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ESSAYS IN THE THEORY OF
INTERNATIONAL FACTOR MOBILITY

By

Jorge Gerardo Gonzalez Davila

A DISSERTATION

Submitted to
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ABSTRACT

ESSAYS IN THE THEORY OF
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This dissertation consists of three essays:

1. "Direct Foreign Investment in the Presence of Sector-Specific Unemployment" analyzes the effects of foreign investment on a Harris-Todaro economy. In the absence of another distortion, foreign investment necessarily improves the welfare of a small economy. Second, foreign investment would not be immiserizing under import-substitution policies in countries characterized by a high ratio of urban to rural employment, a high elasticity of the rural wage with respect to labor, and a low tariff. Third, inflows of foreign capital into the manufacturing sector may decrease or increase unemployment.

2. "Illegal Immigration in the Presence of Labor Unions" develops a general equilibrium framework of a two-sector economy which incorporates illegal immigration in the presence of labor unions. It demonstrates that stricter enforcement of immigration laws, by reducing the demand for or supply of illegal aliens, benefits all legal workers in the economy. Border enforcement is shown to be a welfare-inferior policy

relative to domestic enforcement, when the welfare of illegal aliens is ignored by policy makers.

3. "Illegal Immigration and the Immigration Reform and Control Act of 1986(IRCA)" evaluates the labor market effects of the IRCA provisions. Following a review of the IRCA, the amnesty provision is incorporated into the model. It is demonstrated that the granting of amnesty reduces the wages of nonunion legal workers. Furthermore, it is speculated that unemployment in the union is likely to increase. Since amnesty and employer sanctions have opposite effects on wages and employment, it is not possible to determine theoretically the final outcome of their imposition. However, in a partial equilibrium simulation, it is shown that with the present level of enforcement, the IRCA is unlikely to reduce the number of jobs available to illegal aliens by more than 5%.

TO MY FAMILY,

ESPECIALLY

MY PARENTS: JORGE AND YOLANDA,

AND MY WIFE: SUZIE.

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The completion of my dissertation would have not been possible without the assistance of my dissertation committee. I want to thank the chair of this committee, Professor Mordechai Kreinin, for all his help and guidance. Taking time from his busy schedule, he was always the first to finish reading my essays and to provide me with substantive comments. And, even going beyond the call of duty, he edited away much of the verbosity that normally plagued my writing. Professor Elias Dinopoulos guided me from the earliest stages of the writing of this dissertation. His contributions to my career are many and invaluable. Professor Steven Matusz always gave my work his complete attention. His comments and suggestions have enabled me to correct many mistakes and have dramatically improved the quality of my thesis. For all of these things, I thank him. Finally, I want to thank Professor Carl Davidson for his contributions to the completion of this dissertation.

Many people in the Economics Department helped me at different stages of my Ph.D. program. My gratitude goes to my professors, for their guidance and understanding; to my fellow Ph.D. students, for their friendship and support; and to the secretaries, for their help and permanent good sense of humor. Also, I specially want to thank Dean Richard Lewis for his support.

My friends and family, especially my parents and my wife,
are the reason why I was able to complete my Ph.D. degree.
Without their "blind" faith in me and their unlimited support,
I would have stalled long ago. To all of you:

<div align="center">MUCHISIMAS GRACIAS !!</div>

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CHAPTER 1

REVIEW OF RELATED LITERATURE

I. INTRODUCTION.

As improvements in technology have been transformed into dramatic communications and transportation advances, the size of the world has shrunk. Many things that were thought inconceivable in the past, are now common every day occurrences. With countries being linked together as never before, economic agents have been able to see economic opportunities that were not recognized in the past. This has lead not only to more international trade in goods, but also to more factor mobility across countries.

It is important, therefore, to study the effects of international factor mobility. However, it should be recognized that factor mobility does not occur free of economic distortions in the real world. The purpose of this dissertation is to study some of the issues related to the mobility of factors across countries and to bring these conceptual frameworks closer to the real world by incorporating distortions into the models. The first essay of this dissertation deals with the effects of foreign investment in the presence of tariffs and unemployment; while the last two essays study the phenomenon of illegal immigration.

The first chapter of the dissertation presents a summary of the relevant literature on the topics of foreign investment and illegal immigration.

II. FOREIGN INVESTMENT IN THE PRESENCE OF DISTORTIONS.

The literature analyzing foreign investment has mushroomed since Mundell(1957) showed that international factor mobility was a substitute for international trade in goods. It has been proven under different sets of assumptions that foreign investment is likely to improve the welfare of the host-country. MacDougall(1960) was one of the first authors to prove this proposition. He used a model characterized by complete specialization. Since then, Bhagwati(1979) and many more authors have established the same result under more general assumptions.

The beneficial effects of foreign investment are clear and intuitive for distortion-free economies. However, once distortions are included in the analysis, these results are no longer straightforward. Bhagwati(1958) and Johnson(1955) were the first authors to raise the paradox of immiserizing growth. In their analysis, when a large country follows a free trade policy -which is nonoptimal for it- even internal accumulation of capital can lead to immiserization. This can occur in the following way: when the exporting sector of a

large country receives more capital and expands its production, the nation's export supply and import demand increase. This leads to a deterioration in its terms of trade. If this worsening of the terms of trade is large enough to offset the gains in output, the nation is immiserized by its growth. Once again, the source of this immiserization lies in the fact that the country is not following its optimal trade policy. If the large country imposes tariffs, then immiserizing internal accumulation of capital can be avoided. However, when free trade is followed and the growth in the capital stock is due to foreign investment, the possibility of immiserization is even greater since the returns to foreign capital have to be subtracted from national income [Brecher and Choudhri(1982)].

The possibility of immiserizing foreign investment for a small country appears also when such a country utilizes a non-optimal trade policy; in other words, when it uses tariffs. The strategy of imposing tariffs to attract foreign investment has been widely used by countries around the world. In a surprising result, Brecher and Diaz Alejandro(1977) prove that a small tariff-ridden country must be immiserized by inflows of foreign investment. The reason for this result is the following: As foreign capital flows into the manufacturing sector of the economy (assumed to produce the imported good), the economy increases production in this

sector and decreases output in the other sector. Then, foreign capitalists repatriate their profits, which are equal to the value of the marginal product of foreign capital. This marginal product of capital is equal to the increase in national income valued at domestic prices. Therefore, national income valued at domestic prices does not change. However, since the economy moved to increase production of the manufacturing good, the commodity composition of national income presents now a relative increase in the amount of this type of good. Given the fact that the manufacturing good is valued less internationally than domestically --because of the tariff--, the economy must be immiserized by the inflow of foreign capital. In other words, foreign capital pushes the economy to specialize in a commodity that is valued less internationally than domestically. Hence, once foreign profits are subtracted and national income is left unchanged at domestic prices, the value of this income at international prices must be lower than before. The immiserizing effects of foreign capital have also been studied by Uzawa(1969), Bhagwati(1973), Hamada(1974), and Minabe(1974).

