

Strategic Amnesty and Credible Immigration Reform

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Why do countries that impose employer sanctions to deter the illegal entry of foreign workers nevertheless grant amnesty to illegal immigrants? In this article, I provide a positive theory of amnesty provision in a model where the constrained optimal immigration reform, involving the joint use of employer sanctions and border interdictions, is time-inconsistent. In particular, my framework demonstrates that host countries of immigration can enhance the credibility of their immigration reforms by “binding their own hands” and strategically granting a socially excessive amount of amnesty to illegal workers.

[The Immigration Reform Control Act] is not a perfect bill, but it's the least imperfect bill we will ever have before us. (*Washington Post*, October 16, 1986, p. A-5)

I. Introduction

Nearly all countries impose limitations on immigration of foreign nationals. Alongside efforts to control legal labor inflows through numerical ceilings, guest worker programs, and naturalization procedures, recent immigration reforms in the United States as well as in many immigration-prone European nations have focused on measures that combat illegal immigration. In the 20 countries surveyed by the U.S. General Accounting Office (USGAO; 1982), for instance, a combination of employer sanctions legislation, border enforcement measures, and amnesty provisions are in place to mitigate immigration

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pressure. Similarly, in the United States, the Immigration Reform Control Act (IRCA) of 1986, designed specifically to address the problem of illegal immigration, also adopted employer sanctions and border enforcement along with an amnesty provision that granted full legal status to over 2.25 million illegal workers (Immigration and Naturalization Service [INS] 1989).

Despite the widespread use of employer sanctions, border enforcement, and amnesty provisions as immigration reform measures, surprisingly little work has been done to examine the important question of whether amnesty provisions can indeed complement other direct measures of migrant deterrence, such as internal or border apprehensions. Until this date, theories of immigration reforms have traditionally been analyzed in terms of (i) the monopsony power of the host country in the immigrant labor market, wherein a host country of immigrants can, through an appropriate choice of wage tax and/or immigration quotas, impose control over the volume and the wage income of legal foreign nationals (Kemp 1960; Bhagwati 1979; MacDougall 1990; Grubel and Scott 1993); (ii) the potential regional and federal fiscal burden of the immigrant population (Chiswick 1988*a*, 1991), with an emphasis on the uneven income distributional consequences of immigration, as immigrants tend to concentrate in low-wage sectors of employment; and (iii) the differential work effort contributions of immigrants and the native work force, particularly when immigrants are engaged in occupations that are temporary in nature (Galor and Stark 1990). All of these writings, however, do not feature problems that are specific to illegal immigration. For instance, the clandestine character of illegal immigrants makes the feasibility of imposing income taxation highly questionable. In addition, it is entirely unclear as to how the welfare costs of illegal immigrants can and should be shared between natives and foreign workers and, finally, to whether employment standard legislations can be duly enforced in the presence of a clandestine workforce.

Ethier's pioneering article (1986) and its subsequent extensions seem to be the only exceptions.¹ These works focus on the choice of policy response to illegal immigration in the crime-theoretic tradition, taking into account the joint use of employer sanctions and border interdiction as immigration deterrence devices. By imposing penalties on employers of illegal immigrants, employer sanctions effectively drive a tax wedge between the cost of hiring and the wage income of illegal workers. As such, employer sanctions have a presumed outcome that

¹ Bond and Chen (1987), e.g., offers a two-country extension of Ethier's (1986) basic setup and compares the effectiveness of employer sanctions with a wage tax on the employment of foreign workers.

complements border enforcement efforts by curtailing the demand for illegal immigrants.

Actual experience with employer sanctions, however, tells a different story. The USGAO survey concluded that employer sanctions “were not an effective deterrent” to illegal employment in the 20 selected countries (1982, p. 2). Prior to the IRCA, 11 states in the United States already had statutes that penalized the employment of illegal workers. The key pattern that emerged, however, was that employer sanction laws were rarely enforced, with very few cases of actual convictions (Schwarz 1983; LeMay 1987). Studies regarding the effectiveness of the IRCA also arrived at similar conclusions: one of the most significant impacts of the reform turned out to be a large increase in legal and illegal labor supply, and many of these people were first-time illegal immigrants who entered the United States hoping to acquire legal status through the amnesty program and/or the temporary agricultural workers program (U.S. Commission of Agricultural Workers [USCAW] 1992; Cornelius, Martin, and Hollifield 1994a; Huffman 1995).

Based on these stylized facts, encountered by recent immigration reforms, I draw attention to a number of puzzling observations, especially that efforts to penalize employers for illegal workers seem to have been reverted since the onset of employer sanctions. In addition, the provision of amnesty to illegal aliens in the absence of a credible employer sanctions program may run contrary to the original intent of the immigration reform. This article provides a possible explanation for these issues, with an emphasis on some strategic questions not heretofore emphasized in theory. Specifically, I point out that the optimal immigration reform package, involving the joint use of employer sanctions and border enforcement, suffers from a credibility problem. In addition, host countries can partially restore the credibility of employer sanctions by “binding their own hands” and strategically granting a socially excessive amount of amnesty to illegal workers.

The dynamic inconsistency of immigration reforms can be understood by first recognizing that employer sanctions affect the level of illegal immigration and the welfare of the host country through three distinct channels: migrant deterrence, as the anticipated probability of internal apprehension rises; penalty shifting, as employers reduce wages in anticipation of the possibility of a penalty; and finally, internal apprehension, to dispense with (part of) the welfare expenditure resulting from illegal immigration, albeit at the cost of reducing output as illegal workers are apprehended. Recognizing these three effects allows us to delineate those factors that govern the ex ante optimality of employer sanctions as a part of an immigration reform package, subject to its associated enforcement expenditure.

A key observation, which distinguishes my findings from that of the previous theoretical literature on immigration reforms, is that the effectiveness of employer sanctions in terms of migrant deterrence and penalty shifting depends crucially on the expectations that employers and immigrants hold regarding the actual frequency of internal apprehension. As such, policy makers may have an *ex ante* incentive to put checks on illegal immigration by the threat of internal apprehensions. As I will show, if policy makers entertain discretion in the amount of resources to be spent on enforcing employer sanctions, the *ex post* optimal frequency of internal apprehension, which takes as givens the expectations of the public along with the attendant supply of illegal immigrants, will be strictly less than the *ex ante* socially efficient level, which duly accounts for the migrant deterrence and penalty shifting effects of the threat of employer sanctions.

Nevertheless, as long as employers and potential illegal immigrants cannot be systematically fooled, the migration of illegal laborers, along with the determination of migrants' wage incomes, will incorporate the expectation of the government's incentive subsequently to reduce internal enforcement efforts. In the presence of rational expectations, therefore, these expectations are fulfilled, with a resulting level of employer sanctions enforcement that is socially insufficient.

As a second objective of this article, I point out that the provision of amnesty can serve as a partial solution to the time-inconsistency problem above, when the participation of native workers in the industry in which illegal employment concentrates is sufficiently low. In particular, since the *ex post* optimal level of employer sanctions enforcement depends only on the welfare cost of the existing stock of illegal immigrants versus the output loss subsequent to apprehension, the introduction of an amnesty clause in the immigration reform package serves two distinct purposes: (1) it lowers the potential output reduction that results from the apprehension of illegal workers, while (2) it raises the benefits of inspecting potential employers of illegal immigrants as the number of such workers rises with the probability of acquiring amnesty. As such, amnesty may well serve as an essential component of a credible immigration reform package, when the policy maker is unable to precommit to its *ex ante* optimal policy.

This article is organized as follows: Section II summarizes a number of common themes in recent immigration reform efforts that cast doubt on the credibility of employer sanctions legislations. Section III presents a model that introduces a game theoretic extension of Ethier's (1986) model of illegal immigration. In Section IV, the optimal immigration reform is shown to be time-inconsistent in the presence of rational expectations. Section V illustrates the possible role of amnesty

provisions as a partial solution to the credibility problem. The final section suggests extensions.

