International Integration with Heterogeneous Immigration Policies

Nicola D. Coniglio [(1)] and Kenji Kondoh [(2)]

[(1)] University of Bari "Aldo Moro" - Italy and NHH Norwegian School of Economics - Norway (email address: Nicola.Coniglio@nhh.no)
[(2)] Chuckyo University, Nagoya – Japan (email address: kkondo@mecl.chuckyo-u.ac.jp)

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Abstract

This paper investigates the welfare effects of uncoordinated changes in (heterogeneous) immigration policies adopted by economically integrated Sovereign States. We build a simple three country model where two developed countries with different immigration policies receive immigrants from the third developing country. We show the existence of cross-country policy externalities. In particular, we show that a more skill-selective immigration policy of one developed country might negatively affect welfare in an alternative migration destination which applies an immigration quota. In addition we consider the effects of free mobility of native workers between the two developed countries. We show that under certain conditions, labour market integration might lead to both win-win or lose-lose situations depending on the sign of the wage gap between the two developed countries. In addition, we shed light on the possibility of a "boomerang effect" of stricter immigration policy since a more skill selective immigration policy under certain conditions might translates into overall larger inflows of (irregular) immigrants.

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1. Introduction

Migration flows are a powerful source of economic and social change in both destination and origin countries. The regulation of the inflows of migrants is a very sensitive policy area where national sovereignty leaves very little scope for multilateral coordination and harmonization of immigration policies. Also, the European Union process of convergence with respect to immigration policies is merely confined to the establishment of uniform rules on very specific issues (e.g. asylum seekers regulations[1]) or to the definition of broad principles.

Autonomous immigration policies within an interdependent economic area might represent a source of concern if they generate distortions and cross-border policy externalities. Within the EU, the need to set common rules has long been acknowledged. In fact, at the Tampere European Council in October 1999 policy objectives and main components of a common immigration policy were defined. After almost a decade, in October 2008, a European Pact on Immigration and Asylum was adopted. However, member countries still retain a very high degree of freedom in defining their immigration policies. Cooperation in the area of immigration policy is limited or absent in other regional integration agreements around the world. The only common ground for national immigration policies, within the EU and in general for most OECD countries, is a generalized trend of restrictiveness which aims at limiting the number of immigrants from third countries.

National policies in migrant receiving countries greatly differ in many respects such as the numbers and types of visa granted and criteria for obtaining them. Besides countries differs in their degree of enforcement of internal and external borders. For example, within the EU some countries have recently introduced a point-based system aimed at selecting the "quality" of migrants at entry (the UK since October 2008; Denmark since July 2008; the Netherlands since January 2009 and Austria point-based system is effective from July 2011[2]). Other countries have introduced rules which simplify labour migration of highly skilled individuals like students in Germany or executives and management professionals in Belgium. Indeed, in some countries a minimum requirement on language abilities is often imposed with the aim of selecting those immigrants which have a higher probability of becoming fully economically and socially integrated.[3]

A quota system for labour migrants is the main gate to immigration in countries like Italy, Spain, Greece, Portugal and France.[4] On the contrary, the Swedish system is entirely demand driven (since the end of 2008); the size of inflows reflects the needs of the labour market and related skill requirements are defined only by employers. Receiving countries substantially differ also with respect to the degree of irregularity of migration flows; the phenomenon is in fact quite large in

[1] The recent large increase in migration flows from the North African coast toward Italy as a consequence of the wave of political unrest in the sending area shows the difficulties within the European Union in enforcing common rules and coordination in the management of external borders.

[2] The Austrian point base system has replaced the former immigration quota system and is effective from 2011. These policies are aimed at attracting highly skilled individuals and employees in shortage occupations.

[3] In Austria for instance, the National Integration Plan introduced in 2009 established that a basic knowledge of German language prior to arrival is required for low-educated family migrants. A similar regulation was adopted by France in 2008: as a condition for family reunification a French language and culture test has to be passed while applicants are still residing in the country of origin. In other cases, the "language test" is required in order to obtain long term residence permit (like in Italy and Denmark). The UK Government has recently passed a new regulation which imposes an English language test also for partners of migrants. In point-based systems, language abilities are either compulsory (UK, Australia, New Zealand) or are given a large weight in the assessment process (Denmark, Netherland, Canada).

[4] Numerical limits to immigration, equivalent to explicit quotas, might be imposed also indirectly by modifying acceptance procedures.

some countries such as the US, Italy, Greece, France and Spain while relatively limited in other EU countries or in relatively more pro-immigration countries like Canada, Australia and New Zealand. The policy differences outlined above demonstrate that sovereignty over immigration policies has not changed substantially notwithstanding the deeper economic integration between EU countries and, in general, between the club of rich countries.

In this paper we employ a simple three-country model which allows us to investigate the effects of autonomous change in immigration regulations by two large countries within a federation (or common economic area) who receive migrants from a large developing country. We consider the case of heterogeneous policies where one of the two destination countries adopts a selective immigration policy in the form of minimum skills requirements for legal entry with an imperfect border enforcement which leads to illegal migration while the other destination country adopts an endogenous quota system.

Our results show that a more restrictive immigration policy in one country, such as an increase of the skills level required for legal entry, may lead to negative policy spillovers and decrease the welfare in the other developed country. On the contrary, a more restrictive policy towards illegal migrants, in the sense of higher penalty cost imposed on apprehended clandestine immigrants, leads to positive welfare effects in the other destination country within the federation. We shed light on the possibility of a "*boomerang effect*" of stricter immigration policy since a more skill selective immigration policy under certain condition might translates into overall larger inflows of (irregular) immigrants. In addition, we show that economic integration between the two destination countries in the form of free mobility of native workers, like in the EU, might lead to interesting welfare effects: when internal migration flows are toward the country which is affected by the (sub-optimal) phenomena of illegal migration, under certain conditions, free mobility of natives might lead to a win-win situation where both countries within the federation gains. Alternatively, mobility of natives out of the country where illegal migration is a relatively strong phenomena might reinforce the sub-optimal allocation of labour and lead to a lose-lose situation.

This paper is related to Djajic (1989) which studies in a two-country setting the effect of alternative immigration policies employed by a labour-importing country. As in our framework, qualitative and quantitative restrictions on international migration are modelled explicitly and the effects of changes on such restrictions on the size and composition of the migrant inflows are considered. In the framework, we are able to analyse policy externalities between alternative migrants destination and consider as in Kondoh (2000) the possibility to migrate illegally. Brucker and Schroder (2010) show the existence of cross-country spill-over effects of selective immigration policy. Using data on a panel of OECD countries between 1980 and 2005, the authors find evidence of a contagion effect where the adoption of selective immigration policy by one country induces a similar policy shift in neighbouring countries. Although related, the aim of our analysis is different since we focus on welfare effects of autonomous policy changes and not on the determinants of immigration policy setting in a multi-country framework.

Bertoli et al. (2009) consider a three-country model where strategic interactions arise in the setting of immigration quota. Their contribution show the inefficient outcome of uncoordinated immigration policies due to the fact that a country does not consider the negative externality imposed on the other country in terms of a reduced level of human capital embedded in the flows. Jesus Fernandez-Huertas Moraga (2008) considers another kind of policy externalities, i.e. between origin and destination countries in a theoretical model where bilateral immigration agreements emerge as a way to internalize such externalities.

