following very intuitive result.

Lemma 1. *In equilibrium,* $r(n) = 1$ *if* $n \leq 1^-$ *and* $r(n) = 0$ *if* $n \geq 1^+$.

In words, there is income redistribution only in states where the unskilled are in the majority. The reason is that current redistribution does not affect next period's state (and the positive skill premium). Moreover, the tax rate always takes corner values because labor supply and saving decisions are totally inelastic, as we shall see, a convenient simplifying assumption.

3 Autarky

Prior to examining the interaction between immigration and redistribution, it will be helpful to examine the dynamics of the model when there is no immigration of either type (autarky) but income redistribution is endogenously determined by majority vote.

In the absence of immigration, the skill distribution of the labor force and of the native population (electorate) always coincide. Hence, $n_{t+1} = M(n_t; p_1, p_2)$, which converges monotonically to a unique steady state at $k^a = p_1/(1-p_2)$.

Absent immigration choices, the equilibrium of the model is quite trivial. The skilled ratio monotonically converges to the steady state. Along the process, there is income redistribution as long as the majority is unskilled (assumption 1). As the next result summarizes, whether there is redistribution in steady state depends solely on the transition probabilities.

Lemma 2. *Suppose that* $n_0 < k^a$.

i) If $p_1 \leq 1 - p_2$*, redistribution is sustained forever.*

ii) If $p_1 > 1 - p_2$ *redistribution is permanently abandoned after a finite number of periods.*

The intuition is straightforward. Unskilled workers are always poorer than skilled workers and thus impose maximum redistribution whenever they can. If $k^a < 1$, the unskilled are always in the majority but if $k^a > 1$, eventually the majority becomes skilled and redistribution is abandoned forever. Let us turn now to the main question of the paper: the political sustainability of the welfare state. To do so, we make an additional assumption, which implies that, in autarky, redistribution will be eventually abandoned.

Assumption 2: $n_0 < 1 < k^a = \frac{p_1}{1-p_2}$.

A simple calculation using US data from the General Social Survey allows us to evaluate this assumption. Define an individual as being *skilled* if he or she had 14 years of education or more (some college) and let us say that an individual comes from a *skilled family* if his or her father was skilled.[12] I estimate p_i by calculating the fraction of skilled individuals that were born in a family of type $i = 1, 2$. I find that $\widehat{p}_1 = 0.33$ and $\widehat{p}_2 = 0.78$, with very small standard errors. When the estimation is restricted to the subsample of children with foreign-born parents the results are quite similar: $\widehat{p}_1 = 0.37$ and $\widehat{p}_2 = 0.83$. Note that these estimates satisfy that $p_1 > 1 - p_2$ and $p_1 < 0.5 < p_2$.

The stage is now set to address the main question of the paper. When immigration policy is endogenous, can redistribution be maintained in the long run?

4 Can Immigration save the welfare state?

Let us now analyze the case where immigration policy and redistribution are both chosen at each period. The key feature of the environment is that voters realize that immigration not only affects their labor market outcomes (the skill premium), but also domestic politics. More specifically, voters anticipate that current immigration will affect next period's income redistribution and immigration policies. Keep in mind that the model is "biased" toward the elimination of redistribution (assumption 2), that is, in autarky redistribution would eventually be abandoned. Can the welfare state, interpreted as income redistribution from rich to poor, survive in this scenario? What is the relation between the skills of natives and the selected immigrants?

[12] Ortega and Tanaka (2004) analyze cohort differences in the effects of paternal and maternal education on educational attainment.

4.1 Immigration and Redistribution in steady state

We shall say that an equilibrium policy rule (k, r) has a *steady state,* denoted by $n^* \in \Omega$, if the equilibrium skill composition of the native population is constant over time when n^* is the initial condition. It follows that in a steady state, redistribution and immigration policy are constant from then on. More specifically, the timing protocol of the model implies that if n^* is a steady state then $Mk(n^*) = n^*$ or, equivalently, $k(n^*) = M^{-1}(n^*)$. Observe that in steady state skill growth and the skill-content of immigration flows must offset each other:

$$\gamma^* = -\sigma^* = h(n^*) - h(k(n^*)).$$

Thus, if a steady state displays *skill growth*, it must feature *unskilled immigration* as well. Of course, an equilibrium with steady state redistribution may fail to exist. Establishing existence, by construction, is the task of the next section. For now, let us just state the following simple result.

Proposition 1. *Steady state immigration is unskilled if and only if* $n^* < k^a$*. Thus, any steady state with income redistribution displays unskilled immigration. A steady state without income redistribution involves unskilled immigration if* $n^* < k^a$ *and skilled immigration otherwise.*

4.2 An equilibrium with redistribution

It is well known that the set of equilibria in infinite dynamic games can be rather large (even under the Markovian restriction) and a full characterization is often difficult. The same is true in the present model. so this section adopts a constructive approach. First, I propose a policy rule that gives rise to an outcome path where redistribution is maintained forever. Next, I shall provide conditions for that policy rule to be an equilibrium. Finally, I shall argue that this particular equilibrium provides interesting empirical insights.

Let us start by defining a particular skilled ratio. Let ϕ be such that $M(\phi; p_1, p_2) = 1$. That is, when the current labor force (after immigration) is $k_t = \phi$, it is the case that there is a tie in next period's election, which allows the incumbent majority to choose policies once again. It is easy to show that $\phi = (1 - 2p_1) / (2p_2 - 1)$ and, under assumption 2, $\phi < 1 < k^a$, implying skill growth at any $k \leq \phi$.

