Immigration and the Survival of the Welfare State

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Abstract

This paper studies the political sustainability of redistributive policies under two alternative immigration systems. Under the first one, immigrants are assumed to stay permanently in the country and gain the right to vote. Under the second system, immigrants can only stay temporarily and, as a result, their only effect on the receiving economy is through factor prices. In the model I present, the native population chooses redistribution and immigration policy in each period through majority vote. Over time, the income distribution varies because of intergenerational skill mobility and immigration. I first show that when immigrants gain the right to vote there exist equilibria with long-run income redistribution, sustained by means of a strategic use of immigration policy. The unskilled majority admits (a restricted amount) of unskilled immigrants. Next I show that a shift toward an immigration system based on temporary migration leads to abandoning redistributive policies, under parameter values where this would not have been the case under the first system.

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1 Introduction

There is wide consensus in the US that immigration policy needs to be overhauled in order to curb illegal immigration flows and, at the same time, to cope with the millions of undocumented workers currently in the country. Two main proposals are currently under discussion, both endorsing a shift toward a system based on temporary work permits. Generally speaking, foreign workers will be admitted into the country for a fixed period of time and then will have to return to their home countries.

One of the crucial differences between the two proposals is the inclusion or not of a track to permanent residence, which might ultimately lead to citizenship.\(^1\) Citizenship (or permanent residence) grants immigrants the right to vote, which implies that current decisions over immigration policy may have an effect on future public policies, once immigrants begin to vote.

Similar debates are being conducted in most countries that have received large flows of immigrants in the recent past. To the extent that the socio-economic background of natives and immigrants differs, one would expect to find a relation between the size of the immigration flows received by these countries and the political support for redistributive policies.

The goal of this paper is to analyze the consequences for the future size of redistributive policies of a switch to an immigration system based on temporary migration. In order to do so I build a dynamic political economy model where in each period the size of redistributive policies and immigration policy are determined by majority vote. Over time, the income distribution varies because of intergenerational skill mobility and immigration flows. A key aspect of the model is that voters take into account the effect of current immigration on future policies. I consider two alternative immigration systems. Under the first, immigrants work and stay permanently in the country, obtaining the right to vote after some time. Under the second system, immigrants leave the country at the end of their working lives, without having participated in political decisions. In this case, immigration only affects labor market outcomes. I provide an analytical characterization of the dynamics of redistributive policies under the two immigration systems.

To understand the economic environment it is helpful to begin by analyzing the dynamics of income redistribution assuming that policies are chosen by a benevolent government. The optimal policy consists in admitting as many skilled immigrants as available and to redistribute income

\(^1\)While the more conservative proposal, the Kyl-Cornin bill, does not contain such an option, the McCain-Kennedy proposal does include a route to apply for permanent residence, which then opens the door to American citizenship. The other important difference between the two proposals is whether or not to offer permanent residence to the several million of undocumented foreigners already in the US.
vigorously, to reduce differences in marginal utilities of consumption between rich and poor workers.

We then turn to the analysis of voting equilibria. Under the first immigration system, permanent migration, I show the existence of equilibria where redistributive policies are sustained indefinitely. In this case, the pro-redistribution party uses immigration policy strategically and admits (a restricted amount of) unskilled immigrants. This is reminiscent of the “voting for your enemy” behavior in the literature on dynamic club formation, as in Barbera, Maschler and Shalev (2001). Interestingly, the anti-redistribution party may also support admitting restricted amounts of unskilled immigrants.

The second main result is that a shift toward a temporary migration system, where immigrants never gain the right to vote, leads to abandoning redistributive policies under parameter values where this would not have been the case under the earlier system. Moreover, with temporary migration, the two parties have sharply opposing views over immigration policy: the pro-redistribution party only supports skilled immigration while the anti-redistribution party only supports unskilled immigration.

There is a growing literature studying immigration policy from a political economy perspective. Benhabib (1996) is one of the pioneer contributions. He builds a static model where agents with heterogeneous capital holdings choose immigration policy by majority vote. In his model, there is an exogenous supply of potential migrants with different endowments of capital. In casting their votes, native workers take into account the effects of immigration on factor prices but ignore the effect on future policies. Benhabib (1996) argues that immigration policy is likely to display policy cycles, alternating (long) periods of tight restrictions with (brief) periods where large inflows of immigrants are admitted.

Ortega (2005) provides an infinite-horizon extension of Benhabib (1996) and shows that stationary equilibria are also possible. He then argues that the surge in immigration flows in the US in the last four decades seems more consistent with the predictions of stationary equilibria once changes in educational trends are taken into account. The model I present here borrows some elements from the setup in Ortega (2005) but extends it in several important directions. A more detailed comparison of the two models can be found in the next section.

Dolmas and Huffman (2004) propose a 3-period model in the spirit of Benhabib (1996) that incorporates endogenous redistribution policy. In the first stage, a capital-heterogeneous native population votes over immigration policy. In the second stage, the native population and the enfranchised immigrants vote over redistribution, which takes place in the last stage. In their model immigration affects factor prices and the size of redistributive policies. Their model allows
for savings and international capital movements but assumes that potential immigrants are all identical. As a result, immigration policy is solely a decision over the size of immigration flows. Despite being highly stylized, their model has to be solved numerically. Of course, being a 3-period model, their setup is uninformative about long-run policies.

The model I present is in the same spirit as Dolmas and Huffman (2004) but has the advantage of providing an analytical characterization of immigration policy and redistribution dynamics. More concretely, I show that the size and skill composition of immigration flows in steady state are a function of the parameters governing educational mobility over time.

