II. SKILLS AND IMMIGRATION:
A SHORT RUN TRADE THEORETICAL APPROACH

II.I. Introduction

For the past half century the immigration of culturally and ethnically different groups has transformed economies, societies, and politics all over the world. For example, European Union countries have experienced a change from an ethnically homogenous to a multi-ethnic society, and the cultural diversity of the United States has noticeably increased as well.

In this chapter, I study the political economy of immigration in a direct democracy regime. In a host country of immigrants, when evaluating an immigration proposal, each individual is concerned only with the short run effect of immigration on her labor and capital ownership. By employing a specific factor model where labor is assumed to be immobile in the short run while capital is completely mobile within a country, and blending it with the median voter framework developed by Mayer (1984), I argue that the liberalization of immigration restrictions depends on the host country’s stock and distribution of capital, the number of groups of skilled workers that each country (host and origin country of immigrants) has, and the number of types of goods (not volume) produced in each country.22

In order to give incentives to individuals of one small country (referred to as the origin country of immigrants) to immigrate to some other small country (referred to as the host country of immigrants), I develop a scenario in which I first assume that the capital/labor ratios (K/L endowments) of two small economies are similar enough.23 Then a shock happens in the potential host country of immigrants, which causes an increase in the price of labor in this country. For example, a host country of immigrants enjoys an improvement in technology or an economic boom that is not related to the labor movements. Within a country, only capital moves from one industry

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22In other words, in this model, capital is considered intersectorally mobile, but not internationally mobile, while labor is considered intersectorally immobile in the short run. In the long-run, however, labor becomes perfectly mobile within a country.

23This assumption is made in order to ensure that, in the long-run, the K/L ratios both countries are inside the Factor Price Equalization (FPE) parallelogram. This is a necessary condition for the existence of incomplete specialization.
to the other, whereas the inability of labor to reallocate instantaneously causes a wage differential in the short run. Since the potential host country of immigrants is operating in a direct democracy regime, meaning that the immigration proposal requires the approval of the majority of voters in order to pass, I will focus only on the effects that this proposal would have on the median voter who, in fact determines the outcome of the immigration proposal. The income of each individual comes from returns on labor and capital ownership. Each individual is assumed to supply (own) one unit either of unskilled or skilled labor but not both in the short run. However, each individual can own different levels of capital. The same is true for the median voter in the host country. If immigration occurs in a country, then we might expect to observe a change on the returns both of labor and capital ownership of the median voter of that country. This would be demonstrated in the indirect utility of the median voter. Consequently, in the host country of immigrants, the median voter will approve the immigration proposal only after examining her short run indirect utility difference because of immigration.

The short run specific factor model used in this chapter explains why there is polarization between workers and capital owners, as well as between skilled and unskilled workers, on the immigration issue. Both of these results are not novel in the literature of political economy of immigration and trade. However, the main contributions of this chapter are related to the following two relationships. First, I show the positive relationship between the number of skills that exist in each country and the liberalization of immigration restrictions in the host country of immigrants. Second, I demonstrate the positive relationship between the number of different types of goods that each country produces in a perfect competitive environment and the liberalization of the immigration restrictions in the host country.

According to my understanding, the above relationships provide some previously unidentified implications on the political economy of immigration. For example, both relationships provide a theoretical rationalization on the different immigration laws that exist among similar host countries in terms of stock and distribution of capital. In other words, one can find the number of types of goods (not volume) that are produced in each potential host country of immigrants. The
country that produces more types of goods would be more liberal towards immigration. Thus, in the real world, one can analyze the degree of openness that different host countries apply to immigration. For example, if the Netherlands’ labor stock, capital stock, and distribution of capital are similar with those of Belgium, but assuming that the Netherlands produces more types of goods as compared to Belgium, then according to the theory developed in this chapter, the Netherlands should be more open than Belgium to immigrants arriving from the same origin country (See Table I. in Appendix II). Put differently, under these circumstances, the median voter’s positive returns on her capital ownership because of immigration are the same in both countries. However, since the Netherlands is producing more types of goods as compared to Belgium, the decrease of the Netherlands’ median voter’s wage that results from immigration would be less than that of Belgium. This is true because the production of more types of goods within each country is related to the availability of a greater number of different groups of skilled workers. Since the Netherlands is producing more types of goods as compared to Belgium, then a greater number of groups of skilled workers exists in the Netherlands. It follows then that the higher the difference between the number of groups of skilled workers in the Netherlands and Belgium, the higher the difference on the degree of openness towards immigrants between the two countries. Thus, in this case, more liberal policies toward immigrants from the same origin country would be talking place in the Netherlands relative to Belgium. Following the same intuition, but now focusing on the number of the types of goods that each country produces, one can compare a number of countries such as Belgium to Finland, the Netherlands to Finland, Austria to Ireland, Germany to U.K., France to Italy, Greece to Portugal, to name a few (see Table I. in the Appendix II. for more details).

On the same grounds, both relationships also provide a theoretical justification for the different attitudes that the median voter of a host country has towards immigrants who attempt to move in from different origin countries. Following the same intuition as in the above paragraph, I can provide some real world anecdotal evidence of cases where immigrants come from different origin countries. For instance, within a same host country, we would expect to see more liberal immigration policies towards immigrants coming from either China or India, where there might be
many groups of skilled workers per population, as compared to immigrants coming from African countries such as Nigeria and Ghana, where there might be only a few groups of skilled workers per population.

Next, I provide a brief literature review of similar research and point out the main differences between those papers and the present one. In a pioneering work, with a similar framework as this paper, Mayer (1974) assumes that capital is immobile between industries, but labor is perfectly mobile between the same industries within a country. Using this assumption, he studies the effect of immigration in the host country of immigrants and shows that capital owners in both industries (capital-intensive and labor-intensive industries) gain from immigration, while workers lose. In the current chapter, on the other hand, I assume the opposite; by using the skill level. In other words, I assume that labor is immobile and capital is perfectly mobile in the short run within a country. It is this key assumption when dealing with labor mobility that makes the model developed in this chapter to behave differently in the short run, as compared to Mayer’s (1974) model.

Bilal, Grether, and de Melo (2003) employ a three-factor, two-household, two-sector trade model and show among other things, that low-skill and high-skill households have contradictory stances toward immigration. This property of their model is shared in the model developed in this chapter. However, my model is different from that of Bilal et al. (2003): the model developed in this chapter assumes that one factor (labor) is immobile in short run, while they take a long-run view by assuming that all factors are mobile across sectors within a country. It is this short run feature of my model that adds to the current literature.

This chapter is organized into several sections. In section II.II, the median voter approach is introduced. In section II.III, a short run general equilibrium of the specific factor model is introduced, where each country produces only two goods by employing two groups of workers

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24 See also Neary (1978a, 1978b) and Grossman (1983), where models similar to Mayer (1974) are applied and similar results are found in terms of immigration. Moreover, see Mussa (1974) for a generalization of a model with n-goods and n-factors, similar to Mayer (1974).

25 See also Grethen, de Melo, and Muller (2001) for similar results.
The short run impact of immigration on the returns of labor and capital then is analyzed. In section II.IV, the immigration proposal is evaluated using the median voter approach. In section II.V, I reconsider the immigration proposal by allowing that in both countries, there exist a number of unskilled workers who can be classified as one group of workers as well as several different groups of skilled workers. In section II.VI, the relationship between the types of goods that each country produces and liberalization of immigration restrictions in the host country is examined. Finally, the main conclusions of this chapter are summarized in section II.VII, along with some new ideas for future research.