The paper is organized as follows. In *Section 2,* we present a simple three-country model of migration from a poor origin country toward a rich federation composing two countries with different immigration policies. In *Section 3,* we present and discuss the effects of (autonomous and uncoordinated) changes in immigration policies and of free mobility of natives of the two destination countries. Concluding remarks are developed in *Section 4*.

2. A Simple 3-Country Model of International Migration

Let us consider a stylized world economy composed by three large countries: two rich countries A and B and a developing country C. Each country produces the same single good by using labour and capital under perfect competition. We assume that the production function, $F_j\left(K_j, L_j\right)$, have the following standard features $\partial F_j / \partial K_j > 0$, $\partial F_j / \partial L_j > 0$, $\partial^2 F_j / \partial K_j^2 < 0$, $\partial^2 F_j / \partial L_j^2 < 0$, and $\partial^2 F_j / \partial L_j K_j > 0$. The price of the good is the numeraire. The presence of perfect competition in both capital and labour markets ensures that factors are paid the values of their marginal products $\partial F_j / \partial K_j = r_j$ and, $\partial F_j / \partial L_j = w_j$ where r_j and w_j denote respectively the rental price of capital and the wage rate in country j. Let for simplicity the marginal products of labour to be linear. We assume that the three countries are endowed with a fixed amount of capital (K_A, K_B and K_C), and at every instant, a constant number of individuals, N_j is born in each country $j = A,B,C$ and live for a lifespan equal to T. In the absence of migration, the total number of workers in country j can be expressed as $L_j = TN_j$.

To sharpen the focus of our analysis on the problem of international migration, we assume that capital is internationally immobile like land. Countries differ in their labour endowments; in particular, both the new-born labour in each period and the aggregate stock of labour in Country C are larger than those of other two countries. Let us assume also that Country A and B have a higher capital/labour ratio than Country C. Wage rates in the three countries will reflect the capital/labour ratios, $w_A, w_B > w_C$. The wage gap implies that the two developed countries confront, at least potentially, an inflow of workers from Country C. Following Djajic (1989), to simplify our analysis, the dynamic problems involving capital accumulation and population growth are not addressed in the paper.

2.1 Heterogeneous immigration policies

In order to capture the stylized facts reported above, we consider a situation where the two receiving countries use different immigration policies in order to regulate the inflow of immigrants. We abstract for simplicity from the political economy mechanisms which lead to the setting of different policies in the two countries. We analyse a situation where Country A adopts a qualitative immigration policy (i.e. only individuals with a minimum level of skills are allowed to migrate) and measures aimed at contrasting illegal immigration, while Country B adopts a quantitative immigration policy (quota system) and is relatively more liberal toward migration inflows.

In particular, the government in Country A can regulate the immigrant population, that is both legal workers L_1 and unskilled illegal workers L_2. This is achieved by using two policy measures: the minimum skill requirement $\overline{Q}$ and the penalty cost inflicted to detected illegal workers θ. In this simple one-good model with two factors of production L_A, K_A à la MacDougal (1960), an

increase in the stock of foreign labour will cause a positive effect on the economic welfare of Country *A* although the distributional consequences will be different for owners of capital and native workers. While the former will be pro-immigration, the latter will oppose it since an increase in either L_1 or L_2 leads to a negative effect on wages.
Let assume that the objective function of the government in Country *A*, W_A, takes into account both the national income, $g(\overline{Q},\theta)$, and the hostility of native workers toward immigration $h(\overline{Q},\theta)$ as follows:[5]

$$W_A = g\left[\overline{K}_A, L_A, L_1(\overline{Q},\theta), L_2(\overline{Q},\theta)\right] + h\left[L_1(\overline{Q},\theta), L_2(\overline{Q},\theta)\right] \qquad (1)$$

where g is decreasing in $\overline{Q}$ and θ whilst the opposite applies to h.
It is assumed that the native population of Country *B*, contrarily to Country *A*, has a more positive attitude toward immigrants. This might be due for instance to the fact that capital is more equally distributed across the population so that the negative effects of immigration on wages are more than compensated by positive effects on the returns to capital. Or it might also be related to the existence in Country *B* of (fiscal) mechanisms to redistribute gains from winners (ie the owner of the capital stock) to losers (native workers).[6]
We can write the general expression for Country *B* government's objective function as follows:

$$W_B = g\left[\overline{K}_B, L_B, L_3(v)\right] \qquad (2)$$

where national welfare depends on the fixed endowments of capital, $\overline{K_B}$, on the stock of native labour, L_B, and on the stock of immigrants from Country *C*, L_3 . Note that L_3 is the optimal quota (indirectly) imposed by Country *B* through the use of the entry tax and/or visa cost v.
The above setting describes a simple but realistic situation where two countries which are potentially alternative destinations for migrants originating from a third country employ different immigration policies. Admittedly, the immigration policy structure of the model could be further enriched in several directions. For instance, by micro-founding the two different policy stance with a fully-specified political economy model of immigration. This extension would go beyond the scope of the paper and substantially complicate the analysis. Besides, the model can be extended to a situation where illegal migration characterizes also Country *B*. This second extension of the model will not alter the results as long as illegal migration in Country *B* is relatively less intense

[5] Given the main aim of the paper we do not specify in what follows a political economy model of immigration policy in Country *A*. We present a simple but realistic objective function which explicitly takes into account the well documented heterogeneous attitude toward migrants in the destination country (see Mayda 2006; Facchini and Mayda 2009) which in turn is the main determinant of the political process which shapes immigration policy. For a recent paper on the determinants of immigration policy in the US see Facchini and Steinhardt (2011).
[6] Governments when choosing a particular immigration policy trade-off economic welfare with political support from special interest groups. In other words, the restriction of immigration might respond to the optimal choice of a Government to weight welfare of some groups within society differently from others. If the median voter – like highlighted in Benhabib (1996) – is someone who is negatively affected by immigration, the Government might be induced to keep a restrictive stance in immigration policy. See also Llavador and Solano-Garcia (2011) for an interesting political economy model of immigration with parties competing in a situation where workers are heterogeneous in skills and attitudes toward immigration.

than Country *A*. The simplifying assumption used in the paper captures the stylized fact that in countries characterized by less restrictive immigration policy, like Country B in our model, the magnitude of illegal migration is generally smaller.[7]
In the following analysis, we describe more specifically, the alternative emigration strategies for individuals from the origin Country *C*.

