Return Migration and Illegal Immigration Control

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Abstract

This paper investigates the effects of immigration control policies when the duration of stay of illegal immigrants is endogenous because they may return home voluntarily. Return intentions turn out to be contentious for the optimal choice of immigration policy. First, we find that spending on border enforcement can potentially increase the total amount of illegal labor in the receiving country because while fewer illegals enter the country those who do enter stay longer. Second, in-site inspections unambiguously reduce illegal labor - however, this is not necessarily true in the presence of legalization programs. Third, higher penalties on apprehended migrants do not necessarily reduce illegal labor.

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1 Introduction

The issue of illegal immigration is of growing importance worldwide. According to ILO estimates, illegal migrants represent 10 to 15 per cent of total global migrant stocks and flows (ILO, 2004). In developed countries, illegal immigrants have been estimated to account for even one-third to one-half of new entrants, with an increase of 20 per cent over ten years (IOM, 2003). However, not all illegals intend to stay in their destination country forever. Empirical evidence shows that a significant fraction intends to immigrate only temporarily and return to their home country eventually (see for example Chiswick (1988), Massey and Liang (1990) and Borjas, Freeman and Lang (1991) for the US). In her study on Western Mexican immigrants, Reyes (1997) in fact finds that undocumented immigrants are much more likely to return than documented ones: about 50 percent of the former leave within two years and retention rates after 5 and 10 years, respectively, are between 30 and 50% lower than those of documented immi grants for both California and the US as a whole. Most recently, Conligio, De Arcangelis and Serlenga (2009) find that more than 70% of illegal immigrants to Italy had the intention to return home after an intended stay of 6 years on average.\footnote{Their findings are based on survey data on illegal immigration in Italy in 2003.}

If part of the illegal immigration is non-permanent voluntarily, this should matter for the effectiveness of policies against illegal immigration. In this paper, we develop a simple lifecycle model of migration to allow for both temporary and permanent immigration plans. We then evaluate common policies against illegal immigration while taking into account explicitly the migration decision of illegals. We distinguish between three types of individuals: those who want to emigrate temporarily, those who want to emigrate permanently and those who do not want to emigrate at all. Migrants have heterogeneous preferences for consumption at home but may use migration as a potentially temporary way to supplement their income, as expected wages are higher abroad than at home. Therefore, they face a trade-off between staying and returning: if they stay in the destination country, they forgo the benefit of consumption at home, whereas if they return home, they forgo the pecuniary advantage of earning a higher wage abroad.

In our framework, policies against illegal immigration affect the total amount of illegal labor both via their effect on the initial emigration decision and the subsequent return decision. As a result, policies can have implications that are very different compared to what has been emphasized in the existing literature, where the possibility of voluntary return is neglected. Considering two main types of policies against illegal immigration - external control (border enforcement) and internal control (employer inspections) - we find that only the latter decreases the stock of illegals unambiguously in our model. In
contrast, the effect of border control can be positive or negative. This is because, on the one hand, the number of people entering illegally decreases, but on the other hand, a number of temporary migrants changes their plans towards a permanent stay. We also consider the effects of two other policy instruments: amnesties and a penalty on detected migrants. We show that amnesties increase illegal immigration and can, moreover, invert the effect of employer inspections. Finally, increasing penalties on apprehended migrants is not necessarily effective either: higher penalties can increase illegal immigration.

Our paper contributes to two strands of the literature almost unconnected hitherto: illegal immigration and return migration. The economic literature on illegal immigration has been growing since early papers by Ethier (1986), Bond and Chen (1987) and Djajic (1987) who analyze border control and employer sanctions as two effective ways of combating illegal immigration. The subsequent literature has investigated the effects of policies against illegal immigration when taking into account various specific features of illegal immigration unrelated to return migration. For example, Djajic (1999) shows that border control and internal enforcement may increase the overall amount of illegal immigration because it may drive immigrants into sectors where they are harder to detect. Epstein, Hillman and Weiss (1999) consider that migrants may enter the host country legally but move into the illegal sector subsequently to avoid deportation. Chau (2001), Epstein and Weiss (2001) and Mayr, Minter and Krieger (2012) analyze the legalization of immigrants via an amnesty and interactions with other policies against illegal immigration. Friebel and Guriev (2006) consider the effectiveness of policies in the presence of debt-financed illegal immigration.

In turn, a number of studies have identified reasons for why the preferred duration of migration may be shorter than the feasible duration, for example because of a preference for consumption at home (Hill 1987, Djajic and Milbourne 1988, Dustmann 1997, 2003, Dustmann and Kirchmamp 2002), a greater return to host-country human capital at home (Dustmann 1995), a greater purchasing power of earnings at home (Stark, Helmenstein and Yegorov 1997), or borrowing constraints at home (Mesnard 2004). These papers identify important links between the migration duration and other variables of interest, but are typically framed in the context of legal migration only.

There are only two papers to the best of our knowledge that are close to ours in considering both illegal immigration and return migration. First, Hill (1987) raises the issue of temporary illegal immigration in his paper on return migration. However, he does not formally analyze the policy implications and, moreover, confines the discussion to border enforcement. Second, Carter (1999) assumes a higher quitting probability of illegal workers (compared to natives) due to return in an efficiency wage model. However, that probability is exogenous to the model and not derived from individual decisions. In contrast, our paper provides an analysis of optimal illegal immigration policies in a life-cycle model of illegal migration where the duration of stay is endogenous. In showing that some policies
against illegal immigration can become ineffective or even counterproductive, we provide an important and novel perspective on the effectiveness of illegal immigration control that should be taken into account in the design of policy.

The paper is organized as follows. Section 2 introduces the model. Section 3 derives the optimal decisions of migrants on (the timing of) migration and consumption. Section 4 analyzes the effects of immigration policies including border enforcement, employer inspections and amnesties. Some concluding remarks are offered in Section 5.

2 The Model

2.1 The Economic Environment

Consider a mass of individuals born in country H (home) and living for three periods. At the end of period 0, individuals contemplate whether to stay at home or to move illegally to country F (foreign). In H, they receive wage $h$ per period. In F they get the wage $f$, but only if they are not detected by authorities in F. If an individual is detected, he is deported back to H. This pattern holds in both period 1 and period 2. Additionally, people residing illegally at the beginning of period 2 decide whether to stay or return voluntarily to H.\(^2\)

All individuals are endowed with the same initial wealth $a_0$, but they are heterogenous in two respects. First, they differ in $h$, their earning opportunities at home. Second, there is variation in the individual attachment to home: people generally prefer living in H over living in F, but at different degrees. In line with the existing literature (e.g. Hill, 1987), we depict this preference by a factor $\rho$ by which marginal utility of consumption at home exceeds marginal utility from consumption abroad. To focus our analysis, we assume that $\rho$ is distributed over the interval $[1, \infty)$, and $h$ is distributed over $[0, f]$. So we assume that every individual considers consuming at home at least as good as consuming in F and has non-inferior wage prospects abroad. Let $g(\rho, h)$ and $G(\rho, h)$ denote the (cumulative) distribution functions.