Now consider the following policy rule:

$$(k(n), r(n)) = \begin{cases} (b(n), 1) \text{ if } n < b^{-1}(\phi) \\ (\phi, 1) \text{ if } b^{-1}(\phi) \leq n \leq 1^- \\ (\phi, 0) \text{ if } n \geq 1^+ \end{cases} . \tag{1}$$

In words, the policies prescribed are as follows. For unskilled majority states when the population is relatively low skilled, the policy rule postulates full redistribution and the maximum feasible skilled immigration, coinciding with skilled voters' favorite static policy mix. When the skills of the native population reach a certain threshold, $n = b^{-1}(\phi)$, the policy rule specifies full redistribution and $k = \phi$, the highest skilled ratio that allows unskilled voters to retain the majority. Policies are constant across skilled majority states: no redistribution and again $k = \phi$, which is the skilled ratio that generates the highest possible skilled wage while maintaining a skilled majority. Note that there are two steady states: $n^* = 1^-$ and $n^* = 1^+$. In the former, there is full redistribution while in the latter there is no redistribution and both display $k^* = k(n^*) = \phi$. Observe that, given our initial condition, the economy would start in a situation with income redistribution that would be maintained indefinitely.

The rest of the section provides conditions under which policy rule (1) is an equilibrium policy rule. We shall start by examining the (ex ante) continuation values along the equilibrium path, that is, voters' beliefs about which policies would be adopted in each conceivable state. Recall that ex ante continuation values where defined as

$$C_i(n) = (1 - p_i)V_1(n) + p_i V_2(n), \ n \in \Omega,$$

and recall that V_i depends on the postulated policy rule. Using the definition of equilibrium, we can explicitly solve for the continuation values implied by policy rule (1).

Lemma 3. *The ex ante continuation values implied by policy rule (1) are:*

$$C_i(n) = \begin{cases} \Sigma_{t=0}^{T(n)} \beta^t u \left[f \left(b \left[(M \circ b)^t (n) \right] \right) \right] + \beta^{T(n)+1} \left(\frac{u[f(\phi)]}{1-\beta} \right) \text{ if } n < b^{-1}(\phi) \\ \frac{u[f(\phi)]}{1-\beta} \text{ if } b^{-1}(\phi) \leq n \leq 1^- \\ a_{i1} E_1 [v(\phi, 0)] + a_{i2} E_2 [v(\phi, 0)] \text{ if } n \geq 1^+ \end{cases},$$

where $T(n)$ and $a_{ij}(\beta, p_2, p_1)$ are defined in the proof, and $E_i [v(\phi, 0)] = (1-p_i)v_1(\phi, 0)+p_i v_2(\phi, 0)$.

It is worth noting that $C_1(n)$ is non-decreasing over $[k^l, 1^-]$ and $C_2(n)$ is constant over $[1^+, k^h]$.

In unskilled majority states, $C_1 = C_2$ because there is full redistribution along the outcome path originated from any unskilled majority state. In contrast, ex ante continuation values differ for both types of voters in skilled-majority states due to consumption levels being determined solely by wages.

Let us turn now to the determination of voters' political preferences. Given a believed policy rule, a voter with skill level i compares alternative policy pairs according to

$$W_i(k,r) = v_i(k,r) + \beta C_i(Mk),$$

where the continuation value function is given by the previous lemma. Recall that the set of feasible policy rules in state n is given by $r \in [0,1]$ and $k \in [k^l, b(n)]$, where $b(n) \geq n$.

Let us examine the political preferences of unskilled voters or, put differently, their best responses to the postulated policy rule. We shall need the following assumption.

Assumption 3: $u[f(\phi)] > (1-\beta)u[f(b(1))] + \beta u[F_1(\phi)]$.

In words, the previous assumption requires that $u[F_2(\phi)]$ be high enough relative to $u[F_1(\phi)]$.[13] To see this, consider keeping $F_1(\phi)$ fixed and raising $F_2(\phi)$. Clearly, output per worker, $f(\phi)$, will increase. Intuitively, assumption 3 guarantees a high incentive to redistribute by inducing a high opportunity cost to the unskilled (poor) of living in an economy without redistribution, under the assumption of $p_1 = 0$. The next lemma provides sufficient conditions for unskilled voters' favorite policy pair to coincide with the prescribed policy rule.

Lemma 4. *For low enough p_1, policy rule (1) coincides with unskilled voters' favorite policies in unskilled-majority states.*

The intuition for the result is simple. For very low values of n, the policy rule requires unskilled voters to want to admit as many skilled immigrants as feasible. They are happy to do so given that it increases output per worker and still assigns them the majority. Eventually, as the electorate's skills rise, unskilled voters face a trade-off. If they choose immigration policy so as to maximize output per worker once again, the majority in the next period will be skilled and redistribution will be abandoned forever. To avoid that, the unskilled majority shifts immigration policy toward admitting (restricted) flows of unskilled immigrants.

We now turn to skilled voters' political preferences. As before, we shall need an extra assumption.

Assumption 4: $u[F_2(\phi,0)] > (1-\beta)u[F_2(k^l,0)] + \beta u[f(\phi)]$.

[13] Moreover, the inequality holds if β is close enough to one and fails if it is close enough to zero.