2.2 Skills formation and legal migration to the country with selective immigration policy

Due to the existence of a wage gap, if permitted workers will migrate from Country *C* to Countries *A* and *B*. As described above, a minimum entry skill requirement, $\overline{Q}$, is imposed by the government of Country *A*, for instance in the form of host-country language proficiency. For simplicity, let us assume that this human capital is valuable only in Country *A* and can be acquired by potential migrants at a cost equal to μ.[8]
As in Djajic (1989), it is assumed that, in each generation, new-born individuals in Country *C* are heterogeneous in their capacity to develop productive skills. Although the cost of acquiring the destination-specific human capital is constant and equal to μ, learning time depends on innate individual abilities which can be measured by a continuous function, $p(i)$, where $p'(i)>0$ and where each individual within a generation is indexed by $i \in [0,1]$.[9] The accumulation of destination-specific skills by individual *i* at age $t(0 \le t \le T)$ is assumed to be given by:

$$Q(i,t) = p(i)q(t), \tag{3}$$

where $q(0)=1, q'(t)>0, q''(t)<0$ and *T* denotes the retirement age. It follows that the brightest individuals within each generation are able to acquire the minimum required level of skills $\overline{Q}$ for migrating legally in Country *A* in less time than others. In other words, they migrate at a younger age and enjoy a longer migration spell as a consequence.
Note that individuals from Country *C* once they have accumulated the required level of skills have no incentives to postpone their departure for Country *A*. We then obtain the following relationship between $\overline{Q}, i$ and the migration age τ:

$$\tau = \Psi\left(i, \overline{Q}\right) \tag{4}$$

[7] Different intensities of illegal migration might also be due to differences in the effectiveness of the enforcement of external and internal borders. For example the magnitude of illegal migration in Italy is, at least partly, due to geographical features – the length of its costs, proximity to North Africa - which make the fight against the phenomena particularly costly compared with northern European countries.
[8] The introduction of partial transferability of the acquired skills to the alternative destination, Country *B*, implies that a larger number of individuals from Country *C* will invest in human capital acquisition but it will not fundamentally alter the results. Note also that in the current framework of the model we restrict the analysis to a case were the required destination-specific human capital is acquired only before (legal) migration; we abstract for simplicity and without loss of generality from the possibility of an improvement in individuals' abilities during the (illegal or legal) migration spell in the destination country.
[9] As the population in Country *C*, *Lc,* is assumed to be sufficiently large, we may treat every age group as a continuum of individuals with different abilities. In addition we assume that each generation is an exact replica of the previous one such that the distribution of skill formation within the population is constant over time.

where $\Psi_1 < 0$, $\Psi_2 > 0$ and τ is decreasing in individual innate learning abilities, *i,* and increasing in the skill requirement imposed by country *A*, $\overline{Q}$. The function $\Psi\left(i,\overline{Q}\right)$ is given by $q^{-1}\left[p(i)/\overline{Q}\right]$. On the vertical axes of *Figure 1* is reported the constant distribution of learning abilities indexed by *i*, while the horizontal axes measures the age of all living generation (where 0 are new-born and *T* are individuals close to retirement); hence the area within the box measures stock of native individuals from Country *C* residing in the home country or abroad. The $\overline{Q}\,\overline{Q}$ schedule represents the minimum migration age τ for each individual with a given level of ability *i* associated to the minimum skill requirement $\overline{Q}$. For an individual in Country *C* legal migration to Country *A* is convenient if the gains from migration - which depend on the length of the migration spell, T - τ , and on the wage differential $(w_A$-$w_C)$ - are larger than the cost of acquiring the destination-specific human capital, μ.
Let define $\underline{i}$ as the ability level of *marginal legal migrants,* those individuals who are indifferent between migrating to Country *A* and staying in the home Country *C.* For marginal migrants the following equation holds:

$$\left(w_A - w_C\right)\left[T - \tau\left(\underline{i},\overline{Q}\right)\right] - \mu = 0 \tag{5}$$

where for simplicity, we assume no inter-temporal discount factor and no savings since all perceived income is immediately consumed. All individuals with an innate level of abilities below this critical threshold, $i < \underline{i}$, will have no incentive to invest in human capital in order to match the requirement imposed by the selective immigration scheme of Country *A*.
For a given $\overline{Q}$ established by the government of Country *A*, the stock of legal migrants is represented by the grey area L_1 in *Figure 1*. Note from (5) that a reduction of the wage gap between Countries *A* and *C* will implies that in order to break-even the new marginal migrant $\underline{i}$ will be an individual who is able to migrate earlier (ie with a longer migration spell T - τ).

(Figure 1 is around here)

2.3 Illegal migration in the country with selective immigration policy

The natives of Country *C* who are not able to migrate through the "main door", i.e. through the legal selective screening process, might potentially use two other channels for migration: (i) migrating illegally in Country *A*[10]*;* or (ii) obtain a legal working visa from the alternative destination, Country *B* (see *paragraph 2.4*). Country *A* adopts measures to contrast illegal migration such as border control and internal inspections. If detected while trying to enter the country or while working without a legal visa, then an illegal worker is fined and deported. Let $\rho \in [0,1]$ denote the probability of detection in every period *t* which is known to potential illegal migrants and is a positively related function of the total amount of illegal immigrants, L_2. In other words, the government efforts to reduce illegal migration is increasing in the size of the stock of

[10] We assume that individuals are risk-neutral when they decide to migrate illegally and that it is never convenient for individuals with inborn abilities $i \in [0, \underline{i}]$ to postpone illegal migration in order to acquire destination-specific skills.

illegal migrants in Country *A*.[11] Let the penalty inflicted upon detected illegal migrants, θ, be constant and not dependent on the duration of the illegal stay. Individuals who migrate illegally are employed in Country *A* but they are less productive since they have not enough skills and hence let assume that their wages are discounted by a factor $0 < \delta < 1$ with respect to the competitive wages paid to natives and legal migrants[12].

In a steady state equilibrium, in each period, the expected income of illegal migrants, $\tilde{w}_A$, will equalize that of those left behind in the home Country *C*:

$$\tilde{w}_A = (1-\rho(L_2))\delta w_A + \rho(L_2) w_C - \rho(L_2)\theta = w_C \tag{6}$$

where L_2 represent the number of illegal migrants from Country *C* in steady state equilibrium whose index is $i \in [0, \underline{i}]$ and where we assume for simplicity that the cost of migration (and return) is null.

The government of Country *A* will optimally choose $\overline{Q}$ and θ in order to satisfy $dW_A / d\overline{Q} = 0$ and $dW_A / d\theta = 0$ [13]where the marginal change in the government utility is given by the following two expressions:

$$\frac{dW_A}{d\overline{Q}} = \frac{dW_A}{d(L_1+\delta L_2)} \frac{d(L_1+\delta L_2)}{d\overline{Q}} + h_{\overline{Q}}(\overline{Q},\theta) \equiv g_{\overline{Q}}(\overline{Q},\theta) + h_{\overline{Q}}(\overline{Q},\theta) \tag{7}$$

$$\frac{dW_A}{d\theta} = \frac{dW_A}{d(L_1+\delta L_2)} \frac{d(L_1+\delta L_2)}{d\theta} + h_{\theta}(\overline{Q},\theta) \equiv g_{\theta}(\overline{Q},\theta) + h_{\theta}(\overline{Q},\theta) \tag{8}$$

where δL_2 represent the effective units of labour provided by illegal migrants and we assume $h_{\overline{Q}} > 0, h_\theta > 0, h_{\overline{Q}\overline{Q}} < 0$ and $h_{\theta\theta} < 0$.

The policy-induced changes in effective units of labour offered by immigrants are represented by

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[11] The underliying idea is that a government will react strongly against illegal migration when the phenomena becomes more and more visible and citizens might call for "actions". Besides, as Hanson and Spilimbergo (1999) suggest in their study on illegal migration flows between Mexico and the US border enforcement, and more in general the "apprehension technology" presents increasing return to scale. In this paper for simplicity we do not consider border enforcement costs in the objective function of the government. See Ethier (1986) for a theoretical model on border enforcement.