Utility of individuals can be described as:

$$U = c_1 [1 + (\rho - 1)d_1] + c_2 [1 + (\rho - 1)d_2], \quad (1)$$

where $c_t$ is consumption in period $t \in 1, 2$. The dummy variable $d_t$ captures the effect of location on utility from consumption and is equal to one when the individual is located in H and equal to zero when it resides in F in period $t$. Apart from location, period

\(^2\)In order to concentrate on return migration, we assume that emigration to F is possible only in period 1. Thus, postponing migration or reentering is not allowed.
1- and period 2-consumption are perfect substitutes.\footnote{This is well in line with the common assumption of risk-neutral migrants in the literature (Ethier, 1986; Carter, 1999; Friebel and Guriev, 2006).} For simplicity, we abstract from consumption before the migration decision.

\section*{2.2 Timing of events}

In our model, individuals face the following decision problems: whether to migrate abroad or not, whether to return or not in case that they migrate, and how much to save and consume. The timing of events and decisions is as follows.

**Period 0:** Individuals residing in H decide whether to stay in H or to emigrate to F illegally. Emigration requires a financial investment $b$.

**Period 1:** At the beginning of the period, a share $1 - \pi > 0$ of immigrants in F is detected and deported to H. There, they earn $h$, like all other residents in H. The share of undetected migrants $\pi > 0$ works in F and earns $f$. At the end of the period, all individuals decide on how much to consume and save at their current location.

**Period 2:** At the beginning of the period, immigrants in F decide whether to stay or to return to H voluntarily. Among those deciding to stay, the share $1 - \pi$ is detected and deported. Like in period 1, they receive the wage $h$. The rest succeeds to stay in F and earns $f$. At the end of the period, all individuals consume their remaining wealth at their location.

\section*{3 Migrant Decisions}

In this section, we determine the individually optimal location and consumption decisions as described above. Due to the sequential structure, we proceed by backward induction, starting with the return decision in period 2.

\subsection*{3.1 Period 2: The Return Migration Decision}

Consider individuals residing illegally in F at the beginning of period 2. Based on a comparison of the respective utility levels, they decide whether to return home or try to remain in F. As this period is the last period of their life, individuals consume their total earnings of that period plus all remaining wealth, which we label $a_2$. Thus, utility in period 2 in case of voluntary return amounts to:

$$V_T^2 \equiv \rho (a_2 + h) \quad (2)$$
and in case of an (intended) stay to:

\[ V_2^P = (1 - \pi)\rho (a_2 + h) + \pi (a_2 + f). \]  

(3)

Deportation reduces the individual income level but increases the utility derived from this income.\(^4\)

Comparing the two utility levels \( V_2^T \) and \( V_2^P \), we have:

**Proposition 1.** An illegal worker residing in \( F \) at the beginning of period 2 returns home voluntarily, if he has a sufficiently strong attachment to home. The share of returnees is the smaller, the higher (lower) the foreign (home) wage \( f \) (\( h \)) and the lower current individual wealth \( a_2 \).

**Proof.** We can express the indirect expected utility of migrants in period 2 as:

\[ V_2 = \begin{cases} 
(1 - \pi)\rho (a_2 + h) + \pi (a_2 + f) & : \rho \leq \rho_2^T \\
\rho (a_2 + h) & : \rho \geq \rho_2^T 
\end{cases} \]

(4)

which is a function of the threshold level of home attachment where utility in case of return (2) and stay (3) is the same:

\[ \rho_2^T = \frac{a_2 + f}{a_2 + h}. \]

(5)

As \( \frac{\partial V_2^T}{\partial \rho} > \frac{\partial V_2^P}{\partial \rho} \), all people with \( \rho > \rho_2^T \) prefer to return to \( H \) and all those with \( \rho < \rho_2^T \) prefer to stay in \( F \). Thus, the higher \( \rho_2^T \), the fewer illegals return voluntarily. The comparative statics on \( \rho_2^T \) are straightforward from (5).

The intuition behind this finding is simple. Staying abroad provides a higher income, but at the price of lower marginal utility of consumption. If the attachment to home \( \rho \) is sufficiently strong, the latter effect dominates and it is worthwhile to return. An increase in \( f \) (or a decrease of \( h \)), however, makes returning less lucrative, just like a decrease in wealth \( a_2 \), which reduces the relative utility gain from returning home. This is due to the fact that all of period-2 wealth is consumed in that period. Note that the detection probability does not matter for return decisions because utility in case of voluntary return equals utility in case of deportation. In sum, we find that people with a low attachment to home, a high wage differential and low wealth intend to stay abroad longer.

\(^4\)Assuming that the deported can take all their current wealth back home complies with the general literature and is also corroborated by the fact that fines play a minor role at best in most actual immigration policies. However, we address the effects of fining the deported in Section 4.4.
3.2 Period 1: The Consumption Decision

Consider now illegals residing in F at the beginning of period 1. A fraction $1 - \pi$ of them is detected and sent back home immediately. These people work in H for two periods and earn lifetime income $a_1 + 2h$, where $a_1$ denotes individual immigrant wealth at the beginning of period 1. Being indifferent between consumption in period 1 or period 2, their utility in this case amounts to $\rho [a_1 + 2h]$.

In contrast, the share $\pi$ succeeds to stay in F for at least period 1 and earns the wage $f$.$^5$ At the end of the period, each migrant decides how much of his current resources $a_1 + f$ to consume now and to save. Obviously, there is a trade-off because higher current consumption decreases period 2-wealth and hence future consumption: $a_2 = a_1 + f - c_1$.

**Proposition 2.** For all migrants undetected in period 1, it is optimal to save all current income.

**Proof.** Illegal residents in F maximize utility:

$$U = c_1 + \begin{cases} \pi(a_1 + 2f - c_1) + (1 - \pi)\rho(a_1 + f + h - c_1) & : \rho \leq \rho^T_1 \\ \rho(a_1 + f + h - c_1) & : \rho > \rho^T_1 \end{cases},$$

with respect to period 1-consumption. This gives the first-order conditions:

$$\frac{\partial U}{\partial c_1} = \begin{cases} -(1 - \pi)(\rho - 1) & : \rho \leq \rho^T_1 \\ -\rho - 1 & : \rho > \rho^T_1 \end{cases},$$

which are negative when $\rho > 1$. Therefore, in optimum $c_1 = 0$ or, equivalently, $a_2 = a_1 + f$.