II.II. Median voter approach in two small open economies

In this section as well as in section II.III, I am going to develop a temporarily immobile factor trade model with two small open economies that have two sectors each: a capital-intensive sector and a labor-intensive sector. Let me employ all the basic Heckscher-Ohlin assumptions such as pure competition in both product and factor prices, full employment of both factors of production ($K_i$ and $L_i$), similar tastes between countries, no restriction to trade in goods for both countries, and perfect mobility of capital within a country. However, in order to use the temporarily immobile factor model, the assumption of perfect labor mobility is relaxed. In addition, assume that in both countries the good $X$ (capital-intensive good) is produced by the high wage industry and good $Y$ (labor-intensive good) is produced by the low wage industry. In each country, let us use the following cost function for each good:

$$C_{ji}(w_{ji}, r_{ji}) = \min_{L_{ji}^K, K_{ji}^L} [(w_{ji}L_{ji} + r_{ji}K_{ji})]$$

s.t. $j_i = A_{ji}K_{ji}^\gamma L_{ji}^{1-\gamma}$

All the parameters are assumed to be positive and $\beta, \gamma \in (0,1)$ in order to satisfy the Inada conditions for the concavity of our production functions ($X;Y$) where $\delta \equiv \gamma$ when $j$ corresponds to $X$ and $\delta \equiv \beta$ when $j$ corresponds to $Y$. As one can observe easily from the above relationships: $i \equiv (1,2)$ is used to denote the host country and the origin country of immigrants respectively, while $j \equiv (X;Y)$ is used to denote the capital-intensive good and the labor-intensive good respectively. The
term $P_j$ denotes the exogenously determined price for each good in both countries. The term $A_{ij}$ represents the corresponding technological parameter for each good in each country. 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 $L_i = L_{X_i} + L_{Y_i}$. Then the income of each individual in each country can be written as follows:

$$I_i = w_{ij}a_i + r_i\theta_i$$

(1)

where $a_i, \theta_i$ are both positive and correspond to the labor and capital ownership of each individual respectively, and $r_i$ represents the return of one unit for capital. Keeping in mind the assumption of full employment in each country, we easily can assume that each individual will work the same amount of time regardless of how her wage is affected.

Let us make another simple assumption that each individual owns one unit of labor. Thus, in terms of equation (1), employing the above assumptions for each individual in each country, we would have $a_i = 1$. Also, each individual within each country can be classified either as skilled or as unskilled but not both. The intuition behind this classification comes from the fact that skill levels are determined exogenously in the short run which, in turn, is implied by the assumption (explained in the following section) that labor is considered temporarily immobile between industries within a country.

The term $w_{ij}$ represents the return of skilled or unskilled labor (wage) that each individual obtains in each country, subject to her exogenously determined skill level. On the other hand, however, different individuals within a country can own different levels of capital $\theta_{q_i}$. The density of individuals is shown by the continuous density function $N(\theta_{q_i})$, defined on $[0, \infty)$. The capital stock $(K_i)$ for each country $(R_i)$ is given by the following equation.

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26The sub-index (i) is missing in the notation of each price for the simple reason that the price of each good is determined in the world market, where both countries (origin and host countries of immigrants) are considered relatively small to influence it. Thus, the industries in both countries take their products’ prices as exogenously given by the world market.
\[
\int_{q_i=0}^{\infty} N(\theta_{q_i})\theta_{q_i} d\theta_{q_i} = K_i
\]

and the stock of labor in each country is \( L_i = \int_{q_i=0}^{\infty} N(\theta_{q_i})d\theta_{q_i} \).

Using the notation and the assumptions of the above paragraph, equation (1) can now be written as follows:

\[ I_i = w_i + r_i \theta_{q_i} \]  

(3)

The identical preferences of each individual in both countries can be represented by the following felicity function:

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

(4)

Since, we are considering a passage of an immigration proposal where all individuals in the host country will be asked to allow a certain amount of labor movement from the origin country, we should focus our attention on the changes of the indirect utility of each individual within the host country. The indirect utility of each individual in the host country \( (V_{q_1}) \) before immigration is put to a vote can be written as follows:

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

(5)

If the immigration proposal were to pass, the indirect utility of each individual in the host country \( (V_{q_1}^*) \) would look like the following:

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

(6)

where \( I_{q_1}^* \) notates the new income that each individual obtains because of the approval of the immigration proposal and where the labor-intensive good is considered the numeraire good. Using our notation this means that \( P_Y = 1 \) and \( P_X = p \).

Since we are assuming that the host country is operating in a direct democracy environment, where every type of proposal requires a majority of voter approval to pass, I will concentrate my efforts only on the economic benefits/costs of the median voter, since she is the
one who will decide on the outcome of the immigration proposal.\textsuperscript{27} Maximizing the median voter utility function subject to her income, I easily can obtain the median voter indirect utility function.

Under direct democracy rule, the median voter will approve the immigration proposal only if her indirect utility function after immigration will be higher than before immigration. If we denote \( V_m^* \) as the median voter indirect utility function after the immigration proposal is approved and \( V_m \) as the median voter indirect utility function before the immigration proposal is presented to the voters in the host country, and with the fact that the median voter in the host country is the individual with the median capital over labor ratio [see equation (7) below], then the immigration proposal will pass only and only if \( \frac{V_m^*}{V_m} > 1 \). Making use of the assumption of exogenous prices because we are dealing with two small open economies, the inequality \( \frac{V_m^*}{V_m} > 1 \) is equivalent to the following inequality \( \frac{l_m^*}{l_m} > 1 \) or \( \frac{w_m + r_m \theta_m}{w_m + r_m \theta_m} > 1 \), where \( \kappa \) indexes the median voter in the host country. 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

\[
\frac{\int_{q=0}^{m} N(\theta_q) \theta_q \, d\theta_q}{L} = 0.5
\]  

Therefore, the solution of (7) will give us \( \theta_m \), which represents the capital to labor ratio owned by the median voter.

\textbf{II.III. Short run general equilibrium}

As mentioned in the above sections, in this chapter I am examining the short run effect of immigration in the host country of immigrants by employing a specific factor model where labor is immobile between industries, but capital is mobile between the same industries within a country. Before I analyze the short run general equilibrium model, I briefly will provide some intuition for the classification of each factor of production in terms of their mobility. The intuition regarding the labor immobility in the short run is that, in the real world, the skills that workers obtain usually are

\textsuperscript{27}Following the work of Mayer (1984), in order to ensure certain that the median voter is the one who decides the outcome of the immigration proposal we assume that under direct-democracy regime, all the individuals in the host country of immigrants have single-peaked preferences. For a detail analysis of this approach, see Muller (1989).
exogenously determined. This means that a certain worker in either country already has obtained (at some point in the past) some specific skills that make her valuable to working only in a specific industry in the short run. As a result, labor is considered a non-inter-industry-transferable input factor in the short run, even though wages may differ between industries within a country. On the other hand, capital is considered inter-industry-transferable in the short run. The intuition for the above classification of capital in terms of its mobility can be justified by the fact that the technology continuously has made the adjustment of capital use from one industry to another faster over time. Moreover, the proper functioning of the financial systems has improved the ability of industries to expand and adapt new technology faster and faster over time. Consequently, it is not that unrealistic to assume that capital is perfectly mobile between industries within a country.

Let us start our analysis by assuming that in both countries there exist two types of workers: skilled and unskilled. Using the fact that labor is considered a non-intra-transferable input factor in the short run while capital is considered intra-transferable in the short run within a country, it is reasonable to add the obvious assumption that within each country the return on skilled labor is higher than the return on unskilled labor. Since, industry $X$ uses only skilled labor to produce the homogenous capital-intensive good ($X_i$) and industry $Y$ uses only unskilled labor to produce the homogeneous labor-intensive good ($Y_i$), then it is apparent that $w_{X_i} > w_{Y_i}$.

Following the work of Mayer (1974) and employing our production functions as outlined in section II.II, it can be shown that the wages and the rental rates for each country in the short run can be expressed in following equations.\footnote{The short run equilibrium for each country is described by the condition [shown in the first equality of (9)] $\frac{dx_i}{dX_i} = \frac{p}{w_{X_i}}$. This condition results from the fact that capital is assumed to be mobile between sectors in the short run, within a country, which implies that capital’s marginal product is the same in both industries (again, in the short run within a country). This is the reason, therefore, why the two last equalities of (9) both are equal to $r_i$. On the other hand, labor is assumed to be immobile in the short run within a country, which is a sufficient condition to have different wages in different sectors within a country. Hence, in the short run, in the labor market of each country we have the following: $\frac{dx_i}{dX_i} \neq \frac{p}{w_{X_i}}$. Therefore, in (8) $w_{X_i} \neq w_{Y_i}$. It is reasonable, then, to assume that the return of skilled labor is higher than the return of unskilled labor ($w_{X_i} > w_{Y_i}$).}
Therefore, if the labor supply in the host country increases as a result of immigration, then it is easy to show that \( \frac{dr_t}{dL_t} > 0 \) and \( \frac{dw_{i,t}}{dK_{i,t}} \leq 0 \). We will show that these inequalities are true by using the constant return to scale property (CRTS) of our production functions: \( \frac{d^2j_t}{dK_{i,t}^2} = -\frac{d^2j_t}{dK_{i,t}'^2} \).