[12] The labour market is perfectly competitive for both legal and illegal workers; equilibrium wages will reflect the heterogeneity of the two categories of workers with respect to their productivity or effective unit of labour that they are able to offer (hence workers differs in the quantity and not in the quality of job supplied). Given the absence of penalty inflicted to employers of illegal foreign workers in our model, firms in Country *A* are indifferent between hiring a native, a legal or an illegal worker. Note that the introduction in the model of a fine imposed on employers – a measure often used against illegal migration in developed countries - will not lead to any substantial change in the qualitative results highlighted below but would simply imply a further reduction of the equilibrium wages for illegal migrants.

[13] In what follows we assume that W_A is a concave function both in $\overline{Q}$ and θ. This property is insured when $h(\overline{Q},\theta)$ is sufficiently concave, i.e. when the political benefit of following a strict immigration policy for the Government is decreasing in $\overline{Q}$ and θ.

the following expressions: [14]

$$\frac{d\left(L_1+\delta L_2\right)}{d\overline{Q}}=\frac{1}{\Delta}L_1^{\overline{Q}}\left[\delta-L_2^{w_A}\left(w_A^{L_2}-\delta w_A^{L_1}\right)\right] \tag{9}$$

$$\frac{d\left(L_1+\delta L_2\right)}{d\theta}=\frac{1}{\Delta}L_2^{\theta}\left[\delta-L_1^{w_A}\left(-w_A^{L_2}+\delta w_A^{L_1}\right)\right] \tag{10}$$

the signs of (9) and (10) are both negative since the stock of regular foreign workers is decreasing in the minimum skill entry requirement $L_1^{\overline{Q}}=\partial L_1/\partial\overline{Q}<0$, the stock of irregular workers is decreasing in the penalty $L_2^{\theta}=\partial L_2/\partial\theta<0$, the sign of the determinant Δ is positive (see *Appendix*), and $w_A^{L_2}=\delta w_A^{L_1}$ since workers are paid the value of their marginal products and legal and illegal workers only differ in terms of the efficiency units of labour that they are able to provide in the labour market (where δ is the discount factor for illegal migrants). Using (9) and (10) we can conclude that the signs of $g_{\overline{Q}}$ and g_{θ} respectively in (7) and (8) are negative.

2.4 Immigration in Country B: an optimal immigration quota

Natives from Country *C* have the option of migrating to Country *B*. We assume that the two potential destination countries are not perfect substitutes since net life-long income of legal immigrants in Country *A* is higher than that of Country *B*. As a result, workers in Country *C* whose ability index is larger than $\underline{i}$ will always prefer to acquire Country *A*-specific human capital (with a cost equal to μ) and legally migrate to this most preferred location. Individuals for which human capital acquisition is too costly will consider one of the following three choices; namely, migrate illegally in Country *A*, obtain a legal visa in Country *B* or remain in Country *C*. In equilibrium, the three options will give the same expected life-long return.

Country *B* regulates the inflows of migrants by setting an *entry tax, v*, which might be considered as the cost of a working visa. This tax is imposed at the beginning of the migration spell and is equivalent to an immigration quota which maximizes national economic welfare, W_B in eq. (2).[15] Note that L_3 is the optimal quota (indirectly) imposed by Country *B* through the use of the entry tax/visa cost *v* which in equilibrium is equal to the lifelong benefit from migration as follows:

$$v=T\left(w_B-w_C\right) \tag{11}$$

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[14] Note that in what follows we use superscripts as notation for partial derivatives, for example $L_2^{w_A}$ represents the derivative of L_2 with respect to the wage rate of Country *A*..

[15] According to the well-known Ramaswami (1968) proposition, a capital abundant country will maximizes the *per capita* income of natives by imposing an optimal tax on immigrants' earnings (i.e. extracting a rent from immigrants originating from the capital scarce country). As emphasized by Webb (1970) the Ramaswami proposition holds in the absence of retaliation from the capital scarce country (in our model Country C). Without loss of generality, in this model we assume that the Government is able to apply a tax-rate à la Ramaswami. Note that the results of our model hold also if we depart from this assumption and we consider for instance the (welfare-inferior) cases of free entry or pure quantitative restriction without entry costs.

Equation (11) implies that in equilibrium the wage difference between Country *B* and *C* in each period should be equal to *v/T*. Wages are set in competitive markets and, given that capital is fixed and immobile across countries, marginal products of labour of Country *B* and *C* is a linear and decreasing function of the stock of labour in equilibrium as shown in *Figure 2*. The *BB'* (*CC'*) line shows the relationship between labour inputs and marginal products of labour in Country *B* (Country *C*). In the figure, Country *B* national income – the sum of workers' labour income and of returns to capital - is depicted by the area between BB' and the horizontal axes. As already mentioned above, marginal products are assumed to have a linear relationship as follows: $MPL_j = b - aL_j$ with $j=B,C$. In *Figure 2*, the horizontal axe, *OO**, is equal to the sum of Country *B* native labour stock (L_B) and the stock of labour in Country *C* net of migration (legal and illegal) to Country *A*, $\tilde{L}_C = L_C - L_1 - L_2$.

Without loss of generality, we assume $L_B < \tilde{L}_C$ and that the optimal immigration quota defined by Country *B* is denoted by L_3 as expressed in *Figure 2*.[16] In equilibrium, from (6) and (11), we have $w_C = w_B - (v/T) = \tilde{w}_A$, the net wage of a migrant in Country *B* is equal to the equilibrium wage rate in the origin Country *C* and to the expected wage of an illegal migrant in Country *A*.

(Figure 2 should be around here)

In *Figure 2* we report the optimal entry tax, *v**, imposed by the government of Country *B* in order to maximize the income of native factors of production (equivalent to the area *S*). The expression for *v** is:

$$v^* = \frac{1}{3} aT(\tilde{L}_C - L_B) \tag{12}$$

Using the above expression, the optimal immigration quota L_3, and economic welfare of Country *B*, W_B can be written respectively as:

$$L_3 = \frac{1}{3}(\tilde{L}_C - L_B) \tag{13}$$

$$W_B = -\frac{a}{2} L_B^2 + (b - \frac{a}{6}) L_B + \frac{a}{6} \tilde{L}_C \tag{14}$$

Note that the above equations reveal the existence of interdependence between the immigration policy of Country *B* and that of Country *A* (*immigration policy externality*). The size of migration in Country *B* negatively depends on the number of migrants who decide to reside in Country *A* both legally or illegally.

3. Immigration Policy Interactions: an Analysis

[16] The immigration quota is indirectly set by the government using an (equivalent) entry visa.Iin the fashion of McDougal model, free factor mobility, compared with autarky, benefits both the host and the source countries in national income or welfare. From the point of view of the host country the imposition of an "optimal level tax", on the income of immigrants, ie the visa cost in our model, would raise national welfare compared to the free immigration case.

Following the outline of the immigration policies adopted by the two receiving countries, *A* and *B*, this section investigates the effects of autonomous changes in immigration practices. We focus our attention on two main aspects. Firstly, we assess how a change in the immigration policy stance in Country *A* affects the pattern of migration and welfare in both countries. Secondly, we analyze the consequences of the free mobility of natives of the two developed countries.

