Love of Variety and Immigration

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Abstract

This paper develops a political-economic analysis of immigration in a host country that operates in a direct democracy regime. It shows that, in a monopolistic competitive environment with differentiated capital intensive goods, labor liberalization is more likely to come about in the societies that have more taste for variety. Moreover, in a host country with a strong preference for variety, workers and capital owners may share the same positive stance toward labor liberalization. It follows that the latter is impossible in a perfect competitive environment. Finally, in a dynamic inter-temporal setting with strategic voters, it demonstrates that the median voter is willing to accept fewer immigrants in the first period, in order to preserve her domestic political influence in the next period because of the naturalization of immigrants. In this way, the median voter maximizes her gains from immigration by accepting more immigrants in total.

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1. Introduction

Labor liberalization is currently the subject of intense debate. According to Hatton and Williamson (2005), the proportion of the world’s population that has migrated increased slowly from 2.3% in 1965 to 2.9% in 2000. On the other hand, average industrial tariffs’ rates around the world have fallen over the last half century from about 40% to 3%. Over the last 30 years the ratio of exports of goods and services to GDP has doubled.\(^1\) In a short essay, Dani Rodrik (2002) concluded that, since the gains from immigration are much larger than those of further liberalization of trade and capital movement, the policy makers at the WTO, IMF, World Bank, and OECD should spend more energy on the liberalization of labor movements across countries.

This paper provides a combination of trade theory and political economy in order to analyze the possibility of labor liberalization in a developed country that operates in a direct democracy regime. I show that the combination of a host country’s wealth, income distribution, and taste for variety produces a rich set of predictions on its immigration legislation. In particular, wealthy host countries with more equal income distribution are more likely to support immigration. However, immigrants bring variety, and therefore, an immigration proposal is more likely to pass in a society that has a strong preference for variety. In such a case, it is possible for owners of capital and workers to be allies in their attitudes towards immigration.

The liberalization of labor depends mostly on the host countries of immigrants. There are only three countries-Cuba, North Korea, and Myanmar-which prevent their citizens from

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\(^1\) The liberalization of trade has benefited from the powerful push of political forces, but the same forces have been almost nonexistent in the case of immigration. In order to better understand differences in the individuals’ attitude toward the liberalization of trade and that of labor, some authors have used data gathered from international surveys. For example, Mayda (2007), by using an individual-level dataset, analyzed attitudes toward trade and immigration across several countries. She found that individuals are on average more pro trade than pro immigration. See also Mayda and Rodrik (2005) for similar results. O’Rourke and Sinnott (2001 and 2004), using variables marked as ‘patriotism’ and ‘chauvinism’, found a strong and positive correlation between these variables and individual anti-immigration sentiment. They provided convincing evidence that this kind of intolerance is an important component of individual attitudes. These empirical results suggest that in the near future we will live in a world with no barriers to trade, but barriers to immigration are likely to persist.
applying for jobs abroad, so it seems reasonable to focus on immigration policy in a host country of immigrants. Most economic immigrants, originating in large part from developing countries, attempt to move into developed (host) countries because of wage differences. It is assumed that in a host country, the decision of labor liberalization depends on the outcome of the election of an immigration proposal, where a majority of votes is required in order for the proposal to pass.

Voters respond differently to the proposal because they own different levels of capital. The median voter is defined as the individual with the median capital endowment. She decides the outcome of a certain proposal because she will always represent the attitude of the majority.

I blend the median voter framework with two different static trade models to show that labor liberalization depends on the stock and distribution of capital and the societies’ taste for varieties. In particular, in societies where the taste for varieties is absent, I show that immigration is liberalized only if most of the median voter’s income comes from the return to capital. On the other hand, in societies where there is a preference for variety the likelihood of labor liberalization is increasing in the degree of taste for variety. This is because the liberalization of labor provides benefits to all residents of the host country due to the availability of more varieties at lower prices. Thus, it is possible for both capital owners and workers to be pro immigration.

A dynamic two period game, where the immigration proposal is put to a vote at the end of each period, also is analyzed in this paper. The voters are considered forward-looking, and the immigrants that were accepted in the first period are able to vote on the immigration proposal reintroduced in the second period. In this two stage approach, I show that the median voter

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2 Ortega and Peri (2009) using a dataset on migration flows and stocks on 14 OECD host countries and 74 origin countries of immigrants over the period 1980-2005 find that migration flows from an origin to a host country are increasing in the income per capita gap between the host and the origin country. They also show that migration laws in the host countries that made entry more restrictive reduced significantly migration flows.

3 Note that the direct democracy regime is not just a theoretical notion. The constitutions of most developed countries allow for the provision of direct legislation. For example, Switzerland has held a lot of ballots at the federal level. Some of them are related to immigration issues. For more see Frey (1994) and Feld and Kirchgassner (2000). Also, in USA, despite the fact that the USA does not permit referenda at the national level, a number of states (such as California, Florida, New England, New York, to name a few) have held some kind of statewide referenda or ballot. For more details, see Feldman (1999).
paradoxically accepts fewer immigrants in the first period, in order to preserve her domestic political dominance in the second period.

In this paper, I use a Heckscher-Ohlin trade model with complete specialization. The capital abundant country, which is the host country of immigrants, produces a capital intensive good. The labor abundant country, which is the origin country of immigrants, produces a labor intensive good. In this environment, it is reasonable for labor unions always to lobby against immigration, and for capital owners always to lobby pro immigration.

Second, I employ a love of variety framework, as in Helpman-Krugman (1985), where the capital intensive differentiated goods are produced under increasing returns to scale, while the labor intensive good is produced under constant return to scale.\(^4\) In this model, I assume that more varieties are preferred to less. I show that the liberalization of labor in a host country that operates in a direct democracy is more likely to occur in societies with more taste for variety. This is related to the availability of more and cheaper varieties, caused by immigration.

Third, I analyze the immigration proposal in a dynamic inter-temporal setting with strategic voters. The immigrants, who are accepted in the first period in a host country, earn their voting right before the next period when the new immigration proposal is re-voted. Thus, the liberalization of labor in this dynamic approach is to proceed in two stages. In the first stage, the immigration proposal is voted. If the median voter rejects the immigration proposal in the first stage, the game ends because there is no capital accumulation, and therefore, no immigrant will be accepted in the host country. However, if in the first period the immigration proposal passes, then the same proposal will be reevaluated by a new, poorer median voter because of the naturalization of the immigrants accepted in the first period. Since voters are considered forward looking, with perfect vision and complete information regarding the future, they are fully aware

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\(^4\) I would like to point out at this point that the assumption of existence of the increasing return to scale sector (in this type of Helpman-Krugman framework) is not just a theoretical notion. For more details, see Antweiler and Trefler (2002). They use trade data from 72 countries over 5 years (1972, 1977, 1982, 1987, and 1992) and show that a third of all goods-producing industries exhibit increasing returns to scale.
that the volume of immigrants accepted in the first period will affect the outcome of the immigration proposal in the second period. As a result, the median voter will be less liberal to immigration in the first period in order to keep the domestic political dominance in the second period. In this way, the median voter accepts more immigrants in total in the second period, and thus, maximizes her welfare caused by immigration, because the poorer median voter will re-approve the new immigration proposal in the second period.

In the burgeoning literature on labor liberalization and its effects on the world economy, there are numerous studies. For instance, Freeman (1986, 1995) argues that capital owners belong to a specific group in an economy that benefits from liberalizing the labor markets. Consequently, this group lobbies toward the liberalization of labor. On the other hand, workers, who belong to the other specific group in an economy, suffer cost rather than reap benefits from immigration, primarily because their wages will go down. Thus, workers lobby against liberalization of labor. But, is it theoretically possible to have no conflict of interest between workers and capital owners on the issue of labor liberalization? My paper provides the answer to this question, where I show that the existence of the same, positive attitude toward the labor liberalization between workers and capital owners may occur because of the high preference for variety that societies obtain.