In related studies, Bhagwati and Tironi(1980) and Bhagwati and Brecher(1980) have shown that trade liberalization in the presence of foreign-owned factors of production can also lead to immiserization of the host country. The factor that gives rise to immiserizing trade
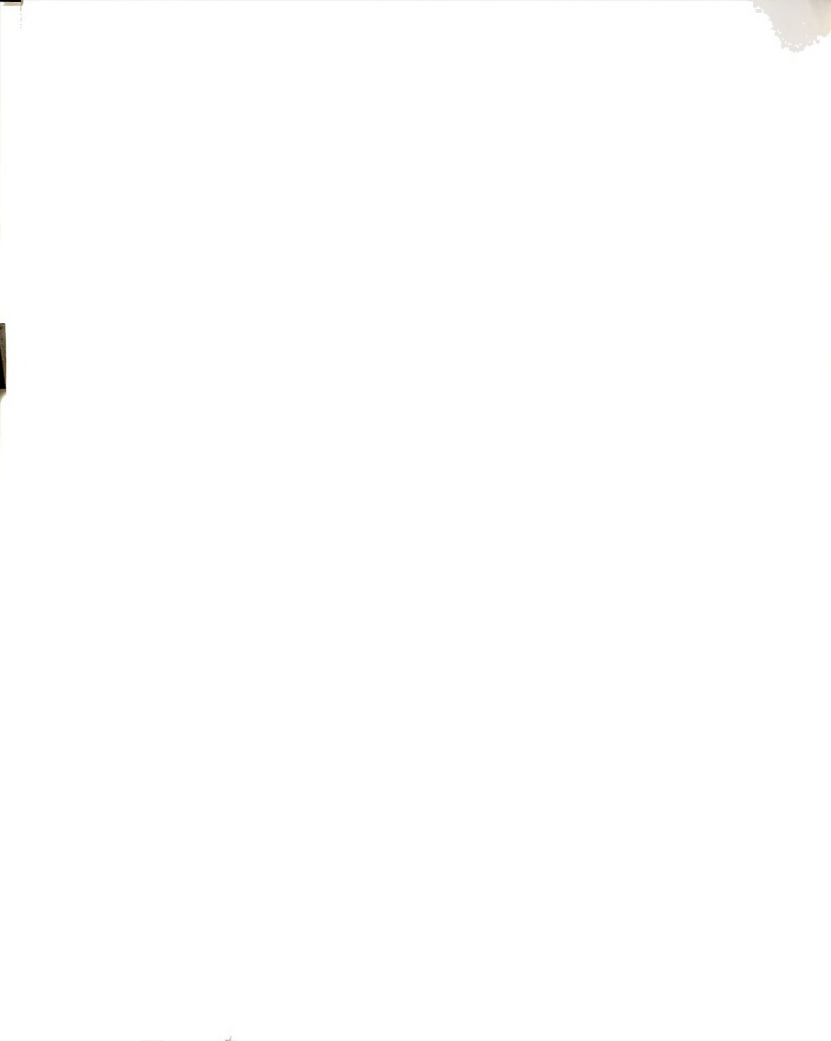
liberalization is the redistributive effects of this policy between foreign-owned and domestic factors. In this fashion, if trade liberalization results in an increase in the returns to the foreign factors, while the return to domestic factors falls, then national income falls and immiserization occurs. In the simplest case, for a 2x2 model where the importable is labor intensive and all capital is owned by foreigners, a movement from autarky to free trade increases the return to capital and decreases the wage bill. Therefore, the domestic factor --labor-- looses and national income falls as a result of trade liberalization.

Trade economists have also studied the effects of foreign investment in the presence of factor market distortions. The Jones(1971) and Neary(1978) sector-specific-factor model has been used in this context by several authors. Srinivasan(1983) concludes that inflows of foreign investment improve the welfare of a small open economy which presents labor-market distortions. In this paper, the author describes a two-sector economy and evaluates the effects of foreign investment in the presence of two types of labor market distortions, namely an uniform minimum wage or a sector-specific minimum wage. For the first case, foreign investment increases employment in the sector in which it is used and has no effect on the other sector. Therefore, by using previously unemployed resources, foreign capital must increase welfare.

In the second scenario, when foreign investment flows into the minimum wage sector, it expands this sector and causes a contraction in the other sector. Given the fact that the labor market distortion had made the minimum wage sector smaller than its optimal size, then foreign investment -by boosting output in this sector- helps alleviate the negative effects of the labor market distortion and improves welfare.

Brecher and Findlay(1983) allow for endogenously determined flows of foreign capital and find similar results as those found by Brecher and Diaz Alejandro(1977). These authors use the Jones-Neary model and allow foreign capital to flow into the nation up to the point where its return is equalized among countries. In this context, a tariff in the manufacturing sector diverts labor into this sector and makes it larger than is should have been in the absence of trade distortions. As a result of the tariff, the return to capital increases and foreign investment is attracted into the protected sector. When foreign capital arrives, the manufacturing sector is further enlarged and the negative effects of the tariff are increased. Furthermore, when foreign capital earnings are deducted, the nation's welfare is reduced even more. In a related paper, Amano(1977) studies the effects of foreign investment on output, employment, wages, and rental on capital in a sector-specific factor model. Khan(1982) also uses a three-factor model to study the

effects of foreign investment and reaches similar conclusions to those of Brecher and Diaz Alejandro(1977).

Sector-specific factor studies generally use the Harris and Todaro(1970) model to generate unemployment. A different approach has been employed by Brecher(1986). He follows Brecher(1974a, 1974b) in incorporating economy-wide unemployment into the model by the imposition of an uniform minimum wage in both sectors. He concludes that the welfare of a tariff-imposing nation would fall while unemployment would normally increase as the result of capital inflows.

The first essay of this dissertation extends the analysis developed in the literature by analyzing the effects of foreign investment in an economy characterized by tariffs and unemployment of the Harris-Todaro type. Since a large number of countries receiving foreign investment are characterized by these two distortions in their labor and product markets, it is important to incorporate both into the analysis. Furthermore, many developing nations have followed import substitution strategies where tariffs are imposed to attract foreign investment, if the conclusions of Brecher and Diaz Alejandro(1977) apply to them, then these strategies must have been immiserizing. It is important to add unemployment into the model, and see if this result is still a necessary

outcome. The essay on foreign investment was written with this objective in mind.

III. ILLEGAL IMMIGRATION.

Although it is impossible to come up with exact numbers on the level of illegal immigration in the world, it is safe to state that this phenomenon is prevalent in most nations and that its importance has been growing over time. Moreover, the relative volume of the illegal immigrants in comparison to that of legal immigrants has also been on the rise. Therefore, the paucity of economic literature on the subject is surprising.

The available literature on illegal immigration can be divided into three categories. The first is represented by authors who develop theoretical frameworks which can be used to study illegal immigration. The second category includes the empirical studies that have been done to analyze the effects of illegal immigrants on host economies. Finally, other authors use theoretical frameworks to simulate the effects of changes in immigration policy.

A. Theoretical Studies

It appears to make sense to develop a theoretical framework of illegal immigration before any empirical study is done or before policy changes are implemented. However, this has not been the sequence of events in this field.

Conceptual studies of illegal immigration have been neglected and only in the last couple of years a few have been developed. This suggests that policy changes were made without proper study. Rather, theory was developed to explain the effects of policies that have already been implemented, and not to evaluate the consequences of proposed policy changes.

Existing theoretical studies of illegal immigration are of two varieties. Some authors assume that nations are already in equilibrium with respect to their stock of migrants; thus the flow of immigrants has stopped. These studies then proceed to evaluate the effects of policy changes on the stock of illegal immigrants. The other type of studies assumes that illegal immigration is not in equilibrium; and examines the effects of policy changes on the flow of illegal aliens.

In turn, the first category of studies can be divided according to the use of one sector economies or two sector general-equilibrium models.

In the path-breaking theoretical study of illegal immigration Ethier(1986) uses a one sector economy with two factors: skilled and unskilled workers. He develops a model that includes illegal aliens and examines the effects of

border and domestic enforcement on the level of illegal immigration and on the distribution of income. In this paper, border enforcement appears to be an effective policy to control the wage received by unskilled workers. As expenditures on border enforcement increase, the number of illegal immigrants coming into the country is reduced and employment opportunities of unskilled workers improve. However, this policy is likely to reduce national income since skilled labor is losing a cooperating factor in the production process. When domestic enforcement is included in the analysis, it is shown that illegal aliens suffer relative to legal workers when firms can distinguish between these types of workers. The reason for this result is that firms will lower the wages they are willing to pay illegal aliens because they face expected penalties for hiring them. If firms cannot distinguish between legal and illegal workers, domestic enforcement hurts all unskilled workers in the economy.