II. Some Stylized Facts

Although individual experiences vary and a single model cannot possibly address the variety of circumstances under which immigration reforms may fail to deter illegal labor inflows, I will note here a number of common themes that emerge on reviewing many recent experiences of the joint use of employer sanctions, border enforcement, and amnesty provisions. These themes suggest that a gap exists between the stated goals of employer sanction as a deterrent to illegal immigration and the subsequent failure to implement its promise. The cases that will be reviewed here are those of the United States, Italy, and Japan.²

In the United States, the IRCA of 1986 included (i) employer sanctions, with the purpose of subjecting employers to the possibility of civil penalties for knowingly hiring illegal immigrants; (ii) amnesty for illegal aliens, to assure a stable supply of workers in industries where illegal immigrants tend to concentrate; and (iii) promises of increased enforcement resources, to facilitate illegal immigrant apprehension. Only recently have official and scholarly efforts begun to evaluate the effectiveness of the reform to date. First, promises of employer sanctions enforcement resources were seldom fulfilled: "IRCA authorized a 70 percent increase in INS's budget for the years immediately following its passage, more than \$100 million of which was intended to be used annually for employer sanctions. In reality, employer sanctions received \$34 million in 1987 . . . and by FY 1994, only about \$23 million was spent on employer sanctions enforcement" (U.S. Commission on Immigration Reform [USCIR] 1994). Second, the amnesty provision led to the legalization of over 2.25 million illegal aliens (INS 1989) at a time when the rough estimates of the total illegal population in the United States ranged from 3 to 5 million (Chiswick 1988*b*; Martin 1994). In addition, temporary legal resident status for an additional limit of up to 350,000 workers was granted specifically for foreign workers engaged in agriculture. Third, while the employment of illegal aliens continued, real wages of native workers, particularly in agriculture, declined (USCAW 1992). Legalized workers also gained access to publicly financed health care, low priced housing, and education (USCAW 1992; Huffman 1995), while illegal workers and their dependents continued to be eligible for public education and for a number of federal

² For an excellent survey of these and the cases of West Germany, France, and Spain, see Cornelius, Martin, and Hollifield (1994*b*).

health and social service programs (USCIR 1994).³ In addition, the IRCA also included a built-in feature that facilitated discretionary impositions of fines and punishment. Specifically, the “Affirmative Clause” of the IRCA requires that the conviction of illegal employment must include evidence of employers who knowingly hire illegal immigrants (Chiswick 1988a). The lack of a tamper-proof national identification system and the prevalent use of fraudulent identification documents thus leave much room for discretion in the imposition of fines (Briggs 1984).

The narrowing of the wage gap between Italy and northern Europe and the subsequent diversion of non-European Community (EC) immigrants from northern to southern Europe have transformed Italy into an immigrant-receiving country since the late 1970s. By the early 1990s, as high as 1 million legal and illegal non-EC foreign population, or 2% of total population, is estimated to be present in the Italian workforce (Calavita 1994). In 1986, Italy’s first comprehensive immigration law, Foreign Workers and the Control of Illegal Immigration (Law 943), was passed. The new law was proposed to address three main issues concerning illegal employment: foreign workers’ rights; rules on the employment of foreigners, for which Italy’s first employer sanctions law was put into action; and a “regularization” program that grants legal status to the previously clandestine workforce, extending members the full rights of a legal foreign worker. As a result of this new law, Italy today has Europe’s largest population of “amnestied” foreign workers (Cornelius et al. 1994a). The immigration reform was met with limited success, however. Enforcement of employer sanctions was faced with wide discretion by the Ministry of Labor regarding the imposition of fines, and, in practice, very few such fines were ever imposed (Calavita 1994).

Japan experienced sharp increases in illegal immigration, mostly from neighboring Asian countries, since the early 1990s. The current illegal population constitutes less than 0.5% of the Japanese workforce (Cornelius 1994); what seems to be significant, however, is that this increase in illegal immigration occurred at a time when Japan began a series of stricter immigration reform measures. In June 1990, an employer sanctions law went into effect that imposed up to 2 million yen per illegal worker, in addition to criminal penalties and jail sentences on violators. Regarding

³ In 1982, e.g., the U.S. Supreme Court ruled in *Plyler v. Doe* (457 U.S. 202) that states may not deny children of illegal aliens access to public elementary education, secondary education, and the national school lunch program. Other programs include the special supplemental food program for women, infants, and children; community and migrant health centers; and emergency medical services under state Medicaid plans. In 1994, Arizona, California, Florida, and Texas filed claims for reimbursement of the obligation of these states to provide services for illegal immigrants, amounting to \$121 million, \$377 million, \$1.5 billion, and \$1.34 billion, respectively.

enforcement, however, the effectiveness of employer sanctions in apprehending illegal workers was hampered by the lack of resources devoted to enforcement. In the 2 years immediately following the onset of the new legislation, only about 350 employers per year were convicted. Meanwhile, although Japan does not yet have a large-scale amnesty program, various “side-door” mechanisms exist that import foreign workers under the disguises of corporate trainees and part-time student labor. All in all, the number of workers imported through these informal devices reached about 150,000 per year, as compared with the estimated stock of about 300,000 illegal workers, most of whom overstay their visas.

As in many recent studies of the credibility of optimal economic policies, I address the problem of dynamic inconsistency of employer sanctions with two important features in mind.⁴ First, there must be a divergence between the prereform optimal level of enforcing employer sanctions and the ex post optimal level, once migrants and employers have fully taken into account the potential impact of the reform. Second, policy makers have the discretion to reoptimize at any stage of the game. In Section III, I show how immigration reforms can be understood with these features in place.

III. The Basic Model

The migrant-receiving host country is endowed with a large number (n) of identical and competitive firms. Each firm combines one unit of firm specific input and labor, L , to generate revenue, Q , via a neoclassical production function, where $Q = af(L)$. Expression $a > 0$ captures technological or price shocks that affect host country employers.

There is a constant number (N) of native host country workers. Throughout, I denote I_0 as the “status quo stock” of illegal workers in the host country. The analysis in the sequel focuses on an external shock that has the potential of further increasing the flow of illegal immigrants to the host country (I). Thus, supply of labor in the home country consists of the exogenously given number of native workers, N , and $I_0 + I$ number of foreign workers, with $nL = N + I_0 + I$.

In the presence of employer sanctions, a penalty is imposed on employers who hire illegal immigrants. In particular, on discovery of T number of illegal workers, a penalty, $k(T)$, is imposed on the employer, with

⁴ Beginning with the seminal paper by Kydland and Prescott (1977), the notion of time-inconsistency has also been applied, e.g., to the study of optimal commercial policies (Eaton and Grossman 1985; Staiger and Tabellini 1987; Maskin and Newbery 1990), as well as monetary and stabilization programs (Persson, Persson, and Svensson 1987).

$k'(\cdot) > 0$ and $k''(\cdot) > 0$.⁵ Enforcement of employer sanctions is accomplished by a random inspection of potential illegal immigrant employers. Let b denote the probability that a home country employer is subject to inspection. The resource cost of employer sanctions is $D(b)$, with $D(0) = 0$, $D'(b) > (=)0$ for $b > (=)0$, and $D''(\cdot) > 0$.

Regarding border interdictions, let g be the probability that an illegal immigrant is caught at the border. The cost of border enforcement will be given by $H(g)$, with $H(0) = 0$, $H'(g) > (=)0$ for $g > (=)0$, and $H''(\cdot) > 0$.

Amnesty provisions are aimed at granting legal status to selected members of the status quo stock of illegal immigrants, with $A \in [0, I_0]$. As long as there is a wage gap between legal and illegal foreign workers, however, amnesty also creates incentives for newly arriving immigrants to masquerade as veteran migrants.⁶ Let ψ be the probability that a deceptive application for legalization is discovered.

The timing of events following the onset of immigration reform is as follows:⁷

1. The government announces a probability of employer inspection b ; the probability of border interdiction, g ; and the number of foreign workers to be granted amnesty, A .⁸
2. Immigration and border interdiction take place simultaneously, given the expectations that employers and foreign workers hold regarding the actual frequency of employer inspection and the probability of acquiring legal residence in the home country.
3. A number of workers are selected from the pool of immigrants and granted amnesty.
4. Natives and legal and illegal workers are employed.
5. Firms are randomly inspected and illegal immigrants are apprehended.

⁵ Following Ethier (1986) and Bond and Chen (1987), the penalty schedule is taken to be given to both the employers and the policy maker. The strict convexity of the penalty schedule also guarantees that identical employers behave identically by employing the same number of any mix of native and legal workers, along with an identical number of illegal workers.

⁶ That an equilibrium legal-illegal wage gap indeed exists is the subject of discussion in Sec. IIIB.

⁷ More precisely, our setting is a sequential move game in which (1) the government commits to a given level of border interdiction and amnesty provisions, (2) employers and migrants sign wage contracts given their expectations about the probability of employer inspections, and (3) the government observes this expectation and chooses the actual rate of employer inspection. Since reoptimization at the third stage is an option to the government, the solution concept employed here is Subgame Perfect Nash.

⁸ In the case of the IRCA, for instance, the fine tuning of the estimated number of workers to be legalized is achieved by granting amnesty to individuals who have resided continuously in the United States since January 1982.

6. Production of output takes place, and penalties and wages are paid.⁹

Stage 1 represents the policy announcement stage. Stages 2 and 3, respectively, determine the total volume in the host country of foreign workers who may opt to apply for, and ultimately obtain, a legalized status. With the legality of workers determined, native employers hire legal and illegal workers in stage 4, based on the expected probability of getting caught in stage 5. Finally, payoffs are realized in stage 6.