At this point we need to add three more assumptions. 1) The immigrants do not bring any capital with them when they move to the host country, they only supply labor;\(^{29}\) 2) There are no illegal immigrants in the host country;\(^{30}\) 3) The skilled workers have the same productivity in both countries, the same is true for the unskilled workers. As a result, by using the CRTS property of our production functions, the fact that capital’s marginal product is the same in each industry within the host country of immigrants and the resource constraints, the following inequalities are true for the short run implications of an increase in the labor supply that results from immigration.\(^{31}\)

\(^{29}\)Also, the cases of possible accumulation of capital and the possibility of workers sending a portion of their capital earnings (savings) back to their families are excluded from the analysis in this chapter.

\(^{30}\)For simplicity purposes, this assumption is used to ensure the theory that if the immigration proposal passes, then the wages of immigrants in the host country will be equal to the wages of the natives.

\(^{31}\)
I can summarize the implications of the above inequalities as follows: by employing the assumption of capital mobility and labor immobility in the short run within a country, any labor mobility from one country to the other will lead to reallocation of capital between sectors within each country. However, labor in each sector within a country is a fixed factor; therefore, further differences emerge between the wages in the two sectors. These further wage differentials depend on the amount of skilled and unskilled workers (immigrants) who decide to move from one country to the other.\textsuperscript{32} In other words, inequalities (11) and (12) show that if more skilled than unskilled workers immigrate, then the wages of skilled workers will decrease more than the wages of unskilled workers \((\frac{dwy_{X_1}}{dL_{X_1}} < \frac{dwy_{Y_1}}{dL_{Y_1}} \text{ because } k_{X_1} < k_{Y_1})\). Analogously, if more unskilled than skilled workers immigrate, then the wages of unskilled workers will decrease more than the wages of skilled workers \((\frac{dwy_{Y_1}}{dL_{Y_1}} < \frac{dwy_{X_1}}{dL_{X_1}} \text{ because } k_{Y_1} < k_{X_1})\).

\textbf{II.IV. The case of two types of skills}

Since we established the short run reactions of returns of both labor and capital because of immigration, in this and the following section, I will continue our discussion on the evaluation of an immigration proposal in the host country of immigrants by focusing on the median voter approach. Individuals in the host country may approve the immigration proposal by looking only at its short run effect on their indirect felicity function. Now, the following inequalities: \(w_{Y_1} > w_{Y_2} \text{ and } w_{X_1} > w_{X_2}\) must always be true for immigration (from \(R_2\) to \(R_1\)) to exist. Since we are in the short run, it is safe to find ourselves in a situation where \(w_{f_1} > w_{f_2}\). This can be achieved by

\begin{align*}
\frac{dr_{11}}{dL_{11}} &= \xi > 0 \\
\frac{dwy_{X_1}}{dL_{X_1}} &= -\frac{\xi}{k_{X_1}} \leq 0 \\
\frac{dwy_{Y_1}}{dL_{Y_1}} &= -\frac{\xi}{k_{Y_1}} \leq 0
\end{align*}

\textsuperscript{32}In the long-run, in response to these further wage differentials, labor will flow between sectors, eventually tending to a new long-run equilibrium where all the wages are equal in both sectors for both countries.
developing a scenario where both countries have incomplete specialization on producing both homogeneous goods. As mentioned in the previous section, there exist two industries in each country, where industry $X$ uses only skilled labor to produce the homogenous capital-intensive good ($X_i$) and industry $Y$ uses only unskilled labor to produce the homogeneous labor-intensive good ($Y_i$). Then a shock happens in the potential host country of immigrants, which increases the wages in this country. I can describe such a shock as an improvement in technology that is used for production of both goods in the host country of immigrants. One also can use as a shock either the exogenous change of the (exogenous) prices of both goods or only the price of one of the goods, such that this would cause the wage of each worker in the potential host country to be higher than the wage of each worker in the origin country of immigrants. After the occurrence of the positive shock in the potential host country of immigrants, the two equations of (8) now are described by the following equations:

For $R_1$: \[
\begin{align*}
    & w_{X_1} = \gamma A_{X_1} k_{X_1}^{(1-\gamma)} \\
    & w_{Y_1} = \beta A_{Y_1} k_{Y_1}^{(1-\beta)}
\end{align*}
\]

and for $R_2$: \[
\begin{align*}
    & w_{X_2} = \gamma A_{X_2} k_{X_2}^{(1-\gamma)} \\
    & w_{Y_2} = \beta A_{Y_2} k_{Y_2}^{(1-\beta)}
\end{align*}
\]

where $A_{j_1} > A_{j_2} \Rightarrow w_{j_1} > w_{j_2}$, with sub index 1 representing the host country of immigrants and sub index 2 representing the origin country of immigrants. As a result, immigration looks attractive for an individual in the origin country of immigrants, no matter what her skill level is. Therefore, if the immigration proposal were introduced in the host country, then the median voter would have to consider the effects that the proposal would have on her income. If labor was homogeneous in both countries and there is a movement of labor from the origin to the host country of immigrants, then \[
\frac{dw_1}{dt} < 0 \text{ and } \frac{dr_1}{dt} > 0. \]

This can be achieved by combining the basic Heckscher-Ohlin assumptions, where both labor and capital are perfectly mobile within a country, with equation (3). Consequently, when labor is homogeneous within a country, an increase in the supply of labor in the host country because of immigration would have a negative effect on labor return and a positive effect on capital return. In this case, the positive effect on capital return again would be

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33By allowing labor to move from the origin to the host country of immigrants, we still will not have FPE in the short run. Only in the long run where labor becomes mobile (within a country) will FPE occur again in both countries.
represented by the same inequality (10). On the other hand, inequalities (11) and (12) would not have the respected $k_j$ parameter in their numerators. As a result, (11) and (12) would be exactly the same and can be written as one inequality, which would represent the negative effect on labor return. For further details on the political economy analysis of immigration where labor is homogeneous in both countries, see the first chapter of this dissertation. However, in this case, labor is not homogeneous, since we have skilled and unskilled workers within each country. Thus, it is crucial that the median voter is able to identify the type of skills that the immigrants have; otherwise she will be ambiguous when estimating the magnitude of the effect of her wage because of immigration (See inequalities 11 and 12). As a result, if a government can build a mechanism by which the median voter will be able to identify the type of skills that immigrants possess prior to immigrating to the host country, then the median voter would have all the necessary information to make an educated economic decision regarding the changes in her indirect utility function. This will determine the success or failure of the immigration proposal. One way for the government of the host country to achieve information regarding the skills of immigrants is to apply a point system to immigration. This is a system in effect in immigration policies of host countries such as Canada, Australia, and Ireland, to name a few. Thus, assuming that the median voter in the host country has accurate information regarding the type of skills that immigrants possess, then proposition II.1 is easily established as follows:

**Proposition II.1.** The immigration proposal more likely would get approved when the median voter(s) in the host country has (have) different (opposite) types of skills than those of the immigrants.

Proof:

In order to prove the above proposition, we are going to examine the immigration proposal in two separate cases and then compare them. In the first case all the immigrants are unskilled workers and the median voter is a skilled worker, while in the second case the median voter is an unskilled worker and again all the immigrants are unskilled workers.
Case a) Median voter is a skilled worker \((w_m = w_{X_1})\) and all immigrants are unskilled.