This paper is also related to a number of recent papers that study the size of government using dynamic political economy models. The early contributions of Krusell, Quadrini and Rios-Rull (1997) and Krusell and Rios-Rull (1999) try to account quantitatively for the evolution of the size of the US government. The model I present is more closely related to the recent work by Hassler et al (2002, 2005). These authors study the political sustainability of the welfare state using an overlapping-generations model (without altruism) that can be solved analytically. The present paper contributes to this literature by introducing endogenous immigration flows.

The paper also makes a methodological contribution to the set of papers in this literature that can be studied analytically. In this respect, the most salient features of the model presented here are the following. Policies are chosen in each period by majority vote by infinitely-lived voters, the policy vector is multi-dimensional (the degree of redistribution and the relative size and average skills of immigration flows), the skill distribution varies over time, and the production function allows for an endogenous determination of the skill premium.

A number of papers have already studied the relation between immigration flows and the size of government but using only static frameworks where immigration flows are exogenously given. Roemer and Van der Straeten (2004) study the consequences of the rise in xenophobia (in Denmark) on the size of the welfare state. 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.

Conceptually, this paper views immigration policy as a decision on admission to a political community. This relates the present work to the literature on dynamic club formation. Roberts (1998) and Barbera, Maschler and Shalev (2001) study dynamic games where current club members vote over new membership. In their analysis voters’ preferences are exogenously defined over the composition of the club and substantial effort is required to prove existence of equilibrium. The model I analyze is much simpler in many respects and assumes that voters’ preferences over
immigration (new members) are derived solely from the effect of immigrants on wages and tax rates. Interestingly, Barbera, Maschler and Shalev (2001) find that some voters sometimes engage in a strategic use of admission policy, admitting individuals that reduce their current payoff anticipating that the new comers will provide support for desirable policies in the future. They refer to this behavior as “voting for your enemy”. A similar feature will be present in the model I introduce in the next section.

Similar issues also arise in the literature on franchise extension. Important early contributions to this question are Acemoglu and Robinson (2000) and Lizzeri and Persico (2004). A recent contribution to this literature is closely related to the model here. Jack and Lagunoff (2005) present an infinite horizon, recursive model of franchise extension where policies are determined by majority vote. The policies they consider include the identity of next period’s decisive voter and intra-temporal income redistribution. They study Markov perfect equilibria and focus on equilibria with gradual franchise extension. While similar in some respects, there are several important differences between their model and the one I present here. In their model, the set of agents in their model is fixed and economic mobility over time is not allowed. While more general in several other dimensions, their model is an endowment economy where general equilibrium effects are absent. Allowing for varying degrees of economic (educational) mobility turns out to play an important role in the analysis here.

The plan of the paper is the following. Section 2 presents the model. As a benchmark case, section 3 studies optimal policy from the point of view of a benevolent government. Section 4 studies voting equilibria under permanent migration. Section 5 analyzes the simpler case of voting equilibria under temporary migration and section 6 concludes. An appendix containing proofs and some additional material closes the paper.

2 Model

The environment we consider builds on Ortega (2005) but we now incorporate income redistribution as an endogenous policy. In addition, we now allow for a more general ‘supply’ of immigrants, which allows for scarcity of immigrants. 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 immigrants (foreign-born). 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, strictly concave, and 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 that is supplied inelastically. Bequests are not allowed.

In every period, the government redistributes income from the rich to the poor by means of a proportional income tax, paid by all workers, and a universal transfer. Taxes are non-distortionary and \( r_t \in [0, 1] \) denotes the tax rate in period \( t \). The government runs a balanced budget. Immigrants also pay taxes and receive transfers.

For most of the analysis, I assume that the children of immigrants are born with voting rights (\textit{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.\(^2\)

\section*{2.1 Exogenous policies}

I 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 native-born workers and immigrants arrived in period \( t \). Period \( t \)'s labor force is given by \( L_i(t) = N_i(t) + I_i(t), i = 1, 2 \). As a result of constant returns to scale, wages in each period are solely a function of the ratio of skilled to unskilled workers in the labor force, that is \( k_t = L_2(t)/L_1(t) \).

Thus, individual consumption is given by

\[
c_i(k_t, r_t) = F_i(k_t) + r_t (f(k_t) - F_i(k_t)) \\
= (1 - r_t) F_i(k_t) + r_t f(k_t), \text{ for } i = 1, 2,
\]

\(^2\)In some countries citizenship is only transmitted from parents to children (\textit{jus sanguinis}). As we shall see later, this can be analyzed as a specific case of the general model.
where $f(k_t) = \frac{F_1(k_t) + k_t F_2(k_t)}{1 + k_t}$ is the output per worker. It is easy to see that $f(k)$ is increasing as long as $F_1(k) < F_2(k)$. Below we shall introduce an assumption that will guarantee that skilled workers will always be richer than unskilled ones.

2.2 Intergenerational Mobility

Children’s skills are determined stochastically but depend on parental skills. More specifically, I assume that intergenerational mobility in skills is governed by a two-state Markov chain with persistence. Letting $p_i$ be the probability of being skilled given parental skill level $i$, I assume that $p_1 < 0.5 < p_2$. The skills of the children of immigrants are determined identically. 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 solely $k_t$ 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 $M k_t$. As a function of $k$, $M$ is increasing and strictly concave. We also note that $M(0) = \frac{p_1}{1 - p_1}$, $M(\infty) = \frac{p_2}{1 - p_2}$, and it has a unique fixed point at $\frac{p_1}{1 - p_2}$.

2.3 The supply of immigrants

At any point in time, the skill distribution of the native population is fully characterized by skilled-to-unskilled ratio $n_t$. We shall denote by $[n, \bar{n}]$ the set of potential values for this variable, where

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3Educational attainment among the children of immigrants varies widely by ethnicity. Most studies for the US find that, controlling for parental education, Asian children have above-average attainment, while Hispanic children perform more poorly. However, on average, the attainment of the children of immigrants is similar to that of the children of natives. See, for instance, Hirschman (2001).