From the equilibrium conditions outlined in the previous section, using the three equations that define respectively the marginal legal migrant from Country *C* to Country *A* (eq. 5), the expected income of an illegal migrant in Country *A* (eq. 6) and the size of immigration quota in Country *B* (eq. 13), we obtained the following system:

$$L_1 = L_1\left(\overline{Q}, \mu, w_A\right) \tag{5'}$$

$$L_2 = L_2\left(w_A, w_C, \theta, \delta\right) \tag{6'}$$

$$L_3 = L_3\left(L_B, L_C, L_1, L_2\right) \tag{13'}$$

where wage rates are endogenously determined and depend upon the distribution of the population between the three countries:

$$w_A = w_A\left(L_A, L_1, L_2\right) \tag{15}$$

$$w_C = w_C\left(L_C, L_1, L_2, L_3\right) \tag{16}$$

The system above determines the immigration outflows from Country *C* (L_1, L_2 and L_3) for a given set of exogenous parameters L_A, L_B, L_C, $\overline{Q}$, μ, θ, and δ.

3.1 The Effects of a Restrictive Immigration Policy in Country A

Let consider first the effects of more restrictive policy changes in Country *A* on emigration patterns from the developing Country *C* and, in turn, on welfare in the two host-countries. Suppose tthat an exogenous institutional shock[17] modifies Country *A* welfare function from $W_A = g\left(\overline{Q},\theta\right) + h\left(\overline{Q},\theta\right)$ to $W'_A = g\left(\overline{Q},\theta\right) + h'\left(\overline{Q},\theta\right)$, where $h'\left(\overline{Q},\theta\right) < h\left(\overline{Q},\theta\right)$: at the initial policy equilibrium defined by $\left(\overline{Q},\theta\right)$ the two optimality conditions, $\partial W'_A / \partial\overline{Q} = 0$ and $\partial W'_A / \partial\theta = 0$ are not satisfied, and the higher weight given to native workers' hostility should translate in the new equilibrium to a more restrictive policy stance (an increase in $\overline{Q}$ and/or θ). The new situation is depicted in *Figure 3* where GG' and HH' represent respectively *g*(.) and *h*(.) as a function of $\overline{Q}$ and θ.

A more restrictive policy on legal immigrants in Country *A,* an increase in $\overline{Q}$, will affect the number of immigrants in Country *B* and change its national welfare in eq. (14), as follows:

[17] In this paper, we abstract from the possible determinants of policy shifts. As emphasized by the existing literature and mentioned above, both economic and non-economic factors might affect individual attitudes toward immigration. A change in the political power between heterogeneous actors in a society is likely to translate into changes of immigration policy.

$$\frac{dW_B}{d\overline{Q}} = -\frac{a}{6}\left(\frac{d\left(L_1+\delta L_2\right)}{d\overline{Q}}\right) = -\frac{a}{6\Delta}L_1^{\overline{Q}}\left[1-L_2^{w_A}\left(w_A^{L_2}-w_A^{L_1}\right)\right] \tag{17}$$

From the *Appendix*, we can assert that $\left(w_A^{L_2}-w_A^{L_1}\right)>0$ and therefore the sign of (17) is ambiguous. Consequently, we can distinguish between two situations. First, in case of a small wage differential between skilled-legal and unskilled-illegal migrants in Country *A* so that $\delta \approx 1$[18], then $\left(w_A^{L_2}-w_A^{L_1}\right)\approx 0$ and the sign of (17) would be positive: a higher minimum entry requirement for skilled migrant will increase welfare in Country *B*. On the contrary, in the case of a large wage difference between legal and illegal migrants such as $\delta \approx 0$, then the effect of illegal migration flows on wages in Country *A* would be small, $w_A^{L_2}\approx 0$. It follows that $(1+L_2^{w_A}w_A^{L_1})$ might be negative if the effectiveness of contrast against illegal migration, as captured by the parameter ρ in eq. (6), is sufficiently inelastic with respect to $\boldsymbol{L_2}$. In this situation, the sign of (17) would be negative and, as a result, a more restrictive immigration policy in Country *A* will translate into a reduction of welfare in Country *B*. In other words, Country *B* may or may not gain from a more restrictive immigration policy adopted by Country *A* depending on the effect that raising the skills requirement at entry has on irregular migration inflows.

Interestingly, under certain conditions there is the possibility of a "*boomerang effect*" of a more restrictive entry requirement: namely, a reduction of legal flows accompanied by a large increase in irregular flows. The intuition for this result is the following. The reduction in legal migration, $d\boldsymbol{L_1}<0$ will result in an increase in wages in Country *A*. In turn, this will induce, *ceteris paribus*, an increase in the stock of illegal migrants equal to dL_2. From (6) it follows that if the effectiveness of the contrast is sufficiently inelastic with respect to the stock of illegal entrants and the supply of migrants relatively elastic with respect to wage then the reduction in legal migration is more than compensated by the increase in the number of illegal immigrants. In this situation both destination countries might lose as a consequence of the policy change.

Let us consider now an alternative policy change for Country *A*, that is an increase in the penalty imposed to illegal immigrants in case of detection, a higher θ. The effects in this case are more straightforward since a more restrictive policy on illegal immigrants in Country *A* will divert part of the flows toward Country *B* and hence generate a positive welfare effect as follows:

$$\frac{dW_B}{d\theta} = -\frac{a}{6}\left(\frac{d\left(L_1+\delta L_2\right)}{d\theta}\right) = -\frac{a}{6\Delta}L_2^{\theta}\left[1-L_1^{w_A}\left(w_A^{L_1}-w_A^{L_2}\right)\right] \tag{18}$$

where the sign of (18) is positive.
To sum up, we can establish the following proposition.

PROPOSITION 1
Consider the case of a developed country which applies a skill-selective immigration policy with imperfect control of illegal migration.

[18] This situation is likely when the status of illegal migrant is not associated with a significant wage difference compared to a legal migrant.

1) An increase in the **penalty cost** *imposed on apprehended illegal migrants will cause positive effects on the economic welfare of an alternative destination which applies an optimal quantitative restriction on immigration inflows.*
2) An increase in the **minimum skill entry requirement** *(i.e. the degree of selectivity of legal immigrants) may cause negative effects on the economic welfare of an alternative destination which applies a quantitative restriction on immigration inflows if the reduction in legal migration is offset by the increase in illegal migration in the first country (***boomerang effect** *of more skill-selective immigration policy).*

The second result is particularly interesting since it highlights a situation where a restrictive immigration policy does not reach the ex-ante goal of reducing migrant inflows and instead inflicts a negative externality on another potential destination. This situation is likely to happen in contexts where the costs incurred by illegal migrants are not prohibitively high. The frequent introduction of an amnesty toward illegal migrants in several OECD countries during the last decades seems to lend support to this idea.