The immigration proposal will pass if \(\frac{I_m}{I_m} = \frac{(w_{X_1} + r_1 \theta_m)}{(w_{X_1} + r_1 \theta_m)} > 1\) (See page 6). Since all immigrants are unskilled workers, then \(dL_{X_1} = 0\). But from inequality (11), we know that

\[
\frac{d\xi}{dL_{X_1}} = \frac{-\xi}{k_{X_1}} \leq 0 \quad \text{or} \quad d\xi = \frac{-\xi}{k_{X_1}} \cdot 0 = 0.
\]

Since, \(d\xi = 0\),

then \(w_{x_1}^* = w_{x_1} \cdot \frac{(w_{x_1} + r_1 \theta_m)}{(w_{x_1} + r_1 \theta_m)} > 1 \Rightarrow (w_{x_1} + r_1 \theta_m) > (w_{x_1} + r_1 \theta_m) \Rightarrow (r_1^* - r_1) \theta_m > 0\).

In other words, in the case of opposite skills between median voter and immigrants, the immigration proposal will pass as long as:

\[(r_1^* - r_1) \theta_m > 0\]  \(\text{(a)}\)

Case b) Median voter is an unskilled worker \((w_m = w_{X_1})\) and all immigrants are unskilled workers. The immigration proposal will pass if \(\frac{I_m}{I_m} = \frac{(w_{Y_1} + r_1 \theta_m)}{(w_{Y_1} + r_1 \theta_m)} > 1\). Since all immigrants are unskilled, then \(dL_{Y_1} < 0\). From (12) we know that \(dY_1 = \frac{-\xi}{k_{Y_1}} \leq 0\). But, \(dL_{Y_1} < 0\)

\[
\Rightarrow \frac{d\xi}{dL_{Y_1}} = \frac{-\xi}{k_{Y_1}} < 0 \Rightarrow w_{Y_1}^* < w_{Y_1}.
\]

Therefore, \(\frac{I_m}{I_m} > 1 \Rightarrow (r_1^* - r_1) \theta_m - (w_{Y_1} - w_{Y_1}^*) > 0\).

In other words, in the case of opposite skills between median voter and immigrants, the immigration proposal will pass as long as:

\[(r_1^* - r_1) \theta_m - (w_{Y_1} - w_{Y_1}^*) > 0\]  \(\text{(b)}\)

Comparing (a) to (b) it is evident that the immigration proposal is more likely to pass in case (a) than in case (b). Putting it algebraically, the following inequality is true:

\[(r_1^* - r_1) \theta_m > (r_1^* - r_1) \theta_m - (w_{Y_1} - w_{Y_1}^*)\]

because \(w_{Y_1}^* < w_{Y_1}\) as explained in case 2) and \(r_1^* > r_1\) because \(\frac{dr_1}{dL} > 0\).

In an analogous way, we can demonstrate the situation where all the immigrants are skilled workers, and the median voter is an unskilled worker in the first case and a skilled worker in the second case. I can demonstrate the validity of proposition II.1 and its implications in figure II.1, where each point in the vertical axes represents different values of the ratio between the
income of the median voter after immigration and the income of the same median voter before immigration. As we know, the immigration proposal will pass in the host country of immigrants as long as \( \frac{I_n}{I_m} > 1 \).

Figure II.1. Two types of skills and the stock of capital owned by the median voter

Along the horizontal axis, each point represents the stock of capital owned by the median voter. Lines A and B show the relationship between the likelihood of the approval of the immigration proposal and the stock of capital owned by the median voter. More specifically, line A shows the latter relationship where all immigrants have skill levels opposite to those of the median voter. Putting it differently, line A is used to graphically demonstrate the inequality (a) of the above proof. Hence, in this case, \( \frac{I_n}{I_m} > 1 \) if \( (r_1^* - r_1)\theta_m > 0 \). Therefore, as long as \( \theta_m > \tilde{\theta}_{m_A} \), where \( \tilde{\theta}_{m_A} = 0 \) the immigration proposal will pass. In other words, the immigration proposal will
fail to pass only in the case that the entire income of the median voter comes from her wage. \( \hat{\theta}_{mA} \) denotes the cutoff level of the median voter’s capital stock, which makes her indifferent to the outcome of the immigration proposal in the case illustrated by the line A. Thus proposition II.1 is also telling us that if the median voter owns some positive amount of capital (independent of its magnitude) and all the immigrants have skill levels opposite to those of the median voter, then the immigration proposal will pass. Line B represents the same relationship as line A, but now all the immigrants belong to the same skill level as the median voter in the host country. Putting it differently, line B is used to graphically demonstrate the inequality (b) of the proof of proposition II.1, but in a more general form. Thus, line B shows the following inequality: \( \frac{r_m^*}{r_m} > 1 \) if \( \{(r_1^* - r_1)\theta_m - (w_m - w_m^*)\} > 0 \). Thus, as long as \( \theta_m > \hat{\theta}_{mB} \), where \( \hat{\theta}_{mB} = \frac{w_m - w_m^*}{r_1^* - r_1} \) the immigration proposal will pass. Analogously to the case a), in this case (illustrated by line B) \( \hat{\theta}_{mB} \) denotes the cutoff level of the median voter’s capital stock, which makes her indifferent to the outcome of the immigration proposal. One can easily observe from figure II.1 that \( \hat{\theta}_{mB} \) is further to the right of \( \hat{\theta}_{mA} \), which means that the immigration proposal is more likely to pass when all immigrants have skill levels opposite to those of the median voter (illustrated by line A), than when all immigrants have the same skills as the median voter (illustrated by line B). From figure II.1, one also can observe that in both cases, the further we move \( \theta_m \) (not \( \hat{\theta}_m \)) to the right of the horizontal axes, the more likely the immigration proposal will pass. Therefore, the more capital-rich the median voter is, the more liberal towards immigration the host country would be. Thus, figure II.1 shows, among other things, that immigrants generally are more welcome in countries where the median voter is a capital owner.

Referring back to line B, the approval of an immigration proposal is correlated positively with the slope of the line. From inequality (b), we know that the increase of the rate of return on capital from immigration \( (r_1^* - r_1) \) represents the slope of B, which is always positive since \( \frac{dr_1}{dl_1} > 0 \). Thus, the higher \( \frac{dr_1}{dl_1} \), the higher \( (r_1^* - r_1) \) would be, which is the slope of B. In figure
II.1, one can establish that the higher the slope of $B$, the lower the cutoff level of capital ownership of the median voter, which makes her indifferent to the outcome of the immigration proposal.

However, the most important implication of figure II.1 is the relationship between the decrease of the median voter’s wage due to immigration and the approval of the immigration proposal. This is represented by the intercept of either line with the vertical axes, within the interval between zero and one. Thus, line $A$ touches the vertical axes at the exact point where $\frac{t_m^*}{t_m} = 1$ because the wage of the median voter is not affected by immigration. Hence, when $w_m^* = w_m$, then $\frac{t_m^*}{t_m} = 1$ at the corresponding point where $\theta_m = 0$. This scenario would happen only in the case where all immigrants have skill levels opposite skill levels opposite to those of the median voter in the host country. On the other hand, if all immigrants (or at least one of them) have the same skill level as the median voter, then $\frac{t_m^*}{t_m} < 1$ at the point where $\theta_m = 0$. The reason for the latter is that in such cases $w_m^* \neq w_m$. In other words, the wage of the median voter will be affected by immigration. The magnitude of this effect depends on the number of immigrants who possess the same skill level as the median voter. The higher the decrease of the median voter’s wage because of immigration, the more stock of capital the median voter needs to own for the immigration proposal to pass. This is the reason why line $A$ is on the left of line $B$. Thus, the lower the wage decline that results from immigration, the higher the cutoff level of capital owned by the median voter would be. More specifically, in figure II.1, the higher the wage decline because of immigration, the lower the point, within the segment $[0,1]$, where line $B$ intercepts the vertical axes. As a result, the approval of the immigration proposal in the host country does not depend only on the capital ownership of the median voter but also on the magnitude of the wage decline of the median voter because of immigration. In the following section, I will show that the latter is related to the number of skill groups that exists in each country.