4In reality, skill accumulation is a conscious investment that is affected by a number of variables, including the market returns of education and parental education. The process specified here is convenient but can also be calibrated to data.

5Its inverse function is given by $k_t = M^{-1}(n_{t+1}) = \frac{n_{t+1}(1 - p_1) - p_1}{p_2 - n_{t+1}(1 - p_2)}$. 

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By choosing immigration policy appropriately, the country we are considering can vary its skilled-to-unskilled ratio, which affects wages and consumption. Naturally, the set of feasible ratios that the country can attain depends on the availability of immigrants of each skill type. A convenient way to model the supply of immigrants is the following. Given \( n_t \), the set of feasible ratios after immigration, \( k_t \), will be given by

\[
k_t \in [a(n), b(n)],
\]

where functions \( a, b : [n, \overline{n}] \to \mathbb{R}^{2+} \) are continuous, increasing, and satisfy

\[
a(n) \leq n \leq b(n).
\]

Thus, by admitting all available unskilled immigrants (and no skilled ones) current wages would be determined by ratio \( k = a(n) \). Conversely, admitting only skilled immigrants would deliver a ratio \( b(n) \). Obviously, any intermediate ratio can be attained by admitting appropriate numbers of immigrants of either type.\(^7\) This flexible formulation allows us to study the case where only unskilled immigrants are available. In that case, the choice set would be given by \([a(n), n]\). We shall say that (current) immigration is unskilled when \( n_t > k_t \), that is when the after-immigration skilled-to-unskilled ratio is lower than the ratio among natives only. Likewise, we shall say that immigration is skilled when \( n_t < k_t \).

It will be useful to define the set of feasible policy pairs by

\[
(k, r) \in \Gamma(n) = [a(n), b(n)] \times [0, 1].
\]

The following assumption guarantees that skilled workers are always richer than unskilled ones. Let us assume that

\[
F_2(b(\overline{n})) \geq F_1(b(\overline{n})).
\]

### 3 Optimal policy

Prior to introducing political competition, it is helpful to study the case where policies are chosen by a benevolent government. This allows us to illustrate how beliefs about future policies are formed and to highlight the role of intergenerational mobility in determining policy outcomes.

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\(^6\)The set of relevant skilled-to-unskilled ratios depends on the parameters of the stochastic process governing the evolution of skills over time. The precise construction can be found in Appendix 1.

\(^7\)In general, several vectors of immigrants \((I_1, I_2)\) will deliver a given ratio \( k \) from a native population \( n \).
More specifically, this section analyzes the policy choices of a government that cares about the dynastic utility of the residents in the country. I also assume that immigrants remain in the country permanently. As a result, the skill distribution of the population changes both due to immigration and to educational mobility, which implies time-varying weights in the social welfare function. Thus it is natural to focus on optimal policies without commitment on the part of the government: the current government forecasts how the changes in the future composition of the population will affect future policies.

It is straightforward to show that if the government only cares about the current utility of its residents it is optimal to fully redistribute income, which equalizes marginal utilities of consumption, and to admit as many skilled immigrants as available, which maximizes output per worker. It turns out that this is the dynamic optimal policy as well.

Let beliefs about future policies be given by a policy function, that is, a pair of functions \((k, r) : [\pi, \pi] \rightarrow \mathbb{R}^2_+\) that maps the skilled-to-unskilled ratio in each period to a policy pair. Given these beliefs about future policies, at each period the government chooses current policies to maximize the average (dynastic) welfare of its residents. Let \(n\) be the skilled-to-unskilled ratio among the native population. The set of feasible policies is then given by \(\Gamma(n)\) and the dynastic utility of a worker of skill type \(i\) by \(V_i(n)\), for \(i = 1, 2\). We can now define an optimal policy more precisely.

**Definition 1.** An optimal policy is a policy rule \((k, r) : [\pi, \pi] \rightarrow \mathbb{R}^2_+\) and associated continuation values \((V_1, V_2) : [\pi, \pi] \rightarrow \mathbb{R}^2\) such that

i) Given policy rule \((k, r)\), continuation values \((V_1, V_2)\) satisfy

\[
V_1(n) = v_1(k(n), r(n)) + \beta [(1 - p_1)V_1(Mk(n)) + p_1V_2(Mk(n))] \\
V_2(n) = v_2(k(n), r(n)) + \beta [(1 - p_2)V_1(Mk(n)) + p_2V_2(Mk(n))]
\]

for all \(n \in [\pi, \pi]\).

ii) Given continuation values \((V_1, V_2)\), policy rule \((k, r)\) satisfies

\[
(k(n), r(n)) \in \arg \max_{(k, r) \in \Gamma(n)} \frac{V_1(k_t, r_t) + \beta C_1(Mk_t) + k_t (v_2(k_t, r_t) + \beta C_2(Mk_t))}{1 + k_t}
\]

for all \(n \in [\pi, \pi]\), where \(C_i(n) = (1 - p_i)V_1(n) + p_iV_2(n)\) is the expected utility of the child before the skill type has been determined.

The following proposition describes the optimal policy.
Proposition 1. The optimal policy rule is \((k(n), r(n)) = (b(n), 1)\) for all \(n \in [\underline{n}, \bar{n}]\) with associated continuation values

\[
V_1(n) = V_2(n) = \sum_{t=0}^{\infty} \beta^t u(f(b(n_t))) \text{ where } n_t = (M \circ b)^t(n).
\]

Given this policy rule it is easy to show that the economy converges to a time-invariant skill distribution, which we define as a steady state. More specifically, we shall say that skilled ratio \(n^* \in [\underline{n}, \bar{n}]\) is a steady state of policy rule \((k, r)\) if \(Mk(n^*) = n^*\). Proposition 1 then implies the following result.