Bond and Chen(1986) advance the framework developed by Ethier(1986) by including capital as a factor of production and allowing its international mobility in a two country model. In this model, the degree of capital mobility modifies the income distribution effects of immigration control policies. When home-country capital can escape penalties by moving to the foreign country, foreign labor wins from immigration control while the gains to domestic labor are

reduced. At the same time, foreign capitalists lose because of the inflow of penalty-jumping capital. Clearly, when capital mobility is not allowed foreign workers lose, while domestic labor and foreign capital gain. In sum, capital mobility reduces the possible gains to domestic labor from changes in the immigration control policies.

The models presented by Hill and Pearce(1987) and Dell'Aringa and Neri(1987) use two-sector analysis. Hill and Pearce's(1987) framework assumes that one sector of the economy is subject to immigration inspections while the other sector is free of them. Therefore, illegal workers concentrate in the second sector. This model is used to evaluate the effects of stricter immigration control. When immigration enforcement is increased, firms in the sector subject to inspections curtail their demand for illegal workers, which in turn reduces their wages. At the same time, demand for low-skilled domestic labor increases in this sector. In the other sector of the economy, demand for illegal labor increases -because of the lower wage being paid to them- while the demand for legal labor falls. The final effect of stricter immigration policies on the earnings of low-skilled domestic labor depends upon the relative strengths of the changes in their demand. When Hill and Pearce(1987) introduce values consistent with the U.S. economy into the model, they find that the earnings of low-skilled legal

workers are likely to increase as a result of stricter immigration control. However, once again, high-skilled labor bears the costs of these gains. With less cooperating factors to work with, the productivity and wages of high-skilled workers are likely to decline.

Dell'Aringa and Neri(1987) study the illegal immigration phenomenon in Italy, where illegal workers are highly concentrated in the informal sector of the economy. To approximate the Italian case, their model represents a nation with a formal and an informal sector. Illegal workers are assumed to work in the latter sector. The framework is used to study the effects of increases in the illegal immigration population. When the number of illegal immigrants increases, the returns to capital in the informal sector rise. Consequently, capital moves from the formal to the informal sector, leaving workers in the former sector worse off. An exogenous increase in the supply of capital or stricter immigration control are two proposed ways to reduce the size of the informal economy.

All the studies described so far assume that an equilibrium level of illegal immigration has been achieved. Todaro and Maruszko(1987) differ from the rest of the literature on this respect. Their paper begins by describing the conditions under which an individual might decide to

immigrate illegally. The prospective illegal alien is assumed to compare the expected income differential between the home and the destination countries. The expected earnings in the destination country are assumed to depend on the probability of being captured and deported as well as on the wage that he could receive if hired. This wage is assumed to be lower than the market wage due to the fact that employers take advantage of the migrant's illegal status. With this framework established, the authors proceed to study the rate of migration, which is defined as the annual percentage change in the illegal alien population. The rate of migration is set to be a function of the unemployment in the destination country, the income differential between countries, the probability of having a job in the home-country, the costs of migration, the growth in the labor market of the destination country, and some parameters which represent the level of border and domestic enforcement. Once this is done, the authors examine the effects of changes in border and domestic enforcement on the rate of migration. They conclude that both policies, by reducing the expected income in the destination country, are potentially effective in reducing the flow of illegal immigrants.

B. Empirical Studies

The empirical studies of illegal immigration face a very important limitation: Because of its illegal nature, good

statistics are not available to study this phenomenon. Despite this fact, researchers have used different methods to estimate the illegal alien population and study its effects on the economy. The empirical literature on illegal immigration can be divided into three categories. First are studies which use available data to estimate the number of illegal aliens in the country. The second group of authors study the question of whether or not illegal workers face discrimination in the wages they receive. And finally, other studies evaluate the impact of illegal immigration in the earnings of legal workers.

In the late 1970's the INS claimed that the number of illegal immigrants in the U.S. ranged from 8 to 12 million,[1] an estimate that proved completely unrealistic by subsequent studies. The Bureau of the Census estimated that in 1985 the illegal immigration population ranged from 4 to 6 million.[2] Siegel, Passel and Robinson(1981) concluded that the numbers of this population were between 3 and 6 million. The annual growth of the illegal alien population in the 80's was estimated by Passel and Woodrow(1984) to be between 100,000 and 200,000. These estimations of the number of illegal aliens are arrived at by looking first at the available U.S.

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[1] Bhagwati(1986).

[2] Economic Report of the President(1986)
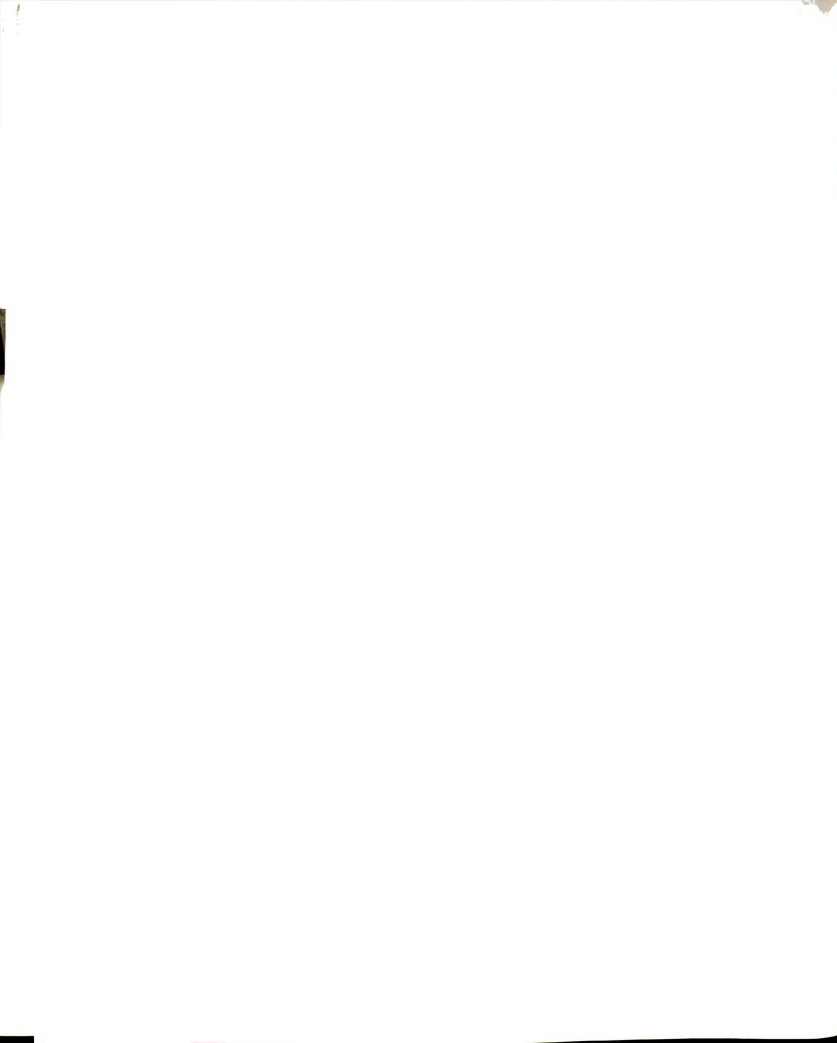
Census data on illegal aliens. Then, approximations are made for the possible rate of underestimation contained in these numbers. With these two parameters, an estimation of the size of the illegal immigrant population can be obtained. Another way of constructing an estimate of the size of the illegal alien population is to approximate first the number of illegal aliens of Mexican origin, then estimate the percentage of illegal aliens of this origin, and with these two numbers calculate the total size of the illegal immigrant pool. In order to arrive at an estimate of the number of Mexican illegal aliens in the U.S., researchers compare Mexican and U.S. census data. From the Mexican data, the number of Mexican nationals living in the U.S. -both legally and illegally- is found; this can be used as an upper bound for the number of illegal aliens of Mexican origin. The U.S. Census data gives the number of illegal immigrants of Mexican origin counted during the Census; this serves as a lower bound for the approximation. With these two numbers, researchers can estimate the size of this population. Bean, King and Passel(1983) and Warren and Passel(1987) estimate the number of illegal aliens from Mexico in the U.S., while Bean, Telles, and Lowell(1987) use these estimations to calculate the total number of illegal immigrants in the country, and conclude that about 3.8 million illegal aliens resided in the U.S. in 1980.