II.V. The case of numerous groups of skilled workers

Following the same approach as in section II.IV, we now are ready to take a further step into the real world and reconsider the immigration proposal by allowing a number of unskilled
workers that can be classified as one group of workers as well as many different groups of skilled workers to exist in our countries \((R_1\) and \(R_2\)). The assumption behind the existence of many skill groups within a country is related to the fact that, in real world, a certain worker is considered skilled only in her area of expertise. In other words, it seems realistic to consider skills as mutually exclusive for each individual in each country.\(^{34}\) Therefore, this section is a generalization of the short run specific factor model discussed in sections II.III and II.IV. Now within a country, however, there exist a number of industries where labor is considered immobile among industries and capital is considered perfectly mobile among industries. Therefore, here I am going to develop a temporarily immobile factor trade model with two small open economies, each with more than two sectors. The immigration proposal is introduced in the host country, where the median voter is the one who decides on the outcome of the proposal. As demonstrated in figure II.1, the median voter compares the positive return on her capital ownership to the negative return on her wage. The latter is related positively to the number of immigrants who belong to the same skill group as the median voter. Hence, a crucial factor on the liberalization of immigration restrictions in the host country is the number of immigrants who possess the same skills as the median voter, which in turn, as we will show in the following propositions, will depend on the number of the groups of skilled workers that exist in each country. Before we introduce any propositions in this section, I will make certain assumption that will prove helpful in analyzing all the subsequent propositions. Therefore, let us assume that the productivity of the workers who belong to same skill group is the same for the populations of both countries;\(^{35}\) in each skill group there is the same number of

\(^{34}\)For example, if a certain individual has an undergraduate degree in economics, then she is considered a skilled worker only in the field of economics. Therefore, if immigrants are only those individuals who have an undergraduate degree in economics, then in the short run, we will observe a decline only in the wages of individuals who have the same degree in the host country. In this case, the wages of biologists, or other groups of skilled workers in the host country, will not be affected by immigration. In the real world, we can find examples of individuals who possess more than one skill. For instance a physician can have an MBA degree and she can work either as a physician or as a high level administrator in a hospital. In analysis of this section, I exclude such cases to make the implications of assuming the short run immobility of labor clearer to the reader.

\(^{35}\)For simplicity purposes only, I exclude from the analysis all skilled workers who are specific to the origin (or the host) country. For example, an individual who has a degree in Greek law is considered a skilled worker in Greece but in the short term, she cannot be considered a skilled worker in USA because she must study American Law in order to be classified as a lawyer. On the other hand, a computer-programmer in Greece, with the same productivity as an American computer-programmer, is considered a skilled worker both, in Greece and in the USA.
workers in both countries; in both countries the majority of the population belongs to the skilled workers; and immigrants move proportionally according to the group of skill to which they belong. Looking at these assumptions, an observant reader should notice that the focal difference between the host and the origin country of immigrants is the number of groups of skilled workers that exist in each country. Independent of her skills, each individual of the origin country is a candidate to becoming an immigrant in the host country. Then I use random binomial probability to handle, because of immigration, the negative impact of the wage of the median voter in the host country. The reason I employ random binomial probability is that we want to find the probability of selecting the same group of skilled workers from the origin country as from the host country’s group of skilled workers to which the median voter belongs. The higher such a probability is, the higher the number of immigrants who belong to the same group of skilled workers as the median voter, and therefore, the higher the negative impact on the wage of the median voter. Consequently, the possibility of the immigration proposal passing would be lower. Thus, the median voter in the host country, in order to measure the magnitude of the negative impact of her wage because of immigration, considers an experiment that has two possible outcomes, “immigrants belong to the same skill group as the median voter”, or “immigrants do not belong to the same skill group as the median voter”. Then the random binomial probability of selecting immigrants who belong in the same group of skill with the median voter in the host country is:

\[
P(x) = \frac{\lambda!}{\left(\frac{L_2}{xN_2}\right)! \left[\lambda - \left(\frac{L_2}{xN_2}\right)\right]^x} \left(\frac{n_3L_2}{N_2}\right)^{L_2} \left(1 - \frac{n_3L_2}{L_1L_2}\right)^{\lambda - \left(\frac{L_2}{xN_2}\right)}
\]

(13)

where, \(L_i\) represents the whole population in each country; \(\lambda\) stands for the portion of immigrants who move from \(L_2\) to \(L_i\); \(x\) symbolizes the binomial random variable;

\[
n_i = \frac{L_i}{\text{# of workers in one skill group in the host country}}.
\]

\(^{36}\)At the first, this assumption might seem unrealistic, especially for the origin country. However, a number of host countries of immigrants apply a point system to the immigration process, in which they tend to award more points to skilled immigrants. In other words, most host countries accept only skilled immigrants.
Thus, if we denote the number of skill groups in each country as \( \tau_i \), then the following equality stands for each country: \( 1 \cdot u_i + \tau_i \cdot n_i = L_i \). Put differently, \( \frac{1}{n_i \tau_i} \) denotes a particular group of skilled workers, while \( \frac{1}{u_i} \) represents the only group of unskilled workers within each country.

In equation (13), \( P(x) =1 \) indicates that all the immigrants belong to the same group of skilled workers as the median voter; this implies the larger possible negative impact that immigration could cause to the median voter’s wage in the host country in the short run. On the other hand, \( P(x) =0 \) indicates that none of the immigrants belong to the same group of skilled workers as the median voter in the host country; this implies a null effect on the median voter’s wage in the host country that results from immigration in the short run. As result, if the median voter of a certain host country is considering choosing among immigrants coming from different origin countries, she is more likely to accept immigrants that come from an origin country with a greater number of groups of skilled workers. This country might not necessarily be the origin country with the larger volume of skilled workers. Therefore, Proposition II.2 can be formulated as follows:

**Proposition II.2.** The greater number of groups of skilled workers in the origin country of immigrants, the more likely the approval of the immigration proposal in the host country of immigrants.

Proof:

If \( \tau_2 \rightarrow +\infty \Rightarrow n_2 \rightarrow 0 \) in order to keep \( L_2 \) fixed, because \( L_2 = u_2 + \tau_2 n_2 \) and \( m_2 \) is constant. If \( n_2 \rightarrow 0 \Rightarrow \left( \frac{L_2}{n_2} \right)^{\lambda!} = \frac{\lambda!}{L_2^{\lambda} n_2^{\lambda-\lambda}} \rightarrow \frac{\lambda!}{L_2^{\lambda} n_2^{\lambda-\lambda}} \) which is a constant; if \( n_2 \rightarrow 0 \Rightarrow \left( \frac{L_2}{n_2} \right)^{\lambda!} \rightarrow 0; \) if \( n_2 \rightarrow 0 \Rightarrow \left( 1 - \frac{n_1 n_2}{L_1 L_2} \right)^{\lambda - \frac{L_2}{n_2}} \rightarrow 1. \) Hence, the following limit is true.

\[
\lim_{\tau_2 \rightarrow +\infty} \left\{ \frac{\lambda!}{\left( \frac{L_2}{n_2} \right)^{\lambda!} \left[ \lambda - \left( \frac{L_2}{n_2} \right) \right]} \left( \frac{n_1 n_2}{L_1 L_2} \right)^{\lambda - \frac{L_2}{n_2}} \left( 1 - \frac{n_1 n_2}{L_1 L_2} \right)^{\lambda - \frac{L_2}{n_2}} \right\} = 0. \]
The above proposition might be used to explain theoretically an economic reason as to why the median voter of the same host country behaves differently on immigrants coming from different poor countries, by simply focusing on the skill level of immigrants. In other words, the above proposition provides a theoretical political-economic justification for the different immigration restrictions that a particular host country applies towards different origin countries. For example, in the same host country, we would expect to see more liberal immigration policies towards immigrants coming from India where there might be numerous groups of skill workers per population, than there from Ghana where there might few groups of skill workers per population.