A. The Demand for Illegal Migrants

Rational employers form a common expectation, $h^e \in [0,1]$, regarding the probability of employer inspection. When we denote w_n , w_a , and w_i as the wage income of natives, legal residents, and illegal workers, respectively, we have

$$(1 - h^e)af'(L) + h^eaf'(L - T) = w_n = w_a; \quad (1)$$

$$(1 - h^e)af'(L) = (1 - h^e)w_i + h^ek'(T), \quad (2)$$

where $L = (N + I_0 + I)/n$ denotes the per-firm employment of legal and illegal workers, and $T = (I_0 + I - A)/n$ denotes the number of illegal workers subject to internal apprehension. Equation (1) simply requires that w_n and w_a be equated to the expected marginal product of labor. In particular, with probability h^e , the employer is subject to inspection, and output depends only on the number of natives and legal workers employed, $L - T$. Otherwise, with probability $1 - h^e$, natives and legal and illegal workers jointly contribute to generate revenue $Q = af(L)$. Hence, with decreasing marginal product, the wage income of legal workers is strictly increasing in expected internal enforcement efforts, given L and T .¹⁰ Equation (2) is obtained by equating the expected marginal product of an illegal worker with the expected cost of employing an illegal immigrant, $(1 - h^e)w_i + h^ek'(T)$. The marginal penalty, $k'(T)$, thus drives a wedge between the marginal product and the wage income of the illegal worker. To see this, equation (2) can be rearranged to obtain

$$af'(L) - \frac{h^ek'(T)}{1 - h^e} = w_i.$$

⁹ Note, in particular, that our timing assumptions require that illegal immigrants are apprehended without pay, and that producers account for the output loss that the discovery of illegal workers entails.

¹⁰ This is also in consonance with the empirical result of Fry, Lowell, and Haghighat (1995), wherein an increase in expected hiring fines is shown to raise wages in 13 selected nonagricultural industries in the United States.

B. The Supply of Illegal Immigrants

Workers in the migrant-sending country are also equipped with rational expectations. In addition, each potential immigrant worker is endowed with one unit of labor input, and they have preferences that are represented by a utility function $U(w_j, c_j)$. The utility function, $U(w_j, c_j) = w_j + c_j$, $j = i, a$, appropriately subscripted, takes as arguments the immigrant's wage income, w_j , and his access to public services, c_j , depending on his immigration status in the home country.¹¹ Assume, in addition, that $c_a > c_i$.

A typical foreign worker has two options: (i) remain in the foreign country and receive a reservation utility $U^* = U_0 - \epsilon$, where ϵ denotes an exogenous shock to foreign wages, or (ii) attempt migration to the home country. In the latter case, the immigrant obtains amnesty for legal residence with probability $\alpha \equiv A/[I_0 + I(1 - \psi)]$; otherwise, he works as an illegal immigrant with probability $1 - \alpha$. Since every illegal immigrant expects a probability h^e of internal apprehension, the expected utilities of a legal and an illegal worker, respectfully, are given by $U_a = w_a + c_a$ and $U_i = (1 - h^e)(w_i + c_i) + h^e U^*$.

Given the probability of border interdiction, g , and the expectation of employer inspection, h^e , along with A , the expected utility of an immigrant with reservation utility U^* , can be written as¹²

$$\begin{aligned} EU(U^*, h^e, g, A) &= gU^* + (1 - g)[\alpha U_a + (1 - \alpha)U_i] - k^* \\ &= [g + (1 - g)(1 - \alpha)h^e]U^* + (1 - g)[\alpha(w_a + c_a) \\ &\quad + (1 - \alpha)(1 - h^e)(w_i + c_i)] - k^*, \end{aligned} \quad (3)$$

where k^* represents a lump-sum cost, which includes the cost of moving, along with the expenditure associated with deceptive efforts for the purpose of legalization. Three possible sources of income thus constitute the expected utility of an immigrant worker: (i) with probability $g + (1 - g)(1 - \alpha)h^e$, an immigrant who is apprehended either at the border or during employer inspections receives his reservation utility U^* on returning to the migrant-sending country; (ii) with probability $(1 - g)\alpha$, the worker is granted amnesty and receives $w_a + c_a$; and (iii) with probability $(1 - g)(1 - \alpha)(1 - h^e)$, the worker is employed illegally in the home country and receives $w_i + c_i$.

The equilibrium number of illegal immigrants employed in the home

¹¹ The provision of public services to legal and illegal immigrants is assumed to be financed through nondistortional lump-sum taxation imposed on native workers and the n employers.

¹² Implicit in the statement of eq. (3) is that amnesty provisions must be individually rational, with $U_a > U_i$. A sufficient condition for this requirement is that $c_a > c_i$, as stated above.

country, $\hat{I} = n\hat{T} \equiv n\mathcal{I}(b^e, g, A)$, can be determined, as migration equates the expected rewards from migration to the reservation utility, U^* :

$$\begin{aligned}
 U^* &= EU(U^*, b^e, g, A) \\
 \Leftrightarrow U^* &= \alpha U_a + (1 - \alpha)U_i - \frac{k^*}{1 - g} \\
 \Leftrightarrow U^* + \frac{k^*}{1 - g} &= \alpha[(1 - b^e)af'(L) + b^eaf'(L - \hat{T}) + c_a] \\
 &\quad + (1 - \alpha)\{(1 - b^e)[af'(L) + c_i] - b^ek'(\hat{T}) + b^eU^*\},
 \end{aligned} \tag{4}$$

where the last equality follows from equations (1) and (2). Equation (4) thus completely describes the various factors that enter into the determination of the cost of hiring and the supply of illegal immigrants. For instance, stricter border enforcement deters illegal entry as the probability of border apprehension rises. Similarly, an increase in expected internal enforcement efforts discourages illegal immigration in the absence of amnesty ($\alpha = 0$), since, from equation (2), an increase in b^e effectively decreases U_i as the tax wedge between the marginal product of illegal workers and their wage income widens. However, since w_a is strictly increasing in b^e (eq. [1]), the expected utility of illegal immigration may in fact rise with b^e for α sufficiently large, without further restrictions on the size of the marginal penalty, k' . We have, therefore, the following results.

PROPOSITION 1A. Stricter border enforcement decreases illegal immigration. In addition, if the marginal penalty, k' , is sufficiently large, illegal immigration falls with an increase in the expected frequency of internal apprehension, b^e .

PROPOSITION 1B. An increase in the number of amnesty provisions increases illegal immigration if the legal and illegal wage responses with respect to L are sufficiently small.

Proposition 1B demonstrates that the effect of amnesty on illegal immigration also depends on the interaction of two opposing effects. By raising the anticipation that illegal immigrants may obtain legal status, amnesty provisions have the direct effect of attracting the inflow of more illegal immigrants. Meanwhile, an increase in A also depresses wages, w_a and w_i . The net response of illegal immigration as a result of amnesty provisions is thus strictly positive as long as the former effect dominates. This is in consonance with case studies concerning the immigration impact of the IRCA, in which one of the most significant impacts of the reform turned out to be a large increase in legal and illegal labor supply; many of these people were first-time illegal immigrants who entered the United States hoping to acquire legal status through the amnesty program (U.S. Commission of Agricultural Workers 1992; Cornelius et al. 1994a; Huff-

man 1995). Corresponding to the illegal immigration response elaborated above, I summarize the associated income distribution responses for native and legal workers, along with immigrant employers in proposition 2.

PROPOSITION 2. The wages of native and legal workers increase and the income of immigrant employers declines with (i) stricter border enforcement; (ii) an increase in the expected frequency of internal apprehension if the marginal penalty, k' , is sufficiently large; and/or (iii) a decrease in the number of amnesty provisions if the legal and illegal wage responses with respect to L are sufficiently small.

The intuition for proposition 2 parallels that of proposition 1. As should be expected, native and legal workers' income responses to immigration policy are orthogonal to those of illegal immigrant employers.¹³ In particular, supply-side immigration restrictions via border enforcement and demand-side immigration measures via internal apprehension both have the effect of bidding up wages for existing natives and legal workers. The resulting increase in labor income, along with the associated reduction in the number of workers employed, negatively affect the expected profits of immigrant employers. However, as long as amnesty provisions attract the inflow of more illegal workers (proposition 1B), host country employers benefit from the willingness on the part of illegal immigrants to accept lower wages in exchange for the possibility of legalization. Meanwhile, native and legal workers suffer income losses as a further influx of foreign workers depresses host country wages. Taking into account the immigration and income distribution responses to an increase in border enforcement, expected internal apprehension, and amnesty provisions elaborated in propositions 1 and 2, the ensuing analysis characterizes the nature of optimal immigration reform, depending on whether the government can credibly commit to its ex ante optimal immigration policy announcement.

IV. The First- and Second-Best Immigration Reforms with Commitment

We are now in a position to characterize the optimal policy vector, $s = \{b, g, A\}$, to be undertaken by the policy maker. The objective function is taken to be the income of native workers and employers, net of the cost of providing public services, and the enforcement expenditure of the immigration reform, $Y(s, b^e)$, with

¹³ Also see Chau (1998), which explicitly takes into account the income responses to immigration policy in order to examine the political economy of immigration reform.

$$\begin{aligned}
Y(s, b^e) &= \omega_a N + n[(1 - b)af(L) + haf(L - \hat{T}) \\
&\quad - (1 - b)\omega_i \hat{T} - \omega_a(L - \hat{T}) - hk(\hat{T})] \\
&\quad - D(b) - H(g) - c_i \hat{I} - c_a A + nbk(\hat{T}), \quad (5) \\
&= n[(1 - b)af(L) + haf(L - \hat{T}) \\
&\quad - (1 - b)(\omega_i + c_i)\hat{T} - (\omega_a + c_a)A - D(b) - H(g)].
\end{aligned}$$

Observe that b and b^e affect home country welfare through two distinct channels. In particular, while b controls output and the fraction of apprehended illegal immigrants, b^e enters into the objective function by controlling the stock of illegal immigrants, \hat{I} , and the wage rates ω_a and ω_i .