In a influential paper in the literature of political economy, Benhabib (1996) provides a simple one-sector, one-factor model, which under direct democracy regime, explains why the individuals who depend mostly on labor income support raising the capital to labor ratio through immigration. According to Benhabib’s model, it is implied that there are always individuals ready to immigrate in the host country. In the present paper, by working with two economies, where their factor endowments are outside the FPE parallelogram, I am able to identify the incentives of individuals willing to immigrate simply by examining the magnitude of the difference of capital over labor endowments between two open economies.

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5 For an overview of the median voter approach in the literature of political economy of immigration, especially in one sector-one good models, see the volume by Krieger (2005).
Ortega (2005, 2010) provides an extension of Benhabib (1996) by using a dynamic, general equilibrium, political economy model of immigration. He shows that there exists a trade-off between skill complementary immigration and the resulting shift in the political power. This is because native voters realize that immigrants earn the right to vote in the future which may affect future legislations. This is similar to the dynamic model developed in this paper, however in my paper there exists a homogenous labor force in both countries. Thus, in my dynamic setting it is the presence of immigrants and not their skill distribution (Ortega, 2005), or immigrants influence on native future tax policies (Dolmas and Huffman 2005), that encourage native voters paradoxically to accept fewer immigrants in the first period, realizing that immigrants may affect the immigration legislation in the next period, by voting against future labor liberalization.

Ivlevs (2005), by using a two-sector, specific factor, general equilibrium, political economy model with non-traded goods, shows that labor liberalization depends on its positive effect on the purchasing power of median voter’s income. This result could be considered as a special case of the general result of my paper, where I show that the societies that have more taste for variety are more open toward immigration. In my paper, a variety labels a differentiated good produced under increasing returns to scale. However, if I label a variety as a differentiated non traded good, where I even can relax the assumption of increasing returns to scale, the main result of Ivlevs’ paper still will stand, but now in a much simpler framework.

This paper is organized as follows. Section 2 demonstrates a political economic analysis of immigration in a perfect competitive environment. Section 3 describes a political economic analysis of labor’s liberalization, using a love of variety framework, where the differentiated capital intensive goods are produced in a monopolistic competitive environment with increasing returns to scale and the labor intensive good is produced homogeneously. Section 4 provides an extension of the model in a dynamic environment with two periods. Section 6 provides

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6 In the same line Dolmas and Huffman show that native voters may paradoxically accept fewer immigrants in the first period, understanding that immigrants may affect native’s future tax legislation.
conclusions. The proofs of propositions and corollaries are shown in Appendix.

2. Immigration Proposal under Perfect Competition

In this section, I develop a political economy analysis of immigration in a host country. I employ a framework similar to Mayer (1984), in which a majority of voters is required to pass a proposal, and incorporate it with a two factors Heckscher-Ohlin trade model. For each country, \( i \in \{1,2\} \), I obtain the cost function for each good \( j \in \{X, Y\} \) by solving

\[
C_j(w_j, r_j) = \min_{l_j, K_j} \left[ (w_j L_j + r_j K_j) \right]
\]

s. t. \( j_i = K_j^{\delta} l_j^{1-\delta} \)

All the parameters are assumed to be positive and \( \beta, \gamma \in (0,1) \), where \( \delta \equiv \gamma \) in the case when \( j \) corresponds to \( X \) and \( \delta \equiv \beta \) in the case that \( j \) corresponds to \( Y \), \( j = (X,Y) \) denotes the capital intensive good and the labor intensive good respectively, \( i = (I;2) \) denotes the host country and the origin country of immigrants respectively. The factor prices are different between the two countries because of the existence of sufficient different factor endowments. The total amount of each good produced from both countries is: \( j = j_1 + j_2 \), where the stock of capital that is used to produce both homogeneous goods, within each country, is: \( K_i = K_{X_i} + K_{Y_i} \), while the stock of labor that is used to produce the same goods within each country is: \( L_i = L_{X_i} + L_{Y_i} \). As a result, the income of each individual in each country can be written as

\[
I_i = w_l + r_l \theta_{q_l}
\]  
(1)

where \( w_l, r_l \) are the returns to one unit of labor and one unit of capital, respectively, and \( \theta_{q_l} \) is positive and corresponds to the capital ownership of the median voter. For simplicity, I assume that all individuals have the same skill level\(^7\) and supply one unit of labor, but they own different levels of capital. They spend all their income on the two goods. An individual (\( q \)) owns \( \theta_q \) capital.

\(^7\) There are a lot of papers in the literature that focus on the role of heterogeneous labor force over the immigration legislation. For example, Grethen et al. (2001) and Bilal et al. (2003) and employing a three-factor, two-household, two-sector trade model and, among other things, show that low-skill and high-skill households have contradictory attitudes toward immigration.
and the number of individuals is given by the measure of \( N(\theta_q) \), which is defined on \((0, \theta_1, \theta_2, \ldots, \theta_L)\), where \( \theta_q \) is strictly increasing in \( q \). But, in the labor abundant country \( (R_2) \), I assume that some citizens own no capital at all. The number of these citizens is represented by \( \Lambda \) in the equation of the labor stock in the origin country. This represents the volume of immigrants willing to move in the host country. The labor and capital stocks of each country is

\[
\begin{align*}
\{R_1\} & \rightarrow K_1 = \int_{\theta_{b_1}}^{\theta_{L_1}} N(\theta_{q_1}) \theta_{q_1} d\theta_{q_1} \\
L_1 & = \int_{0}^{\theta_{L_1}} N(\theta_{q_1}) d\theta_{q_1} \\
\{R_2\} & \rightarrow K_2 = \int_{0}^{\theta_{L_2}} N(\theta_{q_2}) \theta_{q_2} d\theta_{q_2} \\
L_2 & = \Lambda + \int_{0}^{\theta_{L_2}} N(\theta_{q_2}) d\theta_{q_2}
\end{align*}
\]

The identical preferences of each individual are represented by the following felicity function

\[
U_{qi} = X^\mu Y^{(1-\mu)} \text{ where } \mu \in (0,1)
\]

Having the above costs and utility functions, I provide a political economic analysis of immigration, in a host country, when there is a tendency toward FPE between two open economies. It is important to focus on cases where FPE is invalid, since such cases allow the existence of immigration as an economic phenomenon.\(^8\) In this framework, factor prices are different between the two countries only in the existence of complete specialization for at least one country. Thus, using the basic Heckscher-Ohlin assumptions, I look at scenarios where \( K_i \) and \( L_i \) are very dissimilar between \( R_i \) and \( R_2 \). A sufficient condition for this to hold is that the endowments of both countries lie outside the intersection of the cones of diversification of the country with the lowest, and the country with the highest, capital-labor ratio. For simplicity, let assume that the host country is specialized in producing the capital intensive goods, while the

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\(^8\) Other ways to get incentives to immigrate would be technological differences across countries. For more details see Qirjo (2010 a). Also institutional differences across countries could also provide incentive for individuals to immigrate. For example, see Qirjo (2010 b). However, in the above two cases the liberalization of labor in the host country will not give any predictions on the volume of immigrants. Theoretically the wages of both countries (origin and host) may not be equalized in the long run if the technological or institutional differences will still exist after the liberalization of labor. Therefore, there will always be some individuals willing to immigrate in the host country even in the long run. In the current model, I avoid this issue, since FPE will be achieved in the long run if the immigration proposal passes and there will no incentives of individuals of the origin country to emigrate.
origin country is specialized in the production of the labor intensive good. Thus, the wage in the host country exceeds the wage in the origin country. If some individuals move from the labor intensive to the capital intensive country, the factor endowments of both countries will change. The more dissimilar the factor endowments between two countries, the higher the volume of immigrants needed in order to achieve the FPE.9

Since I am considering an immigration proposal in a direct democracy, I focus on the changes of the indirect utility of each voter caused by immigration. I assume that voters behave as rational agents and are perfectly informed about the factor endowments of both countries.10 Therefore, voters know that even though every citizen of the origin country could be a potential immigrant in the host country, only a fraction of the origin country’s population is willing to emigrate. The theoretical reason behind this belief has to do with the fact that in this model, individuals in both countries understand that if A individuals move from the origin country to the host country, the wage of all citizens in both countries will be equalized.