3.2 Economic integration and free mobility of native workers

One important stylized fact of international labour mobility is the asymmetry in migration costs incurred by those belonging to origin countries with a different level of development. In fact it is relatively easier, with some notable exceptions, for a native of a rich OECD country to obtain a working visa into another OECD country compared to natives of poor developing countries.[19] In some cases, like in the current EU framework, citizens from one State of the Union are free to move and work in another State whilst this right is not extended to non-citizens.[20] In this section we model international integration between Country A and B as a removal of barriers to free mobility of native workers within the federation (or common economic area). According to the differences in capital/labour ratios (after immigration from Country C has already taken place) in the two countries, two possible scenarios arise in our model:

Case 1: $K_A/(L_A+L_1+L_2) > K_B/(L_B+L_3) \Rightarrow w_A > w_B$
Case 2: $K_A/(L_A+L_1+L_2) < K_B/(L_B+L_3) \Rightarrow w_A < w_B$

Obviously, the direction of migration flows will depend on wage differences between the two countries. For simplicity let us assume that natives of the two developed countries are perfect substitutes in the common economic area labour market and migration is not costly.[21]
As a first step of the analysis, we consider the effects of a change in Country A and Country B populations due to internal migration within the common economic area on immigration from the third developing Country C. Using the model outlined above we obtain the following equations

[19] This asymmetry is explained by several factors such as cultural proximity, deeper economic and political integration and historical influences.
[20] An exception to this fundamental rule of the European Union is the limit (temporarily) imposed by some Member Countries on mobility from New Member Countries such as Bulgaria and Romania.
[21] This will be the case if native workers of Country B, contrarily to immigrants from the third country, have already acquired the necessary skills for working in Country A.

which relate the immigrant population (legal and illegal) from Country *C* residing in Country *A* to population changes in the common economic area:

$$\frac{d\left(L_1+L_2\right)}{dL_A}=\frac{1}{\Delta}\left(L_1^{w_A}w_A^{L_A}+L_2^{w_A}w_A^{L_A}\right)<0 \tag{19}$$

$$\frac{d\left(L_1+L_2\right)}{dL_B}=\frac{1}{\Delta}L_3^{L_B}L_2^{w_C}w_C^{L_3}\left[1-L_1^{w_A}\left(w_A^{L_1}-w_A^{L_2}\right)\right]>0 \tag{20}$$

An increase in Country *A* native population, *ceteris paribus*, reduces the equilibrium wage and hence erodes the returns to both legal and illegal migration. On the contrary an increase in the native labour stock in Country *B* reduces the incentive to migrate to that country and hence will increase illegal immigration in Country *A*.

In *Case 1*, Country *A* attracts native workers from Country *B* and therefore $dL_{\mathbf{A}}$ (= $-dL_{\mathbf{B}}$)> 0. Using the two equations above (19), (20) and from $\tilde{L}_C=L_C-L_1-L_2$, note that ($d\tilde{L}_C/dL_A-d\tilde{L}_C/dL_B>0$. In other words, a population shift from Country *B* to Country *A* by reducing (L_1 + L_2) induces an increase in $\tilde{L}_C$, the population in Country *C* net of immigration to Country *A*. The intuition is straightforward from equations (19), (20); in fact an increase in $L_{\mathbf{A}}$,and the equivalent decrease in $L_{\mathbf{B}}$, decreases the incentive of native from Country *C* to migrate in Country *A* and increases the incentive to migrate in Country *B*. The opposite happens in Case 2 where $dL_{\mathbf{A}}$ (= $-dL_{\mathbf{B}}$)< 0 which implies a reduced incentive to migrate in Country *B.* Let define $L_{\mathbf{BA}}$ as the number of native of Country *B* who migrate to Country *A*, where $L_{\mathbf{B}}$ = $L_{\mathbf{BB}}$ + $L_{\mathbf{BA}}$. It follows from equation (14) that economic welfare in Country *B* will change as follows:

$$dW_B=\{-[-aL_{BB}+(b-\frac{a}{6})]+\varphi(w_B+\frac{\partial w_B}{\partial L_B})\}dL_{BA}+\frac{a}{6}d\tilde{L}_C \tag{14'}$$

note that in eq. (14') we have introduced a new parameter $\varphi\in[0,1]$, which captures the relevance of migrants in Country *A*, $L_{\mathbf{BA}}$ (= $L_{\mathbf{B}}-L_{\mathbf{BB}}$), in the welfare function of Country *B*. If the Government of Country *B* does not care about those individuals who migrate abroad, in common with the standard assumption in the brain drain literature, then φ = 0 and the wages earned abroad by migrants do not enter in (14'). On the contrary if φ = 1, Country *B* welfare function is equivalent to national income which includes earning of natives living abroad.

In *Case 1* (*Case 2*) the second term of RHS of eq. (14') is positive (negative). It is worthy to note that if labour endowment of those remaining in Country *B*, $L_{\mathbf{BB}}$, is sufficiently large so that it satisfies the following condition, ($L_{BB}>3L_{BA}+\tilde{L}_C-(1/2)$) if φ = 1 [($L_{\mathbf{BB}}$ > *b/a* – 1/6) if φ = 0), then also the first term of RHS of (14') will be positive (negative) and we can conclude that economic welfare of Country *B* will increase (decrease) as a consequence of economic integration with free mobility[22]. Intuitively, the outflow of native workers from Country *B* implies two main effects. Firstly, the reduction of the stock of native workers implies an increase in wages and a reduction of returns to native capital owners. The horizontal axe in *Figure 2* will be reduced from left the stock of foreign migrant L_3 and the *S* area, the gains due to the optima entry tax, will

[22] These conditions follow from the equalization of wages in equilibrium and from the following equations: [$dL_{\mathbf{BA}}$ = $-dL_{\mathbf{BB}}$], [$w_{\mathbf{B}}$ = $b-a(L_{\mathbf{BB}}+L_3)$ = $b-a(2/3L_{\mathbf{BB}}+1/3\,L_c)$] and ($\partial w_{\mathbf{B}}/\partial L_{\mathbf{B}}=-a$).

increase. The second (indirect) is associated to the "diversion" of migrants from Country A to Country B, the increase in $\tilde{L}_C$ implies an increase of the horizontal axe from the right in Figure 2 and cause downward shift of the CC' line. This second effect will also lead to an increase in L_3 and, *ceteris paribus*, an increase in the *S* area. If the labour endowment of Country *B* is sufficiently small, then the negative effect on the returns to the capital owners due to a reduction in domestic workers may dominate the positive effect caused by an increase in the area of *S*. In *Case 2*, the opposite applies.

What happens to the economic welfare of Country *A* depends, in this simple one-good two factors model à la MacDougal (1960), on the overall change in effective units of labour due to free mobility of natives.[23] Country *A* will gain from economic integration if the following inequality holds:

Case 1 $\quad \left|d\left(L_1+\delta L_2\right)\right|<\left|dL_A\right|=\left|dL_B\right| \qquad$ (21a)

Case 2 $\quad \left|d\left(L_1+\delta L_2\right)\right|>\left|dL_A\right|=\left|dL_B\right| \qquad$ (21b)

In *Case 1*, where Country *A* receives immigrants from Country *B*, free mobility within the common economic area is welfare improving if there is a less than proportional reduction in effective units of labour provided by the migrants from the third Country *C*. In *Case 2*, when the direction of immigration flow is from Country *A* to Country *B* then a welfare gain is possible if the increase in effective units of labour from the third country is larger than the reduction in labour supply due to the outflows of natives.