Corollary. From any given initial \(n_0 \in [\underline{n}, \bar{n}]\), \(\{n_t\}\) converges to steady state \(n_{op}^* \in \left(\frac{p_1}{1-p_2}, \frac{p_2}{1-p_2}\right)\), the solution of

\[
b(n_{op}^*) = M^{-1}(n_{op}^*).
\]

Figure 1 in the appendix plots the optimal skilled-to-unskilled labor force ratio, given by function \(k(n) = b(n)\). Function \(k_t = M^{-1}(n_{t+1})\) maps current labor force skilled-to-unskilled ratios (which includes also recent immigrants) into skilled-to-unskilled ratios among native-born workers (voters) next period. Observe that steady state \(n_{op}^* > p_1/(1-p_2)\).

Since this steady state was reached by allowing maximum skilled immigration in each period it will provide an upper bound for the set of steady states in the voting equilibrium. Note that, in principle, the steady state of the optimal policy might have a majority of skilled or unskilled workers. In order to allow for both cases to occur in the voting equilibrium I shall make the following assumption.

Assumption 1: \(p_1 > 1 - p_2\).

As we may expect, skilled voters will oppose redistribution. Under assumption 1 unskilled voters may want to use immigration policy strategically, when in the majority, in order to sustain income redistribution. Appendix 2 provides some estimates of intergenerational persistence that suggest that the condition in assumption 1 is empirically plausible as well.

4 Political equilibrium with permanent migration

We now turn to an economy where policies are determined democratically by foresighted voters. We assume that immigrants and their offspring stay in the country permanently. On arrival immigrants
can work but cannot vote. However, their children will be considered citizens with the right to vote. This creates a link between current immigration flows and future policies.

Even though a dynasty’s skill type varies over time it is always the case that current skills determine voters’ current views on redistribution. As the first result in this section shows, unskilled voters support redistribution while skilled voters are against it. For expositional purposes I shall refer to the set of currently unskilled voters as the pro-redistribution party and to the currently skilled voters as the anti-redistribution party. In steady state the relative size of each party will remain constant even though the exact composition will be changing over time.

Formally, the problem is a dynamic game with a state variable that summarizes the skill distribution of the electorate at each point in time. As common in the dynamic political economy literature, I restrict attention to stationary (Markov perfect) voting equilibria, where the state variable is the skilled-to-unskilled ratio in the native population. Voters’ beliefs about future policies are given by a time-invariant (policy) function of the state variable. Taking the function as given, each voter is assumed to vote for her preferred policy pair. In each state, the policy proposed by the majority of voters is adopted. In the event of a tie, that is when there is an equal number of voters of each type, I assume that the party that decided policies in the last period can do so again. Formally, define state \( n = 1^- \) as the tie where unskilled voters decide current policies. Likewise, let state \( n = 1^+ \) denote the tie where skilled voters decide current policies. State variable \( n_t \) determines which party is in the majority as well as the set of feasible policies.

In the previous section, we considered state space \( [n, \pi] \). Some states in this set are relatively trivial, in the sense that regardless of the policies adopted in the current period, the dynamics of skill accumulation fully determine which party will be in power. In order to simplify exposition it is helpful to restrict the state space to

\[
\Omega = [b^{-1}(\phi), a^{-1}(\phi)] \subset [n, \pi],
\]

where \( \phi \) is defined by \( M \phi = 1 \), the skilled-to-unskilled ratio of the current labor force that delivers a tie in next period’s election.\(^8\) Observe that for all states \( n \in \Omega \) it is the case that \( a(n) \leq \phi \leq b(n) \). In words, there exist feasible ratios \( k \) and \( k' \) that lead to a skilled majority in the next period when \( k_t = k \) and to an unskilled majority when \( k_t = k' \). Skilled-to-unskilled ratios \( n < b^{-1}(\phi) \) or \( n > a^{-1}(\phi) \) are fairly trivial since the next period majority is independent of the current immigration flow. For these states I shall assume that parties choose policies according to

\(^8\)It is easy to show that \( \phi = (1 - 2p_1) / (2p_2 - 1) \) and \( \phi < 1 \) when \( p_1 > 1 - p_2 \).
static considerations: unskilled majorities are assumed to choose \((k(n), r(n)) = (b(n), 1)\) and skilled majorities are assumed to choose \((a(n), 0)\), as dictated by static considerations.\(^9\)

Let us now focus on policy determination in the non-trivial set of states, \(\Omega\). First, let us provide a formal definition of the voting equilibrium under permanent immigration.

**Definition 3.** A majority vote equilibrium with permanent migration is a policy rule \((k, r)\) and a pair of value functions \((V_1, V_2)\) such that:

i) Given \((k, r) : \Omega \rightarrow R^2_+\), continuation values are given by

\[
V_i(n) = v_i(k(n), r(n)) + \beta[(1 - p_i)V_1(Mk(n)) + p_iV_2(Mk(n))] = v_i(k(n), r(n)) + \beta C_i(Mk(n)), \text{ for all } n \in \Omega \text{ and } i = 1, 2.
\]

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

\[(k(n), r(n)) \in \arg \max_{(k, r) \in \Gamma(n)} v_1(k, r) + \beta C_1(Mk),\]

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

\[(k(n), r(n)) \in \arg \max_{(k, r) \in \Gamma(n)} v_2(k, r) + \beta C_2(Mk),\]

where \(\Gamma(n) = [a(n), b(n)] \times [0, 1]\).