I consider the price of the labor intensive good as numeraire \((P_Y = 1 \text{ and } P_X = p)\). Using the profit maximizing conditions, the indirect utility of each individual in the host country is

\[
V_{q_1} = \mu^\mu (1 - \mu)^{(1-\mu)} \left(\frac{1}{p}\right)^\mu I_{q_1}^\mu
\]

If the immigration proposal passes, the indirect utility of each individual \((V_{q_1}^*)\) becomes

\[
V_{q_1}^* = \mu^\mu (1 - \mu)^{(1-\mu)} \left(\frac{1}{p}\right)^\mu I_{q_1}^*
\]

where \(I_{q_1}^*\) denotes the new income that each individual obtains from the approval of the immigration proposal. Maximizing the median voter utility function subject to her income, I

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9 I also can add the assumption that there are no illegal immigrants in the host country. For simplicity, this assumption is used to assure the theoretical fact that if the immigration proposal passes, then the wages of immigrants in the host country will be equal to the wages of the natives. Nonetheless, the dynamic model introduced in the fourth section provides some intuition about the existence of the illegal immigrants in the host country. See pp. 21.

10 In order to avoid the issue of individuals’ expectations about the voting behavior of other individuals, I assume that all voters participate in the election regardless of their belief on the power of their own vote on the outcome of the election. For more details on this issue see Matsusaka (1992) and Kessler (2005).
easily can obtain the median voter indirect utility function. If \( V_m^* \) denotes the median voter indirect utility function after the immigration proposal is approved and \( V_m \) denotes the median voter indirect utility function before the immigration proposal is presented to the voters, then the immigration proposal will pass only and only if: 
\[
\frac{V_m^*}{V_m} > 1 \text{ or } \frac{l_m}{l_m^*} \left( \frac{p}{p^*} \right)^\mu > 1 \text{ or } \frac{(w_1 + r_1 \theta_m)}{(w_1 + r_1 \theta_m^*)} > 1.
\]
Using the definition of capital and labor stocks shown in equation 2) then \( \theta_m \) is the median capital to labor ratio that solves the following equation

\[
\int_0^{\theta_m} N(\theta_q) \, d\theta_q = \frac{0.5}{\int_0^{\theta_m^*} N(\theta_q) \, d\theta_q}
\]  

(6)

The solution of the above equation gives us \( \theta_m \). Therefore, Proposition 1 can be established as

**Proposition 1.** In the absence of the price effect, immigration is beneficial to the median’s voter utility if and only if the positive effect on her returns to capital outweighs the negative effect on her wage.

The above proposition implies that, in a perfectly competitive environment, a society that consists of more capital owners will push more towards the liberalization of the labor market.

**Corollary 1.** If the capital endowment of the median voter (\( \theta_m \)) is higher than the critical level of the capital endowment [\( \tilde{\theta} \equiv \frac{w_1 - (1 + \lambda) \gamma^{(1 - \mu)}r_1^*}{(1 + \lambda) \gamma^{(1 - \mu)}r_1^* - r_1} \)] then the immigration proposal will pass.

Corollary 1 implies that the immigration proposal will pass only if \( \theta_m > \tilde{\theta} \). In this environment, it is reasonable for labor unions always to lobby against immigration, and for capital owners always to lobby pro immigration. But, the median voters’ income of most host countries comes from their returns of their labor services. Assuming that developed countries apply some degree of direct democracy rule, when evaluate an immigration proposal; their median voters must value something else, in addition to their income. This might very well be the societies taste for variety. I analyze this statement in the following section.
3. Immigration Proposal under Monopolistic Competition

In this section, I demonstrate that under a differentiated-good model, the immigration proposal is more likely to pass in societies that have more taste for variety. I relax the assumption of perfect competition, and assume that there are a lot of varieties of the capital intensive good $X$ produced under increasing return to scale with a fixed cost of production. Good $Y$ is still produced in a perfectly competitive environment. I also assume that each individual has identical homothetic preferences where more varieties are preferred to less. However, the cost of having more variety because of immigration is different for different voters. The capital owners enjoy more variety and higher income as a result of immigration. Thus, they only reap benefits from labor liberalization. On the other hand, workers also enjoy more variety but suffer some costs related to the fall of their wages because of immigration.

As in the previous section, the endowments of both countries lie outside the intersection of the cones of diversification of the country with the lowest and the country with the highest $K/L$ ratio. As a result wages are lower in the origin country as compared to the host country. Under free trade, the origin country of immigrants is specialized in producing the homogeneous good and the host country is only producing the differentiated-good. Thus, citizens of the labor abundant country have an economic incentive to immigrate in the capital abundant country.

Goods in the industry $X$ are assumed to be differentiated products produced under increasing returns to scale ($\eta > 1$) with constant elasticity of substitution between each variety and with a fixed cost of production ($\alpha$) measured in the unit of $X$.\footnote{The inclusion of such a fixed cost is necessary in this particular production function in order to assure the existence of an optimal level of production for each differentiated good.} If $x$ denotes an individual variety, then its production function is

$$x = A_x K_x^{\eta} L_x^{\eta(1-\gamma)} - \alpha$$ \hspace{1cm} (7)

I denote by $n$ the number of varieties produced in the monopolistic industry, and by $X$ the total output produced in this industry. So, $x$ is produced under a monopolistic competitive model
using a demand function similar to that described in Krugman (1979).\textsuperscript{12}

Let me briefly describe the general equilibrium in this model. The identical preferences of each individual in both countries can be represented by the following utility function

\[ U_q = \left( \sum_{v=1}^{n} D_v \right)^{\mu/\varepsilon} Y^{(1-\mu)} \]  

Note that \( \left( \sum_{v=1}^{n} D_v \right)^{\frac{1}{\varepsilon}} \equiv U_x \) indicates the SDS (Spence-Dixit-Stiglitz) subutility function, \( v \) denotes the index of varieties of the capital intensive good, \( D \) symbolizes the consumption of one individual variety and \( \sigma \) represents the cross-price elasticity of substitution between a pair of varieties \( (0 < \varepsilon < 1; \varepsilon = \left( 1 - \frac{1}{\sigma} \right); \sigma > 1) \).