Clearly, if policy makers can deny both legal and illegal immigrants access to public services, the foregoing framework parallels the well-known analysis of Bhagwati (1979), with a constant marginal cost of immigration ($U^* + k^*$), which coincides with the marginal product of immigrant laborers, in the absence of any immigration deterrence devices. Hence, the first-best immigration policy involves setting $b = g = 0$. Moreover, the share of legal and illegal workers in the home country is a matter of indifference to the policy maker. In practice, however, the denial of all public services to the foreign population is frequently not a feasible option. My discussion proceeds with two cases in mind, characterizing the second- and the third-best outcomes, respectively.¹⁴

In a second-best regime, the government is capable of making a binding commitment concerning its future course of action. In particular, this benchmark requires that policy makers are capable of committing to the announced frequency of employer inspection, b . Denote $s^* = (b^*, g^*, A^*)$ as the solution to the following maximization problem in the second-best regime:

$$\begin{aligned}
&\max_s Y(s, b^e) \\
&\text{subject to } b^e - b = 0; \quad (6) \\
&\text{and } b \geq 0; \quad g \geq 0; \quad A \geq 0.
\end{aligned}$$

¹⁴ In addition to the removal of public service provisions to illegal immigrants, the government may also elect to use an output tax on native production to discourage illegal immigration. Chau (1999) demonstrates the rationale behind the use of economically inefficient, but nevertheless informationally efficient, second-best immigration deterrence devices. In particular, second-best immigration deterrence policies are shown to welfare dominate first-best policies, when governments that are imperfectly informed about the size of the immigration shock must resort to information revealed by vested interest groups.

The requirement, $b^e - b = 0$, can be interpreted as a commitment constraint, which accounts for the expectation that the policy maker will not deviate from its ex ante optimal policy. We have

$$\begin{aligned}
\left. \frac{\partial Y}{\partial g} \right|_{b^*, g=0, A^*} &= n(1 - b^*)af'(L) \frac{\partial \hat{q}}{\partial g} - (1 - b^*)(w_i + c_i) \frac{\partial I}{\partial g} \\
&\quad - (1 - b^*) \frac{\partial w_i}{\partial g} - A \frac{\partial w_a}{\partial g} \\
&= - (1 - b^*)n \left[c_i - \frac{b^*k'}{1 - b^*} + \hat{q} \frac{\partial w_i}{\partial q} \right] \frac{\partial \hat{q}}{\partial g} \\
&\quad - A^* \frac{\partial w_a}{\partial \hat{q}} \frac{\partial \hat{q}}{\partial g} - H'(0) \\
&\equiv Y_g \frac{\partial \hat{q}}{\partial g} - H'(0),
\end{aligned} \tag{7}$$

where the second equality follows from the definition of w_a and w_i , with $w_a = (1 - b^*)af'(L) + b^*af'(L - \hat{q})$ and $w_i = af'(L) - b^*k'/(1 - b^*)$.

From equation (7), the contribution of border enforcement efforts to improvements in national welfare depends on whether the average welfare cost of illegal immigration, $c_i - b^*k'/(1 - b^*)$ [$= w_i + c_i - af'(L)$], is strictly positive, and on the illegal and legal wage responses to any border interdiction induced change in illegal labor supply ($\partial w_i/\partial q < 0$, $\partial w_a/\partial q < 0$). In particular, since border enforcement decreases the number of illegal immigrants (proposition 1B), the wage income of the existing illegals rises. Hence, as long as the average welfare cost of illegal immigration, $(c_i - b^*k'/1 - b^*)$, is strictly positive, and if $|\partial w_i/\partial q|$ and $|\partial w_a/\partial q|$ are sufficiently small, we have $g^* > 0$.

In addition, under the same set of sufficient conditions,

$$\begin{aligned}
\left. \frac{\partial Y}{\partial A} \right|_{b^*, g^*, A=0} &= n \left[(1 - b^*)af'(L) \left(\frac{1}{n} + \frac{\partial \hat{q}}{\partial A} \right) + b^*af'(L - \hat{q}) \right] \\
&\quad - (1 - b^*)(w_i + c_i) \frac{\partial I}{\partial A} \\
&\quad - (1 - b^*) \frac{\partial w_i}{\partial I} - (w_a + c_a) - A \frac{\partial w_a}{\partial A}
\end{aligned}$$

$$\begin{aligned}
&= -(1 - b^*)n \left(c_i - \frac{b^*k'}{1 - b^*} + \hat{q} \frac{\partial \omega_i}{\partial \mathcal{I}} \right) \frac{\partial \hat{\mathcal{I}}}{\partial A} - c_a \quad (8) \\
&\equiv Y_I \frac{\partial \hat{\mathcal{I}}}{\partial A} - c_a \\
&= \left[\frac{\partial Y}{\partial g} + H'(g^*) \right] \frac{\partial \hat{\mathcal{I}} / \partial A}{\partial \hat{\mathcal{I}} / \partial g} - c_a < 0,
\end{aligned}$$

where the second equality follows by substituting for $A = 0$ and by making use of the definitions of ω_a and ω_i .

Hence, national welfare is doubly worsened as a result of amnesty whenever the government can credibly abide by the commitment constraint, so that expectations b^e are formed according only to the government's ex ante optimal level of internal apprehension.¹⁵ The intuition here is straightforward. First, amnesty necessitates the direct welfare cost of $c_a > c_i$ per legal worker. In addition, from proposition 1, $(\partial \hat{\mathcal{I}} / \partial A)$ and $(\partial \hat{\mathcal{I}} / \partial g)$ are of opposite signs, as amnesty induces the entry of even more illegal immigrants. Thus, as long as $Y_I < 0$, requiring a strictly positive level of welfare-maximizing border enforcement, amnesty provision only serves to offset the immigration deterrence effect of costly border enforcement measures. As such, in a second-best regime, granting amnesty serves only to worsen home country welfare, and thus $A^* = 0$.

Regarding the optimal frequency of internal apprehension, we have, on accounting for $A^* = 0$,

$$\begin{aligned}
\left. \frac{\partial Y}{\partial b} \right|_{b=0, g^*, A^*} &= \left. \frac{\partial Y}{\partial b^e} \right|_{b=0, g^*, b \text{ const.}} \\
&+ \left. \frac{\partial Y}{\partial b} \right|_{b=0, g^*, A^*, b^e \text{ const.}} \\
&= -nc_i \frac{\partial \hat{\mathcal{I}}}{\partial b^e} - n\hat{q} \frac{\partial \omega_i}{\partial b^e} \quad (9) \\
&+ n[f(L - \hat{\mathcal{I}}) - f(L) + \hat{\mathcal{I}}(\omega_i + c_i)] - D'(0).
\end{aligned}$$

The welfare consequences of employer sanctions are illustrated in the

¹⁵ In Sec. V, the benefits of amnesty are shown to take effect precisely when the government cannot credibly commit to the ex ante optimal level of internal enforcement, so that public expectation can be altered by manipulating the level of amnesty provisions.

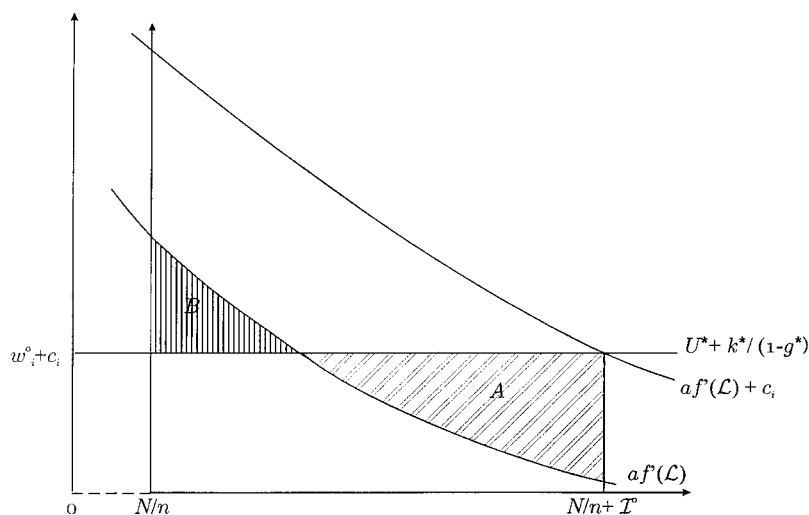


FIG. 1.—The costs of illegal migration

geometry of figures 1 and 2. To make our analysis as transparent as possible, all figures are drawn with the degree of amnesty provisions and border-enforcement efforts fixed at A^* and g^* , respectively. In particular, since $A^* = 0$, we have, from equation (2),

$$\begin{aligned}
 U^* &= gU^* + (1 - g)[(1 - b^e)(w_i + c_i) + b^e U^*] - k^* \\
 \Leftrightarrow U^* + \frac{k^*}{(1 - g^*)(1 - b^e)} &= w_i + c_i \tag{10} \\
 &= af'(L) - \frac{b^e k^*}{1 - b^e} + c_i.
 \end{aligned}$$

Figure 1 illustrates the welfare costs and benefits of illegal immigration prior to the onset of employer sanctions, with $b = b^e = 0$. The horizontal schedule, representing the left-hand side of equation (10), $U^* + k^*/(1 - g^*)$, should be interpreted as the supply price of illegal immigrants. The downward sloping schedule, $af'(L)$, is the marginal product of labor curve. The $af'(L) + c_i$ schedule constitutes the right-hand side of equation (10) and represents the effective demand for illegal immigrants in the absence of employer sanctions. Migration of labor takes place until T^0 number of illegal immigrants are employed in each of the n firms. As shown, the associated welfare loss to the home country is given by the shaded area A . Meanwhile, each home country employer earns an amount of rent that amounts to the shaded area B .