Using the random binomial probability of equation (13), if we keep fixed the number of groups of skilled workers of the origin country fixed, then the host country that obtains the greater number of groups of skilled workers would be more liberal towards immigrants arriving from the same origin country than some other potential host countries of immigrants. This particular host country might not necessarily be the host country that has the greater volume of skilled workers, and/or the host country that has the richer median voter among other potential host countries. As a result, Proposition II.3 can be easily established.

**Proposition II.3.**

The greater the number of groups of skilled workers in the host country of immigrants, the more likely the approval of the immigration proposal in the same host country.

Proof:

If $\tau_1 \to +\infty \Rightarrow n_1 \to 0$ in order to keep $L_1$ fixed, because $L_1 = u_1 + \tau_1 n_1$ and $u_1$ is constant.

If $n_1 \to 0 \Rightarrow \frac{\lambda!}{(\frac{L_1}{X_n})!} \left(1 - \frac{L_2}{X_n}\right)^{n_1 n_2} \Rightarrow n_1 \to 0 \Rightarrow \left(1 - \frac{n_1 n_2}{L_1 L_2}\right)^{\left(\frac{L_2}{X_n}\right)^n} \Rightarrow n_1 \to 0 \Rightarrow \frac{\lambda!}{(\frac{L_1}{X_n})!} \left(1 - \frac{L_2}{X_n}\right)^{n_1 n_2} \Rightarrow n_1 \to 0 \Rightarrow \lim_{n_1 \to +\infty} \left(1 - \frac{n_1 n_2}{L_1 L_2}\right)^{\left(\frac{L_2}{X_n}\right)^n} = 0.$
Proposition II.3 could be used to explain theoretically a political economic reason as to why the median voter in different host countries where she owns the exact amount of capital, does not have the same behavior towards immigrants who move in from the same origin country. Thus, according to the above proposition, different host countries that have similar stock and distribution of capital, apply different immigration laws to immigrants coming from the same origin country. For example, Ireland’s capital stock and its distribution are similar to those of Austria, but assuming that Ireland obtains a greater number of groups of skilled workers as compared to Austria, then Ireland would be more open to immigrants arriving from the same origin country than Austria. In terms of Table I (see Appendix II), the proxy for Ireland’s median voter’s level of capital is €8253, while the proxy for Austria’s median voter’s level of capital is €8654. However, the percentage of immigrants per population in Ireland is higher than the percentage of immigrants per population in Austria (1.73% > 1.28%). This indicates that Ireland is more open to immigration than Austria even though the median voter owns roughly the same level of capital in both countries \(8253 \approx 8654\).

In the same way, one can compare Belgium to Finland. Belgium’s capital stock and its distribution are similar to those of Finland. Thus, if Belgium produces more types of goods than Finland, and assuming that each type of goods requires the services of at least one group of skilled workers, it is obvious that Belgium obtains a greater number of groups of skilled workers as compared to Finland. According to the above proposition, therefore, Belgium would be more open to immigration than Finland. In terms of Table I (see Appendix II), the proxy for Belgium’s median voter’s level of capital is €23169, while the proxy for Finland’s median voter’s level of capital is €23249. However, the percentage of immigrants per population in Belgium is higher than the percentage of immigrants per population in Finland (0.85% > 0.40%). This shows that Belgium is more open to immigration than Finland even though the median voter owns roughly the same level of capital in both countries \(23169 \approx 23249\). I can combine propositions II.2 and II.3 and set up a more general proposition.
Proposition II.4. The greater the number of groups of skilled workers in both countries (origin and host countries of immigrants), the more likely the approval of the immigration proposal in the host country.

Proof:

Since, we showed in the proof of proposition II.2 that the \( \lim_{\tau_2 \to +\infty} P(x) = 0 \), and in the proof of proposition II.3 that the \( \lim_{\tau_1 \to +\infty} P(x) = 0 \), then the following limit also is true:

\[
\lim_{\tau_1, \tau_2 \to +\infty} \left\{ \frac{\lambda!}{\left( \frac{L_2}{\lambda n_2} \right)! \left[ \lambda - \left( \frac{L_2}{\lambda n_2} \right) \right]!} \frac{n_1 n_2}{L_1 L_2} \left( 1 - \frac{n_1 n_2}{L_1 L_2} \right)^{\left( \frac{L_2}{\lambda n_2} \right)} \right\} = 0.
\]

Therefore, Proposition II.4 is telling us that the liberalization of immigration restrictions in a host country depends not only on the number of groups of skilled workers in the same host country, but also on the number of groups of skilled workers on the origin country.

Looking at the random binomial probability in equation (13), if we keep fixed the number of groups of skilled workers of the host country and the origin country, then the larger the population of the host country compared to the origin country, the lower the binomial probability that the median voter in the host county will belong to the same group of skilled workers as the immigrants. Consequently, proposition II.5 follows:

Proposition II.5. The higher (lower) the population of the host country (origin country) relative to the origin country (host country) of immigrants, the more liberal the host country would be towards immigrants arriving from the origin country.

Proof:

\[
\{ \text{If } L_1 \to +\infty \implies \left( \frac{n_1 n_2}{L_1 L_2} \right)^{\frac{L_2}{\lambda n_2}} \to 0; \text{ if } L_1 \to +\infty \implies \left( 1 - \frac{n_1 n_2}{L_1 L_2} \right)^{\left( \frac{L_2}{\lambda n_2} \right)} \to 1; \}. \quad \text{Thus, the following limit is true.}
\]

\[
\lim_{L_1 \to +\infty} \left\{ \frac{\lambda!}{\left( \frac{L_2}{\lambda n_2} \right)! \left[ \lambda - \left( \frac{L_2}{\lambda n_2} \right) \right]!} \frac{n_1 n_2}{L_1 L_2} \left( 1 - \frac{n_1 n_2}{L_1 L_2} \right)^{\left( \frac{L_2}{\lambda n_2} \right)} \right\} = 0.
\]
\{ \text{If } L_2 \rightarrow 0 \Rightarrow \left( \frac{L_2}{\lambda x n_2} \right) \left( 1 - \left( \frac{L_2}{\lambda x n_2} \right) \right) \rightarrow 1 ; \text{ if } L_2 \rightarrow 0 = \left( \frac{n_1 n_2}{L_1 L_2} \right) \left( \frac{L_2}{\lambda x n_2} \right) \left( 1 - \left( \frac{n_1 n_2}{L_1 L_2} \right) \right) \left( \frac{L_2}{\lambda x n_2} \right) \rightarrow 1 \}. \\

Thus, limit approaches 0, or: \( \lim_{L_2 \to 0} \left( \frac{L_2}{\lambda x n_2} \right) \left( 1 - \left( \frac{L_2}{\lambda x n_2} \right) \right) \left( \frac{n_1 n_2}{L_1 L_2} \right) \left( \frac{L_2}{\lambda x n_2} \right) \left( 1 - \left( \frac{n_1 n_2}{L_1 L_2} \right) \right) \left( \frac{L_2}{\lambda x n_2} \right) = 0 \). 

Focusing on the random binomial probability of equation (13), if we keep fixed the population of the host country and the origin country, then the higher the size of each group of skilled workers in the host country relative to the size of each skilled group in the origin country of immigrants, the lower the binomial probability that the median voter in the host country will belong to the same group of skilled workers as the immigrants. This situation can be described in proposition II.6.

**Proposition II.6.** The higher (lower) the number of workers who belong to each skill group in the origin country (host country) compared to the number of workers that belong to each skill group in the host country (origin country) of immigrants, the lower the probability that the immigration proposal will pass.