In this model, there are a certain number of firms \( (n) \) each producing, under monopolistic competition, the exact level of output \( (x) \) by simply equalizing marginal revenue with marginal cost, and the relative equilibrium price with the entry conditions

\[ x = \frac{\eta a (\sigma - 1)}{\sigma - \eta (\sigma - 1)} \quad \text{or} \quad x = \frac{\eta ea}{1 - \eta \varepsilon} \]  

Note that the above optimal amount of each variety produced in the host country should be positive, which is true for \( \frac{\sigma}{\sigma - 1} > \eta \). Then the aggregate amount of varieties is equal to the product of the number of firms with the optimal level of output \( (x) \) that each firm produces. Under the structure of this model, each firm produces the same optimal amount of the differentiated product because of the assumption of the constant cross price elasticity between varieties. Therefore, the aggregate level of the differentiated capital intensive goods is

\[ X = nx \]  

The identical preferences of each individual before immigration is represented by the

\textsuperscript{12} See Levy (1997) for an application of a similar model (with the model described in this section) in a political economy approach evaluating a proposition on trade liberalization. For a detailed description of such demand functions see also: \{Norman (1976); Krugman (1980); Dixit-Norman (1980 Ch .9); Helpman and Krugman (1985 Ch. 6); Wong (1995 Ch.14); Feinstra (2004 Ch. 5)\}.
following indirect utility\(^{13}\)

\[
V_{q_i} = \left[ \mu^\mu (1 - \mu)^{(1-\mu)} \left( \frac{1}{p} \right)^\mu l_{q_i} \right] n \left( \frac{\mu}{\sigma - 1} \right)
\] (11)

If the immigration proposal passes, the new indirect utility of an individual is

\[
V_{q_i}^\ast = \left[ \mu^\mu (1 - \mu)^{(1-\mu)} \left( \frac{1}{p^\ast} \right)^\mu l_{q_i}^\ast \right] n^\ast \left( \frac{\mu}{\sigma - 1} \right)
\] (12)

All voters have identical and homothetic preferences where more varieties are preferred to less. Since different voters obtain different levels of capital, they will react differently when evaluating the immigration proposal. As in the previous section, the median voter represents the majority of the voters. Thus, the new features of this richer model are the gains from varieties accompanied with lower equilibrium prices for each variety. Using equations (11) and (12), the ratio of the indirect utilities of the median voter before and after the immigration proposal is

\[
\frac{V_{m}^\ast}{V_m} = \left( \frac{l_m^\ast}{l_m} \right) \left( \frac{p^\ast}{p} \right)^{-\mu} \left( \frac{n^\ast}{n} \right)^{\mu \left( \frac{\mu}{\sigma - 1} \right)}
\] (13)

In terms of equation (13), the immigration proposal passes only if the ratio of indirect utility of the median voter after immigration to the ratio of her indirect utility before immigration is higher than unity. In order to understand the intuition behind the approval of the immigration proposal, I split the ratio of equation (13) into two effects, the “income effect” and the “real variety effect.” The income effect is that portion of the indirect utility that remains if societies have no love for variety at all. Thus, the immigration proposal will pass only if the income of the median voter will ameliorate. This is shown by the following equation

\[
\frac{l_m^\ast}{l_m} = \frac{w_1^\ast + r_1^\ast \theta_m}{w_1 + r_1 \theta_m}
\] (14)

The remaining effect of the ratio the equation (13) in the case where the income effect of the

\(^{13}\) This indirect utility is obtained by decomposing the utility maximization problem of the consumers into two stages. In the first stage, the consumer maximizes the SDS subutility function \((U_c)\) subject to a given income \((\bar{I})\) and a given price for each variety \((p)\). In the second stage, the consumer chooses to allocate the given income between the differentiated goods and the homogeneous good.
median voter does not change as a result of immigration is called the real variety effect. This effect consists of two sub-effects, which I label the “price effect” and the “variety effect.”

The variety effect is defined as the portion of the indirect utility that represents the gain that each consumer enjoys because of the availability of more varieties caused by immigration. In our ratio of indirect utilities of (13), this gain is represented by \((\frac{n^*}{n})^{\frac{\mu}{\sigma-1}}\).

The percentage increase in the labor force of the host economy due to the approval of the immigration proposal is defined as \(\lambda\). Recall from the definition of the median voter demonstrated in the equation (6) and equations shown in (2), that \(\Lambda\) represents the volume of immigrants. Hence, \(\lambda \equiv \frac{L_2 - L_1}{L_1} = \frac{\Lambda}{L_1}\). Then, the variety effect is

\[
(\frac{n^*}{n})^{\frac{\mu}{\sigma-1}} = [(1 + \lambda)^{1-\gamma}]^{\frac{\mu}{\sigma-1}}
\]  

(15)

Note that \([(1 + \lambda)^{1-\gamma}]^{\frac{\mu}{\sigma-1}} > 0\) because \(\lambda > 0\) by definition. This inequality shows that in this richer model, the variety effect is always positive. Voters always enjoy more varieties, and therefore, more gains in their indirect utility function as a result of immigration. Thus, if the other two effects cancel each other, the liberalization of labor is supported by all voters since it will increase the welfare of all agents in the economy.

Finally, the effect that remains from the real variety effect after subtracting the variety effect is called the “price effect.” This effect is the portion of the indirect utilities of (13) that represents the gain that each voter enjoys because of the decrease of the equilibrium price of each differentiated good caused by immigration. The price effect is represented by the ratio of \((\frac{p^*}{p})^{-\mu}\), where \(p^*\) is the new equilibrium price of a variety after immigration, and \(p\) is the old equilibrium price of a variety before immigration. The price effect can be written as

\[
(\frac{p^*}{p})^{-\mu} = (1 + \lambda)^{\gamma \mu + \beta(1-\mu)}
\]  

(16)

As one can easily observe from equation (16), the right hand side is always higher than unity.
This shows that in this type of love of variety framework, the price effect will always be positive. Thus, the agents of the host country enjoy lower prices per variety because of immigration. If the variety effect cancels the income effect, then the immigration proposal will find unanimous support in the host country because it will improve the welfare of all its citizens.

So far I have shown that the variety effect always is positive and higher than unity. The same stands for the price effect. Therefore, the real variety effect, which is represented by the product of the variety effect and the price effect, also is higher than unity. Thus, the following propositions are established.

**Proposition 2.** The critical level of the median voter’s capital necessary for the approval of the immigration proposal in the monopolistic competitive case ($\tilde{\theta}$) is always lower than that of the perfect competitive case ($\hat{\theta}$) because of the real variety effect.

The above proposition introduces the notion that in a monopolistic competitive environment, the level of median voter’s capital loses the previous exclusive power over the liberalization of labor because of the variety effect. The latter effect pushes the median voter in the host country toward the liberalization of labor. This can be described by the following proposition.

**Proposition 3.** The higher the love of variety in a society, the more open to immigration is the host country.

As one can easily observe from the variety effect described in equation (15), the gains from variety also is related with the cross-price elasticity of substitution ($\sigma$) and with the volume of immigrants ($\Lambda$). These two relations are included in the following corollary.

**Corollary 2.** The lower the constant cross-price elasticity of substitution between varieties ($\sigma$), or/and the higher the volume of immigrants ($\Lambda$), the more intense is the variety effect, and therefore, the more liberal toward immigration is the host country.\(^\text{14}\)

\(^{14}\) The above corollary shows two important results that require caution in their interpretation. The positive relationship between the variety effect and the volume of immigrants stands only if the volume of immigrants is bounded from above. This is related to the structure of the SDS subutility function ($U_\lambda$) and
Referring back to proposition 2, one can analyze the immigration proposal in an extreme scenario, where the median voter of the host country owns zero capital. In other words, all of her income comes from her wage. The main result that I want to point out through the examination of this extreme scenario is the fact that it is theoretically possible that even the host country’s labor unions might favor the approval of the immigration proposal. The key factor that could make the workers in the host country, to push for the liberalization of labor is related to the real variety effect. Voters will vote pro immigration, only if the positive effect of the real variety gains outweighs the negative effect of their lower wages. This is expressed in the following corollary.

**Corollary 3.** *It is theoretically possible that the median voter will be pro liberalization of labor, even in the extreme case when her entire income comes from her wage.*

It should be obvious that if the above corollary is true then the liberalization of labor will find unanimous support in the host country, since it will increase the welfare of all its residents. This is related to the fact that the rental rate of capital increases because of immigration. Thus, if the workers are pro labor liberalization, the capital owners will be more than happy to vote pro immigration since their welfare will increase by more. This is shown in the following corollary.