Figure 2 illustrates the potential benefits of employer sanctions. The

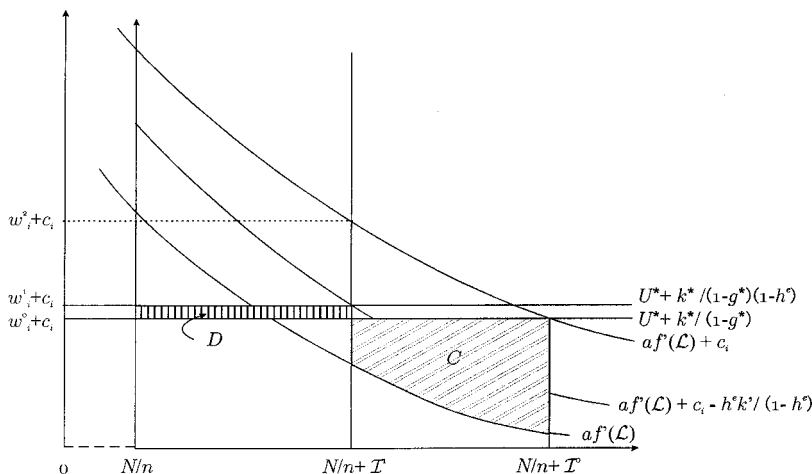


FIG. 2.—The migrant deterrence and penalty shifting effects of employer sanctions

horizontal schedule $U^* + k^*/(1 - g^*)(1 - h^e)$ and the downward sloping schedule $af'(L) + c_i - h^e k'/(1 - h^e)$ represent the supply price of illegal immigrants and the effective demand for illegal workers when the perceived likelihood of internal apprehension, h^e , is strictly positive. The equilibrium number of illegal workers under employer sanctions is given by T^1 .

The potential benefits of employer sanctions can now be categorized into three distinct effects, corresponding, respectively, to the first three terms of equation (9). For immigrant hiring firms that are not subject to inspections, the enforcement of employer sanctions results in (i) migrant deterrence—by virtue of a strictly positive perceived probability of apprehension subsequent to employment, employer sanctions serve to decrease the number of illegal workers from T^0 to T^1 , with an associated net welfare improvement (compared with a regime with $h^e = h = 0$) that amounts to the shaded area C. (ii) Penalty shifting—in anticipation of the possibility of inspections, the effective demand for illegal immigrants now accounts for the increase in penalties associated with the hiring of an additional illegal migrant. Hence, corresponding to a reduction in the number of illegal workers from T^0 to T^1 , the associated wage increase is given only by w_i^1 , rather than by w_i^2 , which would have been the case, for instance, had the reduction of illegal workers from T^0 to T^1 been a result of stricter border enforcement. The net benefits of employer sanctions, on accounting for the wage increase from $w_i^0 + c_i$ to $w_i^1 + c_i$, is given by the shaded area C minus D. Clearly, the smaller the illegal wage response with respect to the reduction in T , the more likely it is that the migrant deterrence effect of employer sanctions dominates.

Finally, for the $b^e n$ number of employers that are subjected to inspection, the enforcement of employer sanctions also leads to (iii) internal apprehensions—the welfare gains to the home country on inspecting one more illegal employer is equal to shaded area B in figure 1, with a corresponding reduction in employer's rent that amounts to the shaded area A . Note, in particular, that the relative sizes of these two effects in turn determine the sign of the square bracket in equation (9). The foregoing discussion is summarized in proposition 3.

PROPOSITION 3A. Variables $g^* > 0$ and $A^* = 0$ if the illegal wage response to changes in \hat{T} is sufficiently small.

PROPOSITION 3B. If, in addition, $af[N/n + \mathcal{I}(0, g, 0)] - af(N/n) < \mathcal{I}(0, g, 0)(w_i + c_i)$, then $b^* > 0$.

V. Credible Immigration Reforms with Amnesty

In this section, I characterize the optimal immigration reform when the policy maker cannot commit to the foregoing second-best practice. Specifically, if the policy maker entertains discretion in the choice of the frequency of employer inspection, ex ante announcement of employer sanctions becomes irrelevant in the formation of expectations, b^e , whenever the public recognizes that the policy maker has an incentive to deviate from the policy announcement. In effect, the policy maker must take b^e as a given. Also, since the amount of illegal immigration depends on b^e , A , and g , the optimal choice of b , once border enforcement and amnesty provisions have been implemented, is tantamount to maximizing national welfare, taking the supply of the illegal immigrant workforce as a given.

In figure 3, the constant supply of the illegal immigrant workforce is given by the vertical line originating from the point $(N/n + \mathcal{I}^1, 0)$, with a corresponding wage income, w_i^1 , regardless of the actual rate of employer inspection. Accordingly, with a perfectly inelastic supply of illegal immigrants, and a fixed illegal wage income, given that b^e , the use of employer sanctions as a means of migrant deterrence and penalty shifting is no longer relevant. Meanwhile, the benefits of apprehending \mathcal{I}^1 number of illegal workers depend only on the difference between the areas shaded E and F . Variables E and F , respectively, represent the gains from recovering $w_i^1 + c_i$ amount of wage and public service consumption from each apprehended migrant, and the associated output loss as a result of internal interdictions.

More formally, the incentive for the policy maker to deviate from b^* can be seen from the following maximization problem, which describes the choice of an optimal frequency of employer inspection, taking b^e , A , and g as given constants \bar{b}^e , \bar{A} , and \bar{g} , respectively,

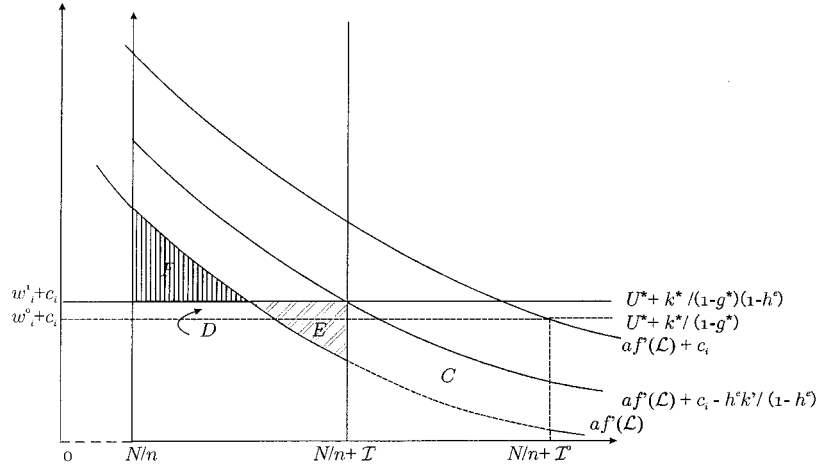


FIG. 3.—The benefits of internal apprehension

$$\max_b Y(s, b^e),$$

$$\text{subject to } A = \bar{A}; \quad g = \bar{g}; \quad b^e = \bar{b}^e; \quad b \geq 0. \quad (11)$$

It can be readily verified that on setting $\bar{A} = A^*$ and $\bar{g} = g^*$,

$$\begin{aligned} \left. \frac{\partial Y}{\partial b} \right|_{s^*, b^e \text{ const.}} &= n[f(L - T) - f(L)] \\ &\quad + n(w_i + c_i)q(b^*, g^*, A^*) - D'(b^*) \\ &= - \left. \frac{\partial Y}{\partial b^e} \right|_{s^*, b \text{ const.}} = -Y_I \frac{\partial \hat{q}}{\partial b^e} + (1 - b)n\hat{q} \frac{\partial \tau w_i}{\partial b^e} \quad (12) \\ &= n(1 - b^*) \left(c_i - \frac{b^e k'}{1 - b^e} + \hat{q} \frac{\partial \tau w_i}{\partial q} \right) \frac{\partial \hat{q}}{\partial b^e} \\ &\quad + (1 - b)n\hat{q} \frac{\partial \tau w_i}{\partial b^e}, \end{aligned}$$

where the second equality follows from the first-order condition under the second-best regime, requiring $(\partial Y / \partial b)|_{s^*, b^e \text{ const.}} + (\partial Y / \partial b^e)|_{s^*, b \text{ const.}} = 0$