This conditions states that, when $p_2 = 1$, the one-period gain (for skilled voters) from admitting the largest feasible quantity of unskilled immigration is smaller than the accumulated loss, caused by the redistribution that would take place from that period onward. The inequality makes clear that this is the case when $F_2(\phi)$ is large relative to $F_1(\phi)$, that is there is high labor income inequality in the absence of redistribution.[14] We now have the following result.

Lemma 5. *For high enough p_2, policy rule (1) coincides with skilled voters' favorite policies in skilled-majority states.*

The following proposition collects all these results. The proposition requires no proof, as it simply combines the previous lemmas.

Proposition 2. *If intergenerational persistence is high enough for both types of voters, policy rule (1) is an equilibrium. Starting from a relatively unskilled native population, he main features of the equilibrium path are:*

i) Income redistribution is maintained forever.

ii) After several periods of skilled immigration (only limited by its supply), a steady state is reached where a restricted quantity of unskilled immigrants is admitted in each period.

iii) If skilled voters were to decide the policies, redistribution would be permanently abandoned and the same restricted flow of unskilled immigration as in ii) would be chosen.

The intuition for the result is quite simple. When the fraction of the native population who are skilled is very low, there is no future cost for the unskilled majority from pursuing their favorite static policies: full redistribution and unrestricted skilled immigration. Immigration policy reinforces the domestic skill accumulation process. Eventually, a *trade-off* arises. Continued admission of skilled-immigrants entails a cost, in terms of transferring the decision power over future policies to skilled voters, which would result in the termination of income redistribution. To maintain redistribution, the unskilled majority reverses the use of immigration policy and starts admitting a steady inflow of unskilled immigrants at each period. Now, immigration policy is used to offset skill growth. The unskilled majority admits a restricted amount of unskilled immigrants in order to regenerate the political support for redistribution. This behavior is reminiscent of the so-called

[14] Alternatively, we can view the assumption as requiring a relatively low elasticity for the skilled wage to changes in the skilled ratio. It is worth noting that both assumptions 3 and 4 can hold simultaneously. Fix $F_1(\phi)$ and consider increasing $F_2(\phi)$ until assumption 3 holds. Along this process, both sides of the inequality in assumption 4 increase. However, the left-hand side increases by more. Hence, for a high enough value of $F_2(\phi)$, both inequalitites will simultaneously hold.

"voting for your enemy" behavior in Barberà, Maschler and Shalev (1998), a model of dynamic club formation. The group in the majority chooses to admit immigrants (new club members) of their same skill level, incurring a cost in terms of lower current consumption. The reason is purely strategic. When the newcomers gain the right to vote, they are expected to support the same policies as the current majority.

An important feature of this equilibrium is that it provides a new insight on the nature of quantity restrictions on immigration. Virtually every country restricts, explicitly or implicitly, inflows of immigrants. Why is this so? The previous proposition suggests that it is related to concerns on the future of redistributive policies. The unskilled majority in the equilibrium supports the admission of unskilled immigrants in order to regenerate the political support for redistribution. However, this majority is aware that unskilled immigration has a cost in terms of lower consumption. And, as a result, chooses to restrict the quantity of unskilled immigrants admitted.

Although there might be other explanations for why countries restrict immigration, the one proposed here is attractive for a number of reasons. First, it is consistent with the wide social support for immigration restrictions consistently found in survey data. In the equilibrium discussed above, unskilled voters support immigration restrictions. But skilled voters support them too, since they would adopt the same immigration policy should they be in the majority. Their appetite for unskilled immigrants is limited by the increase in taxes that would result from larger unskilled immigration. Clearly, there are other reasons why a large part of society might want to restrict immigration. It suffices to assume that individuals are xenophobic and dislike foreigners. However, the current economic-political interpretation is particularly appealing as it identifies a number of factors that affect the quantity (and skill) of immigration flows. Hence, the model can be used to formulate predictions about policy changes and can perhaps help explain international differences on immigration restrictions. The following section explores these implications further.

Another interesting feature of the equilibrium is the endogenous shift in immigration policy, as the fraction of skilled natives increases over time. When there is a very low fraction of skilled in the native population, the chosen immigrants are skilled. But beyond a threshold, the country becomes "skill-abundant" and starts admitting unskilled immigrants. The experience of recent countries of immigration may be interpreted along these lines. Until recently, immigration into Spain had higher average levels of income and education than the natives. The substantial emigration of unskilled Spaniards would reinforce the effects of skilled immigration on the skill composition of the Spanish labor force. However, the last decade has witnessed a dramatic reversal in these migration patterns. Nowadays, the average education and income of immigration flows into Spain is significantly lower than that of native Spaniards..

Let us now discuss the assumptions needed to sustain the above equilibrium. As we have seen, the existence of this equilibrium relies on two assumptions: high intergenerational persistence and high labor income inequality (prior to redistribution). How reasonable are these assumptions? A large literature on intergenerational persistence in income and education within families strongly suggests a substantial degree of persistence, although there is still an ongoing discussion about the relative contribution of several competing explanations. The second important assumption is a high value of $F_2(\phi)$ relative to $F_1(\phi)$, that is high labor income (or wealth) inequality in a steady state without redistribution. A large literature in economics has analyzed the extent and the reasons behind the large increase in income inequality in many countries over the last few decades. There is a growing consensus that intense skilled-biased technological change has magnified the degree of labor income inequality in the last few decades in many countries. In a nutshell, both conditions seem quite plausible for a large set of countries. It is worth noting that the previous equilibrium also relies on voters being altruistic (non-myopic) to some degree. It is easy to show that when $\beta = 0$, the only equilibrium implies a cyclic behavior of the economy, affecting the degree of redistribution and labor income inequality, as well as the skills and size of immigration flows.[15] Several periods of relatively small (skilled) immigration and redistribution are followed by one period of massive (unskilled) immigration and a sharp reduction in taxes. In this situation, redistribution is only compatible with skilled immigration.