**Corollary 4.** *If corollary 3 is true, the liberalization of labor faces unanimous support.*

Therefore, in a monopolistically competitive environment it is theoretically possible that the liberalization of labor benefits both workers and the capital owners of the host country unlike in a perfectly competitive environment. Thus, it can be reasonable for both labor unions and capital owners to lobby pro immigration.

Helpman, Krugman (1985 Ch. 6-8), show among other things, that both capital owners and workers might lobby for the liberalization of trade since they both gain from trade if the variety

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the assumption of increasing returns to scale of the production function for each differentiated capital intensive good. Thus, if the volume of immigrants goes to infinity, then the number of firms, each producing a different variety, will go to infinity. But, throughout this paper, I assume constant elasticity of substitution between varieties ($\sigma$), which means that the number of varieties does not affect their elasticity of substitution. However, if the number of varieties approaches infinity, then $\sigma$ approaches infinity, which means that the capital intensive goods now will be produced under perfect competition.
effect is strong. This is similar to the result of the above corollary but here the gains come from labor liberalization as trade is already assumed to be liberalized in this model. Moreover, since immigration makes both countries factor endowments more similar, (after the approval of the immigration proposal, the endowments of both countries lie outside the intersection of the cones of diversification of the countries’ capital-labor ratios.) there will be more intra industry trade between these two countries, which will produce further gains from international trade.\footnote{Other benefits from labor liberalization would be the variety effects on the factors of production. In particular, larger market means more differentiated inputs which in turn will increase productivity. See Rodriguez-Clare (1996). Another benefit from immigration would be the creation of similar economies in terms of their endowments which in turn will increase both countries (or the integrated economy) rates of growth by increasing intra-industry trade of goods, or/and by increasing flows of ideas. For more details see Rivera-Batiz and Romer (1991).}

Despite that theoretically variety effect might have similar results on liberalizing trade and labor markets, countries are much more resistant to immigration than to free trade. Some empirical evidence, such as Mayda (2007), Mayda and Rodrik (2005), O’Rourke and Sinnott (2001, 2004), show that this fact might be related to non-economic factors such as ‘patriotism’ and ‘chauvinism’. However, this model despite the very restrictive assumptions about costs, utility and labor homogeneity provides some economic justification to theoretically support the fact that countries are more resistant to liberalizing their labor market as compared to their goods market. This economic rationale relies mostly on the bargaining power of the host country over the origin country. Consequently, in a direct democracy regime, even if the variety effects could be exactly the same in both cases (immigration and trade), the median voter of the host country has exclusive power over immigration, while the median voters of both countries, in case of symmetry, have equal power over trade liberalization. Moreover, in this model, the variety effect created from the presence of immigrants will undoubtedly reduce wages of all voters in the host country. This is not necessarily the case in similar models, such as Levy (1997), Krugman (1979, 1980), Helpman and Krugman (1985, Ch. 7), where variety effect is created from trade liberalization.
4. An Extension of the Models by Looking at Some Dynamic Implications

When the immigration proposal is approved, it seems reasonable to assume that immigrants will earn the voting rights in the host country after working there for a certain period of time. Also, I assume that immigrants remain in the host country forever. For simplicity, I consider the procedure of labor liberalization in two stages, where I assume that there is a population growth in the origin country in the second period. Consequently, the labor force at the end of the second period in the origin country of immigrants is \( L_{22} = (gA_1 - \Lambda) + \int_{0}^{\theta_{q_2}} N(\theta_{q_2})d\theta_{q_2} \), where \( g > 1, A_1 > 0, \Lambda \geq 0 \) and \( gA_1 \) denotes the population growth in the origin country in the second period, while \( \Lambda \) denotes the volume of emigrants who moved in the host country in the first period. The population growth must be strictly higher than the volume of immigrants \( (gA_1 > \Lambda) \) for the existence of the wage inequality between the host and the origin country in the second period. If the immigration proposal passes in the first period, the only thing that has changed in the second period is the total number of voters. Since all immigrants bring only their labor service and no capital, the new median voter will be less rich than the old median voter. Voters, in the first period, realize that if immigration proposal is approved, all immigrants will gain their voting rights in the second period. Thus, voters are not myopic, as they were in the previous section because of the static structure of the models, but they are considered forward looking. So to analyze the immigration proposal in this dynamic environment, I consider a simple two stage game. In the first stage, the immigration proposal is put to a vote. The median voter decides whether to accept it. In the case of failure, the game ends in the first stage. However, if the immigration proposal passes in the first period, it will be reevaluated in the second period by a new, poorer median voter. The voters are fully aware that they might lose their political influence in the second period. Consequently, I show in the following analysis that when these considerations are taken into account voters’ preferences over immigration depend on their initial capital ownership and on the volume of immigrants hypothetically accepted in the first period. To
illustrate this, let’s consider a host country with a capital-rich median voter. She fully acknowledges the fact that admitting immigrants will increase her income. However, in the second period, this flow of immigrants will increase the political influence of the workers. This could lead to the failure of the immigration proposal in the second period, because the new median voter may vote against immigration due to the negative effect on her income. Thus, the old median voter votes to maximize her overall utility of both periods subject to her income level and her influence on the political power. I formalize the behavior of the voters toward immigration in this dynamic setting under perfect competition and under monopolistic competition.

4.1. Dynamics under Perfect Competition

In this subsection, both goods are produced under perfect competition. The forward looking median voter solves the following problem

$$\max_{X_t, Y_t} U_{m_t} = \sum_{t=1}^{2} X_t^\mu Y_t^{1-\mu}$$

s.t. \{(pX_t + Y_t = I_m) and (\theta_{m2} > \tilde{\theta})\}

It should be obvious that \(\theta_{m2}\) represents the new median voter in the second period. Recall that

$$\tilde{\theta} = \frac{w-w^s}{r^* - r} \left(\frac{p}{r}\right)^{-\mu}$$

is the median voter’s critical level of capital that makes her indifferent to the immigration proposal in the static game. Hence, the following conditions must be satisfied \(\theta_{m1} > \tilde{\theta}\) for the approval of the immigration proposal in the first period (see corollary 1). Thus, \(\theta_{m2} > \tilde{\theta}\) represents the necessary condition for the political dominance of the (old) forward looking median voter in the second period. This assures that, even though the forward looking

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16 In US the legal immigrants earn their voting rights approximately four years after they obtained their Green Card. The individuals who have earned the privilege to immigrate to the US from other countries under the Visa-Diversity Lottery Program earn the voting rights in the US after approximately five years. In most of the countries of the European Union, i.e., legal immigrants earn their voting rights in approximately four to five years, depending on the origin country of immigrants. Consequently, for simplicity, one might ignore the discounting factor in the utility function because of the assumption that period one and period two (denoted by \(t\)) are close enough together in time.
median voter is not going to be in the majority of the voters, the new median voter will accept the immigration proposal in the second period. Hence, the immigration proposal in the second period will pass if the constraint $\theta_{m2} > \bar{\theta}$ is not binding. This is shown by the following inequality

$$\frac{v^*_m}{v_{mt}} = \frac{l^*_m + l^*_{m2}}{l_m + l_{m2}} > 1$$

(17)

The income of the median voter consists of her wage and the product of the return to capital with her level of capital. Incorporating this with the percentage increase of the labor force ($\lambda$) in the host country caused by immigration in the first period, the above inequality can be written as

$$\theta_{m1} > \frac{w^1_1 - w^2_1}{r^*_{1} (1 + \lambda) - r_1}$$

(18)

Consequently, proposition 4 follows

**Proposition 4.** In this dynamic setting the immigration proposal would more likely pass in the second period:

1. The lower is the hypothetical host country’s population growth ($\lambda$), in the first period because of immigration.
2. The richer, in terms of capital ownership, is the median voter in the first period.