Equation (12) highlights the incentives on the part of the host country to cut back on internal apprehension efforts once the expectation b^e and, hence, the supply of illegal immigrant, are given. To see this, note that

the term $(\partial Y/\partial b^e)|_{s^*, b \text{ const.}} = Y_l(\partial \hat{q}/\partial b^e) - (1 - b)n\hat{q}'(\partial w_i)(\partial b^e)$ represents precisely the welfare improvement by the threat of internal apprehension. In particular, the term $Y_l(\partial \hat{q}/\partial b^e)$ represents the welfare gain associated with a reduction in illegal immigrant supply as the expected probability of apprehension in the home country increases. Meanwhile, the second term, $-n\hat{q}'(1 - b)(\partial w_i)/(\partial b^e)$, represents the penalty shifting response resulting from an increase in b^e . It can be readily confirmed that so long as welfare optimization requires strictly positive levels of border enforcements ($g^* > 0$), the expression $(\partial Y/\partial b^e)|_{s^*, b \text{ const.}}$, which represents the joint effect of migrant deterrence and penalty shifting on national welfare, is strictly positive.¹⁶

Intuitively, whereas an increase in border enforcement entails the marginal resource cost $H'(g) > 0$, the threat of internal apprehension, via an increase in the expectation of the frequency of internal apprehension, does not require a corresponding increase in enforcement expenditure, so long as the government entertains discretion in the actual frequency of internal apprehension ex post. As such, once expectations are formed, and once actual implementation of internal apprehension has no additional impact on the inflow of illegal immigrants, the ex post welfare response to actual internal apprehension efforts, evaluated at the second-best policy vector s^* , is given simply by $-(\partial Y/\partial b^e)|_{s^*, b \text{ const.}} < 0$. It follows, therefore, that the home country will benefit by deviating from the second-best frequency of employer inspection, precisely by setting the ex post b to be lower than the ex ante optimal level.

Accordingly, let the ex post optimal level of internal apprehension, which equates equation (12) above to zero, be given by the implicit function $\phi(\bar{b}^e, \bar{g}, \bar{A})$. The incentives for policy surprises, and hence, for $\phi(b^*, g^*, A^*)$ to deviate from b^* , can now be illustrated more succinctly by figure 4, where a family of government indifference curves defined over b^e and b are drawn, with the level of border enforcement and amnesty provisions given by g^* and A^* , respectively. Recall that with home country

¹⁶ Note from the maximization problem, eq. (6) that

$$\begin{aligned} \frac{\partial Y}{\partial b^e} \Big|_{s^*, b \text{ const.}} &= -n(1 - b^*) \left(c_i - \frac{b^* k'}{1 - b^*} + n\hat{q}' \frac{\partial w_i}{\partial \hat{q}} \right) \frac{\partial \hat{q}}{\partial b^e} + n\hat{q}' k' \\ &= \left[\frac{\partial Y}{\partial g} \Big|_{s^*} + H'(g^*) \right] \frac{\partial \hat{q}/\partial b^e}{\partial \hat{q}/\partial g} + n\hat{q}' k' \\ &= H'(g^*) \frac{\partial \hat{q}/\partial b^e}{\partial \hat{q}/\partial g} + n\hat{q}' k' > 0. \end{aligned}$$

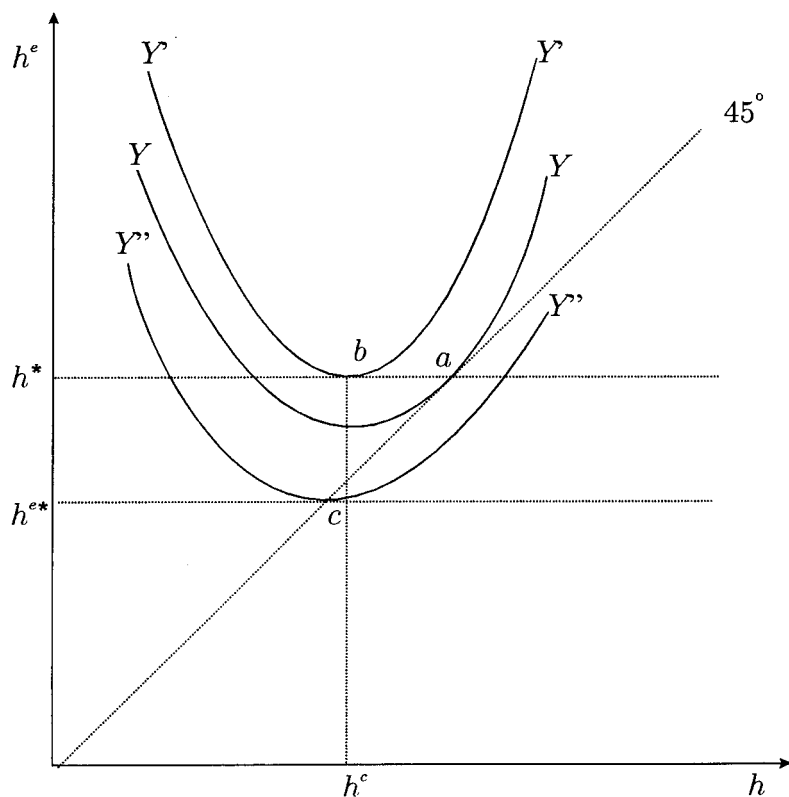


FIG. 4.—The second-best and third-best regimes

welfare strictly increasing in h^e , the indifference curves $Y''Y''$, YY , and $Y'Y'$ indicate increasing levels of national welfare. Finally, the 45° line represents the commitment constraint in the second-best welfare maximization problem, which requires that $h = h^e$.

Curve YY plots the combinations of h and h^e , which yield the level of national welfare in a second-best regime. A second-best equilibrium, point a , is given by the tangency point of curve YY and the commitment constraint. With h^e now fixed at h^* , however, the policy maker can further improve home country welfare by reducing the rate of employer inspection to point b , which corresponds to the tangency point of the indifference curve $Y'Y'$ and the horizontal line $h^e = h^*$. In terms of our notations, the level of employer inspection at point b is just the solution h^c to the implicit function $\phi(h^*, g^*, A^*)$, with h^c strictly less than h^* .

However, since point b represents a situation where public expectation regarding h^e does not coincide with the ex post optimal level of employer

inspection, it cannot be consistent with a rational expectation equilibrium, as both employers and potential illegal immigrants are fully aware of the incentives of the government to deviate from b^* . For given values of \bar{g} and \bar{A} , therefore, the corresponding rational expectation equilibrium, \bar{b}^e , requires that the expectation of employer inspection be given by the fixed point of the implicit solution to the government's maximization problem in equation (12), with

$$\bar{b}^e = \phi(\bar{b}^e, \bar{g}, \bar{A}).$$

By standard arguments, such a fixed point exists. In the appendix, I also show that the uniqueness of \bar{b}^e for every $0 < \bar{g} < 1$ and $\bar{A} \geq 0$ is guaranteed, provided, once again, that the illegal wage response to a reduction in L is sufficiently small.

Within figure 4, the rational expectation equilibrium, $b^{e*} = \phi(b^{e*}, g^*, A^*)$, associated with the second-best choice of border enforcement, g^* , and amnesty provisions, A^* , is given by point c , where two criteria are simultaneously met. First, b^{e*} maximizes ex post national welfare, as indicated by the tangency between the indifference curve $Y''Y''$ and the horizontal schedule $b^e = b^{e*}$. Second, this point of tangency intersects the constraint $b = b^e$, whereby the government's action is perfectly foreseen by rational employers and immigrants. Consequently, the maximal national welfare attainable under commitment (curve YY) is strictly greater than that which is attainable in a third-best regime with discretion (curve $Y''Y''$).

Are there circumstances under which the policy maker can enhance its credibility and thereby avoid, at least partially, the reduction in welfare from point a to c ? The answer to this question is a conditional yes. To see this, note that amnesty, in addition to border enforcement, enters into the determination of \bar{b}^e through the implicit function $\phi(\cdot)$. In particular, by definition, \bar{b}^e is the solution to

$$\begin{aligned} n\{af[L - \mathcal{I}(\bar{b}^e, \bar{g}, \bar{A})] - af(L)\} \\ + n(\omega_i + c_i)\mathcal{I}(\bar{b}^e, \bar{g}, \bar{A}) = D'(\bar{b}^e), \end{aligned} \quad (13)$$

where the left-hand side of the above represents the output reduction resulting from a small increase in b plus the wage and welfare cost savings of apprehending illegal immigrants. It follows, therefore, that an increase in \bar{A} has both a first round- and a second round-effect on the size of \bar{b}^e . First, amnesty decreases the output loss associated with apprehension, since the term $af(L - \hat{\mathcal{I}}) - af(L)$ is strictly increasing in A .¹⁷ Second, am-

¹⁷ To see this, note that by the assumed decreasing marginal productivity of $af(L)$, $\partial[af(L - \hat{\mathcal{I}}) - af(L)]/\partial A = af'(L - \hat{\mathcal{I}}) - af'(L) > 0$.

nesty increases the number of illegal immigrants and, thus, the wage and welfare cost savings that are generated by an increase in internal apprehension efforts, as long as the illegal wage response to an increase in labor supply, $|\partial w_i/\partial L|$, is sufficiently small (proposition 1B). Hence, amnesty enhances the credibility of the promise of employer sanctions by increasing the ex post net benefits of internal apprehensions.