4.3 The size of immigration flows

Countries differ on how restrictive their immigration policies are and, consequently, on the number of immigrants they receive (even in per capita terms). Why is it so? In the context of the equilibrium we have just examined, differences in immigration restrictions reflect differences in skill accumulation. Conditional on the equilibrium, higher skill growth (higher p_1 or p_2) in a country translates into larger inflows of unskilled immigration.[16]

This section presents a tiny extension of the model that enriches the set of factors, beyond skill growth, that determines immigration restrictions. The expanded set of explanatory variables might provide the basis for a better understanding of cross-country variation. Suppose that each skilled voter has one child, that is one voter in next period's election, just as before. But now one

[15] Benhabib (1996) finds a similar result.

[16] Ortega (2004) argues that the 1965 Amendments to US immigration policy, the origin of the large increase in immigration in the US in the last three decades, coincided with a substantial increase in skill growth.

unskilled voter generates α_1 voters in the next period. A possible interpretation is that there are *fertility differentials* by skill levels. Incidentally, it is well known that education and fertility are inversely related, which would suggest $\alpha_1 > 1$. Suppose the current labor force is given by (L_1, L_2). Then the distribution of children's skills is given by

$$N_2' = p_1\alpha_1 L_1 + p_2 L_2$$
$$N_1' = (1 - p_1)\alpha_1 L_1 + (1 - p_2)L_2,$$

which can be summarized by

$$n' = M_\alpha(k) = \frac{\alpha_1 p_1 + p_2 k}{\alpha_1(1 - p_1) + k(1 - p_2)} < M(k),$$

where I used that $\alpha_1 > 1$. Recall now that skill growth was defined as $\gamma_t = h(Mk_t) - h(k_t)$. Clearly, larger values of α_1 imply lower skill growth, for each given value of k_t. Given the steady state relationship between skill growth and the size (skill-content) of immigration flows, higher values of α_1 (the fertility rate of unskilled workers relative to the fertility rate of skilled workers) *reduce* unskilled immigration relative to the size of the native population (lower absolute value of σ^*). The result is quite intuitive. Reaching the steady state now takes fewer current unskilled immigrants, given their higher fertility rate.

Another interpretation is that *political participation rates* differ by skill levels. There is some evidence supporting that abstention is inversely related to education. Now, assume that all the skilled vote but only a fraction $\alpha_1 < 1$ of the unskilled actually vote. It is easy to show that the law of motion for the skilled ratio of actual voters becomes

$$n' = \widehat{M_\alpha}(k) = \frac{1}{\alpha_1}\frac{p_1 + p_2 k}{(1 - p_1) + k(1 - p_2)} > M(k).$$

That is, higher (relative) abstention among the unskilled (lower α_1) implies larger steady state skill growth and a larger inflow of unskilled immigrants. The intuition is that one unskilled potential voter translates into less than one effective unskilled voter. So more unskilled immigrants than before have to be admitted to maintain the steady state.

5 Only labor market effects

This section considers the case where immigration only affects labor market outcomes, that is, wages in this model. There are at least two instances where this might be the case. Several countries have occasionally implemented immigration policies that require immigrants to go back to their countries after some pre-specified period of time. In such cases, immigrants typically do not obtain the right to vote in the host country and, hence, cannot directly influence the choice of policies. Another situation where immigrants may not gain the right to vote is when citizenship (and franchise, in particular) is only transmitted from parents to children. Until recently, Germany's immigration policy has been based on this principle. This section analyzes the relationship between immigration and redistribution in these two cases. Throughout, I shall maintain the assumption that immigrants pay taxes and receive transfers. As we shall see, equilibrium dynamics differ substantially from those described in the previous section.

5.1 Temporary migration

Consider modifying the model as follows. Suppose that immigrants (and their children) leave the country at the end of their working lives but before their children become citizens. The key implication is that the evolution of the skills of the native population is independent from the country's immigration history. More specifically, $n_{t+1} = Mn_t = M^t n_0$, which converges monotonically to $k^a > 1$.

Let us examine how voters' political preferences are determined in this case. To fix ideas, consider an unskilled voter in unskilled majority state $n \leq 1^-$. In equilibrium, it has to be the case that

$$V_1(n) = \max_{(k,r)\in\Gamma(n)} v_1(k,r) + \beta C_1(Mn), \text{ for } i = 1, 2,$$

where unskilled voters realize that next period's state is given by $n_{t+1} = Mn_t$, independently of the choice of k and r. The same is true for skilled voters. As a result, voters' political preferences become purely static. Monotonicity of the payoff functions, given optimally chosen tax rates, implies a unique equilibrium policy rule:

$$(k(n), r(n)) = \begin{cases} (b(n), 1) \text{ if } n \leq 1^- \\ (k^l, 0) \text{ if } n \geq 1^+ \end{cases} . \tag{2}$$

The following proposition summarizes the equilibrium path generated by this policy rule.[17]

Proposition 3. *With temporary migration, the unique equilibrium path is characterized by:*

i) Several periods of unskilled majority, with redistribution and unrestricted skilled immigration.