4.2. Dynamics under Monopolistic Competition

In this subsection, the capital intensive differentiated goods are produced in a monopolistic competitive environment, while the labor intensive good is produced in a perfect competitive environment. The forward looking median voter in the host country solves the following problem

$$\max_{x_t, y_t} U_{mt} = \sum_{t=1}^{2} \left( \sum_{n=1}^{n} D^n \right) \frac{\mu}{\bar{\mu}} Y_t^{(1-\mu)}$$

s.t. \( \{ pX_t + Y_t = l_m \) and \( \theta_{m2} > \bar{\theta} \} \)

Every other assumption is exactly the same as in the previous subsection with an exception. This is related to the median voter’s critical level of capital that makes her indifferent to the immigration proposal, which is $\bar{\theta} = \frac{w^1_1 - (1 + \lambda)w^2_1}{(1 + \lambda)r^*_1 - r_1}$. Again, $\theta_{m1} > \bar{\theta}$ must be valid to assure the
approval of the immigration proposal in the first period. Consequently, \( \theta_{m2} > \bar{\theta} \) portrays the necessary condition for the political dominance of the (old) forward looking median voter in the second period. Therefore, the following inequality must be valid

\[
\frac{\gamma_{m1}^*}{\gamma_{m1}} = \frac{\gamma_{m1}^* + \gamma_{m2}^*}{\gamma_{m1} + \gamma_{m2}} (1 + \lambda) \geq 1
\]  

(19)

Recall from section 3 that the real variety effect, \((1 + \lambda)^\zeta\), is positive and the same for all voters.

The above inequality can be written as

\[
\theta_{m1} > \frac{r_2 + r_2^*(1 + \lambda)^{-1 - (1 + \lambda)^{1-\zeta}(w_1 + w_2 + r_1 + r_2)}}{w_2 + w_2^*}
\]  

(20)

One can easily observe that the above inequality is always valid if the numerator of the ratio of the right hand side is negative. This represents the case when the real variety effect dominates the income effect. Hence, in this dynamic setting, proposition 3 of the static model still is valid.

Moreover the following proposition follows:

**Proposition 5.** In this setting, it is theoretically possible for the immigration proposal always to pass if the real variety effect dominates the median voter’s income effect.

But what happens when the numerator of the inequality 20 is positive? I show that the answer to this question depends on certain values of the parameter \( \zeta = \frac{(1-1)|\gamma + \beta(1-\mu)| + \mu(1-\gamma)}{\sigma - 1} \). Thus, proposition 6 follows

**Proposition 6.** The immigration proposal would more likely pass in the second period, the lower is the hypothetical host country’s population growth (\( \lambda \)), in the first period because of immigration only for certain values of the parameter \( \zeta \). However, the richer, in terms of capital ownership, is the median voter in the first period, the more likely is the approval of the immigration proposal for any values of the parameter \( \zeta \).

The above proposition implies that there is a symmetry (for certain levels of \( \zeta \)) between the two models on the restriction of the volume of immigrants in the first period and level of capital owned by the median voter, unless the income effect dominates the real variety effect. In both
models, the median voter accepts fewer immigrants in the first period, in order to be fully assured that she will not lose her political dominance in the second period, when the immigration proposal is re-voted. The richer the forward looking median voter, the less restricted will be the policy of the host country toward immigration in the first period. However, if the real variety effect dominates the income effect, the host country will apply liberal policy toward immigration regardless of the status of the monopolistic competitive model.

Figure 1

I illustrate proposition 4 with the help of Fig. 1, which portrays a one-dimension graph, where the host country’s capital over labor ratio (\( k_i \)) is normalized to one. For simplicity, let’s use this graph to demonstrate the dynamic model under perfect competition. Let also assume that the median voter’s critical level of capital is equal to 0.5 (\( \bar{\theta} = 0.5 \)). The immigration proposal passes in the first period if \( \theta_{m1} > 0.5 \) and in the second one if \( \theta_{m2} > 0.5 \) (which also represents the necessary condition for the political dominance of the median voter). As one can observe from fig. 1, \( \theta_{m1} \) lies always to the right of \( \bar{\theta} \) indicating that in a static framework, the immigration proposal will pass. However, in the dynamic setting, if the forward looking median voter of period one is represented by \( \theta_{m1} \) and the volume of immigrants is one decimal point, then all immigrants will be accepted in the first period. These immigrants will become citizens after one period and the immigration proposal will be re-voted again in the second period. Now, the new, less rich median voter accepts the new immigration proposal, regardless of the volume of the new immigrant flow. However, if the volume of immigrant flow in the first period is equal to two decimal points, the forward looking median voter will accept only a portion of immigrants. This portion in our line is equal to \( \theta_{m1} - (\bar{\theta} + e) \) where \( e \) is a very small positive number. This is to
fully assure the domestic dominance on immigration in the second period by the new median voter. It is obvious that the immigration proposal would not have passed in the second period if the first period’s median voter was not forward looking. This is demonstrated by $\theta_{m2}'$ in fig 1.

The heart of part two of proposition 4 lies in the fact that the richer the forward looking median voter (of the first period), the less concerned for the weakening of her political influence in the second period due to her acceptance of the immigration proposal in the first period. This is illustrated by $\theta_{m1}'$ in fig. 1. It is obvious that the volume of immigrants accepted in period one by the forward looking median voter is higher, the further to the right is the level of capital owned by the median voter. This is true, since $\theta_{m1}' - (\bar{\theta} + e) > \theta_{m1} - (\bar{\theta} + e) \Rightarrow \theta_{m1}' > \theta_{m1}$, which is true only if $\theta_{m1}'$ lies to the right of $\theta_{m1}$ as indicated in fig. 1.

In this dynamic approach, both models quietly suggest that the capital owners always will be in favor of illegal immigration or be in favor of delaying, as long as they can, the required time for an immigrant to become a citizen in the host country. This is because the capital owners will not have to worry about losing their future political influence when lobbing for immigration. On the other hand, the workers of the host country of immigrants will not always lose from sending illegal immigrants back to their countries of origin. This is related to the future gain of more and more political influence that this scenario will garner when lobbing against immigration. Consequently, both models in their dynamic approach intuitively explain the reason why illegal immigrants are more likely to gain their legal status when the workers’ representative party controls the government, in the host country. Nevertheless, more illegal immigrants are more likely to enter in the host country, when capital owners’ representative party is in power.17

1. Conclusions

This paper has shown that in a Heckscher-Ohlin setting blended it with a median voter

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17 This is somewhat consistent with the US immigration history. For example, Goldin (1994), Timmer and Williamson (1998), Borjas (1999), Hanson et al. (2002), and Martin and Midgley (2006, 2010) provide brief and outstanding accounts of the history of American Immigration Policy before and after World War II.
framework, in a perfect competitive environment; the liberalization of labor in a host country depends on its level and distribution of capital. Therefore, it is reasonable for labor unions always to lobby against immigration and for capital owners always to lobby in support of immigration.

I have demonstrated that in a monopolistic competitive environment, with differentiated capital intensive goods, the immigration proposal is more likely to pass in the societies that have more taste for variety. This is shown to be related to the fact that in this richer model, the liberalization of labor creates gains from the availability of more varieties accompanied with lower prices for each variety. As a result, the median voter’s capital level loses some of its exclusive power. Moreover, it has been portrayed that it is theoretically possible for the liberalization of labor to take place independent of the stock and distribution of capital in the host country. This occurs if the real variety effect dominates the median voter income effect, and therefore, both labor unions and capital owners lobby in support of labor liberalization.