The second question that researchers have attempted to answer is that of the wage discrimination. Two different opinions have emerged. Briggs(1975, 1984) and part of the popular literature have argued that illegal aliens are exploited and paid lower wages than other workers in the economy. On the other hand, a large group of authors have proven that, once skill levels are taken into account, the wages received by illegal aliens are the same as those of legal workers. Cornelius(1978), Simon and DeLey(1984), Massey(1987), Bean, Telles and Lowell(1987), and Chiswick(1988a, 1988b), are some examples of authors that have found no discrimination in wages in empirical studies. These authors obtained their information from wages and employment surveys. Surveys of illegal aliens have been conducted both in U.S. cities --Simon and DeLey(1984) conducted a study in Los Angeles, while Chiswick(1988b) surveyed illegal aliens in the Chicago area-- and in Mexican communities -- Cornelius(1978) and Massey(1987) interviewed illegal aliens who have returned to Mexico--.

From the public point of view, the most important question is the one about the effects of illegal immigration on the wage level of legal workers. Following Greenwood and McDowell(1986), the positions taken by authors can be classified into two categories. The replacement hypothesis states that illegal aliens depress wages of legal workers and

take away jobs from them. Briggs(1975, 1984) has taken this
position. On the other hand, the segmentation hypothesis
postulates that illegal aliens do not compete for jobs with
legal workers, and therefore they do not have a direct impact
on their wage. Abrams and Abrams(1975) supported this
hypothesis by showing that the American labor market was
highly segmented. Additionally, Piore(1979) stated that the
jobs illegal immigrants take are those which legal workers
refuse to perform. A number of studies at the local,
regional, and national level, have been conducted to find the
effect of illegal immigrants on wages of legal workers. Also,
the wage effects have been decomposed to show the impact that
immigration has on different types of legal workers. This has
been done by analyzing available U.S. Census data.
Borjas(1987), Grossman(1982), and Bean, Lowell, and
Taylor(1988) provide studies of this type. Bean, Telles, and
Lowell(1987) present a summary of other studies conducted in
this area. Some of the results of these papers are as follows:
Grossman(1982), using 1970 U.S. Census data, finds that a 10%
increase in the number of foreign-born persons reduces the
wages of second-generation immigrants by 0.2%, while those of
third generation Americans fall by 0.3%. Borjas(1987), using
1980 U.S. Census data, concludes that a 10% increase in the
number of Hispanic immigrants results in a 0.1% increase in
wages of Black natives, a 0.2% increase in wages of Hispanic
natives, and it has no effect on the earnings of white

natives. In a study of illegal immigrants of Mexican origin in the Southwest, Bean, Lowell, and Taylor(1988) used 1980 U.S. Census data to discover that a 10% increase in their number reduces wages of Black males by 0.1%, increases the wages of White males by 0.1%, those of females go up by 0.5%, and this migration has no effect on the wages of Mexican-origin native U.S. males. Upon reviewing the existing literature, Bean, Telles, and Lowell(1987) conclude that if illegal immigration has any effect on the wages of some legal workers, the effect is very small. Furthermore, the gains received from immigration by other legal workers --which are complements in production with illegal aliens-- are likely to outweigh the possible losses to some legal workers.

C. Simulations

In response to the enactment of the Immigration Reform and Control Act of 1986, several authors have simulated the effects of some of its provisions on the U.S. economy. Reynolds and McCleery(1988), who constructed a simulation model of the U.S. and Mexican economies, used it to study the time path of migration, wages, employment, output, and trade in both countries under different sets of immigration policies. In their first experiment, they conducted a simulation of the continuation of the status quo with respect to immigration enforcement. They found that the number of Mexican illegal aliens in the U.S. would peak at over 4

million in 1996, when the number begins to fall. This is important since it suggests that the continuation of the status quo does not imply, as many alarmists have argued, that the U.S. will be flooded by millions of illegal aliens from Mexico. As a next step, Reynolds and McCleery(1988) conduct a simulation of the effects of the provisions of the IRCA, comparing these results to those of the continuation of the status quo. The cumulative cost of the IRCA provisions adds up to a discounted present value of $100 billion for the U.S. between now and the year 2000. These costs are divided among capitalists(who would lose $100 billion), high-skilled workers (who would lose $50 billion), and low-skilled workers (who would gain $50 billion). Hill and Pearce(1987) also conducted a simulation of the effects of the IRCA. They conclude that even if the stricter enforcement provided by the IRCA reduces the non-farm illegal worker population by one-half, the average real wages of native low-skilled workers would rise by less than ten percent. In another simulation, Todaro and Maruszko(1987) state that stricter immigration control could possibly reduce the flow of illegal immigrants. However, they conclude that it is unlikely that the provisions of the IRCA would have a strong enough effect in the apprehension rates of the INS to reduce significantly the flow of illegal aliens. Finally, in a related study, Dell'Aringa and Neri(1987) evaluate the effects of stricter enforcement on the illegal worker population of Italy.
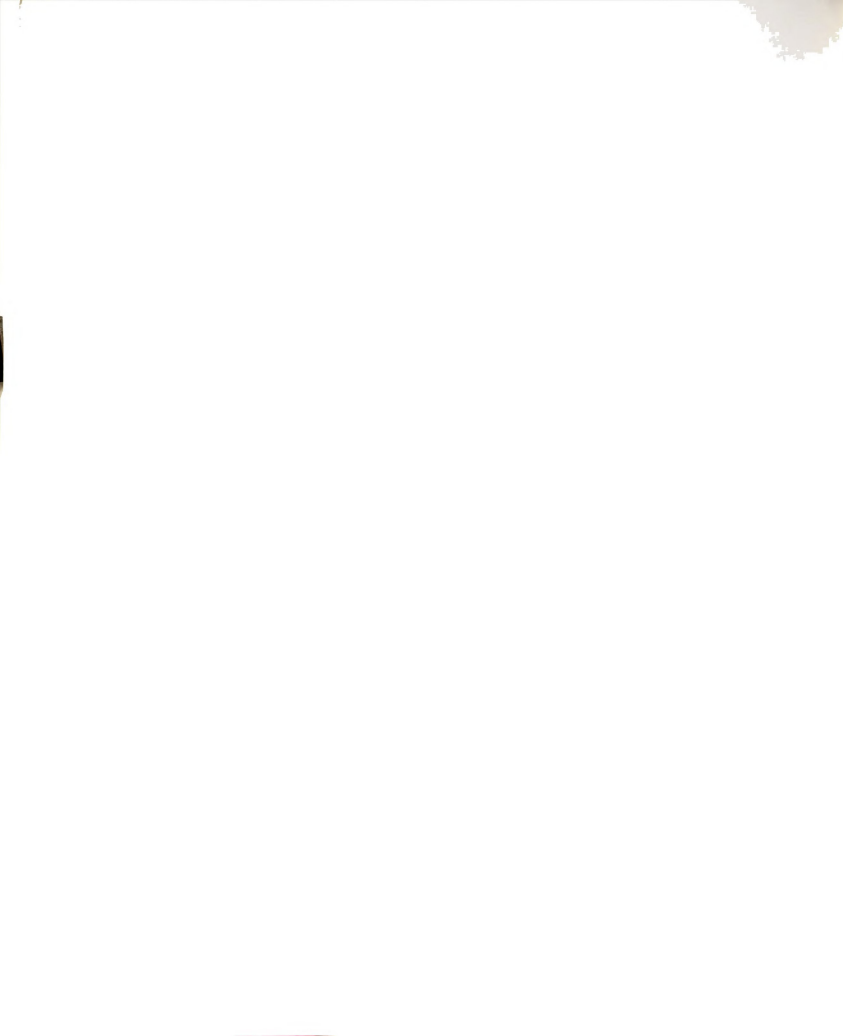
The literature on illegal immigration has failed to incorporate an essential element of the economies of the countries receiving illegal aliens, namely trade unions. The last two essays of this dissertation intend to fill this gap. By incorporating trade unions into the analysis, the conceptual frameworks will be moved closer to reality and their usefulness for policy makers will be enhanced. Furthermore, given the small number of theoretical frameworks devoted to this topic, the development of an additional model would give researchers and policy makers another framework in which to test proposed immigration-policy changes.
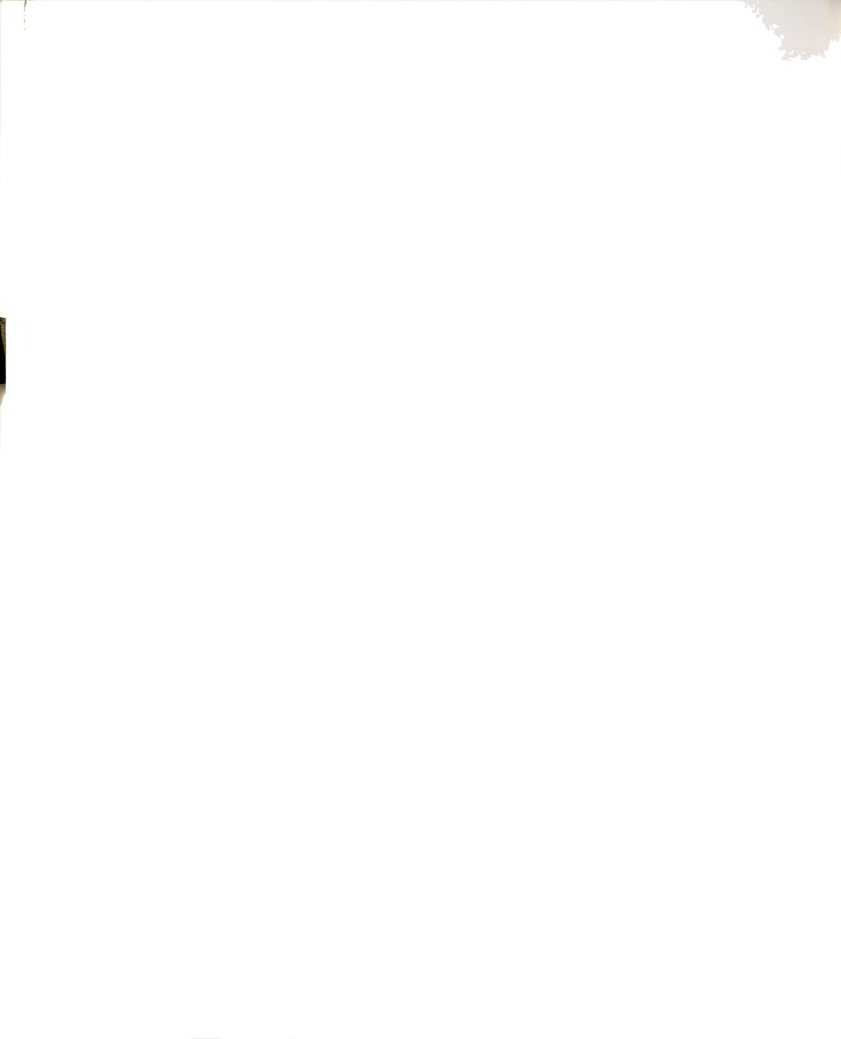
CHAPTER 2