[17] Even if $r_b < 1$, $c_1(k, r_b)$ is an increasing function of k since it is a convex combination between two increasing functions of k. In that case, $(b(n), r_b)$ would have to be the equilibrium policies in unskilled majority states.

ii) After that, unrestricted unskilled immigration and zero redistribution forever.

iii) If $k^a \leq 1$, there is always redistribution and unrestricted skilled immigration.

5.2 Jus sanguinis

This section considers the case where the children of immigrants are not given the right to vote. This is the case when citizenship is passed by bloodline (jus sanguinis). As a result, in the model immigration only affects the labor market and there is a growing population of disenfranchised workers in the economy, composed of the offspring of the immigrants arrived in all previous periods.

At each point in time, the native population contains natives with voting rights (citizens) and natives without (non-citizens), that is,

$$N_i(t) = N_i^c(t) + N_i^{nc}(t), \text{ for } i = 1, 2.$$

As before, the labor force is the sum of the native population and the newly arrived immigrants:

$$L_i(t) = N_i(t) + I_i(t), \text{ for } i = 1, 2.$$

Let us define the following skilled-to-unskilled ratios:

$$n_t^c = \frac{N_2^c(t)}{N_1^c(t)},\ n_t = \frac{N_2(t)}{N_1(t)} \text{ and } k_t = \frac{L_2(t)}{L_1(t)}.$$

Thus, n_t^c summarizes the skill distribution among citizens (that is, the electorate), n_t summarizes the whole native population (including the non-citizen natives) and k_t the skill distribution in the labor force (including immigrants and all natives). In this scenario the appropriate state variable that carries the relevant *political* information is n_t^c, the skilled ratio among citizens (voters).

There is an important difference with the scenario of temporary immigration. Now the set of attainable skilled ratios by means of immigration depends on the skill composition of the *whole* native population ($n_{t+1} = Mk_t$) rather than on the skill distribution of citizens ($n_{t+1}^c = Mn_t^c$). As a result, two state variables are needed. Ratio n_t^c summarizes the distribution of political power and n_t determines the set of feasible skilled ratios in the labor force:

$$k_t \in [k^l, b(n_t)] \text{ with } n_t = Mk_{t-1} \text{ and}$$
$$n_{t+1}^c = Mn_t^c.$$

In spite of this change, it is clear that there is, again, a *unique* equilibrium policy rule. As in the case of temporary migration, the electorate is made of the offspring of the initial native population and its evolution is exclusively dictated by the process of domestic skill accumulation, regardless of the immigration policy choices taken in the past. So, once again, voters' decision problems are purely static. The unique equilibrium policy rule is given by

$$(k(n,n^c), r(n,n^c)) = \begin{cases} (b(n), 1) \text{ if } n \leq 1^- \\ (k^l, 0) \text{ if } n \geq 1^+ \end{cases} \tag{3}$$

and $n^c_{t+1} = Mn^c_t$. The dynamics of immigration and redistribution are essentially identical to the case of temporary migration.

In conclusion, when immigration only affects the labor markets, immigration policy always takes corner solutions. Initially, the policy consists of *unrestricted* skilled immigration, which is eventually replaced by *unrestricted* unskilled immigration. In stark contrast with the steady state result of the general model, when immigration only affects the labor market, redistribution is never compatible with unskilled immigration.

6 Voters' attitudes toward immigration

A growing body of literature uses survey data to study the determinants of individual attitudes toward particular policy issues. On the specific issue of immigration, Scheve and Slaughter (2001) study the relation between individual attitudes toward immigration and one's education level for the US. Mayda (2003) and O'Rourke (2003) extend the analysis to several other countries. Roemer and Van der Straeten (2003) argue that voters' attitudes toward immigration (xenophobia) in Denmark may have affected the size of redistributive policies.

The analysis of the previous sections reveals important differences in attitudes toward immigration, depending on whether voters take into account that immigrants might affect domestic politics. When voters only care about the effects of immigration on the labor market, skilled voters support open doors to unskilled immigration (and low redistribution). In turn, unskilled voters support open doors to skilled immigration (and large redistribution). That is, immigration policy is characterized exclusively by skill restrictions.

In contrast, when voters also take into account the effect of immigration on domestic politics, quantity restrictions on immigration arise. In the equilibrium discussed above, the unskilled majority supports an immigration policy involving a *limited* number of unskilled immigrants, relative to the size of the native population.[18] Moreover, in the two steady states analyzed, if voters where

[18] Implicitly, I am assuming a given immigrant selection rule to translate changes in skilled-to-unskilled ratios into immigration flows. Suppose, for instance, that there is a cost of issuing visas and monitoring immigrants. Then in

asked "Regarding immigration in your country, are you in favor of increasing it, leaving it as it is, or reducing it?", *all voters* (regardless of their skill level) would answer that they support the current immigration levels.[19] The National Election Survey regularly asks this question to the American population. Over the course of the 1990's, 80-90% of those surveyed answered that they supported current immigration levels or somewhat lower levels. These data suggest that voters may be concerned about the effects of current immigration on future policies.