Interestingly the inequality in (21a) hold when: (i) the migration age, τ, is sufficiently elastic with respect to the ability of individuals, *i* (in other words, the slope of $\overline{QQ}$ schedule is sufficiently flat near the initial equilibrium, equal to point E in *Figure 1*);

(ii) the possibility of detection of illegal workers, ρ, is sufficiently elastic with respect to the existing amount of illegal workers, L_2.

The first condition implies a sufficiently small effect of a wage decrease on the marginal legal migrant in Country *A* and hence on the size of legal migration, i.e. a small $L_1^{w_A}$. The second condition implies that both $L_2^{w_A}$ and $L_2^{w_C}$ are sufficiently small since the changes in expected returns from illegal migration due to wages changes will be offset by changes in the probability of being detected, therefore the quantity of illegal migrants L_2 will be rather inelastic overall.

The free mobility of natives within the common economic area, or federation, might lead to win-win or lose-lose situations. If the direction of migration flows is from Country *B* to Country *A* (*Case 1*) both countries might gain when the supply of (effective units of) foreign labour increases in the federation. On the contrary when reallocation of native workers follows the opposite direction, from Country *A* to Country *B* (*Case 2*), the total supply of (effective units of) labour might decrease and both countries lose. The intuition for the above results lies in the sub-optimality of a large stock of illegal migrants in Country *A*. In *Case 1* (*Case 2*), under the

23 Note that as assumed previously the Government in Country A does not maximize economic welfare but an objective function which explicitly takes into account the negative distributional impact of migration on native workers. The economic welfare of Country *A* is measured as function *g*(.) in the government objective function, W_A which is reported in Section 2.3.

conditions which satisfy equation (21a), the reallocation of population within the federation diverts part of the stock of illegal migrants to Country *B* (increases the stock of illegal migrants in Country *A*) with an overall increase (decrease) in the effective units of labour offered by third-country nationals in the common labour market.

On the basis of the findings highlighted above, we establish the following proposition.

PROPOSITION 2
Consider the case where natives are allowed to freely move within a federation composed of Country A (which applies a skill-selective immigration policy with an imperfect contrast over illegal migration) and Country B (which applies an optimal quantitative immigration restriction). The following two cases arise:
1) (If the wage rate of developed Country A is higher than that of Country B), both countries will gain as a consequence of economic integration with free labour mobility if immigration policies in Country A are sufficiently selective and effective plus Country B is sufficiently large.
2) (if the wage rate of developed Country B is higher than that of Country A), both countries will lose as a consequence of economic integration with free labour mobility if immigration policies in Country A are sufficiently selective and effective plus Country B is sufficiently large.

This simple model shows the existence of possible welfare losses (gains) for both countries, hence for the common economic area, as a consequence of economic integration in the form of free mobility when immigration policies are heterogeneous and autonomous.

4. Concluding Remark

In the recent past, the international economy has been through a process of increasing regional and multilateral harmonization and coordination of economic and social policies related to global interactions (e.g. trade agreements, international financial regulations, international investment rules, fiscal and monetary policies). The regulation of international migration flows is an important exception to this trend. Rich countries show little signs of reducing their sovereignty over immigration policy even in areas of strong and pervasive policy integration such as the European Union.

In this paper which uses a simple three-country model of international migration, we show that significant policy externalities might arise; namely, a policy shift in one country affects welfare in other alternative migration destinations. We consider the case of two developed destination countries which apply heterogeneous immigration policies i.e. qualitative restrictions with minimum skills-entry requirements (and imperfect contrast of illegal migration) and optimal immigration quota as well as investigate welfare effects due to an autonomous change in the policy measures in the former country. We find that more restrictive policies to legal migration may lead to a *'boomerang-effect'* and rather than decrease overall migration inflows it might shift the balance from legal to illegal flows (where the increase in the latter might dominate the decrease in the former group). In this situation the alternative destination country might suffer from a diversion of migration flows and experience a reduction in economic welfare.

Furthermore, we investigate the consequences of free mobility of native workers between the two rich destination countries (combined as a federation of States). We find that labour market integration may lead to win-win or lose-lose situations depending on whether the migration flows within the common economic area reduce or amplify the misallocation of labour due to illegal migration from the third country. The results have important policy implications in particular for countries such as those EU members that have strongly integrated markets and represent alternative destinations for third country nationals.

Appendix

After substituting (15) and (16) to (5'), (6') and (13'), total differentiation of those three equations yields

$$\begin{bmatrix} 1-L_1^{w_A}w_A^{L_1} & -L_1^{w_A}w_A^{L_2} & 0 \\ -L_2^{w_A}w_A^{L_1}-L_2^{w_C}w_C^{L_1} & 1-L_2^{w_A}w_A^{L_2}-L_2^{w_C}w_C^{L_2} & -L_2^{w_C}w_C^{L_3} \\ -L_3^{L_1} & -L_3^{L_2} & 1 \end{bmatrix}\begin{bmatrix} dL_1 \\ dL_2 \\ dL_3 \end{bmatrix}= \qquad \text{(A1)}$$

$$=\begin{bmatrix} L_1^{w_A}w_A^{L_A} \\ L_2^{w_A}w_A^{L_A} \\ 0 \end{bmatrix}dL_A+\begin{bmatrix} 0 \\ 0 \\ L_3^{L_B} \end{bmatrix}dL_B+\begin{bmatrix} 0 \\ L_2^{w_C}w_C^{L_C} \\ L_3^{L_C} \end{bmatrix}dL_C+\begin{bmatrix} L_1^{\overline{Q}} \\ 0 \\ 0 \end{bmatrix}d\overline{Q}+\begin{bmatrix} 0 \\ L_2^{\theta} \\ 0 \end{bmatrix}d\theta$$

Where $X_i^{Y_j} \equiv \partial X_i / \partial Y_j$, $L_1^{\overline{Q}} < 0$, $L_1^{w_A} > 0$, $L_2^{w_A} > 0$, $L_2^{w_C} < 0$, $L_2^{\theta} < 0$
$-L_3^{L_C} = L_3^{L_B} = L_3^{L_1} = L_3^{L_2} = -1/3 < 0$, $w_A^{L_A} = w_A^{L_1} < w_A^{L_2} < 0$ and $-w_C^{L_C} = w_C^{L_1} = w_C^{L_2} = w_C^{L_3} > 0$

The determinant of matrix of LHS of (A1), Δ, is:

$$\Delta = -L_2^{w_C}w_C^{L_2}\left[1-L_1^{w_A}w_A^{L_1}-\frac{1}{3}\left(1-L_1^{w_A}w_A^{L_1}+L_1^{w_A}w_A^{L_2}\right)\right]+\left(1-L_1^{w_A}w_A^{L_1}\right)\left(1-L_2^{w_A}w_A^{L_2}\right)>0 \quad \text{(A2)}$$

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Figure 1 – The distribution of the labour stock in the developing Country *C*