On the contrary, since stricter border enforcement efforts reduce the stock of illegal immigrants prior to the actual enforcement of internal interdiction, an increase in g has two opposing effects, in terms of its effectiveness in enhancing the welfare of native workers and employers. In particular, while an increase in g discourages illegal entry of foreign workers (proposition 1A), it also discourages actual internal enforcement efforts ex post, as the wage and welfare cost savings associated with employer inspection fall. In the presence of rational expectations, therefore, stricter border enforcement may in fact discredit the policy maker's promise to maintain its ex ante optimal frequency of internal apprehensions. In the appendix, I provide a formal proof of the following proposition.

PROPOSITION 4. \bar{b}^e is strictly increasing in \bar{A} and decreasing in \bar{g} if the illegal wage response to an increase in labor supply, L , is sufficiently small.

We are now in a position to consider the full maximization problem of the policy maker by accounting for the rational expectation constraint $b^e = \phi(b^e, g, A)$:

$$\begin{aligned} & \max_{\{g, A\}} Y(s, b^e), \\ & \text{subject to } b = b^e = \phi(b^e, g, A) \quad (14) \\ & \text{and } A \geq 0; g \geq 0. \end{aligned}$$

Let a "tilde" ($\tilde{\cdot}$) denote the time-consistent optimal values involving the strategic use of amnesty and border enforcement associated with the maximization problem in equation (14) above. The first-order conditions are

$$\begin{aligned} \tilde{b} = \tilde{b}^e &= \phi(\tilde{b}^e, \tilde{g}, \tilde{A}), \\ \frac{\partial Y}{\partial A} \Big|_{\tilde{s}} &= \frac{\partial Y}{\partial A} \Big|_{\tilde{s}, \tilde{b}^e \text{ const.}} = - \left(\frac{\partial Y}{\partial b^e} \Big|_{\tilde{s}} \right) \phi_A, \\ \frac{\partial Y}{\partial g} \Big|_{\tilde{s}} &= \frac{\partial Y}{\partial g} \Big|_{\tilde{s}, \tilde{b}^e \text{ const.}} = - \left(\frac{\partial Y}{\partial b^e} \Big|_{\tilde{s}} \right) \phi_g. \end{aligned}$$

Note that the condition $\tilde{b} = \tilde{b}^e = \phi(\tilde{b}^e, \tilde{A}, \tilde{g})$ already embodies the first-order condition for the policy maker with respect to b , as given by equa-

tion (12), once \tilde{b}^e is given. The first-order condition with respect to A now accounts for the strategic role of amnesty provisions in altering the public's expectations of the ex post optimal likelihood of employer inspection. From proposition 4, $\phi_A > 0$ since b^e is strictly increasing in A . In addition, national welfare is strictly decreasing in A [$(\partial Y/\partial A)|_{\tilde{s}, \tilde{b}^e, \text{const.}} < 0$] at an interior optimum, and, hence, the optimal policy requires $\tilde{A} > 0$, as long as the increase in output resulting from an increase in A is sufficiently larger than the direct welfare cost of legal immigration, c_a . In the appendix, I confirm that the benefits of amnesty provisions are particularly pronounced in the presence of a sufficiently large positive technological/price shock facing home country producers, and/or an existing stock of native and legal labor endowment that is sufficiently small.

A similar argument applies for the use of border enforcement as an incentive device; in particular, since b^e is strictly decreasing in g , we have $(\partial Y/\partial g)|_{\tilde{s}, \tilde{b}^e, \text{const.}} > 0$ at an interior optimum. The foregoing discussion is summarized in the following result:

PROPOSITION 5. The time-consistent immigration reform involves socially insufficient frequencies of employer inspections and border interdictions. In addition, the time-consistent immigration reform also entails socially excessive provisions of amnesty, when (i) native labor employment (N) is sufficiently small, or when (ii) the host country experiences a sufficiently large technological/price shock (a).

Hence, unless policy makers can credibly commit to the ex ante optimal course of action, host countries can enhance the credibility of employer sanctions through amnesty provisions, whenever discretion on the part of policy maker renders the ex ante optimal immigration reform time-inconsistent. This is so even when amnesty provisions are otherwise welfare immiserizing (proposition 3).

In addition, countries suffering from native and legal labor shortages in immigration-prone occupations, along with countries riding at the peak of the business cycle, are more likely to benefit from amnesty provisions. Both of these factors are suggestive of host country labor markets that have a history of lax immigration control and that risk a large reduction in output ex post if internal apprehension measures are put into effect. These results are of interest, particularly in view of the Special Agricultural Workers (SAW) and the Replenishment Agricultural Workers (RAW) programs, which constitute key components of the legalization provisions of the IRCA. Both of these programs are in place in order to prevent labor shortages in agriculture once employer sanction measures are in place. In this context, amnesty effectively binds the hands of host country governments by offsetting the incentives for policy surprises whenever the output losses associated with an increase in the probability of internal apprehension is sufficiently large.

VI. Conclusion

The basic framework presented above can be extended in several directions, none of which should affect the main thrust of our results, namely, (i) that the time-inconsistency of immigration reform arises when the migrant deterrence and penalty shifting effects of employer sanctions depend largely on the anticipation of internal apprehension, (ii) that welfare calculation regarding the optimal frequency of employer inspections must take these expectations as givens, and finally, (iii) that the imposition of influence on the expectations of rational agents involves actions on the part of the government that can credibly alter its optimal course of actions in the future.

In particular, it is not hard to conceive of circumstances under which legal importation of foreign workers may indeed improve national welfare, even when illegal immigration is absent. For instance, guest workers may work harder and have a higher propensity to invest in human or physical capital (Galor and Stark 1990) when faced with a positive probability of return. Accumulation of foreign workers may also create positive externalities, benefiting both potential immigrants as well as the native workforce (Johnson 1967; Bhagwati and Hamada 1974; Miyagiwa 1991; Grubel and Scott 1993). In each of these cases, the role of legalizing of foreign nationals in enhancing the credibility of employer sanctions is simply strengthened, either when uncontrolled entry of foreign workers is politically costly, or, as in the present analysis, when the fiscal burden of illegal immigration is deemed significant.

An interesting alternative to employer sanctions, as suggested in Chiswick (1988*a*, 1991), is that rather than punishing employers, penalties and detention sentences should be imposed on illegal immigrants. This insight is particularly important, when viewed in contrast to some of the existing analysis of employer sanctions, where illegal immigrants are assumed to be apprehended with pay and to be allowed to work until their contribution to the production of output is complete, so that the full impact of employer sanctions falls on employers. Clearly, from our discussion in Section V, if apprehended immigrants do not encounter income losses, the time-inconsistency problem may become even more acute since there is simply no incentive for costly employer inspections to be undertaken *ex post*. In the context of our model, this element of income loss is embodied in our assumption that illegal workers are apprehended without pay. What remains to be seen, however, is how the interaction between the cost of detaining illegal immigrants, along with the amount of monetary fines that can feasibly be imposed on apprehended illegal immigrants, will affect the nature of the *ex post* optimal frequency of employer inspection.

Finally, it has been frequently suggested that foreign workers rely on

past experience of veteran migrants, along with other sources of word-of-mouth information, in their migration decision process.¹⁸ It bears emphasis that the time-inconsistency of immigration reforms depends on the expectation of native employers, along with foreign workers. An in-depth analysis of the various issues involved when expectations are adaptive rather than rational in the decision making of native employers or foreign immigrants is beyond the scope of this article. Nevertheless, making use of the basic model provided in this article, it should be apparent that the role of expectation formation on the part of migrants (native employers) affects the migrant deterrence (penalty shifting) consequences of employer sanctions. Future research in this area should accordingly focus on the effectiveness of amnesty in providing an implicit guarantee against deviations of ex ante optimal immigration reform, away from the ex post optimal frequency of employer inspection, taking as givens the expectations of both native employers and illegal workers.