Finally, reexamining the immigration proposal in a dynamic model with forward looking voters, it is shown that the median voter is willing to accept fewer immigrants in the first period, in order to be fully assured that she will not lose her domestic political influence in the second period because of the naturalization of the immigrants accepted in the first period. Using this strategy, the median voter increases her gains from immigration by accepting more immigrants in total in the second period. However, the richer the forward looking median voter, the less restricted will be the policy of the host country toward immigration in the first period. Moreover, in the case that the real variety effect dominates the income effect, it is illustrated that the host country always will be open to immigration regardless of the time period. It is argued that both dynamic frameworks quietly provide a political-economic intuition for the allowance of more illegal immigrants when a capital owners’ representative political party controls the government. It also is argued that this dynamic framework intuitively explains the political-economic reason behind the fact that illegal immigrants are more likely to gain their legal status when a workers’ representative party is in power.
Appendix

Proof of Proposition 1:

If the price effect is absent. Note that $\frac{\theta m}{l_m} > 1$ if $\frac{dl_m}{dL_1} > 0$. But $\frac{dl_m}{dL_1} > 0$ iff $\left| \frac{\partial w_1}{\partial L_1} \right| > \left| \frac{\partial r_1}{\partial L_1} \theta \right|$. The proof of proposition 1 consists of three stages: First Stage: Proof of the “if” part:

From the production functions, $w_1$ and $r_1$ can be written as: $w_1 = (1 - \beta)A_{y_1}K_{y_1}^{\beta}L_{y_1}^{-\beta}$ and $r_1 = \beta A_{y_1}K_{y_1}^{(1-\beta)}L_{y_1}^{(1-\beta)} \Rightarrow \frac{\partial w_1}{\partial L_1} = -\beta (1 - \beta)A_{y_1}K_{y_1}^{\beta-1}L_{y_1}^{-\beta} < 0$ and $\frac{\partial r_1}{\partial L_1} = \beta (1 - \beta)A_{y_1}K_{y_1}^{(1-\beta)}L_{y_1}^{(1-\beta)} > 0$ since $0 < \alpha, \beta < 1$. So, let $\left| \frac{\partial w_1}{\partial L_1} \right| > \left| \frac{\partial r_1}{\partial L_1} \theta \right|$ where $\frac{\partial w_1}{\partial L_1} < 0$ and $\frac{\partial r_1}{\partial L_1} > 0$. Then $\left| \frac{\partial w_1}{\partial L_1} \right| + \left| \frac{\partial r_1}{\partial L_1} \theta \right| > 0$.

Second Stage: Proof of the “iff” part:

Let $\left| \frac{\partial w_1}{\partial L_1} \right| > \left| \frac{\partial r_1}{\partial L_1} \theta \right|$, then $\left| \frac{\partial w_1}{\partial L_1} \right| > \left| \frac{\partial r_1}{\partial L_1} \theta \right|$ and $\frac{\partial w_1}{\partial L_1} < 0$, $\frac{\partial r_1}{\partial L_1} \theta > 0 \Rightarrow \frac{\partial w_1}{\partial L_1} + \frac{\partial r_1}{\partial L_1} \theta m \leq 0$, which is a contradiction with stage 1).

Third Stage: Proof that $\left| \frac{\partial w_1}{\partial L_1} + \frac{\partial r_1}{\partial L_1} \theta \right|$ is monotonically increasing in $\theta$ for any distribution $N(\theta)$:

Let $f(\theta) \equiv \left| \frac{\partial w_1}{\partial L_1} + \frac{\partial r_1}{\partial L_1} \theta \right|$ then $\frac{df(\theta)}{d\theta} = \frac{\partial r_1}{\partial L_1} > 0$. Defining $N(\theta) \in (0, \theta_1, \cdots, \theta_m, \cdots, \theta L_1]$ where each element of this distribution is strictly increasing, then it is obvious that $f(\theta)$ is monotonically increasing in $\theta \forall N(\theta)$.

Proof of Proposition 2:

In order to prove the above proposition, I have to show that $\bar{\theta} > \tilde{\theta}$. Let’s assume that the opposite is true. Hence, $\tilde{\theta} < \bar{\theta}$. \(XVII\) Recall from Corollary 1 that $\tilde{\theta} \equiv \frac{w_1 - (1 + \lambda)\mu + \beta(1 - \mu)w_1^*}{(1 + \lambda)\mu + \beta(1 - \mu)r_1^* - r_1}$ and, keeping the pre immigration factor prices exactly at the same values in both models, it can be shown that $
= \frac{w_1 - (1 + \lambda)^\xi w_1^*}{(1 + \lambda)^\xi r_1^* - r_1}$. Thus, the following inequality must also be true:

$\frac{w_1 - (1 + \lambda)^\xi w_1^*}{(1 + \lambda)^\xi r_1^* - r_1} < \frac{w_1 - (1 + \lambda)^\xi w_1^*}{(1 + \lambda)^\xi r_1^* - r_1}$ This is true only if $(1 + \lambda)^\xi > (1 + \lambda)^\mu + \beta(1 - \mu) \{since...
$w_1 > w^*_1$ because $\frac{dw_1}{dl_1} < 0$. $r_1 < r^*_1$ because $\frac{dr_1}{dl_1} > 0$} and $w_1, w^*_1, r_1, r^*_1 > 0$. But, $\lambda > 0$ by definition $\left( \lambda \equiv \frac{A}{L_1} > 0 \right)$ and $\zeta > \gamma \mu + \beta (1 - \mu)$ because $\zeta = \frac{(\sigma - 1) [\gamma \mu + \beta (1 - \mu)] + \mu (1 - \gamma)}{\sigma - 1}$ where $\sigma > 1$ and $\gamma, \mu, \beta \in (0, 1)$ from the assumption of the production and demand functions of the differentiated goods. This implies that: $(1 + \lambda)^{\zeta} < (1 + \lambda)^{\gamma \mu + \beta (1 - \mu)}$. This is a contradiction. Thus, $\hat{\theta} > \hat{\beta}$.

Proof of Proposition 3:

I showed in (15) that the variety effect can be represented by the following equality:

$$\left( \frac{n}{n} \right)^{\left( \frac{\mu}{\sigma - 1} \right)} = [(1 + \lambda)^{1 - \gamma}]^{\left( \frac{\mu}{\sigma - 1} \right)}$$

The love for variety is represented by the value of the parameter $\mu$, which is the utility weight on capital intensive goods. This is taken from the SDS subutility function ($U_x$). Let's denote the variety effect with $f(\mu)$. Then, I obtain the following:

$$f(\mu) = [(1 + \lambda)^{1 - \gamma}]^{\left( \frac{\mu}{\sigma - 1} \right)} \Rightarrow \frac{df(\mu)}{d\mu} = \frac{1 - \gamma}{\sigma - 1} [(1 + \lambda)^{1 - \gamma}]^{\left( \frac{\mu}{\sigma - 1} \right)} \ln (1 + \lambda) > 0$$

because $\lambda > 0, \sigma > 1$ and $0 < \gamma < 1$.

Proof of Corollary 2:

First, I provide the proof of the relationship between $\sigma$ and the variety effect and then do the same for the relationship between $\Lambda$ and the variety effect. Let denote the variety effect with $f(\sigma)$. Then, I obtain the following:

$$f(\sigma) = [(1 + \lambda)^{1 - \gamma}]^{\left( \frac{\mu}{\sigma - 1} \right)} \Rightarrow \frac{df(\sigma)}{d\sigma} = -\frac{(1 - \gamma)\mu}{(\sigma - 1)^2} [(1 + \lambda)^{1 - \gamma}]^{\left( \frac{\mu}{\sigma - 1} \right)} \ln (1 + \lambda) < 0$$

since $\lambda > 0, \sigma > 1$ and $\gamma, \mu \in (0, 1)$. This completes the proof for the first part of corollary 2.