Similar equilibrium concepts have been proposed in the literature on dynamic political economy. Krusell, Quadrini and Rios-Rull (1997) and Krusell and Rios-Rull (1999) provide numerical solutions for a richer environment using a similar equilibrium concept. More recently, Hassler et al (2002, 2005) and Jack and Lagunoff (2005) have studied similar equilibrium concepts in simpler environments that allowed for analytical solutions.

As anticipated earlier, unskilled voters are pro-redistribution and skilled voters are against it.

**Lemma 1.** In any majority vote equilibrium with permanent migration

\[
r(n) = \begin{cases} 
1 & \text{if } n \leq 1^- \\
0 & \text{if } n \geq 1^+ 
\end{cases}
\]

Recall that a policy rule \((k, r)\) has a steady state \(n^*\) if \(Mk(n^*) = n^*\). Clearly, lemma 1 implies that there can be redistribution in steady state if and only if there is an unskilled majority, or \(n^* \leq 1^-\). This is true regardless of whether immigration is temporary or permanent.

\(^9\)This voting behavior is utility-maximizing when intergenerational persistence is high.
We also have the following observation.

Lemma 2. Steady state $n^*$ features unskilled immigration if $n^* < \frac{p_1}{1-p_2}$. Otherwise, immigration flows are skilled (or skill-neutral). Assumption 1 then implies that in unskilled majority steady states there will be unskilled immigration and redistribution.

The reason why the pro-redistribution party admits unskilled immigrants in steady state is that skill accumulation implies that $n_{t+1} = Mn_t > n_t$. In order to offset it, unskilled immigrants are admitted. In contrast, for $n > \frac{p_1}{1-p_2}$, $n_{t+1} = Mn_t < n_t$ thus offsetting skill accumulation in this case requires skilled immigrants.

4.1 An equilibrium with long-run redistribution

The objective of this subsection is to illustrate that voting equilibria with long-run redistribution can exist when immigration is permanent. We propose a simple policy rule supporting this outcome and discuss the conditions for its existence.\footnote{Tractability requires focusing on simple policy rules. For instance, Hassler et al (2002, 2005) study linear policy rules.}

Consider the following policy rule: $(k, r) : \Omega \rightarrow R^2$ such that

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

In unskilled majority states the policy rule specifies full redistribution and $k = \phi$, the skilled ratio that allows unskilled voters to retain the majority while delivering the highest feasible consumption. In skilled majority states, the rule specifies no redistribution and again $k = \phi$, which turns out to be the skilled ratio that generates the highest possible skilled consumption while maintaining a skilled majority. Note that there are two steady states: one with redistribution, $n^* = 1^-$, and one without, $n^* = 1^+$. Given an initial unskilled majority, income redistribution is maintained indefinitely.

The following result states that this policy can indeed be a majority vote equilibrium.

Proposition 2. Assume $a(1) \leq \phi$ and suppose assumptions 2 and 3 below hold. If inter-generational persistence is high enough for both types of voters, policy rule (1) is a majority vote equilibrium with permanent migration. Starting $n_0 < 1$, redistribution is maintained forever and
a steady state is reached where a restricted quantity of unskilled immigrants is admitted in each period.

Figure 2 in the appendix illustrates the dynamics of this equilibrium. Observe that equilibrium function \( k(n) \) is now a continuous function, constant over the interval of states \([b^{-1}(\phi), a^{-1}(\phi)]\). Observe that there are two steady states, which coincide with tie states \( n = 1^- \) and \( n = 1^+ \).

The results rest on a number of assumptions. Assumption \( a(1) \leq \phi \) ensures that enough unskilled immigrants are available to allow the pro-redistribution party to retain the majority in steady state.\(^{11}\) Secondly, assumptions 2 and 3 below require some degree of altruism, \( \beta \). In fact, when \( \beta = 0 \) both assumptions fail and when \( \beta = 1 \) both are satisfied.\(^{12}\) More specifically, we assume:

**Assumption 2:** \( u[f(1)] > (1 - \beta)u[f(b(1))] + \beta u[F_1(1)] \).

**Assumption 3:** \( u[F_2(1)] > (1 - \beta)u[F_2(a(1))] + \beta u[f(1)] \).

Assumption 2 requires the utility of an unskilled worker from no redistribution to be low enough. Note that unskilled voters face a trade-off. The immigration policy that gives them the highest consumption (output per worker) implies handing the majority to the anti-redistribution party. By admitting some unskilled immigrants, current consumption is lower than it could have been but the pro-redistribution party can retain control over future policies. Assumption 3 ensures that 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.\(^{13}\)

Proposition 2 has two important implications. First, it is worth noting that the pro-redistribution party uses immigration policy strategically. In order to sustain redistributive policies the unskilled majority admits foreign unskilled workers. This inflow of workers entails a sacrifice in terms of current consumption (utility) but, at the same time, it regenerates the political support for redistributive policies. This behavior is reminiscent of the so-called “voting for your enemy” effect in Barbera, Maschler and Shalev (2001) in the literature on dynamic club formation. The proposition

\(^{11}\)We note that this assumption holds when intergenerational persistence is high for both types of workers. Observe that in this case \( \phi \) is approximately 1 and \( a(1) \leq 1 \).

\(^{12}\)We also note that a more concave utility function enlarges the set of parameters for which the two conditions hold.

\(^{13}\)Note that the condition will hold when function \( F_2(k) \) is relatively flat.
provides a rationale for why left-wing parties often support less restrictive immigration policies than more conservative parties.