This result is due to the home bias in consumption. Temporary migrants have an obvious incentive to defer consumption because they will enjoy a higher marginal utility in period 2 for sure. But also those intending to stay permanently gain from postponing consumption, because they will (have to) live in H instead of F with positive probability $1 - \pi$. Consumption in period 1 and period 2 would only be equivalent for a migrant who was certain to live in F for both periods. In this sense, deferring consumption works as a compensation for the expected income loss from deportation.

We can now re-write the threshold for home attachment, which determines permanent and temporary migration decisions, as a function of wealth at the beginning of period 1, $a_1$:

$$\rho^T_1 = \frac{a_1 + 2f}{a_1 + f + h}.$$  

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$^5$The is no voluntary remigration in period 1, as migrants have just borne a cost for entering F the country. An immediate return would preclude any possible reward of this investment.
For further reference, we express this threshold level as a function of $h$, with a higher wage at home promoting voluntary return: $\frac{\partial \rho}{\partial h} < 0$. Again, people with greater wealth are more likely to return home after period 1, $\frac{\partial \rho}{\partial a} < 0$, because the utility gain from staying becomes smaller relative to the cost. The effect of the wage in $F$ is qualitatively a little bit more involved. On the one hand, the expectation of a higher $f$ in period 2 makes staying for this period more worthwhile. On the other hand, a higher $f$ in period 1 increases period 2-wealth, so not consuming at home produces a larger utility loss. However, in our simple specification, the first effect dominates and better income opportunities in $F$ prolong the preferred length of stay.

Collecting informations, we can express the expected utility of illegal immigrants to $F$ from the perspective of the beginning of period 1 as:

$$V_1 \equiv \begin{cases} 
(1 - \pi)\rho [a_1 + 2h] + \pi [(1 - \pi)\rho [a_1 + f + h] + \pi [a_1 + 2f]] & : \rho < \rho_T^1 \\
(1 - \pi)\rho [a_1 + 2h] + \pi \rho [a_1 + f + h] & : \rho \geq \rho_T^1 
\end{cases} \quad (7)$$

A migrant planning to stay in $F$ for both periods is detected in period 1 with probability $1 - \pi$ and is detected only in period 2 with probability $(1 - \pi)\pi$. In each case, he consumes in $H$. With the remaining probability $\pi^2$, he stays in $F$, in which case his marginal utility of consumption is lower. A migrant planning to return voluntarily lives in $F$ in period 1 with probability $\pi$ and consumes at home for sure in period 2. For further reference, we denote the expressions in (7) by $V_1^P$ (permanent, top line) and $V_1^T$ (temporary, bottom line).

### 3.3 Period 0: The Emigration Decision

In period 0, all individuals decide whether to move illegally to $F$ or to remain in $H$ for the rest of their lives. Each person opting for the latter gains lifetime utility:

$$V_0^H = \rho [a_0 + 2 \cdot h], \quad (8)$$

which is independent of the distribution of consumption between the two periods.

Similar to Friebel and Guriev (2006), we assume that crossing the border requires a financial investment $b$. This could, for example, represent a migration fee paid for the services of a professional smuggling organization. To simplify matters, we assume that the fee does not exceed initial income $a_0$. Hence, expected lifetime utility from illegal migration in period 0 is given by (7) with period 1-wealth: $a_1 = a_0 - b$.

**Proposition 3.** Individuals with a sufficiently low home wage $[h < h^T]$ choose to emigrate either temporarily or permanently. They choose the latter, if their home attachment is

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*See Friebel and Guriev (2006) for a comprehensive analysis based on debt-financed illegal migration.*
sufficiently weak \( \rho \leq \rho^P(h) \). Individuals with a sufficiently high home wage \( h > h^T \) either stay at home or plan to emigrate permanently. They choose the latter, if their home attachment is sufficiently weak \( \rho \leq \rho^P(h) \).

**Proof.** Individuals face three basic options: temporary, permanent or no emigration. In period 0, expected utility from temporary migration is:

\[
V_T^0 = \rho \left[ (1 - \pi)(a_0 - b + 2h) + \pi(a_0 - b + f + h) \right].
\]

(9)

As the utility of staying in H is given by (8), we have:

\[
V_T^0 \geq V_H^0 \iff h \leq f - \frac{b}{\pi} \equiv h^T.
\]

(10)

Thus, no migration is never the preferred choice when \( h < h^T \). Likewise, temporary migration is never optimal when \( h \geq h^T \). As a consequence, the decision problem boils down to a decision between temporary versus permanent emigration for a low home wage and a decision between permanent versus no migration for a high home wage. For \( h < h^T \), we know from (6) that:

\[
V_T^0 \geq V_P^0 \iff \rho \geq \rho^T(h) = \frac{a_0 - b + 2f}{a_0 - b + f + h}.
\]

(11)

For \( h \geq h^T \), we compare \( V_H^0 \) to:

\[
V_P^0 = \rho(1 - \pi) [a_0 - b + 2h] + (1 - \pi)\pi \rho [a_0 - b + f + h] + \pi^2 [a_0 - b + 2f]
\]

(12)

to get:

\[
V_P^0 \geq V_H^0 \iff \rho \leq \frac{\pi^2 (a_0 - b + 2f)}{\pi^2 a_0 + (1 - \pi^2)b - \pi(1 - \pi)f + \pi(1 + \pi)h} \equiv \rho^P(h).
\]

Figure 1 illustrates the three groups of permanent migrants, temporary migrants and non-migrants depending on their home attachment \( \rho \) and wage at home \( h \). Temporary migrants are located above \( \rho^T \) to the left of \( h^T \) (area C), permanent migrants are below the minimum of \( \rho^T(h) \) and \( \rho^P(h) \) (areas A and B), and individuals above \( \rho^P(h) \) to the right of \( h^T \) decide not to migrate at all.

The intuition behind this migration pattern is as follows. The decision between temporary and no migration is determined by the wage differential. Going abroad is worthwhile only if the home wage is sufficiently low, such that the expected benefit from one-period migration \( \pi(f - h) \) exceeds the migration cost \( b \). The home bias for consumption plays no role here, because consumption takes place in H under either alternative. In contrast, the decision between permanent and no migration is determined by the trade-off between the benefits of higher earnings abroad and those of greater utility from consuming at home. The higher the home bias, the more attractive is no migration compared to permanent migration, and
Return Migration and Illegal Immigration Control

the lower must the home wage be for migration to be attractive. As a consequence, both thresholds $\rho^T$ and $\rho^P$ decrease in $h$. Because of $\rho^P(h^P) = 1$ with:

$$h^P \equiv f - \frac{b}{\pi(1 + \pi)},$$

(13)

individuals with a very low wage differential ($h \geq h^P$) prefer to stay home anyway. For them, the expected benefit of permanent migration $\pi(1 + \pi)(f - h)$ falls short of the required investment $b$. These people would emigrate only if they had a preference for consuming abroad ($\rho < 1$).