DIRECT FOREIGN INVESTMENT IN THE PRESENCE
OF SECTOR SPECIFIC UNEMPLOYMENT

I. INTRODUCTION.

It has been shown that inflows of foreign investment in
the presence of a distortion could, and in some cases must,
reduce the welfare of the host country.[1] Brecher and
Choudhri(1982) outlined the case of a large nation receiving
foreign investment. They showed that the presence of free
trade opens the way to the possibility of immiserizing capital
inflows. Brecher and Diaz Alejandro(1977) showed that a
tariff-imposing small country must be immiserized by inflows
of capital in the importable sector. Brecher(1986)
incorporated economy wide unemployment into the Heckscher-
Ohlin-Samuelson(HOS) trade model to analyze the effects of
foreign investment on unemployment and welfare. He concluded
that the welfare of a tariff-imposing nation would fall while
unemployment would normally increase as the result of capital
inflows.

Srinivasan(1983) investigated the welfare effects of
foreign investment in a sector-specific factor economy with

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[1] The immiserizing effects of foreign capital have been
studied by Uzawa(1969), Bhagwati(1973), Hamada(1974), and
Minabe(1974), among others.
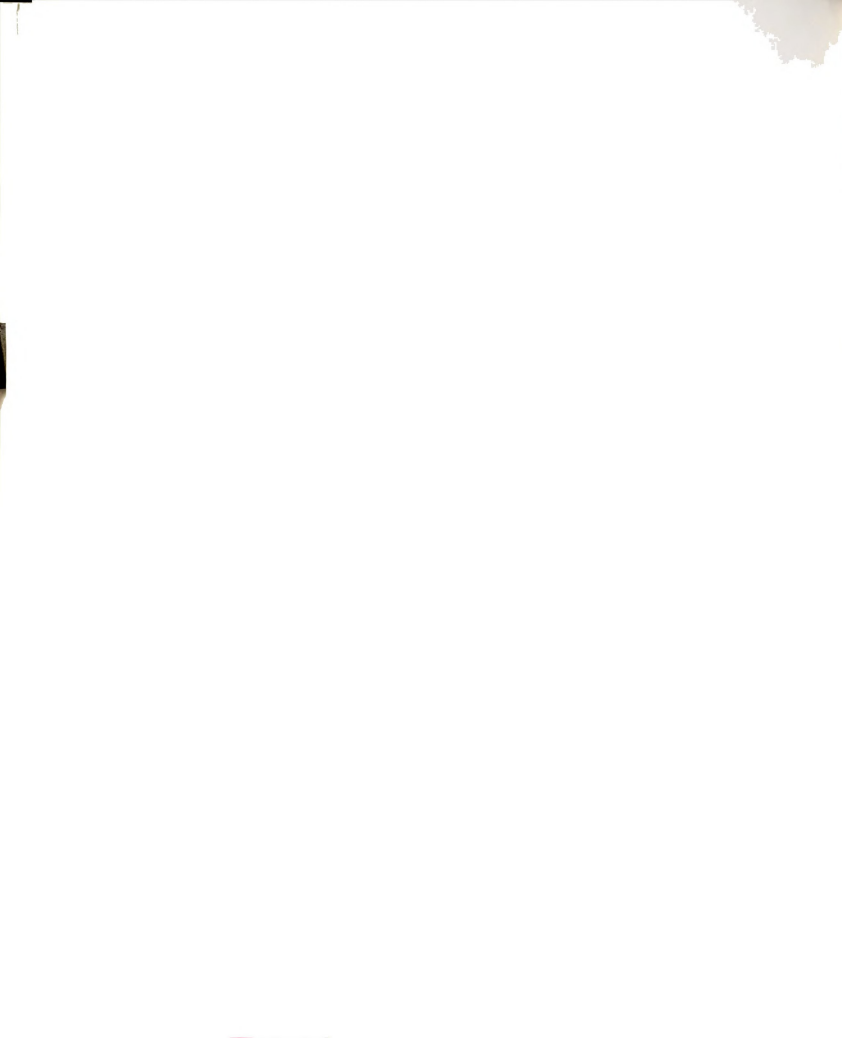
labor market distortions. He concluded that, under these conditions, foreign investment is welfare-improving.