Appendix

Proofs

Proof of proposition 1. To determine the illegal immigration response to g , L , and b^e , routine manipulation of equation (4) yields:

$$\begin{aligned}\frac{\partial \hat{q}}{\partial g} &= -\frac{1}{\Delta} \frac{k^*}{(1-g)^2}; \\ \frac{\partial \hat{q}}{\partial A} &= \frac{1}{\Delta} \left[\frac{\partial \alpha}{\partial A} (U_a - U_i) + \alpha \frac{\partial U_a}{\partial A} + (1-\alpha) \frac{\partial U_i}{\partial A} \right] \\ &= \frac{1}{\Delta} \left[\frac{U_a - U_i}{I_0 + I(1-\psi)} + \frac{1}{n} \left[\alpha \frac{\partial w_a}{\partial L} + (1-\alpha)(1-b^e) \frac{\partial w_i}{\partial L} \right] \right] \\ &= -\frac{1}{\Delta} \left[\frac{U_a - U_i}{I_0 + I(1-\psi)} + \frac{1}{n} [\alpha b^e a f''(L - \hat{q}) + (1-b^e) a f''(L)] \right],\end{aligned}$$

where

$$\begin{aligned}\Delta &= -\frac{\partial \alpha}{\partial q} (U_a - U_i) - \alpha \frac{\partial U_a}{\partial q} - (1-\alpha) \frac{\partial U_i}{\partial q} \\ &= \frac{\alpha(1-\psi)}{I_0 + I(1-\psi)} (U_a - U_i) - \frac{(1-b^e)}{n} a f''(L) + \frac{(1-\alpha)}{n} b^e k''(\hat{q}) > 0.\end{aligned}$$

Hence, illegal immigration is strictly decreasing in g . In addition, if the

¹⁸ See, e.g., Chau (1997) for a dynamic analysis of the role of migrant networks and the variety of migration pattern that emerges when the stock of migrants in the host country determines the migration propensities of future immigrants.

legal and illegal wage responses of an increase in $L(\partial w_a/\partial L$ and $\partial w_a/\partial L$) are sufficiently small, \hat{T} is increasing in A . Also,

$$\begin{aligned}\frac{\partial \hat{T}}{\partial b^e} &= \frac{1}{\Delta} \left[\alpha \frac{\partial U_a}{\partial b^e} + (1 - \alpha) \frac{\partial U_i}{\partial b^e} \right] \\ &= \frac{1}{\Delta} \left\{ \frac{1}{n} \alpha [af'(L - \hat{T}) - af'(L)] + (1 - \alpha) [U^* - af'(L) - c_i - k'] \right\}.\end{aligned}$$

Hence, if $\alpha = 0$, \hat{T} is unambiguously decreasing in b^e , as discussed in the text, since the reservation utility of illegal immigrants U^* is strictly less than the utility of a host country illegal worker $af'(L) + c_i$. Meanwhile, with $al > 0$, a sufficient condition for \hat{T} to be strictly decreasing in b^e is that k' is sufficiently large. Q.E.D.

Proof of proposition 2. Denote π as the expected income of immigrant hiring employers, from our results in the proof of proposition 1, along with the definition of w_n and w_i in equation (1), the income responses to an increase in g , b^e , and A , respectively, are given by:

$$\begin{aligned}\frac{\partial w_n}{\partial g} &= (1 - b^e)af''(L) \frac{\partial \hat{T}}{\partial g}, \\ \frac{\partial w_n}{\partial A} &= \frac{1}{n}(1 - b^e)af''(L) \left(1 + \frac{\partial \hat{T}}{\partial A} \right) + b^e af''(L - \hat{T}), \\ \frac{\partial w_n}{\partial b^e} &= af'(L - \hat{T}) - af'(L) + (1 - b^e)af''(L) \frac{\partial \hat{T}}{\partial b^e}.\end{aligned}$$

Clearly, for increases in border enforcement and internal apprehension, a reduction in illegal immigration is sufficient for native wages to increase. In addition, amnesty provisions induce a reduction in native wages if the sufficient condition for an associated increase in illegal immigration is satisfied.

As for the income of illegal workers in the host country, we have, making use of the definition of w_i in equation (2),

$$\begin{aligned}\frac{\partial w_i}{\partial g} &= \left[af''(L) - \frac{b^e k'}{1 - b^e} \right] \frac{\partial \hat{T}}{\partial g} > 0, \\ \frac{\partial w_i}{\partial A} &= \left[af''(L) - \frac{b^e k'}{1 - b^e} \right] \frac{\partial \hat{T}}{\partial A} < 0, \\ \frac{\partial w_i}{\partial b^e} &= \left[af''(L) - \frac{b^e k'}{1 - b^e} \right] \frac{\partial \hat{T}}{\partial b^e} + \frac{k'}{(1 - b^e)^2} > 0.\end{aligned}$$

Turning now to employers' expected income, we have, from the native and illegal wage responses, respectively, to an increase in g , A , and b^e ,

$$\frac{\partial \pi}{\partial g} = -(1 - b^e) \hat{\tau} \frac{\partial \omega_i}{\partial g} - (L - \hat{\tau}) \frac{\partial \omega_n}{\partial g} < 0,$$

$$\frac{\partial \pi}{\partial A} = -(1 - b^e) \hat{\tau} \frac{\partial \omega_i}{\partial A} - (L - \hat{\tau}) \frac{\partial \omega_n}{\partial A} < 0,$$

$$\frac{\partial \pi}{\partial b^e} = af'(L - \hat{\tau}) - af'(L) - (1 - b^e) f''(L) \frac{\partial \omega_i}{\partial b^e} - L \frac{\partial \omega_n}{\partial b^e} - k(\hat{\tau}) < 0.$$

Q.E.D.

Proof of the uniqueness of \bar{b}^e . For every $\bar{A} \geq 0$ and $0 \geq \bar{g} \geq 1$, uniqueness of b^e is guaranteed by an appeal to the intermediate value theorem if we can show that the expression in equation (13),

$$n \left[f \left(\frac{N + \bar{A}}{n} \right) - f \left[\frac{N + A}{n} + \hat{\tau}(\bar{b}^e, \bar{g}, \bar{A}) \right] \right] + n(\omega_i + c_i) \hat{\tau}(\bar{b}^e, \bar{g}, \bar{A}) - D'(\bar{b}^e),$$

is monotonic in \bar{b}^e . Totally differentiating the above with respect to \bar{b}^e , making use of equations (1) and (2), we obtain

$$n \left(c_i - \frac{b^e k'}{1 - b^e} + \hat{\tau} \frac{\partial \omega_i}{\partial \hat{\tau}} \right) \frac{\partial \hat{\tau}}{\partial b^e} - D'' \equiv \Gamma < 0,$$

if the illegal wage response to changes in $\hat{\tau}$ is sufficiently small and if the average welfare cost of illegal immigration, $c_i - b^e k'/(1 - b^e)$, is strictly positive. Q.E.D.

Proof of proposition 4. Totally differentiating equation (13), and making use of the definition of Γ above, we obtain,

$$\phi_A \equiv \frac{\partial \bar{b}^e}{\partial A} = \frac{-n}{\Gamma} \left[f'(L - \hat{\tau}) - f'(L) + \left(c_i - \frac{\bar{b}^e k'}{1 - \bar{b}^e} \right) \frac{\partial \hat{\tau}}{\partial A} + \hat{\tau} \frac{\partial \omega_i}{\partial A} \right] > 0,$$

$$\phi_g \equiv \frac{\partial \bar{b}^e}{\partial g} = \frac{-n}{\Gamma} \left[\left(c_i - \frac{\bar{b}^e k'}{1 - \bar{b}^e} \right) \frac{\partial \hat{\tau}}{\partial g} + \hat{\tau} \frac{\partial \omega_i}{\partial g} \right] < 0,$$

if and only if $\Gamma < 0$ or, equivalently, if

$$\left(c_i - \frac{\bar{b}^e k'}{1 - \bar{b}^e} \right) > -\hat{\tau} \frac{\partial \omega_i}{\partial \hat{\tau}}.$$

Q.E.D.

Proof of proposition 5. Consider the maximization problem in equation (11). We have

$$\frac{\partial Y}{\partial A} \Big|_{A=0} = Y_l \left(\frac{\partial I}{\partial A} + \frac{\partial I}{\partial b^e} \phi_A \right) > 0,$$

if and only if

$$\frac{\partial I}{\partial A} + \frac{\partial I}{\partial b^e} \phi_A < 0. \quad (\text{A1})$$

Making use of the definition of ϕ_A in the proof of proposition 4 above and rearranging, the inequality in equation (A1) above is satisfied if and only if

$$\frac{N}{1 - b^e} \left\{ c_a - n \left[af' \left(\frac{N}{n} \right) - af' \left(\frac{N}{n} + \hat{q} \right) \right] \right\} > -D'' \frac{\eta_b}{\eta_A}, \quad (\text{A2})$$

where $\eta_b > 0$ and $\eta_A > 0$, respectively, denote the elasticity of I with respect to internal apprehension and amnesty provisions.

In particular, since the left-hand side of equation (A2) tends to infinity as N tends to zero, countries with native labor shortages are more likely to adopt amnesty as a strategic immigration policy. Similarly, the left-hand side of equation (A2) is also increasing in the parameter a . Thus, countries that experience a positive technological or price shock are also more likely to set $A > 0$. Q.E.D.

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