In second place, we note that the equilibrium immigration policy entails both skill and quantity restrictions: only a restricted quantity of unskilled immigrants are admitted, with the exact quantity being a function of the parameters governing skill accumulation.\footnote{As noted earlier, there are numerous inflows of immigration that map ratio $n_t$ into $k_t$. A simple way to pin down the flow uniquely is to assume that there is a cost of issuing visas. In this case the chosen inflow of workers will be the one delivering the desired ratio at the lowest cost.}

### 4.2 Equilibria where redistribution is abandoned

Proposition 1 demonstrated that, with permanent migration, there exist equilibria where income redistribution is maintained indefinitely. The proposed equilibrium required that enough unskilled immigrants be available in order to offset domestic skill accumulation. The next result states that when this is not the case income redistribution cannot be sustained indefinitely.

**Proposition 3.** Assume $a(1) > \phi$. All majority vote equilibria with permanent migration converge to steady state $n_s^* > 1$, the solution to

$$M^{-1}(n_s^*) = a(n_s^*),$$

where a skilled majority chooses no redistribution, $r^* = 0$, and admits as many unskilled immigrants as feasible.

Figure 3 in the appendix provides a graphical representation. For states below $b^{-1}(\phi)$ and above $a^{-1}(\phi)$, the values for $k(n)$ are the trivial ones, which implies that there is a steady state with an anti-redistribution majority: $n_s^* > 1$. Note also that regardless of the values taken by $k(n)$ in the non-trivial states, no other steady states are possible. Hence, there will be a skilled majority after finitely many periods. From that point on, the anti-redistribution party will set the tax rate to zero.

### 5 Political equilibrium with temporary migration

Let us consider now an alternative immigration system. Suppose that immigrants (and their children) are forced to leave the country at the end of their working lives but before their children
become citizens. This applies to temporary migration but also to permanent immigration in countries where citizenship is passed only by bloodline rather than birthplace.\footnote{This principle of citizenship law is known as “jus sanguinis”. Bertocchi and Strozzi (2004) find that an increasing number of countries is adopting the “jus soli” principle.} In each period, voters still decide on redistribution and immigration policy. However, they realize that immigrants will not become future voters. Clearly, voters’ decision problems are now much simpler. The earlier trade-off between the labor market effects of immigration and its political consequences has now disappeared.

The key observation is that under temporary migration the evolution of the skills of the electorate is independent from the country’s immigration history:

\[ n_{t+1} = Mnt = Mt^t n_0, \]

regardless of past immigration choices \( \{k_t\} \). We define now a steady state with temporary migration by \( n^* \) such that \( n^* = Mn^* \). There is now a unique equilibrium.

**Proposition 4.** Suppose that \( n_{t+1} = Mnt \), regardless of \( k_t \). The unique equilibrium with temporary migration is given by

\[
(k(n), r(n)) = \begin{cases} 
(b(n), 1) & \text{if } n \leq 1^- \\
(a(n), 0) & \text{if } n \geq 1^+ 
\end{cases},
\]

which has a single steady state

\[ n^*_a = \frac{p_1}{1-p_2}. \]

We note that with temporary migration the sustainability of redistributive policies is fully determined by the (exogenous) process of intergenerational mobility. Under assumption 1, redistributive policies will eventually be abandoned and, in steady state, immigration flows will be unskilled, as in the above equilibria. But, in contrast to the equilibrium with redistribution no quantity restrictions are used; all available unskilled immigrants are being admitted.\footnote{If assumption 1 does not hold and \( p_1 < 1 - p_2 \) then in steady state the pro-redistribution party will be decisive and income redistribution will be sustained indefinitely.}

6 Conclusions

Up until now, US immigration laws have allowed for relatively easy access to permanent residence, as compared to other countries. In the jargon of this paper, such a system can be considered one...
of permanent migration. An influential Republican bill for immigration reform in the US proposes a shift toward temporary work permits, with highly restrictive conditions to gain permanent residence. Consequently, immigrants would no longer become voters in US elections. The results in this paper suggest that such a shift in immigration laws may have an important effect on the size of redistributive programs in the US.

We have studied an economy where redistribution is optimal, from the perspective of a benevolent government. Next we have assumed that immigration policy and income redistribution are determined by self-interested voters with foresight. We have considered two alternative scenarios. In the first, the economy is endowed with an immigration system based on permanent migration. We have shown that under this system there exist voting equilibria in which redistributive policies are sustained indefinitely by providing sufficient conditions for an equilibrium supporting this outcome.

We have then studied voting equilibria under a temporary migration system. In this case the sustainability of income redistribution is fully determined by the parameters that govern the evolution of the domestic skill distribution over time. However, we show that redistribution disappears under the conditions that allowed it to be sustained with the alternative immigration system based on permanent immigration.

The model studied in this paper has been a highly stylized one, which can only be taken as suggestive of the effects that such a deep immigration reform might have on the economy. Clearly, deriving somewhat accurate predictions requires a more detailed modelling of individual educational decisions and of the political decision-making process. In this respect, the present model only aspires to provide a useful starting point.