The present paper extends the analysis of Srinivasan(1983) by analyzing the effects of foreign investment in an economy characterized by sector-specific unemployment of the Harris-Todaro type.[2] As it is well known, the Harris-Todaro economy can be considered as having only one distortion in the labor market. Bhagwati and Srinivasan(1976) have shown that only one policy instrument is needed to remove the labor market distortion; namely an overall wage tax/cum subsidy in both sectors is sufficient to lead the economy to its first best equilibrium. The present paper shows that small inflows of foreign capital in the manufacturing sector of a small Harris-Todaro economy, necessarily increases its welfare independently of the pattern of trade. The effects of direct foreign investment on unemployment remain ambiguous. Thus, sector-specific foreign capital inflows represent an alternative policy instrument to alleviate a labor market distortion. And for the case of two distortions, namely unemployment and a tariff structure, this paper shows that under certain conditions foreign investment could be welfare-improving.

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[2] See Harris and Todaro(1970), and Corden and Findlay(1975).

Section II of this paper summarizes the basic algebra of the Harris-Todaro model. Section III uses the model to investigate the effects of capital inflows on the unemployment level. Section IV analyzes the welfare effects of foreign investment in the presence of only one distortion, namely unemployment. Section V evaluates these effects in the presence of two distortions, sectoral unemployment and a tariff. And finally, Section VI states a summary of the results and some conclusions.

II. THE HARRIS - TODARO MODEL.

Consider the Harris-Todaro economy consisting of two sectors, manufacturing(denoted by M) and agriculture(denoted by R). The production functions for both sectors are neo-classical, with positive but decreasing marginal products and positive crossed derivatives.

(1) $M = m(K, L_m)$

(2) $R = r(T, L_r)$

where K = capital;
L_m = manufacturing labor;
T = land and rural capital; and
L_r = agricultural labor.

Capital is assumed to be immobile between sectors, while there is perfect intersectoral labor mobility. A wage floor(W_m) is assumed to exist in the manufacturing sector only, and perfect competition prevails in all markets.
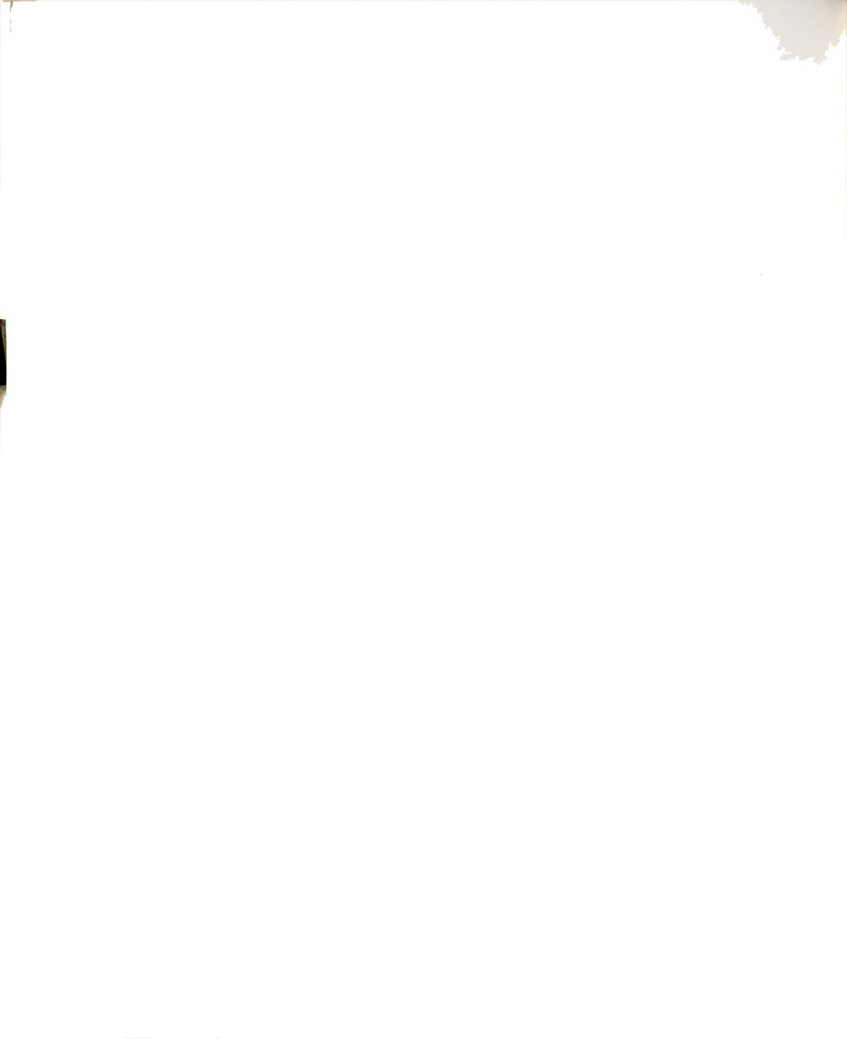
Throughout the analysis the wage floor will be assumed to be binding.[3]

The labor market equilibrium is given by the following two equations:

(3) $W_r = W_m [L_m / (L_m + L_u)]$

(4) $L = L_m + L_r + L_u$

where W_r is the real wage -in terms of the manufacturing good- in the rural sector, W_m is the fixed manufacturing real wage, L is the total labor force, and L_u is unemployed labor in the urban sector

Equation (3) states that the expected wages in the urban and rural sectors are the same, with $L_m / (L_m + L_u)$ being the probability of employment in the urban sector and 1 being that probability for the rural sector. Equation (4) indicates that the total labor force is distributed between those working in the urban and rural sectors, and urban unemployment.

III. EFFECT OF FOREIGN INVESTMENT ON UNEMPLOYMENT.

This section investigates the effects of direct foreign investment on sectoral unemployment. Total employment(L_t) is the sum of urban and rural employment:

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[3] In other words, there is never an excess demand for labor in the manufacturing sector at the minimum wage.

(5) $L_t = L_m + L_r$

The effect of a foreign investment inflow(K^*) in manufacturing on employment will be given by:

(6) $dL_t/dK^* = dL_m/dK^* + dL_r/dK^*$

where all derivatives are evaluated at $K^*=0$

In order to calculate the sign of the first term, we need the first order condition for profit maximization for the manufacturing sector which states that the real wage is equal to the value of the marginal product of labor in this sector:

(7) $W_m = \partial m(K, L_m)/\partial L_m$

Totally differentiating this equation, and noting that W_m is constant, we get:

(8) $dW_m = [\partial^2 m/\partial L_m^2]dL_m + [\partial^2 m/\partial L_m \partial K]dK^* = 0$

(9) $\dfrac{dL_m}{dK^*} = \dfrac{-\partial^2 m/\partial L_m \partial K}{\partial^2 m/\partial L_m^2} > 0$