As a consequence, ignoring return incentives leads to a distorted assessment of the size of illegal migration flows. This distortion arises in the group of individuals with a low home wage and a strong home bias, for whom it is optimal to migrate only temporarily. Looking exclusively at permanent migration is tantamount to considering the $\rho^P(h)$-curve only. This would predict that within area C, workers with $\rho > \rho^P(h)$ would not emigrate at all and those with $\rho \in [\rho^P(h), \rho^T(h)]$ would stay for both periods instead of one. Hence, the amount of illegal immigration would be understated in terms of the number of migrants. In terms of hours worked, however, both an under- and overstatement is possible - depending on the share of temporary and permanent migrants and, therefore, on the shape of the distribution function over home biases and wages. If the mass of individuals in area C between $\rho^P(h)$ and $\rho^T(h)$ exceeds the mass above $\rho^T(h)$, the true amount of illegal labor is higher than projected by considering permanent immigration only.

4 Immigration Control

Distinguishing between temporary and permanent illegal immigrants has important implications for the effectiveness of immigration control policies. In the following, we consider the impact of border enforcement, employer inspections, amnesties, and fines on apprehended migrants on the amount of illegal immigration, while taking into account both direct and indirect effects via the emigration and return migration decisions of migrants.

The total amount of illegal work over both periods amounts to:

$$I = \pi(1 + \pi) \left[ \int_{0}^{h^T} \int_{1}^{\rho^T(h)} g(\rho, h) d\rho dh + \int_{h^T}^{\rho^P} \int_{1}^{\rho^P(h)} g(\rho, h) d\rho dh \right] + \pi \int_{0}^{h^T} \int_{\rho^T(h)}^{\infty} g(\rho, h) d\rho dh.$$

(14)

The first term measures the number of permanent migrants (the fraction $\pi$ of individuals located in the areas A and B of Figure 1) and the second one the number of temporary migrants (the fraction $\pi$ of area C). As the share $1 - \pi$ of undocumented workers is
apprehended each period, the fraction \( \pi \) of return migrants works in \( F \) in period 1. The probability that a migrant intending to stay permanently is undetected for both periods amounts to: \( \pi + \pi^2 = \pi(1 + \pi) \), which equals his average length of stay.

Our premise is that country \( F \) wants to reduce \( I \) and we scrutinize to what extent the various existing policies are conducive to this.\(^7\) So we discuss the effectiveness of these instruments rather than whether immigration control is desirable at all.\(^8\) Identifying the optimal policy would require a detailed knowledge of the distribution function \( g(\rho, h) \) and the costs pertaining to the different measures.\(^9\) Without this information, we restrict ourselves to an evaluation of policy effectiveness against illegal immigration. Here, we are able to produce some interesting and novel insights.

From Figure 1 and (14), it is obvious that the amount of illegal labor is crucially affected

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\(^7\) For arguments why the host country may be reluctant to combat illegal immigration, see Hillman and Weiss (1999) or Entorf (2002).

\(^8\) This question has been extensively dealt with in the existing literature, see for example Yoshida (2000) for a theoretical overview and Bean, Telles and Lowell (1987) for a survey of empirical studies on the impact of illegal immigration on the US labor market.

\(^9\) Moreover, the comparison is impaired by the fact that instruments differ in durability in our model: border interdiction requires spending in period 1, whereas inspections create costs in period 1 and 2.
by the thresholds $\rho^T(h)$, $\rho^P(h)$ (and, correspondingly, $h^T$ and $h^P$)\(^{10}\) as well as $\pi$, which determine the sizes of areas A-C and the fraction of migrants unapprehended. A ceteris paribus decrease of either threshold reduces $I$: a lower $\rho^T(h)$ and a lower $\rho^P(h)$ both reduce area A plus B.

This is important information, since the policies to be considered below typically affect various parameters and thresholds simultaneously. It allows us to conclude that a policy is unequivocally effective only when it decreases at least one of the relevant variable $\pi$ or functions $\rho^T(h), \rho^P(h)$ without increasing any of the other ones. If that property does not hold, the policy exerts countervailing effects on $I$ and the total impact can only be assessed by a proper knowledge of $g(\rho, h)$, which determines the relative strength of effects.

Therefore, our subsequent analysis will focus on the policy effects on $\pi, \rho^T(h)$ and $\rho^P(h)$.

4.1 Border Enforcement

A common policy instrument for tackling illegal immigration is a greater enforcement of border controls. In our model, stricter enforcement equals an increase in $b$, reflecting the idea that intermediaries charge a higher fee for their services when it becomes harder to cross the border (Friebel and Guriev, 2006). This mechanism is confirmed by US-evidence.\(^{11}\)

**Proposition 4.** Border enforcement has an ambiguous effect on the total amount of illegal immigration. It reduces the number of temporary migrants, but can increase the number of permanent migrants.

**Proof.** follows from the fact that:

\[
\frac{\partial \pi}{\partial b} = 0, \quad \frac{\partial h^T}{\partial b} = -\frac{1}{\pi} < 0, \\
\frac{\partial \rho^P}{\partial b} = -\frac{\pi^2[a_0 + \pi(2-\pi)(1+\pi)f + \pi(1+\pi)h]}{[\pi^2a_0 + (1-\pi^2)b - \pi(1-\pi)f + \pi(1+\pi)h]^2} < 0, \\
\frac{\partial \rho^T}{\partial b} = \frac{f - h}{[a_0 - b + f + h]^2} > 0.
\]

There are two countervailing effects behind this result. First, stricter border controls improve the attractiveness of staying at home compared to either form of emigration. This is

\(^{10}\) $h^T$ and $h^P$ are implicitly defined by $\rho^T(h) = \rho^P(h)$ and $\rho^P(h) = 1$, respectively.

\(^{11}\) As border control in the US increased, the (inflation-adjusted) average price for smuggler services at the US-Mexico border increased from $1250 in the late 1990s to $2750 in 2008 (Hanson, 2009). Gathmann (2008) also finds that migration fees increase with border control intensity.
reflected in the decrease of \( h^T \), and \( \rho^P(h) \), which reduces the number of clandestine immigration (areas C and A+B shrink). But second, the profitability of permanent over temporary migration increases: higher spending on border crossing \( b \) diminishes immigrants’ wealth \( a_1 = a_0 - b \) and, hence, the utility gain from return migration. The concomitant rise of \( \rho^T(h) \) changes the composition of immigrants such that some abandon their plans to return and choose to stay in F permanently. Thus, area A grows at the expense of area C, which increases the total amount of illegal immigration. As a consequence, the overall effect on illegal immigration is ambiguous, depending on how the distribution function \( G(\rho, h) \) is shaped in the respective areas.