Nevertheless the model has provided a rationale for some seemingly odd positions in the immigration policy debate in several countries. For instance, it suggests that the reason why left-wing parties often support more pro-immigration policies than more conservative parties may lie in a strategic use of immigration policy. Favoring for somewhat larger unskilled immigration (with a fast track to citizenship) might entail short-run costs in terms of lower wages but it may be a way to regenerate political support in order to sustain income redistribution.
References


Appendix 1: Definition of the state space

As noted earlier, extreme states \( n \) and \( \bar{n} \) need to satisfy some conditions, which depend on the stochastic process for skill accumulation. Recall that \( p_i \) denotes the probability that a child of a type \( i \) worker becomes skilled. For reasons that will be clear when we introduce majority vote, define now ratio \( \phi \) to be such that \( M \phi = 1 \). That is, when the current labor force (after immigration) is \( k_t = \phi \), there is an equal number of voters of each type in the next period. It is easy to show that \( \phi = (1 - 2p_1)/(2p_2 - 1) \) and \( \phi < 1 \) when \( p_1 > 1 - p_2 \). Suppose that \((p_1, p_2)\) is an empirically plausible estimate of the mobility parameters. I shall assume that set \([n, \bar{n}]\) satisfies

\[
0 < n \leq b^{-1}(\phi) < 1 \\
\bar{n} = \frac{p_2}{1 - p_2} > 1.
\]

Moreover, I will assume that \( a(n) \geq \phi \) for some \( n \in [n, \bar{n}] \).

Appendix 2: Intergenerational mobility in the US

This appendix provides a back-of-the-envelope estimate of the parameters governing intergenerational mobility in the model. I use individual survey data from the General Social Survey for the United States, which contains information about the educational attainment of parents and children for many individuals and many cohorts. Let us 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. Ortega and Tanaka (2006) analyze changes in the effects of paternal and maternal education on educational attainment. 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 \( \hat{p}_1 = 0.33 \) and \( \hat{p}_2 = 0.78 \), with very small standard errors. When the estimation is restricted to the subsample of children with foreign-born parents the results are quite similar: \( \tilde{p}_1 = 0.37 \) and \( \tilde{p}_2 = 0.83 \). Note that these estimates satisfy that \( p_1 > 1 - p_2 \) and \( p_1 > 0.5 < p_2 \).
Appendix 3: Proofs

Proof proposition 1. Let us consider first the static optimal policy problem:

$$\max_{(k,r) \in \Gamma(n)} \frac{u(c_1) + ku(c_2)}{1 + k} \quad \text{s.t.} \quad \begin{cases} c_1 = (1 - r)F_1(k) + rf(k) \\ c_2 = (1 - r)F_2(k) + rf(k) \end{cases}.$$ 

The first-order condition with respect to the tax rate, for $r < 1$, can be written as

$$(f(k) - F_1(k)) (u'(c_1) - u'(c_2)) > 0.$$ 

Hence, at the solution there is full redistribution: $r(n) = 1$.\(^{17}\) Using this fact, the first-order condition with respect to $k$ simplifies to

$$u'(f(k))f'(k) > 0,$$

implying that it is optimal to admit as many skilled immigrants as feasible: $k(n) = b(n)$.

Turning to the dynamic problem let us try the static solution as a guess: $r(n) = 1$ and $k(n) = b(n)$. Given this policy rule, the associated continuation values are

$$V_1(n) = V_2(n) = V(n)$$

where

$$V(n) = u(f(b(n))) + \beta V(Mf(b(n)))$$

that can be expressed as

$$V(n) = \sum_{t=0}^{\infty} \beta^t u(f(b(n_t))) \quad \text{where} \quad n_t = (M \circ b)^t(n).$$

Observe that $V(n)$ is increasing over $[\underline{n}, \overline{n}]$ since it is the composition of increasing functions. In particular, $f(k)$ is increasing because $F_2(k) > F_1(k)$ over all $k \in \Gamma(n)$, for all $n \in [\underline{n}, \overline{n}]$.

With these continuation values, the social welfare function simplifies to

$$S(k_t, r_t) = \frac{v_1(k_t, r_t) + k_t v_2(k_t, r_t)}{1 + k_t} + \beta \left[ (1 - \pi(k_t)) V_1(Mk_t) + \pi(k_t)V_2(Mk_t) \right]$$

$$= \frac{v_1(k_t, r_t) + k_t v_2(k_t, r_t)}{1 + k_t} + \beta V(Mk_t).$$

Clearly, the solution to

$$\max_{a(n) \leq k \leq b(n)} S(k, r) \quad \text{subject to} \quad 0 \leq r \leq 1$$

entails $r(n) = 1$ since redistribution does not affect next period’s state. Now, the choice of $k$ does have dynamic implications but note that given full redistribution,

$$S(k, 1) = u(f(k)) + \beta V(Mk)$$

is the sum of two increasing functions. Therefore, $k(n) = b(n)$. $\blacksquare$

\(^{17}\)Constant returns to scale implies that $f(k) - F_1(k) = k(F_2(k) - f(k))$. 

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*References or further details may be needed for clarity.*
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. Define \( k^a = p_1/(1 - p_2) > 1 \) and 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 \( k^a \).

Recall now that \( n < M(n) \) for \( n < k^a \), which implies that \( k(n^*) < Mk(n^*) = n^* \). Rearranging, we obtain \( \sigma^* = k(n^*) - n^* < 0 \), that is immigration is unskilled. An analogous argument establishes that immigration is skilled in any steady state \( n^* > k^a \). ■

Proof proposition 2. Let us start by partitioning the state space as follows. Define sets

\[
U = \{ n \in \Omega : n \leq 1^- \},
\]

\[
S = \{ n \in \Omega : n \geq 1^+ \},
\]

respectively, the set of states with an unskilled majority and the set of states with a skilled majority. Observe that \( a(1) \leq \phi \) implies that \( 1 \in \Omega \), that is, the state space includes states with a skilled majority and states with an unskilled majority.