Relation (9) implies that manufacturing employment increases with foreign investment.
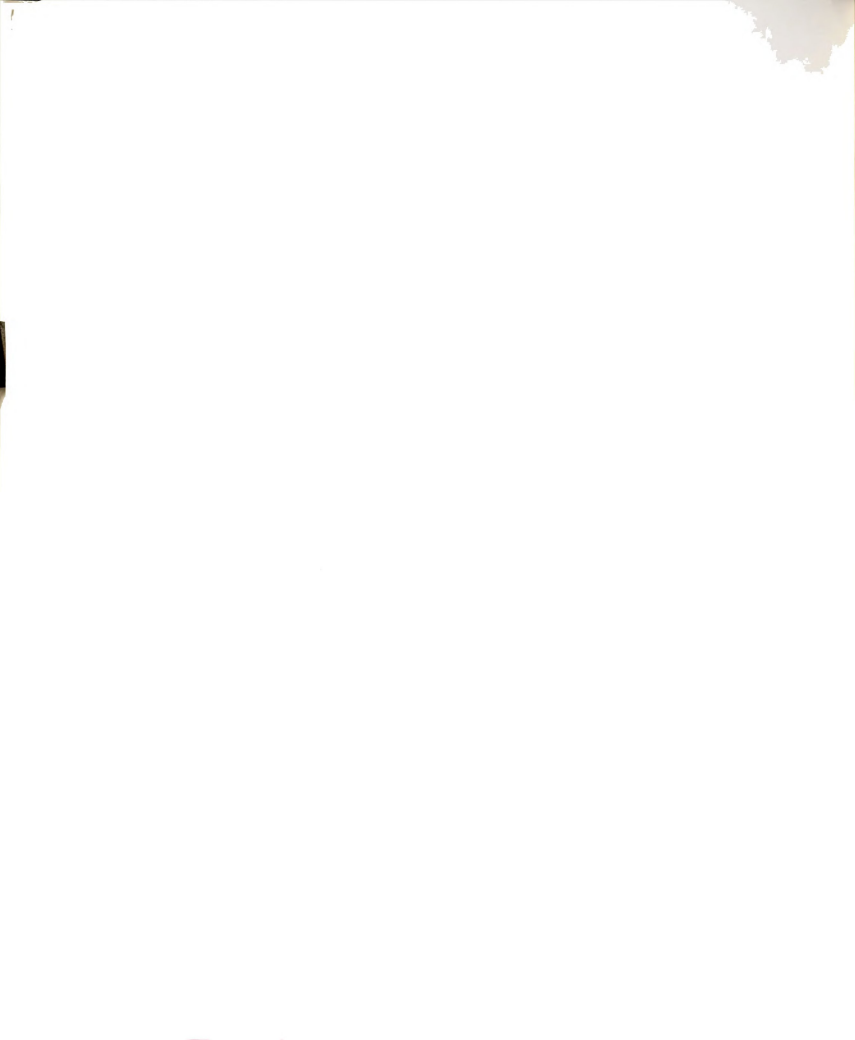
In order to derive the second term of (6) we need the first order condition for the rural sector:

(10) $W_r = P [\partial r(T,L_r)/ \partial L_r]$

where $P = Pr/Pm$

After some algebra we have:

(11) $$\frac{dL_r}{dK^*} = \left[\frac{\partial^2 m/\partial L_m \partial K}{\partial^2 m/\partial L_m^2} \right] \left[\frac{1}{(W_r/W_m) - (L_m/L_r)(E_{wr})} \right] < 0$$

where E_{wr} is the elasticity of the rural wage in terms of labor.[4]

Equation (11) implies that as capital flows into the manufacturing sector, labor employed in the rural sector decreases.

Substituting equations (9) and (11) into (6), we get:

(12) $$\frac{dL_t}{dK^*} = \left[\frac{- \partial^2 m/\partial L_m \partial K}{\partial^2 m/\partial L_m^2} \right] \left[1 - \frac{1}{(W_r/W_m) - (L_m/L_r)(E_{wr})} \right]$$

The sign of the first bracket of equation (12) is positive, while the sign of the second right-hand bracket is

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[4] The elasticity of the rural wage in terms of labor is defined as the proportional change in the rural wage over the proportional change in the labor input. This definition is the inverse of the one used by Corden and Findlay(1975).

not definite. This sign -and the one of the whole equation-
depends on the value of the denominator of the second term of
that bracket; then we can conclude that:

$$(13) \quad \frac{dL_t}{dK^*} \quad \begin{matrix} > \\ < \end{matrix} \quad 0 \quad \text{if} \quad \frac{W_r}{W_m} - \frac{L_m}{L_r} E_{wr} \quad \begin{matrix} > \\ < \end{matrix} \quad 1$$

Equation (13) states that given the initial equilibrium
values of W_r, W_m, L_m, and L_r, the effect of foreign capital
inflows on unemployment will depend on the elasticity of the
rural wage with respect to labor. If this elasticity is
large, total employment will increase; but if it is low,
employment will fall as a consequence of foreign capital
inflows. This conclusion is interpreted graphically in Figure
2.1(to be discussed below). The final outcome in the
employment level will depend on the shape of the curve that
gives the value of the marginal product of labor in the rural
sector. If this curve is steep enough -the elasticity of the
rural wage is large- unemployment will be reduced with the
inflow of capital. But if the curve is flatter than that,
unemployment will increase as the result of foreign capital
inflows.[5][6]

Equation (13) also suggests that the higher the ratio of urban labor to rural labor (L_m/L_r), the higher is the probability that foreign investment would increase total employment. In other words, urban countries would be more likely to reduce unemployment following an inflow of foreign investment than rural nations.[7]

IV. WELFARE EFFECTS OF FOREIGN INVESTMENT.

In this model the level of welfare is determined solely by the level of national income because we assume that the country is small. Therefore, the ensuing analysis should be centered in the changes of national income as foreign capital flows into the manufacturing sector and its results are independent of the pattern of trade.

National income is the sum of the compensation going to all the owners of the national factors of production:

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[6] Another interpretation of equation (13) could be given by transforming it into:

$$(13') \quad \frac{dL_t}{dK^*} \begin{array}{c} > \\ < \end{array} 0 \quad \text{if} \quad \frac{L_r(W_r - W_m)}{L_m(W_m)} \begin{array}{c} > \\ < \end{array} E_{W_r}$$

Equation (13') implies that if the absolute value of the wage elasticity is larger than the absolute value of the ratio of the income lost by rural workers due to the wage differential over the total income of urban workers, then employment will increase as the result of capital inflows. And vice versa.

[7] I thank an anonymous referee for this point.

(14) $NI = L_mW_m + L_rW_r + TI_r + KI_m$

where NI = national income;
  I_r = rent on land and rural capital;
  K = domestic capital; and
  I_m = rate of return on capital.

The change in national income due to a flow of foreign capital in the manufacturing sector is given by:[8]

(15) $dNI/dK^* = W_m dL_m/dK^* + W_r dL_r/dK^* + L_r dW_r/dK^* + TdI_r/dK^*$
  $+ KdI_m/dK^*$

where again derivatives are evaluated at $K^*=0$

The sum of the third and fourth terms on the right hand side of this equation represent the shift in income from landlords to rural workers as capital increases. Clearly this is a zero-sum game, hence both terms cancel each other. Furthermore, the rate of return in the manufacturing sector is constant as capital increases.[9] Therefore, the last term of (15) is equal to zero. Then, equation (15) is reduced to:

(16) $dNI/dK^* = W_m dL_m/dK^* + W_r dL_r/dK^*$

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[8] By assumption W_m, T and K are fixed, so $dW_m = dT = dK = 0$

[9] This is due to the fact that the production function is neoclassical and that we have a fixed wage in manufacturing and fixed prices, implying that the capital-labor ratio remains constant which means that the return of capital is also fixed.

Equation (16) states that the change in national income due to the inflow of foreign capital is equal to the change in the total compensation going to urban workers plus the change in the total compensation going to rural workers. The sign of this equation depends on the signs and sizes of both of these terms. Substituting (9) and (11) into (16) we get:

$$(17) \quad \frac{dNI}{dK^*} = \left[\frac{- \partial^2 m / \partial L_m \partial K}{\partial^2 m / \partial L_m^2} \right] \left[W_m - \frac{W_r}{(W_r / W_m) - (L_m / L_r)(E_{wr})} \right]$$

From equation (17) we conclude that $dNI/dK^* > 0$. Hence, we can irrefutably state that as foreign capital flows into a Harris-Todaro economy, national income and welfare must rise independently of the pattern of trade. And this conclusion is also independent of what happens to unemployment since national welfare is solely determined by national income.