The possible ineffectiveness of border controls results from a change from temporary to permanent migration for some individuals, which is induced by the lower wealth immigrants possess after their arrival in F. As a result, some migrants with low home attachment prolong their duration of stay. This argument is germane to return incentives and is overlooked when only permanent migration is considered. Moreover, the result stands in contrast to the bulk of the literature. With the exceptions of Hill (1987) and Djajic (1999), theoretical approaches usually take the effectiveness of border enforcement policies for granted.\(^{12}\) If at all, observed deficiencies of this instrument are rooted in possible inefficiencies in terms of raising net national income (Ethier, 1986; Bond and Chen, 1987), as the cost of border patrol exceeds possible adverse factor price effects.\(^{13}\)

### 4.2 Employer Inspections

Another common instrument is to track illegal workers via in-site inspections, deport them and impose a fine on the respective company. Thus, this policy tackles illegal immigration more from the demand side, in contrast to the rather supply-oriented border controls. In the realm of our model, employer inspections correspond to an increase in the probability of internal apprehension, that is a decrease in \( \pi \), combined with a fine \( q \) to be paid by the firm.\(^{14}\)

Even though fines are formally levied on the employer, they affect the labor market return of migrants. As firms are only willing to employ an illegal worker when the expected cost of hiring does not exceed the cost of hiring a regular worker, the economic incidence of

\(^{12}\)Djajic (1999) argues that migrants’ offsetting reactions can be strong enough to increase the overall level of immigration. Hill (1987) mentions the possible wealth effects of migration costs in the context of illegal immigration.

\(^{13}\)The empirical literature typically studies deterrence effects of border control, which some studies identify to be only weak (e.g. Hanson et al., 2002).

\(^{14}\)Analogous results could be derived with respect to the level of the fine. Like the references quoted in the paragraph below, we take the fine as given - mainly for the sake of brevity.
the fine is borne by the migrant. Thus, the migrant wage goes below the regular wage, $\hat{f}$, by the expected fine (Ethier, 1986; Djajic, 1999; Woodland and Yoshida, 2006):

$$f = \hat{f} - (1 - \pi) \cdot q.$$  \hspace{1cm} (15)

An increase in $\pi$ therefore exerts a downward pressure on migrant wages. We call this the wage effect of employer inspections.

**Proposition 5.** Employer inspections decrease the total amount of illegal immigration.

**Proof.** follows from:

$$\frac{\partial \pi}{\partial \pi} = 1, \quad \frac{\partial \rho^T}{\partial \pi} = q \cdot \frac{a_0 - b + 2h}{[a_0 - b + f + h]^2} > 0,$$

$$\frac{\partial \rho^P}{\partial \pi} = \frac{\pi(a_0 - b + 2f)(2b - \pi f + \pi h)}{[\pi^2 a_0 + (1 - \pi^2)b - \pi(1 - \pi)f + \pi(1 + \pi)h]^2} > 0,$$

where the sign of the last expression follows from $2b - \pi f + \pi h \geq b > 0$ due to $h \geq h^T = f - b/\pi$ in the relevant range. Thus, all thresholds decrease with an intensification of inspections, i.e. a decrease in $\pi$. Areas A+B become smaller\textsuperscript{15} and a smaller fraction of people in theses areas stays undetected. \hfill \blacksquare

Employer inspections have a direct negative effect on the illegal workforce as a greater share of them is detected. Moreover, they decrease the effective wage to be earned in F and, thereby, diminish the incentives both to emigrate at all and to stay abroad for both periods. Interestingly, there are countervailing effects on return incentives. On the one hand, the wage effect in period 1 reduces period 1-wealth, which reduces return incentives. On the other hand, the lower wage in period 2 increases return incentives. In sum, the latter effect dominates, such that employer inspections are a proper tool to control the illegal influx of labor.

This result is mostly uncontested in the theoretical literature (Ethier, 1986; Chau, 2001; Friebel and Guriev, 2006).\textsuperscript{16} However, some empirical evidence for the U.S. argues that employer inspections and fines have at best minor deterring effects (Chiswick, 1988).\textsuperscript{17} Our interpretation of this evidence is that problems of employer inspections are a problem of lacking information and enforcement rather than of the instrument itself.

\textsuperscript{15} In addition, area C becomes smaller, as $\frac{\partial h^T}{\partial \pi} = [q + \frac{b}{\pi^2}] > 0$.

\textsuperscript{16} Djajic (1999) finds that employer inspections may be ineffective in the presence of sectoral relocation of migrants.

\textsuperscript{17} For that reason, some theoretical work abstracts from this instrument (Carter, 1999).
4.3 Amnesties

Legalizing migrants is a recurrent theme in many receiving countries. Among others, Spain and the U.S. have enacted comprehensive amnesties in recent years. Our interest is to see how such amnesties affect illegal immigration and how they interact with other policy instruments. Following Chau (2001), we model amnesties by introducing some probability $\mu$ that the migrant gains full legal status and earns the regular wage $\hat{f}$. With probability $1 - \mu$ the migrant remains illegal and earns wage $f$ as defined in (15).

As the prospect of legalization can make illegal immigration more attractive, real world amnesties are usually not granted to all illegals but only to those who can document a minimum duration of residence in the country. This has also been the case in the above mentioned legalization waves. We incorporate this feature by assuming that the probability of become legalized is positive only in period 2. In period 1, no amnesties are granted and each migrant faces the risk $1 - \pi$ of detection and deportation as before.

Before deriving further results, it is necessary to adjust the host country’s objective function to the present context. Because amnesties transform illegal labor into regular employment, it is misleading to look at the total amount of illegal labor here. In fact, a comprehensive amnesty ($\mu = 1$) would do away with all illegal employment in period 2, but can hardly be considered a purposive policy to combat illegal immigration. Therefore, we change our focus here to total immigration rather than total illegal immigration in $F$ over both periods. Encompassing all illegal and legalized foreign workers, this measure is equivalent to (14) with the threshold values $\rho^{T}(h)$ and $\rho^{P}(h)$ depending on $\mu$ as shown in the following.