Regarding voters' attitudes toward immigration, the model also predicts that quantity restrictions should be less important in countries where immigrants do not obtain voting rights. In these countries, voters should support large amounts of immigrants with a skill level different from their own. The data analyzed by O'Rourke (2003) and Mayda (2003) might provide the basis for a more rigorous empirical analysis of voters' attitudes toward immigration and redistribution and how these attitudes may depend on each country's rules to grant citizenship to second-generation immigrants.

7 Conclusions

In a recent study, Klein and Ventura (2004) show that lifting immigration restrictions in OECD countries would have large welfare effects, due to a sizeable long-run increase in total capital and output per worker. Their results naturally pose the question of what leads countries to adopt immigration restrictions and what determines the evolution of these restrictions over time. The present paper argues that immigration restrictions arise naturally as an equilibrium outcome when voters take into account that immigrants may affect future policies and, in particular, the degree of income redistribution.

I have provided a dynamic, general equilibrium, political-economy model with endogenous immigration and redistribution policies, where immigration affects labor market outcomes and domestic politics. In the model, immigrants may bring complementary skills into the country and become citizens with voting rights. One of the main findings is the emergence of *widespread* support for immigration restrictions within a country, consistent with the robust findings of survey data (Hanson et al, 2002). The reason is that voters use immigration policy as an instrument to gain *control over redistribution policy.*

Motivated by the work of Hassler et al (2002), we have analyzed the determinants of the survival

equilibrium there would only be immigrants of one type and the number of visas issued would be a function of the transition probabilities and the size of the native population.

[19] Of course, unskilled voters would also support redistributive policies while skilled voters would not.

of the welfare state. The unique feature of the present analysis has been that both redistribution and immigration policy were endogenous. We have learned that the long-run survival of the welfare state, in the sense of an income redistribution mechanism, is intimately linked to controlled unskilled immigration. Voters in the model "vote for their enemies", that is, an unskilled majority admits unskilled immigrants in order to regenerate the political support for redistribution. We have also seen that a time-consistent, majority-vote, immigration policy may vary over time, as the fraction of skilled voters in the domestic population grows over time.

The present analysis has also made a technical contribution to the literature on political economy in macroeconomics by taking one step further the class of models that can be studied analytically. Compared to earlier work, here infinitely-lived voters choose a policy vector by majority vote. And the model allows for a time-varying skill distribution and a general production function, which can generate a variable skill premium. This approach might prove helpful in the analysis of a number of important related questions. For instance, it would be very interesting to study the dynamic interaction between immigration and the welfare state when the latter includes other realistic features such as a pension system or public education. Both issues will surely top the political agenda in many countries in the foreseeable future.

Appendix: Proofs

Proof lemma 1. Let $n \leq 1^-$ and suppose that (k_1, r_1) is the utility-maximizing policy pair for an unskilled voter, with $r_1 < r_b$. Since the continuation value only depends on k_1, pair (k_1, r_b) is preferred over (k_1, r_1) if and only if $v_1(k_1, r_b) > v_1(k_1, r_1)$, that is

$$(1 - r_b)F_1(k_1) + r_b f(k_1) > (1 - r_1)F_1(k_1) + r_1 f(k_1).$$

But $F_2(k_1) > F_1(k_1)$ implies $f(k_1) > F_1(k_1)$. As a result, the inequality holds. Hence, in any equilibrium, $r(n) = r_b$ if $n \leq 1^-$. A symmetric argument proves that $r(n) = 0$ if $n \geq 1^+$. ■

Proof lemma 2. Observe that $W_i(k, r; n) = v_i(k, r) + \beta C_i(Mk)$ is an increasing function of r for unskilled workers (for any value of k) and it is a decreasing function for skilled workers. Hence, unskilled always choose $r_b = 1$ and skilled choose a zero tax rate. The skilled ratio in the economy evolves according to the law of motion $n_{t+1} = M(n_t; p_1, p_2)$. As long as $n_t \leq 1^-$, we have $r_t = r_b$ whereas if $n_t \geq 1^+$, the adopted tax rate is zero. ■

Proof proposition 1. Let $n^* < k^a$ be a steady state, that is, $n^* = Mk(n^*) < k^a$. Since M is an increasing function, $k(n^*) < M^{-1}(k^a) = k^a$, by definition of k^a. Since $n < M(n)$ for $n < k^a$, it follows that $k(n^*) < Mk(n^*) = n^*$. Rearranging, we obtain $\sigma^* = k(n^*) - n^* < 0$, that is immigration is unskilled. An analogous argument, noting that $n > M(n)$ for $n > k^a$, establishes that immigration is skilled in any steady state $n^* > k^a$. The rest of the proposition follows from the assumption $k^a > 1$. ■

Proof lemma 3. By definition of V_i, and for any policy rule (k, r),

$$V_i(n) = v_i(k(n), r(n)) + \beta C_i(Mk(n)) \text{ for } i = 1, 2.$$

Manipulation of these expressions yields

$$\begin{pmatrix} C_1(n) \\ C_2(n) \end{pmatrix} = \begin{pmatrix} 1 - p_1 & p_1 \\ 1 - p_2 & p_2 \end{pmatrix} \begin{pmatrix} v_1(k(n), r(n)) + \beta C_1(Mk(n)) \\ v_2(k(n), r(n)) + \beta C_2(Mk(n)) \end{pmatrix}.$$