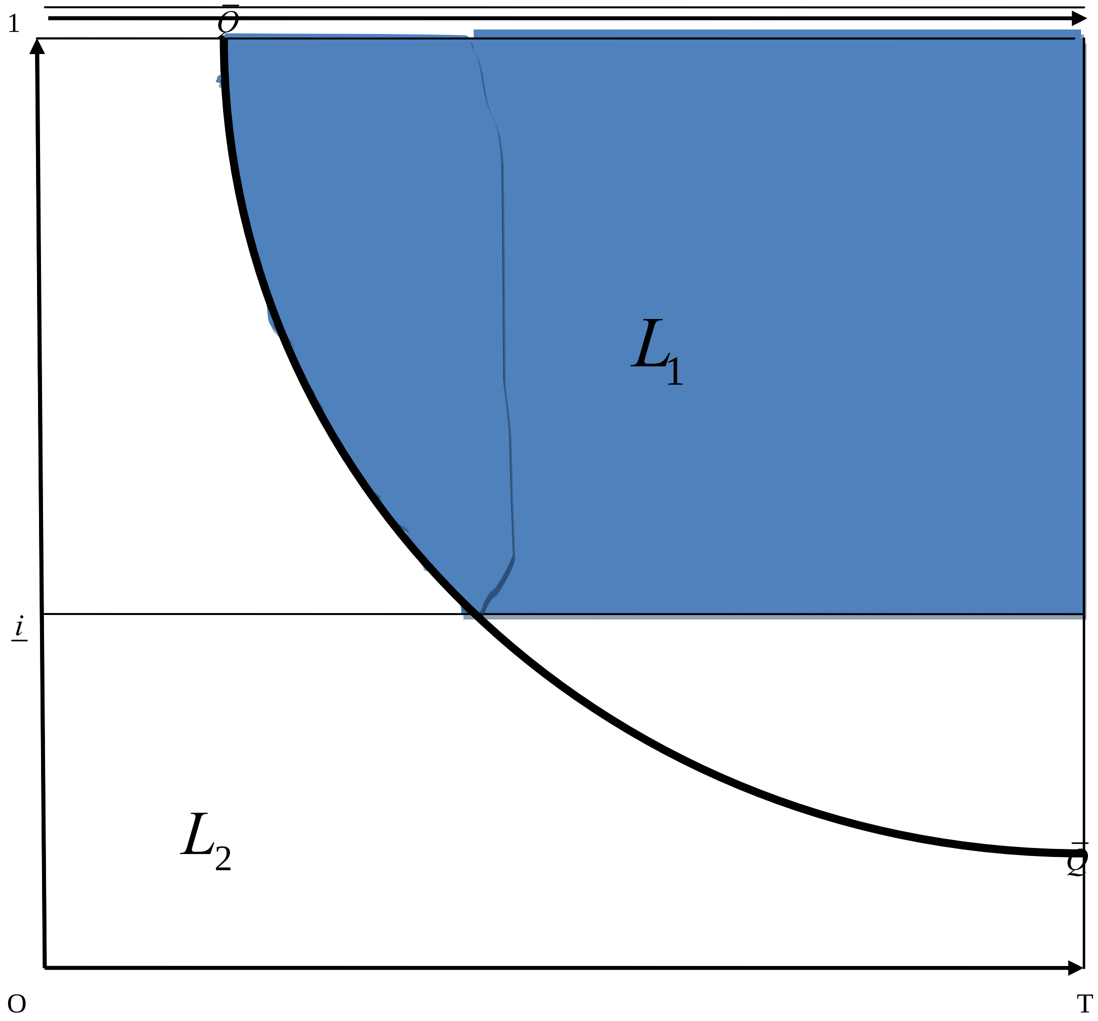

Figure 2 – Optimal Immigration Quota in Country *B*

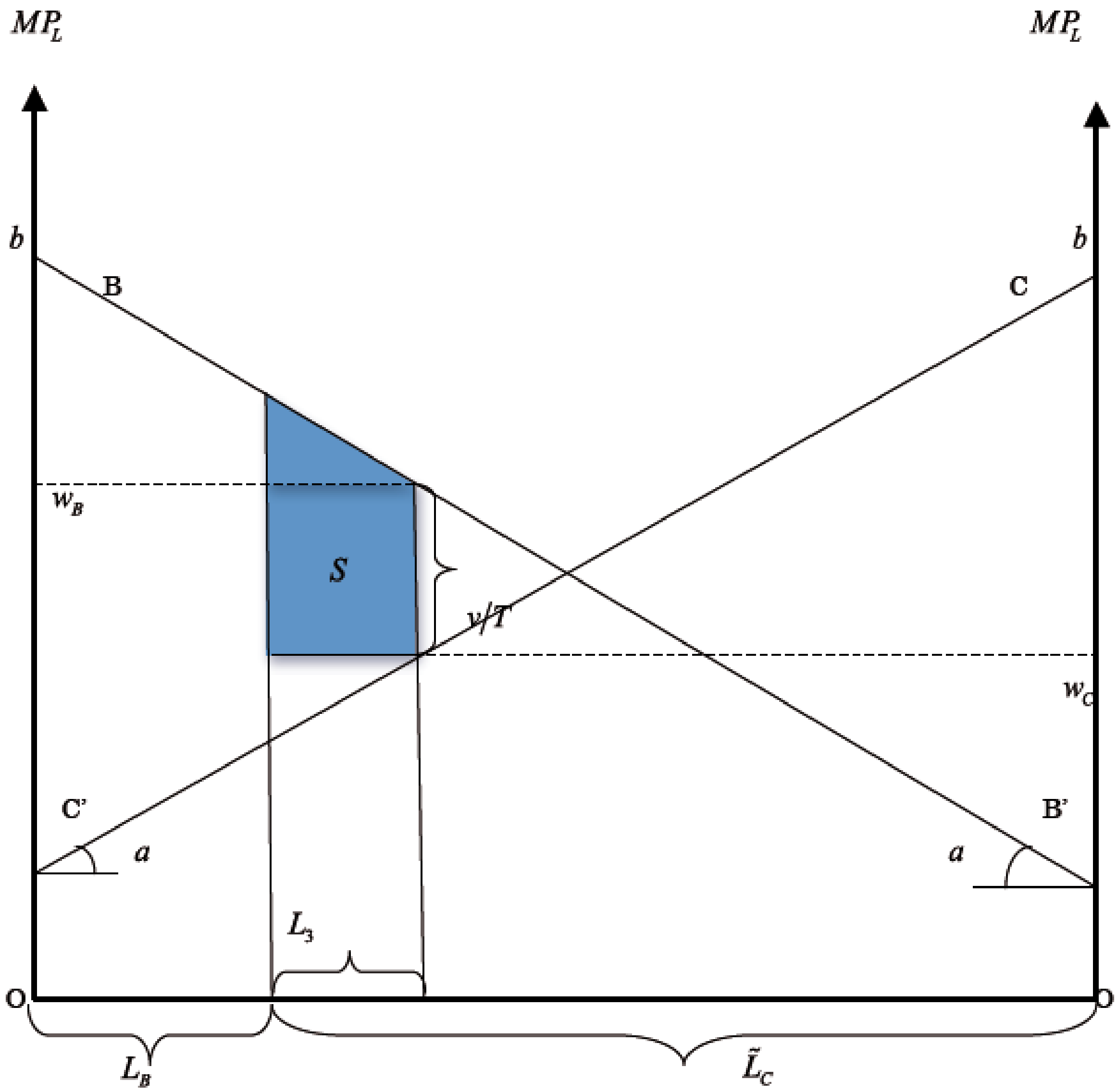

Figure 3 — Optimal restriction policies of country *A*