Proof:

Using the same arguments as in the proof of proposition II.2, then:

\[
\lim_{n_2 \to +\infty} \left\{ \frac{\lambda !}{L_2 x n_2 ! \left( \lambda - \left( \frac{L_2}{\lambda x n_2} \right) \right) !} \left( \frac{n_1 n_2}{L_1 L_2} \right) \left( \frac{L_2}{\lambda x n_2} \right) \left( 1 - \left( \frac{n_1 n_2}{L_1 L_2} \right) \right) \left( \frac{L_2}{\lambda x n_2} \right) \right\} = 1.
\]

\[
\lim_{n_1 \to 0} \left\{ \frac{\lambda !}{L_2 x n_2 ! \left( \lambda - \left( \frac{L_2}{\lambda x n_2} \right) \right) !} \left( \frac{n_1 n_2}{L_1 L_2} \right) \left( \frac{L_2}{\lambda x n_2} \right) \left( 1 - \left( \frac{n_1 n_2}{L_1 L_2} \right) \right) \left( \frac{L_2}{\lambda x n_2} \right) \right\} = 0. 
\]

Propositions II.5 and II.6 can be expressed as a single proposition if we assume that the size of the group of unskilled workers is the same as the size of each group of skilled workers within a country. However, if the size of the group of unskilled workers is different from the size of each group of skilled workers within each country, but the size of the group of unskilled
workers is smaller than the product of the number of the groups of skilled workers and the size of each group of skilled workers, then propositions II.5 and II.6 are different from each other, at least within the host country.

By focusing strictly in their relative size of population, and/or the relative size of each group of skilled and unskilled workers, both proposition II.5 and II.6 can be used to explain theoretically the change of different immigration laws in the host country towards individuals who attempt to legally emigrate from different origin countries. For example, during the early to mid 1990-s, a significant number of Russian physicians immigrated to Israel after the collapse of the Soviet Union. The Israeli government, not only increased its immigration restrictions against Russian physicians, but also changed the requirements for Russian physicians to work in that profession in Israel. After the change of the law, the degree obtained during Soviet times by the Russian (physicians) immigrants was thereafter insufficient to work as a physician in Israel. In other words, now they have to pass stricter native language tests as well as other additional tests in order to obtain a certificate enabling them to work in their profession in Israel. For more details, see Kugler and Sauer (2005).

II.VI. The liberalization of labor and the types of goods

Since we have established the relationship between the groups of skilled workers and the liberalization of immigration restrictions by using the binomial probability properties, I now can concentrate my efforts on examining the relationship between the number of types of goods that each country is producing and the liberalization of the immigration restrictions in the host country. In this section, I assume that one specific skill is required to produce one good in a perfectly competitive environment. Before I analyze the median voter approach in the case of multi-sector, I will reexamine the general short run equilibrium in the same two small open economies by emphasizing the reaction of wages and rental rates of capital. The key assumption that capital is perfectly mobile but labor is immobile among sectors in short run, within a country still is valid. Thus, equations (8) and (9) can be written as follows.
\[
\left\{ \begin{array}{l}
p_j \frac{dj_j}{dL_{j_1}} = w_{j_1} = \gamma_j A_{j_1} k_{j_1}^{(1-\gamma_j)} \\
\frac{dY_i}{dL_{Y_1}} = w_{Y_1} = \beta A_{Y_1} k_{Y_1}^{(1-\beta)} 
\end{array} \right.
\]  
(14)

\[
\left\{ \begin{array}{l}
\frac{dY_i}{dK_{X_1}} = p_j \frac{dj_j}{dK_{j_1}} \\
p_j \frac{dj_j}{dK_{j_1}} = r_{j_1} = (1-\gamma_j) A_{j_1} \left( \frac{1}{k_{j_1}} \right)^{\gamma_j} = r_i \\
\frac{dY_i}{dK_{Y_1}} = r_{Y_1} = (1-\beta) A_{Y_1} \left( \frac{1}{k_{Y_1}} \right)^{\beta} = r_i 
\end{array} \right.
\]  
(15)

where now, \( j = (1X, 2X, \ldots, \mu X) \) and \( \mu \to \infty \) and \( Y \) again is the labor-intensive numeraire good.

In this case, CRTS properties are the same with those of section II.IV, but with some notation adjustments. Thus, CRTS can be described by:

\[
\frac{d^2 j_i}{dK_{j_1} L_{j_1}} = -\frac{d^2 j_i}{dK_{j_1}^2} \cdot \frac{1}{k_{j_1}} \quad \text{and} \quad \frac{d^2 Y_i}{dK_{Y_1} L_{Y_1}} = -\frac{d^2 Y_i}{dK_{Y_1}^2} \cdot \frac{1}{k_{Y_1}}
\]

Analogous to the case of two-industries, in this multi-industries case within a country, if the labor supply in the host country increases as a result of immigration, I can show that \( \frac{dr_i}{dL_{1_1}} > 0 \), \( \frac{dw_{j_1}}{dL_{j_1}} \leq 0 \) and \( \frac{dw_{Y_1}}{dL_{Y_1}} \leq 0 \). In other words, using the CRTS property, the fact that capital’s marginal product is the same in each industry within the host country of immigrants and the resource constraints the following inequalities are true for the short run implications of an increase in the labor supply that results from immigration.\(^{37}\)

\[
\frac{dr_i}{dL_{1_1}} = \xi^* > 0
\]  
(16)

\(^{37}\)Following the same intuition as in section II.III, labor eventually becomes mobile, at least theoretically, among all the sectors in the long run and we end up with the following adjustment of wages: \( w_{j_1} = w_{Y_1} \). In other words, in the long run we end up in the general basic Heckscher-Ohlin world with more than two goods and more than two sectors.

\[
\xi^* = \left[ \frac{\beta (1-\beta) A_{Y_1} L_{j_1}^\beta K_{Y_1}^{-(1+\beta)}}{1 + \beta (1-\beta) A_{Y_1} L_{j_1}^\beta K_{Y_1}^{-(1+\beta)}} + \prod_{j=1}^X \frac{1}{\beta} \frac{1}{\gamma_j} \frac{1}{1-\gamma_j} \right] > 0
\]
Now, we are ready to introduce the median voter approach in our temporarily immobile factor trade model with two small open economies that each have $\mu$ sectors (where $\mu > 2$). Thus, there exist multi-industries in each country, where each industry $X_i$ uses only specific skilled labor (in the short run) to produce the capital-intensive good ($X_i$), and industry $Y$ uses only unskilled labor to produce the labor-intensive numeraire good ($Y_i$). This is a replication of the scenario developed in section II.IV, where a technological shock occurs in the potential host country of immigrants, causing an increase in the price of labor in this country (hence, $w_{j_1} > w_{j_2}$ and $w_{Y_1} > w_{Y_2}$). Consequently, immigration looks attractive for an individual in the origin country, independent of her skill level. Thus, if the immigration proposal is introduced in the host country, then as in the two skills case, the median voter would have to consider the effects that the proposal would cause on her income, or the effects on her wage and rental rate of capital. We know from proposition II.4 that the greater the numbers of groups of skilled workers each country has, the more liberal the host country would be toward immigration. Since in the short run each industry uses specific labor in order to produce each type of good, it is reasonable then to establish proposition II.7 as follows.

**Proposition II.7.** The more types of goods each country produces (origin and/or host country of immigrants), the more likely the approval of the immigration proposal in the host country.

**Proof:**

In each country, $L_i = L_{\gamma_1} + L_{X_1} + L_{X_2} + \cdots + L_{X_{\mu}}$. We know from inequalities (17) and
(18), that \( \frac{d\mu_i x_1}{d\mu_i} \leq 0 \) and \( \frac{d\mu_i y_1}{d\mu_i} \leq 0 \). Hence, when \( \mu, \mu^* \to +\infty \), \( \frac{dw_m}{d\mu_i} \to 0 \), from proposition II.4, and the assumption that for production of each good are required a specific skill, where \( \mu, \mu^* \) denote the number of goods produced in host and origin country respectively.