The decision on an amnesty is taken in period 2 after the migrant’s choice of location. Therefore, the prospect of getting legal status affects the return decision. The expected utility from staying becomes:

$$
\mu(a_2 + \hat{f}) + (1 - \mu) [(1 - \pi)\rho(a_2 + h) + \pi(a_2 + f)]
$$

$$
= (1 - \mu)(1 - \pi)\rho(a_2 + h) + (1 - (1 - \mu)(1 - \pi))a_2 + \mu\hat{f} + (1 - \mu)\pi f.
$$

(16)

Since utility from voluntary return is still given by (2), the amnesty has an impact on the home bias threshold determining return decisions. Now, individuals with a home bias of at least: $(a_2 + f_\mu)/(a_2 + h)$ decide to return to $H$ at the beginning of period 2, where:

$$
f_\mu = \frac{\mu\hat{f} + (1 - \mu)\pi f}{\mu + (1 - \mu)\pi}
$$

denotes the average wage expected in $F$ in period 2. This expression increases in the probability of legalization. As a result, amnesties change the migration pattern towards more permanent and less temporary migration.
As before, migrants defer consumption to period 2: $a_2 = a_1 + f$. This is because the marginal utility of consumption in period 1 still equals unity and is lower than the expected marginal utility of consumption in period 2 regardless of return intentions. In period 2, a temporary migrant enjoys marginal utility $\rho$ from consumption at home, whereas according to (16) a permanent migrant has expected marginal utility $(1-\mu)(1-\pi)\rho + 1 - (1-\mu)(1-\pi) = 1 + (1-\mu)(1-\pi)(\rho - 1) > 1$. Thus, amnesties do not alter saving decisions.

Utilizing this result and $a_2 = a_0 - b + f$, we get the home bias threshold for temporary versus permanent migration from the perspective of period 0:

$$\rho^P(\mu)(h) = \frac{a_0 - b + f + f_\mu}{a_0 - b + f + h}. \quad (17)$$

Migrants with a preference for home consumption of at least $\rho^T(\mu)$ return voluntarily after period 1 and enjoy total expected utility according to (9). The rest prefers to stay in $F$ and has total expected utility:

$$\rho(1-\pi)(a_0 - b + 2h) + \pi\left[\mu(a_0 - b + f + \hat{f}) + (1-\pi)[(1-\pi)\rho(a_0 - b + f + h) + \pi(a_0 - b + 2f)]\right]. \quad (18)$$

For the decision between no migration and permanent migration, we compare utilities (8) and (18) to derive the threshold:

$$\rho^P(\mu)(h) \equiv \frac{\pi(\mu + (1-\mu)\pi)(a_0 - b + f + f_\mu)}{a_0\pi(\mu + (1-\mu)\pi) + (1-\pi)(1 + (1-\mu)\pi)b - (1-\mu)\pi(1-\pi)f + \pi(1+\pi)(1-\mu)h}. \quad (19)$$

From (19) together with $\rho^P(h^P) = 1$, we get:

$$h^P = f - \frac{b - (1-\pi)\mu q}{\pi[2 - (1-\pi)(1-\mu)]},$$

which is increasing in $\mu$. Since $\rho^P$ is a decreasing function of $h^P$, it follows that $\rho^P$ is increasing in $\mu$, as well.

**Proposition 6a.** *Amnesties increase the total amount of immigrant labor.*

**Proof.** Follows from Proposition 3 together with the fact that $\rho^P(\mu)$ and $\rho^T(\mu)$ increase. ■

The possibility of an amnesty increases the expected utility from permanent migration. Moreover, it leaves the utility of both alternatives unchanged: because the amnesty is tied to a minimum duration of stay, the expected utilities of both temporary and no emigration are not altered, and so is $h^T$. All persons with a sufficiently low home wage $h < h^T$ migrate either for one or for two periods, and choose the former if their home bias for consumption
Return Migration and Illegal Immigration Control

is at least as high as $\rho^T_\mu$ from (17) (area C). Individuals with a higher home wage aim for either permanent or no migration.

As expected and in line with much of the literature (Chau, 2001; Epstein and Weiss, 2001), the prospect of legalization fosters immigration incentives. Moreover, we can show that it weakens the effectiveness of employer inspections:¹⁸

**Proposition 6b.** In the presence of amnesties, employer inspections can become an ineffective tool for immigration policy: they can now increase the total amount of immigrant labor.

**Proof.** For a possible ineffectiveness of employer inspections, at least one of the thresholds $\rho^P$ and $\rho^T_\mu$ must increase in $\pi$. From (17), the effect of tighter controls (a reduction of $\pi$) on $\rho^T_\mu$ is as follows:

$$-\frac{d\rho^T_\mu}{d\pi} = -\frac{\partial \rho^T_\mu}{\partial f} \frac{df}{d\pi} - \frac{\partial \rho^T_\mu}{\partial f^*_\mu} \frac{df^*_\mu}{d\pi},$$

depicting the effects both on the period 1-wage and on the expected average earnings in F in period 2. The wage effect in the first period is unambiguously positive:

$$-\frac{\partial \rho^T_\mu}{\partial f} \frac{df}{d\pi} = \frac{(h - f^*_\mu)q}{(a_0 - b + f + h)^2} > 0,$$

whereas the reaction of expected average earnings in period 2 is ambiguous:

$$-\frac{\partial \rho^T_\mu}{\partial f^*_\mu} \frac{df^*_\mu}{d\pi} = \frac{1}{[a_0 - b + f + h]} \cdot \frac{(1 - \mu)q(\pi^2 - \mu(1 - \pi)^2)}{[\mu + (1 - \mu)\pi]^2}. \quad (20)$$

For $\mu < 1$, (20) is negative (positive) iff $\mu$ is less (greater) than $\frac{\pi^2}{(1 - \pi)^2}$. Moreover, (20) is definitely zero for $\mu = 1$. Therefore, we must have $\frac{d\rho^T_\mu}{d\pi} > 0$ for at least sufficiently high $\mu$. Consequently, the efficacy of employer inspections is not warranted.

There are two mechanisms behind this possible adverse effect of amnesties on the efficacy of employer inspections. First, suppose for the moment that sanctions decrease $f^*_\mu$, the earnings expected from staying. Then, amnesties reduce the bite of inspections: the higher the probability of authentication, the less the risk of being detected matters. In the polar case of a comprehensive amnesty ($\mu = 1$), no migrant would care about inspections in period 2 and only the effect on the period 1-wage matters. As employer sanctions reduce that wage, migrants become poorer and are inclined to remain in F for another period.

Consequently, stronger inspections can cause an increase in the total amount of foreign labor via a shift from temporary to permanent migration. It should be stressed that this effect occurs (1) despite the fact that the total number of foreign workers goes down ($h^T, h^P$

---

¹⁸Chau (2001) and Friebel and Guriev (2006) also highlight interactions between this instrument and amnesty policy.
Return Migration and Illegal Immigration Control

and $\rho^P$ decrease in $\pi$ for all $\mu$) and (2) not because of the higher incentive to stay due to the amnesty prospect per se but because of the countervailing effects of employer sanctions over time. In a sense, this result stresses that immigration policies should be consistent, as the effectiveness of employer sanctions can be weakened by subsequent amnesties.