Consider now the policy rule defined in (1) and let $n \geq 1^+$. Then, the previous system of functional equations reduces to

$$\begin{pmatrix} C_1(n) \\ C_2(n) \end{pmatrix} = \begin{pmatrix} 1 - p_1 & p_1 \\ 1 - p_2 & p_2 \end{pmatrix} \begin{pmatrix} v_1(\phi, 0) + \beta C_1(1^+) \\ v_2(\phi, 0) + \beta C_2(1^+) \end{pmatrix},$$

implying that $C_i(n) = C_i(1^+)$ is constant for all $n \geq 1^+$. Furthermore, evaluating at $n = 1^+$, we have a linear system of two equations and two unknowns. The solution to the system is given by

$$\begin{pmatrix} C_1(1^+) \\ C_2(1^+) \end{pmatrix} = \frac{1}{[1-\beta(p_2-p_1)]} \begin{pmatrix} (1-p_1)-\beta(p_2-p_1) & p_1 \\ 1-p_2 & p_2-\beta(p_2-p_1) \end{pmatrix} \begin{pmatrix} \frac{E_1[v(\phi,0)]}{1-\beta} \\ \frac{E_2[v(\phi,0)]}{1-\beta} \end{pmatrix}.$$

In words, the ex ante continuation value for a voter of type i in a skilled-majority state is given by a convex combination. The weights of the combination display less intergenerational persistence than the one-period transition matrix (to the extent that $p_2 > p_1$). The expressions on the right-hand side define the coefficients $a_{ij}(\beta, p_1, p_2)$ appearing in the proposition.

Next, consider an unskilled-majority state in $b^{-1}(\phi) \leq n \leq 1^-$. The policy rule implies full redistribution and $k(n) = \phi$ in these states. Hence,

$$V_i(n) = u[f(\phi)] + \beta C_i(1^-) \text{ for } i = 1, 2,$$

given that $v_1(\phi, 1) = v_2(\phi, 1) = u[f(\phi)]$. Thus, continuation values for the range of states considered are constant functions of n. Next, evaluating the expressions at $n = 1^-$, and using matrix notation, we have the following linear system:

$$\begin{pmatrix} C_1(1^-) \\ C_2(1^-) \end{pmatrix} = \begin{pmatrix} u[f(\phi)] \\ u[f(\phi)] \end{pmatrix} + \beta \begin{pmatrix} 1-p_1 & p_1 \\ 1-p_2 & p_2 \end{pmatrix} \begin{pmatrix} C_1(1^-) \\ C_2(1^-) \end{pmatrix}.$$

It is easy to verify that the unique solution to the system is

$$C_1(1^-) = C_2(1^-) = \frac{u[f(\phi)]}{1-\beta},$$

equal for both types of voters. The intuition is straightforward: with full redistribution, the per-period payoff does not depend on the agent's type so the expected utility given any probability distribution is the same.

Finally, consider an unskilled-majority state with $n < b^{-1}(\phi)$. It follows from the prescribed policy rule and the law of motion for skills that after a finite number of periods the state will fall in region $[b^{-1}(\phi), 1^-]$. Let $T(n)$ be the first period such that $n_t = (M \circ b)^t(n) \in [b^{-1}(\phi), 1^-]$. For such states,

$$\begin{pmatrix} C_1(n) \\ C_2(n) \end{pmatrix} = \begin{pmatrix} 1-p_1 & p_1 \\ 1-p_2 & p_2 \end{pmatrix} \begin{pmatrix} u[f(b(n))] + \beta C_1(Mb(n)) \\ u[f(b(n))] + \beta C_2(Mb(n)) \end{pmatrix}$$

where again $v_1(b(n), 1) = v_2(b(n), 1) = u[f(b(n))]$ and $Mb(n) = (M \circ b)(n)$. It is easy to verify recursively that the solution to the system is given by

$$C_i(n) = \sum_{t=0}^{T(n)-1} \beta^t u[f(b((M \circ b)^t(n)))] + \beta^{T(n)} \frac{u[f(\phi)]}{1-\beta},$$

for both $i = 1, 2$. It is straightforward to check that $C_i(n)$ is a strictly increasing function of n and that $C_1(n) = C_2(n)$ for the states considered. ■

Proof lemma 4. Consider any unskilled majority state, $n \leq 1^-$. Unskilled voters evaluate policy pairs using

$$W_1(k, 1) = v_1(k, 1) + \beta C_1(Mk),$$

where I already used the fact that unskilled voters always impose full redistribution. The set of feasible skilled ratios is given by $k \in [k_l, b(n)]$. Recall that $v_1(k, 1) = u[f(k)]$ is an increasing function and that $C_1(Mk)$ is non-decreasing for $Mk \leq 1^-$ or, equivalently, for $k \leq \phi$. It follows that the optimal choice equals $b(n)$ for all $n \leq b^{-1}(\phi)$.