We know that the immigration proposal will pass if:

\[
\frac{V_m^*}{V_m} = \frac{I_m^*}{I_m} = \frac{(w_m^* + r_1^* \theta_m)}{(w_m + r_1 \theta_m)} > 1, \text{ or } (r_1^* - r_1) \theta_m > (w_m - w_m^*)
\]

From (16) \( \frac{dn_1}{dx_1} = \xi^* > 0 \) \( \Rightarrow (r_1^* - r_1) > 0 \). Then, if \( \theta_m > 0 \) \( \Rightarrow (r_1^* - r_1) \theta_m > 0 \)

when \( \mu, \mu^* \to +\infty \), \( \frac{dw_m}{d\mu_i} \to 0 \) \( \Rightarrow (w_m - w_m^*) \to 0 \) \( \Rightarrow \frac{i_m^*}{I_m} > 1 \). ■

![Figure II.2. Numerous types of goods and the stock of capital owned by the median voter](image)

I can demonstrate the validity of Proposition II.7 and its implication by the use of figure II.2. In the graph represented by figure II.2, as in figure II.1, each point in the vertical axes indicates different values of the ratio between the income of the median voter after \( I_m^* \) and before
(I_m) immigration. The immigration proposal will be approved in the host country as long as $\frac{I_m}{I_m} > 1$. In the horizontal axes, each point indicates the stock of capital owned by the median voter. With $\tilde{\theta}_m$ I denote the cutoff level of the median voter’s capital stock that makes her indifferent to the outcome of the immigration proposal. Line $CC’$ represents the following inequality: $(r^* - r)\theta_m - (w_{m_c} - w_{m_c}^*) > 0$, where $\forall \theta_m > \tilde{\theta}_{mc} \Rightarrow \frac{I_m}{I_m} > 1$.

Line $DD’$ illustrate the inequality: $(r^* - r)\theta_m - (w_{m_p} - w_{m_p}^*) > 0$, $\forall \theta_m > \tilde{\theta}_{mp}$. Thus, $\frac{I_m}{I_m} > 1. \tilde{\theta}_{mp} > \tilde{\theta}_{mc}$ because $(w_{m_p} - w_{m_p}^*) > (w_{m_c} - w_{m_c}^*)$. Line $DD’$ intentionally lies to the right of line $CC’$ in order to show that fewer types of goods each country (host and/or origin) is producing, the less likely the possibility that the immigration proposal would be accepted in the host country. This can be observed from the fact that $\tilde{\theta}_{mp}$ is to the right of $\tilde{\theta}_{mc}$.

Figure II.2 also can be used to demonstrate the approval of an immigration proposal in two different host countries. For simplicity, let all immigrants be from the same country of origin. Line $CC’$ now demonstrates the approval (or failure) of an immigration proposal in the host country that produces numerous types of goods in a perfectly competitive environment. Line $DD’$ represents the approval (or failure) of the immigration proposal in the host country that produces only a few types of goods in a perfectly competitive environment. The higher the difference between the types of goods that each country is producing $(\mu_c - \mu_p)$, the higher the difference in the wage differentials of the median voters because of immigration between the host countries $\{(w_{mp} - w_{mp}^*) - (w_{mc} - w_{mc}^*)\}$ would be. This is represented by the distance between C and D in the vertical axes. The latter implies a higher difference between the cutoff levels of capital ownership of median voters in the host countries, which is shown by the distance between $\tilde{\theta}_{mp}$ and $\tilde{\theta}_{mc}$.

One can use figure II.2 to illustrate that the host country that produces numerous types of goods could be more open to immigration than another host country that produces only a few types of goods, even though the median voter in the latter host country owns more capital. Let us call the
first host country the Netherlands and the second host country Finland. Line $CC'$ now represents the approval (failure) of an immigration proposal in the Netherlands, while line $DD'$ now demonstrates the approval (failure) of an immigration proposal in Finland. Let us assume that the level of capital of the median voter in the Netherlands is equal to $\theta_{m_1}$, and in Finland it is equal to $\theta_{m_2}$. Clearly, $\theta_{m_2} > \theta_{m_1}$ but $\theta_{m_1} > \bar{\theta}_{m_c}$ while $\theta_{m_2} > \bar{\theta}_{m_D}$. Consequently, it is possible that the Netherlands would approve the immigration proposal, while the more capital rich Finland would not approve that same proposal. In Table I in the Appendix II, the proxy for the Netherlands’ level of capital of the median voter is 8801 euro, while the proxy for Finland’s level of capital of the median voter is 23249 euro. However, the percentage of immigrants per population in the Netherlands is higher than the percentage of immigrants per population in Finland (1.01% > 0.40%), which indicates that the Netherlands is more open to immigration than Finland, even though the latter has a more capital rich median voter. In a similar way one can use figure II.2 to demonstrate the validities and implications of propositions II.2, II.3, and II.4.

II.VII. Conclusions

In this chapter, the political economy of immigration, where the median voter cares only about the short run effect of immigration on her returns of labor and capital ownership, is studied. By employing a short run specific factor model, where labor is assumed to be immobile while capital is perfectly mobile in the short run within a country, and blending it with the median voter framework developed by Mayer (1984), it is shown that the liberalization of certain immigration restrictions in the host country depends on the host country’s stock and distribution of capital, the number of the groups of skilled workers within each country (host and origin country of immigrants), and the number of the types of goods produced in both countries.

More specifically, considering labor temporarily immobile and capital mobile within a country (instead of considering capital as immobile and labor mobile within a country, in the short run like the Mayer (1974) model), I have shown that there is a polarization of the voting attitude between workers and capital owners on the immigration proposal, and that there are different voting attitudes on the same immigration proposal between skilled and unskilled workers.
However, by expanding the short run specific factor trade model with two small open economies that each have two sectors to a temporarily immobile factor trade model with two small open economies that each have more than two sectors, I was able to demonstrate theoretically the most intriguing results of this chapter. These can be summarized as follows. The greater the number of groups of skilled workers per population in each country (host and/or origin country of immigrants), the more liberal the host country would be toward immigration. In other words, the more diversely skilled the population of each country is, the higher the probability that the immigration proposal will pass in the host country. The more types of goods each country produces in a perfectly competitive environment (the host and/or the origin country of immigrants), the higher the probability that the immigration proposal will pass in the host country. Put another way, I have shown that the less specialized the rich and/or the poor countries are, the more liberal towards immigration is the host country of immigrants.

Using the above results, I have provided some theoretical reasoning on why some host countries apply more liberal immigration policies compared to other host countries, even though their stock and distribution of capital are similar. Also, using these same results, I was able to explain theoretically why the median voter of the same host country behaves differently about immigrants who attempt to move in from different origin countries. Extensions of the model described in this chapter could be introduced in two possible directions: i) a theoretical one and ii) an empirical one.

i) On theoretical grounds, we know from the pure theory of international trade that labor eventually would become mobile and that the international wages of our (two) countries will be equalized or at least a tendency toward equalization would exist.\footnote{See Harbeler (1936), Rybczynski (1955), Kemp (1969), Mayer (1974), and Jones (1975), to name a few.} Therefore, in the long run FPE theorem still is valid. The intuition about this adjustment of labor, from immobile in the short run to perfectly mobile in the long run, can be described briefly. In the long run, within a country, we would expect to see a movement of labor from the low-wage industry to the high-wage industry because some unskilled workers would attempt and succeed in obtaining the necessary skills to
make enable them to work in the high wage industry. On the other hand, there would be a point where the owners of the firms that produce the low wage good (Y) would find it profitable to raise the wages of the workers employed in the low wage industry in order to prevent them from moving to the high wage industry. Otherwise, they would have to go out of business and no good Y would be produced; in that case we lose the assumption regarding incomplete specialization. This situation could continue until the wages in both industries would theoretically adjust (w_{ki} = w_{yi}).

In terms of extending this framework, how this adjustment from short run to long-run is made can be discussed by introducing a dynamic trade model where we can make some allowance for skill accumulation. A worker can improve her ability by investing in education. Then using this dynamic trade model, one might be able to explain the wage inequality that exists in the labor abundant (low income) countries compared to the capital abundant (high income) countries. Also, using this dynamic trade model one might be able to provide the (true) economic reason of the existence of illegal immigration by looking at the differences of the relatively low-wage jobs (jobs that do not require much skill) between a poor and a host country.

ii) Empirically, one might be able to test the results of the model developed in this chapter. The first step would be to collect data on portfolio of the types of traded goods that different host countries (and/or different origin countries of immigrants), with similar level of distribution and stock of capital, produce in a perfectly competitive environment. Using this dataset, one could test empirically proposition II.7 in this chapter. After controlling for certain variables such as population, the number of the types of non-tradable goods, to name a few, one might use the market size of each country to proxy for the portfolio of the types of goods that are produced in each country.