But, second, the premise that sanctions reduce the earning prospects in F is not necessarily fulfilled. In the presence of amnesties, in-site inspections have a dual impact on average expected earnings abroad, because they affect both the level of the wage of immigrants when illegal and their likelihood of receiving the (higher) official wage in the course of an amnesty. The two effects run in opposite directions: when inspections increase, illegal workers’ earnings are reduced by the wage effect on the one hand but, on the other hand, fewer illegals remain in F such that a greater share of migrants receives the high official wage $\hat{f}$. The first effect dominates the latter when the probability of attaining legal status is low and vice versa, when $\mu$ is sufficiently high.\(^{19}\) Therefore, it is possible that the period 2-effect of employer sanctions reinforces instead of mitigates the mechanisms present in period 1.

It is interesting to compare this finding to the literature. In Chau (2001), amnesties serve to sustain government incentives for employer inspections and, thus, complement inspections. In Friebel and Guriev (2006), a greater amnesty probability reduces the effectiveness of employer fines. In turn, our results suggest that amnesties can even revert this effectiveness such that employer inspections increase the total amount of illegal immigration.

4.4 Immigrant deportation fines

The literature on illegal immigration policy typically abstracts from fines on the tracked migrants themselves.\(^{20}\) However, such fines have been introduced recently for example in Italy in order to deter illegal immigration. Motivated by this observation, we scrutinize the effectiveness of this instrument. To the best of our knowledge, we are the first to address this issue analytically.

Despite their limited amount, fines seizing the entire income of immigrants are frequently criticized for being too harsh from a humanitarian perspective (Human Rights Watch, 2009). Without embarking on that debate, we show in the following that too high penalties may be undesirable for immigration control for economic reasons. For this purpose, we distinguish between two options of fines: a confiscatory fine retrieving the whole current

\(^{19}\)Without amnesties, there is no composition effect and the only impact of fostering inspections is to reduce $f$. Thus, the expected average wage declines in $\pi$.

\(^{20}\)An exception is Chiswick (1988). While typically no explicit reason for this omission is provided, such fines are presumably neglected because they become confiscatory already at very low levels due to the poor wealth the apprehended possess.
wealth of the detected and a moderate fine, leaving the deported with still some resources.\textsuperscript{21}
We show that the latter option can be more effective in reducing illegal immigration than
the former, once return incentives are taken into account.

To fix ideas, we assume that penalties exist only in period 2 such that they affect only the
decision between temporary and permanent migration.\textsuperscript{22}

Consider first a minor fine $p < a_2$. Then, expected utility from (intending to) stay in F in
period 2 amounts to:

$$
(1 - \pi)\rho (a_2 + h - p) + \pi (a_2 + f),
$$

which is obviously decreasing in $p$. Comparing this expression to the utility from voluntary
return (2) gives the home bias threshold for temporary vs. permanent migration:

$$
\frac{\pi(a_2 + f)}{\pi(a_2 + h) + (1 - \pi)p}.
$$

In period 1, migrants save all their wealth to period 2 ($a_2 = a_0 - b + f$), as the marginal
utilities of consuming in period 2 - $\pi \rho + (1 - \pi)$ for permanent and $\rho$ for temporary migrants
- exceed the marginal utility of consumption in F in period 1 equal to 1. This modifies
(22) to:

$$
\rho_p^T (h) = \frac{\pi(a_0 - b + 2f)}{\pi(a_0 - b + f + h) + (1 - \pi)p}.
$$

This expression shows that penalizing migrants exerts both a direct and an indirect effect
on return decisions. While the direct effect is due to the fine itself, which increases return
incentives, the indirect effect arises from the new role of the detection probability $\pi$: as
incomes in the case of forced return are now smaller than in the case of voluntary return,
a higher risk of detection fosters return incentives. As $\rho_p^T$ decreases in $p$, a higher fine
induces more individuals with a low home wage ($h \leq h^T$) to return voluntarily.

For people with a high home wage, the reduction of utility from permanent emigration:

$$
(1 - \pi)\rho(a_0 - b + 2h) + \pi(1 - \pi)\rho(a_0 - b + f + h - p) + \pi^2(a_0 - b + 2f),
$$

relative to the utility of remaining at home (8) matters. Going abroad is preferred for
everybody with:

$$
p > \rho_p^T (h) \equiv \frac{\pi^2(a_0 - b + 2f)}{\pi^2a_0 + (1 - \pi^2)b - \pi(1 - \pi)(f - p) + \pi(1 + \pi)h},
$$

\textsuperscript{21}We assume that migrants have no means to conceal their wealth from authorities in F or remit their
whole wealth to the home country.

\textsuperscript{22}Extending fines to period 1 would not affect our basic result, but complicate the exposition considerably.
This pertains less to the change in utility from temporary migration, but more to the fact that the
accumulation of immigrant wealth renders fines at intermediate levels ($p \in [a_0 - b, a_0 - b + f]$) confiscatory
in period 1, but not in period 2. This is avoided by our setup.
and, consequently, no-one with:

\[ h > h_p^P \equiv f - p - \frac{b}{\pi(1 + \pi)}. \]  \hspace{1cm} (25)

As both \( \rho_p^P \) (and, therefore, \( h_p^P \)) and \( \rho_T^P \) decrease in \( p \), penalizing immigrants unambiguously reduces the total amount of illegal labor: it deters high home-wage migrants from migrating at all and low-wage migrants from staying permanently.

Let us now look at the case where the fine is confiscatory (\( p \geq a_2 \)), that is, the migrant loses all his accumulated wealth if caught and deported (he cannot be charged more than his wealth). For given period 2-wealth, \( a_2 \), the expected utility when intending to stay becomes:

\[ (1 - \pi)\rho \cdot h + \pi (a_2 + f). \]

This changes the optimal timing of consumption for those who intend to migrate permanently. All wealth being lost in case of detection, the marginal utility gain from consumption in period 2 of a person intending to stay amounts to \( \pi \), which is lower than the marginal utility of consumption in period 1 equal to \( \pi + (1 - \pi)\rho \). Thus, a migrant who intends to stay optimally consumes all wealth in period 1 (\( a_2 = 0 \)) to avoid the risk of expropriation by the fine. In contrast, a migrant who intends to return defers consumption (\( a_2 = a_1 + f \)) to \( H \) as before to benefit from the greater marginal utility of consumption equal to \( \rho \) as compared to \( \pi + (1 - \pi)\rho \).