Next, let us compute continuation values along the equilibrium path. Note that

\[
V_i(U) = u(f(\phi)) + \beta [(1 - p_i)V_1(U) + p_iV_2(U)],
\]

for \( i = 1, 2 \), which implies that

\[
V_1(U) = V_2(U) = C_1(U) = C_2(U) = \frac{u(f(\phi))}{1 - \beta}.
\]

(3)

In addition,

\[
V_i(S) = u(F_i(\phi)) + \beta [(1 - p_i)V_1(S) + p_iV_2(S)]
\]

for \( i = 1, 2 \), which implies that

\[
\begin{pmatrix}
C_1(S) \\
C_2(S)
\end{pmatrix} =
\begin{pmatrix}
1 - p_1 & p_1 \\
1 - p_2 & p_2
\end{pmatrix}
\begin{pmatrix}
u(F_1(\phi)) + \beta C_1(S) \\
u(F_2(\phi)) + \beta C_2(S)
\end{pmatrix}.
\]

This is a simple linear system with two unknowns. The solution is given by

\[
\begin{pmatrix}
C_1(S) \\
C_2(S)
\end{pmatrix} =
\frac{1}{(1 - \beta)[1 - \beta(p_2 - p_1)]}
\begin{pmatrix}
(1 - p_1) - \beta(p_2 - p_1) & p_1 \\
1 - p_2 & p_2 - \beta(p_2 - p_1)
\end{pmatrix}
\begin{pmatrix}
(1 - p_1)u(F_1(\phi)) + p_1u(F_2(\phi)) \\
(1 - p_2)u(F_1(\phi)) + p_2u(F_2(\phi))
\end{pmatrix}.
\]

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Let us now analyze voters’ best responses given these continuation values. Let us start with unskilled voters in unskilled-majority states. Set \( n \in [a^{-1}(\phi), 1^+] \). Unskilled voters rank current policies according to

\[
W_1(k, 1) = u(f(k)) + \beta C_1(Mk),
\]

where \( k \in [a(n), b(n)] \) and I already used the fact that they will impose full redistribution. Now notice that among \( k \leq \phi \), \( C_1(Mk) = C_1(U) \) is constant and therefore \( \phi \) dominates all other \( k \leq \phi \). Similarly, \( b(n) \) dominates \( k \in (\phi, b(n)] \). Therefore, choosing \( \phi \) will be optimal if and only if

\[
u(f(b(n))) - u(f(\phi)) \leq \beta [C_1(U) - C_1(S)],
\]

which holds if and only if

\[
u(f(b(1))) - u(f(\phi)) - \beta [C_1(U) - C_1(S)] \leq 0. \tag{4}
\]

Using the expressions for \( C_i(U) \) and \( C_i(S) \), it is immediate to verify that the left-hand side of (4) is a continuous function of \((p_1, p_2)\). In addition, when \( p_1 = 0 \) and \( p_2 = 1 \), expression (4) simplifies to

\[
u(f(b(1))) - u(f(1)) \leq \frac{\beta}{1 - \beta} (u(f(1)) - u(F_1(1))),
\]

which can be rearranged to

\[
u(f(1)) \geq (1 - \beta)u(f(b(1))) + \beta u(F_1(1)).
\]

When this condition holds with strict inequality (assumption 2), expression (4) will also hold for high enough intergenerational persistence, in the sense of \( p_1 \) close enough to 0 and \( p_2 \) close enough to 1.

We now turn to skilled voters’ best responses. In states with a skilled majority, skilled voters rank current policies by means of

\[
W_2(k, 0) = u(F_2(k)) + \beta C_2(Mk),
\]

where \( k \in [a(n), b(n)] \) and I imposed zero redistribution. Now notice that among \( k < \phi \), \( C_2(Mk) = C_2(U) \) is constant and therefore \( a(n) \) dominates all other values. Similarly, \( \phi \) dominates \( k \in [\phi, b(n)] \). Therefore, choosing \( \phi \) will be optimal if and only if

\[
u(F_2(a(n))) - u(F_2(\phi)) \leq \beta [C_2(S) - C_2(U)],
\]

which holds if and only if

\[
u(F_2(a(1))) - u(F_2(\phi)) - \beta [C_2(S) - C_2(U)] \leq 0. \tag{5}
\]

It is straightforward to check that under full persistence, \((p_1, p_2) = (0, 1)\), condition (5) simplifies to

\[
u(F_2(1)) \geq (1 - \beta)u(F_2(a(1))) + \beta u(f(1)).
\]

When this condition holds with strict inequality, expression (5) will also hold for high enough intergenerational persistence, in the sense used above.

As a result, for high enough intergenerational persistence of both types of workers, the proposed rule will be an equilibrium policy rule when assumptions 2 and 3 hold.

**Proof proposition 3.** Let the initial condition be \( n_0 < 1 \). Note that when \( a(1) > \phi \), the state variable along the equilibrium path becomes \( n_T = Mk(n_{T-1}) \) for some \( T > 0 \), regardless
of the policy rule followed. Moreover, $a^{-1}(\phi) < 1$ implies that $n_t$ will always be ‘trivial’ from that period onward. Thus, the policies adopted equilibrium for periods $t > T$ will be given by $(k_t, r_t) = (a(n_t), 0)$. It is easy to verify that in this case the system converges to a steady state given by the solution to $M^{-1}(n^*_s) = a(n^*_s)$. 

**Proof proposition 4.** Let $n \in \Omega$ be the current state. Note that with temporary migration the voter’s problem becomes
\[
\max_{(k,r) \in \Gamma(n)} v_i(k, r) + \beta C_i(Mn),
\]
which is a purely static problem. As a result, the unique equilibrium policy rule is given by each voter’s favorite static policy pair. It is now trivial to show that this policy rule has a unique steady state with temporary migration, the solution to
\[
n_{t+1} = Mn_t,
\]
that is,
\[
n^*_a = \frac{p_1}{1 - p_2}.
\]
Figure 1: Optimal policy
Figure 2: Equilibrium with long-run redistribution.
Figure 3: Voting equilibrium where redistribution is abandoned