For $n \in (b^{-1}(\phi), 1^-]$, ϕ clearly dominates any ratio in $[k_l, \phi]$ and $b(n)$ dominates ratios in open interval $(\phi, b(n))$. Note that over this range of states $W_1(b(n), 1|n)$ increases in n. Thus, ϕ will be the optimal unskilled choice in these states if and only if $W_1(\phi, 1) \geq W_1(b(1), 1)$ or, equivalently,

$$u[f(b(1))] - u[f(\phi)] \leq \beta[C_1(1^-) - C_1(1^+)]. \tag{4}$$

From the previous lemma,

$$C_1(1^-) = \frac{u[f(\phi)]}{1-\beta} \text{ and}$$

$$C_1(1^+) = \frac{1}{1-\beta}\left[\left(\frac{1 - p_1 - \beta(p_2 - p_1)}{1 - \beta(p_2 - p_1)}\right) E_1 v(\phi, 0) + \left(\frac{p_1}{1 - \beta(p_2 - p_1)}\right) E_2 v(\phi, 0)\right],$$

where $E_i v(\phi, 0) = (1 - p_i) v_1(\phi, 0) + p_i v_2(\phi, 0)$. A close look at the previous expression shows that $C_1(1^+|p_1)$ is a continuous (and increasing) function and

$$C_1(1^+|p_1 = 0) = \frac{v_1(\phi, 0)}{1-\beta}.$$

Thus, the right hand side of (4) is a continuous (and decreasing) function of p_1 too. Note that the left-hand side of that expression does not depend on p_1 (other than through the value of ϕ). Assumption 3 requires inequality (4) to hold when $p_1 = 0$. By continuity, it will still hold for an interval of low enough (positive) values of p_1. ■

Proof lemma 5. Consider any skilled majority state, $n \geq 1^+$. Skilled voters evaluate policy pairs using

$$W_2(k, 0) = v_2(k, 0) + \beta C_2(Mk),$$

where I already used the fact that skilled voters always set a zero tax rate (no redistribution). The set of feasible skilled ratios is given by $k \in [k^l, b(n)]$. Recall that $v_2(k, 0)$ strictly decreases in k.

Clearly, ϕ dominates any other choice of k in interval $[\phi, b(n)]$. The reason is that $C_2(Mk) = C_2(1^+)$ is constant across those values of k. Similarly, among values of k in interval $[M^{-1}\phi, \phi]$, that is $Mk \in [\phi, 1^-]$, ratio $M^{-1}\phi$ is dominant given that $C_2(Mk) = C_2(1^-)$ is constant too.

Let us now turn to choices of k in closed interval $[k^l, M^{-1}\phi]$. For any such choice of k, we have

$$W_2(k, 0) = v_2(k, 0) + \beta C_2(Mk),$$

where $v_2(k, 0)$ is decreasing while $C_2(Mk)$ is *non-decreasing* (lemma 3). An upper bound for the expression can be constructed as follows. For all $k \in [k^l, M^{-1}\phi]$,

$$W_2(k, 0) < v_2(k^l, 0) + \beta \frac{u[f(\phi)]}{1-\beta} = \bar{U}.$$

Next, I shall derive conditions for $W_2(\phi, 0) > \max\{W_2(M^{-1}\phi, 0), \bar{U}\}$. It is easy to show that $W_2(\phi, 0) > W_2(M^{-1}\phi, 0)$ if and only if

$$\begin{aligned} &v_2(M^{-1}\phi, 0) - v_2(\phi, 0) < \\ &\qquad < \beta\left(E_2 v(\phi, 0) - u[f(\phi)]\right) + \beta^2\left((1-p_2)\left(C_1(1^+) - C_1(1^-)\right) + p_2\left(C_2(1^+) - C_2(1^-)\right)\right), \end{aligned}$$

where $C_2(1^-) = C_1(1^-)$, as argued in lemma 3. Evaluating the previous expression at $p_2 = 1$, and rearranging terms, we can see that $W_2(\phi, 0) > W_2(M^{-1}\phi, 0)$ if and only if

$$v_2(M^{-1}\phi, 0) - v_2(\phi, 0) < \frac{\beta}{1-\beta}\left(v_2(\phi, 0) - u[f(\phi)]\right),$$

or equivalently,

$$v_2(\phi, 0) > (1-\beta)v_2(M^{-1}\phi, 0) + \beta u[f(\phi)]. \tag{5}$$

If the previous inequality holds, continuity of the expressions in p_2 implies that it will hold for an interval of p_2 around one.

Similarly, we obtain that $W_2(\phi, 0) > \bar{U}$ if and only if

$$v_2(\phi, 0) - v_2(k_l, 0) + \frac{\beta}{1-\beta}\left(C_2(1^+) - u[f(\phi)]\right) > 0.$$

Evaluating the previous expression at $p_2 = 1$, and using lemma 3, we obtain equivalent expression

$$v_2(k_l, 0) - v_2(\phi, 0) < \frac{\beta}{1-\beta}\left(v_2(\phi, 0) - u[f(\phi)]\right).$$

And rearranging yields

$$v_2(\phi, 0) > (1-\beta)v_2(k_l, 0) + \beta u[f(\phi)], \tag{6}$$

coinciding with assumption 4. A careful comparison of the two sufficient conditions we just derived reveals that condition (6) implies (5). In conclusion, under assumption 4, high enough values of p_2 guarantee the best response for skilled voters in skilled-majority states. ■

Proof proposition 3. Regardless of k_t, the state converges monotonically to k_a. Since $v_1(k,1)$ is an increasing function, in any state $n \leq 1^-$, unskilled voters' favorite policy pair is $(k,r) = (b(n),1)$. In skilled-majority states, skilled voters' favorite policy pair is $(k,r) = (k^l,0)$ since $v_2(k,0)$ is a decreasing function. Given $n_0 < 1$, there exists $T < \infty$ such that $n_T = (M \circ b)^T (Mk^l) > 1$, which implies the equilibrium path described in the proposition. ■

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