Therefore, we have to solve for the combined consumption/location decision by comparing the expected utility from voluntary return and consuming at home: \( \rho(a_1 + h) \) with the utility from staying on and depleting wealth in period 1:

\[ (a_1 + f) + (1 - \pi)\rho \cdot h + \pi \cdot f. \]

This gives the home bias threshold:

\[ \rho_c^T(h) = \frac{a_1 + (1 + \pi)f}{a_1 + f + \pi h} = \frac{a_0 - b + (1 + \pi)f}{a_0 - b + f + \pi h}, \]  \hspace{1cm} (26)

where \( c \) stands for confiscatory. Again, individuals with a higher home bias return on their own will after period 1. As the timing of consumption differs, there is a wedge between (26) and (23) when the latter is evaluated for \( p = a_0 - b + f \).

The period 0-expected utility from permanent emigration results as:

\[ (1 - \pi)\rho[a_0 - b + 2h] + \pi[(1 - \pi)\rho \cdot h + \pi(a_0 - b + 2f)]. \]

It is higher/lower than the utility from staying in \( H \) if \( \rho \) exceeds:

\[ \rho_c^P(h) \equiv \frac{\pi^2(a_0 - b + 2f)}{\pi a_0 + (1 - \pi)b + (1 + \pi)h}. \]  \hspace{1cm} (27)
Note that (24) and (27) coincide for \( p = a_0 - b + f \).

**Proposition 7.** Decreasing confiscatory deportation fines can reduce the total amount of illegal immigrant labor.

**Proof.** Consider a marginal reduction of the fine, starting from the confiscatory level \( p = a_0 - b + f \). From (24), the threshold between permanent and no emigration, \( \rho^P \), increases. However, the effect on the threshold between temporary and permanent migration, \( \rho^T \), is non-monotonous, as consumption shifts from period 1 to period 2 (where the expected marginal utility of consumption is now greater) with the reduction of the confiscatory fine. In particular, starting from the confiscatory level of \( p \), \( \rho^T \) decreases by the discrete amount:

\[
\rho^T_p(h) - \rho^T_c(h) = \frac{\pi(a_0 - b + 2f)}{a_0 - b + f + \pi h} - \frac{a_0 - b + (1 + \pi)f}{a_0 - b + f + \pi h} = \frac{-(a_0 - b)(1 - \pi) - f(1 + \pi)}{a_0 - b + f + \pi h} < 0.
\]

In consequence, more low home-wage migrants return after period 1. In turn, a marginal shift of the fine up to the confiscatory level will decrease the number of migrants returning home. In fact, \( \rho^T_c > \rho^T_p \) for all \( p \in (\hat{p}, a_0 - b + f] \) with

\[
\hat{p} = \frac{\pi(a_0 - b + f)(f - h)}{a_0 - b + (1 + \pi)f}.
\]

In the presence of confiscatory fines fewer migrants choose to return than in the presence of fines that are greater than the threshold \( \hat{p} \) but stop short of confiscating all migrant wealth. A marginal decrease in confiscatory fines can, therefore, decrease the total amount of illegal labor.

This counter-intuitive result is due to the possibility of voluntary return migration. An analysis confined to permanent migration only would predict a monotonous negative relation between the level of the fine and the amount of illegal labor up to and including the confiscatory level, caused by the reduction of the gain from permanent migration. In our model, this effect is valid for the reaction of migrants with a high home wage, for whom temporary emigration is never an optimal choice. As long as the fine is not confiscatory, the effect applies also to the low home-wage group, who decide only between temporary or permanent emigration. For a given consumption pattern, the latter option becomes less attractive. However, when the fine becomes confiscatory, the preponement of consumption to evade expropriation boosts the ex-interim utility of staying relative to returning. A discrete shift from temporary towards permanent emigration results. In terms of Figure 1, area A increases at the expense of area C whereas area B decreases. The change in consumption plans occurs only if temporary migration is taken into account: a permanent migrant’s timing of consumption is irrelevant for his utility: period 1-wealth is spent in F anyway - be it in period 1 voluntarily or in period 2 in case the migrant was not deported.
Of course, this argument rests on the presumption that migrants have no means to conceal their wealth from authorities in F or remit their whole wealth to the home country. In this case no fine could be applied in case of detection and the above analysis would be meaningless. We acknowledge that this is certainly an appealing, albeit not necessarily easy, option for a temporary migrant. However, permanent migrants would have use their deposit in H to finance illegal living in F in period 2. This seems to be unlikely.

5 Conclusion

This paper shows that return incentives of illegal immigrants can be important for the effects of illegal immigration policies. We develop a simple life-cycle model of migration to allow for both temporary and permanent migration plans. In this framework, immigration policy can affect not only the total number of illegal migrants in a given period but also their optimal migration duration. In consequence, we find that employer inspections are the only policy that can be expected to be generally effective in reducing the long-term stock of illegal immigrants. Other measures such as border enforcement and amnesties can have unintended detrimental effects on illegal immigration. Deportation fines on immigrants can be effective only within a certain range. We argue that these findings should be taken into account when designing illegal immigration policy.

Our framework can be used for addressing a variety of further issues. For example, one could analyze the effectiveness of additional policy instruments that may be considered by policymakers. Or one could analyze the issue of overstaying on (legal) temporary work permits, which is a frequent source of illegal residence in many countries. It may also be interesting to introduce financial constraints of migrants in the spirit of Friebel and Guriev (2006) to our setup.

Finally, we would like to address some simplifying assumptions of our model. First, we have assumed risk-neutrality on part of the migrants and certainty about the success to enter the host country. Although these assumptions follow the bulk of the literature and simplify the analysis, they are not appropriate when considering the numerous fatalities along both the Mediterranean area and the U.S.-Mexico border. When crossing the border is risky, and this risk depends positively on the intensity of border controls and negatively on migration fees and/or efforts, the overall effect of increasing the former depends on the degree of complementarity with respect to the latter. In particular, our findings would remain valid whenever migration fees increased in response to stricter controls\footnote{Such a positive price effect is found, for example, in Gathmann (2008) and Hanson (2009).}: then, even though the number of successful migrants would decline, those who would make it across the border would be poorer and hence inclined to stay longer. Second, we have assumed...
that migrants prefer to consume at home rather than abroad, all other things equal. However, the ceteris paribus condition is often violated in reality due to poor humanitarian conditions, civil wars and political oppression in source countries. Such non-economic factors - which tend to prolong emigration - are not captured in our analysis. Nevertheless, available empirical evidence shows that return incentives exist for at least part of illegal immigrants. Therefore, we believe that our analysis picks up a both important and hitherto insufficiently investigated aspect of illegal immigration.
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