Let's denote the variety effect with $f(\lambda)$. So, $f(\lambda) = [(1 + \lambda)^{1 - \gamma}]^{\left( \frac{\mu}{\sigma - 1} \right)}$. Recall that $\lambda = \frac{A}{L_1}$. Thus,

$$\frac{df(\lambda)}{d\lambda} = \frac{(1 - \gamma)\mu}{\sigma - 1} (1 + \lambda)^{\left( \frac{1 - \gamma}{\sigma - 1} \right) - 1} > 0$$

since $\lambda > 0, \sigma > 1$ and $\gamma, \mu \in (0, 1)$.

Proof of Corollary 3:

The income effect of equation (14) can be written as: $\frac{r^*}{l} = \frac{w^*}{w}$ since $\theta_m = 0$. Thus, the
immigration proposal in this extreme scenario passes only if:

\[ \frac{V_{m}^{*}}{V_{m}} = \frac{(l_{m})^{n_{1}}p^{\mu}}{n} = \frac{w^{*}}{w} (1 + \lambda)_{\gamma \mu + (1-\mu)\beta}(1+\gamma)_{\sigma - 1} = \frac{w^{*}}{w} (1 + \lambda)^{\gamma} > 1 \]

Where \( \zeta = (\sigma - 1)_{\gamma \mu + (1-\mu)\beta}(1+\gamma)_{\sigma - 1} > 0 \) since \( \sigma > 1 \) and \( \gamma, \mu, \beta \in (0,1) \). Talking logs of both sides \( \frac{V_{m}^{*}}{V_{m}} > 1 \) can now be written as \( \log w^{*} - \log w + \zeta \log (1 + \lambda) > 0 \).

Since \( \frac{dw}{dl} < 0 \Rightarrow w^{*} < w = \log w > \log w^{*} \Rightarrow \log w - \log w^{*} > 0 \). Also, \( \zeta \log (1 + \lambda) > 0 \) because \( \zeta, \lambda > 0 \). Hence, it is theoretically possible that \{\( \zeta \log (1 + \lambda) > \log w - \log w^{*} \)\} is true as long as the magnitude of the positive number of the left hand side is higher than the magnitude of the positive number of the right hand side of the inequality.

**Proof of Corollary 4:**

Since corollary 3 is assumed to be true, then \{\( \zeta \log (1 + \lambda) > \log w - \log w^{*} \)\} always is true. Hence, if an arbitrary individual \( q \) owns \( \theta_{q} \) level of capital, her income will increase further because of immigration, since \( \frac{dr_{q}}{dl} > 0 \) (see stage 1 of the proof of proposition 1). Moreover, \( \zeta \log (1 + \lambda) \) is the same for all individuals independent of their capital levels.

Thus, \{\( \zeta \log (1 + \lambda) > \log (w - r\theta_{q}) - \log (w^{*} - r^{*}\theta_{q}) \)\} is also true since \( r^{*} > r \) and \( \theta_{q} > 0 \).

**Proof of Proposition 4:**

The proof of the above proposition consists of two stages. First Stage: Proof of the 1. part:

I show that in this dynamic setting, the immigration proposal will pass only if the inequality (18) is valid. Let denote \( \theta_{F} \equiv \frac{w_{1} - w_{2}}{r_{2}(1+\lambda) - r_{1}} \). Then, \( \frac{d\theta_{F}}{dl} = \frac{-r_{2}(w_{1} - w_{2})}{(r_{2}(1+\lambda) - r_{1})^{2}} \).

We know that \( \frac{dl}{dw} < 0 \Rightarrow (w_{1} < w_{1}^{*} \text{ and } w_{2} < w_{2}^{*}) \). But, \( w_{2} = w_{1}^{*} \Rightarrow w_{1} < w_{2} \).

Since, \( w_{1} < w_{2} < w_{2}^{*} \Rightarrow w_{1} < w_{2}^{*} \). Hence, \( w_{1} - w_{2}^{*} > 0 \Rightarrow \frac{d\theta_{F}}{dl} < 0 \).

Second Stage: Proof of the 2. part:
From the definition of the median voter, we know that \((1 + \lambda) = \frac{\theta_{m1}}{\theta_{m2}}\). Hence, \(\theta_F = \frac{\theta_{m2}(w_1-w_2^*)}{\theta_{m1} r_2^* - \theta_{m2} r_1}\).

Thus, \(\frac{d\theta_F}{d\theta_{m1}} = \frac{-\theta_{m2}(w_1-w_2^*)r_2^*}{(\theta_{m1} r_2^* - \theta_{m2} r_1)^2}\). Since, \(\theta_{m2}, r_2^*, (w_1 - w_2^*) > 0 \Rightarrow \frac{d\theta_F}{d\theta_{m1}} < 0\).

Proof of Proposition 5

Let assume that the median voter owns some initial capital. This implies that \(\theta_{m1} > 0\). Then, inequality (20) is always valid as long as: \((1 + \lambda)^{1-\zeta}(w_1 + w_2 + r_1 + r_2) > r_2 + r_2^*(1 + \lambda)^{-1}\).

Taking logs of both sides and rearranging, I obtain: \(\zeta < \frac{\log(w_1+w_2+r_1+r_2) - \log[r_2+ r_2^*(1 + \lambda)^{-1}]}{\log(1 + \lambda)} - 1\).

We know from the proof of proposition 2 that \(\zeta > 0\). Hence, it is theoretically possible that, for certain values of the parameter \(\zeta\), proposition 5 is true. This takes place only when

\[0 < \zeta < \left\{\frac{\log(w_1+w_2+r_1+r_2) - \log[r_2+ r_2^*(1 + \lambda)^{-1}]}{\log(1 + \lambda)} - 1\right\}.

Proof of Proposition 6:

The proof of this proposition consists of two stages, as indicated below:

Stage 1): The immigration proposal would more likely pass in the second period, the lower is the hypothetical host country’s population growth \((\lambda)\), in the first period because of immigration.

Let denote with \(\theta_v \equiv \frac{r_2 + r_2^*(1 + \lambda)^{-1} - (1 - \lambda)^{-1}(w_1 + w_2 + r_1 + r_2)}{w_2 + w_2^*}\). Let’s examine the sign of \(\frac{d\theta_v}{d\lambda}\).

\[\frac{d\theta_v}{d\lambda} = -(1 + \lambda)^{-2} + (1 - \zeta)(1 + \lambda)^{-1}(w_1 + w_2 + r_1 + r_2)\] \(\frac{d\theta_v}{d\lambda} < 0\) for \(\zeta > 1\).

Stage 2): The immigration proposal would more likely pass in the second period, the richer, in terms of the ownership of the capital, is the forward looking median voter (in the first period).

From the definition of the median voter, one can obtain \((1 + \lambda) = \frac{\theta_{m1}}{\theta_{m2}}\).

Thus, \(\theta_v = \frac{r_2 + \theta_{m2} r_2^*(\frac{\theta_{m1}}{\theta_{m2}})^1 - \zeta (w_1 + w_2 + r_1 + r_2)}{w_2 + w_2^*}\). Let’s examine the sign of \(\frac{d\theta_v}{d\theta_{m1}}\).

\[\frac{d\theta_v}{d\theta_{m1}} = \frac{r_2^* - \theta_{m2} r_2^* (1 - \zeta)(w_1 + w_2 + r_1 + r_3)}{w_2 + w_2^*}\] \(\frac{d\theta_v}{d\lambda} < 0\) for \(\zeta < 0\). But, \(\zeta > 0\). Hence, \(\frac{d\theta_v}{d\lambda} > 0\).
References


S. Djajic (London: Routledge)