The theory of distortions suggests that when a distortion is present in an economy the possibility of immiserizing growth is present. However, the previous result states that inflows of foreign capital cannot be immiserizing for a Harris-Todaro economy. The intuition behind this result is the following: If the extreme case presented by Lewis(1954) is considered, where the marginal product of rural labor is constant ($E_{wr} = 0$), flows of foreign investment would have no
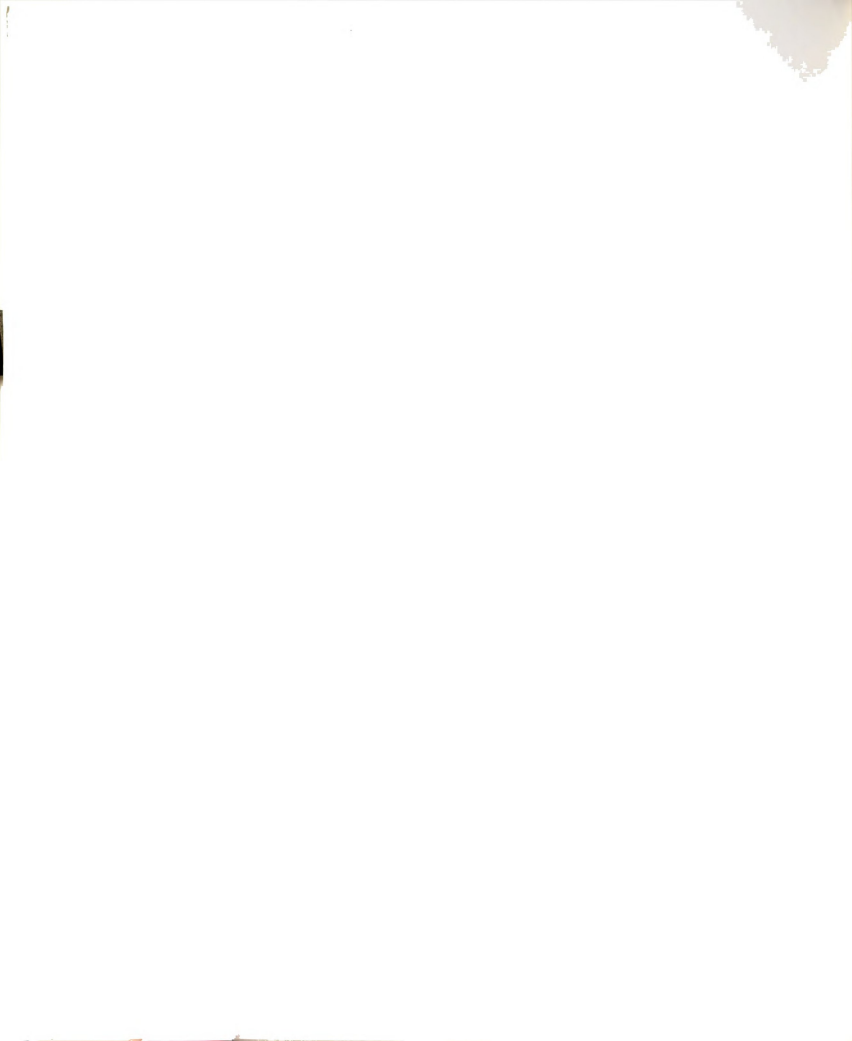
effect on national income. The reason for this result is that foreign investment causes such a large rural-urban migration that unemployment increases sharply; and therefore the increase in the urban wage bill is exactly offset by the fall in the rural wage bill. However, if the marginal product of rural labor is allowed to increase as labor migrates to the urban sector ($E_{wr} < 0$), then the migration process would stop short of the Lewis(1954) case and the increase in unemployment would not be large enough to offset the higher wage received by those who found jobs in the urban area. Hence, the increase in the urban wage bill would be larger than the fall in the rural wage bill; and national income would rise (if foreign investment reduces unemployment, then it is obvious that the increase in the urban wage bill would be larger than the fall in the rural wage bill).

Figure 2.1 represents the familiar labor market equilibrium diagram for the Harris-Todaro economy developed by Corden and Findlay(1975). On the horizontal axis, the total labor force is represented.[10] On the other hand, the vertical axis gives the real wage level expressed in units of the manufactured good. Curves Mm and Rr show the value of the marginal product of labor in the manufacturing and rural sectors. In Figure 2.1 the original equilibrium level

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[10] The distance between O_m and O_r is equal to L.
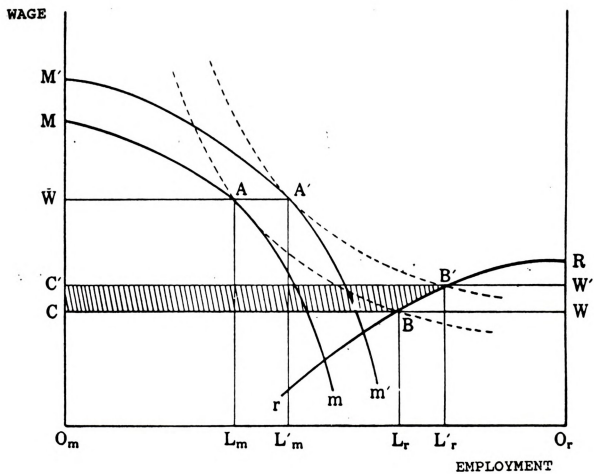
Figure 2.1

DFI in the Presence of Unemployment

of national income is given by O_mO_rRBC plus $\overline{WAM}$. The inflow of capital is shown as an outward shift of the curve representing the value of the marginal product of labor in the manufacturing sector. The new equilibrium in the model is represented by points A' and B',[11] where manufacturing employment has risen to O_mL_m' and rural employment has fallen to O_rL_r'. Income going to urban workers has increased from $O_mL_m A\overline{W}$ to $O_mL_m'A'\overline{W}$, rural workers compensation has changed from L_rO_rWB to $L_r'O_rW'B'$, rent to landlords has fallen from BWR to B'W'R, profits of domestic capitalists remain constant at $\overline{WAM}$, while foreign earnings are AA'M'M. Hence, national income is now given by $O_mL_m'A'AM$ plus $L_r'O_rRB'$. Or equivalently, $O_mO_rRB'C'$ plus $\overline{WAM}$. Therefore, national income has risen by an amount equal to the shaded area CBB'C'.

V. WELFARE ANALYSIS IN THE PRESENCE OF TWO DISTORTIONS.

Brecher and Diaz Alejandro(1977) have found that a small tariff-distorted economy must be immiserized by inflows of foreign capital in the importable sector. We now proceed to analyze if the necessity of immiserization applies to the case of a Harris-Todaro economy.

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[11] B' must be northeast of B since B' has to be on the same rectangular hyperbola as A' and this curve is higher and cannot intersect the original one going through A and B.

Let us consider the case of a small Harris-Todaro economy with two distortions, one in the factor market and the other in the goods market -in the form of a tariff. It is important to mention that our interest here is not on the welfare effects of the imposition of the tariff, but on the welfare effects of the inflow of foreign capital that occurs under an exogenously imposed tariff.

In order to investigate the welfare effects of foreign investment in a tariff-ridden small economy we need to evaluate national income at international prices. This section of the paper uses an equivalent definition of national income than the one used earlier, namely total output less earnings of foreign capital evaluated at domestic prices.[12]

Let us examine first the case of an economy that imports its manufacturing good while it stays incompletely specialized.[13] The domestic price of rural output is:

$P = P_r^*/P_m^* (1+t)$ and its international price is: $P^* = P_r^*/P_m^*$

where t is the tariff on the importable and an asterisk on a price indicates its international level.

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[12] This definition of national income is used by Sapir(1983).

[13] This is the case explicitly presented by Brecher and Diaz Alejandro(1977).

Another factor that has to be considered in this case is the commodity composition of foreign earnings. If we assume, as a first case, that foreign earnings are taken in the form of the importable (manufacturing) good, we would have national income evaluated at international prices(NI^*) given by:

(18) $NI^* = M + P^*R - I_m K^*$

The change in national income due to a flow of foreign capital in the manufacturing sector is now equal to:

(19) $dNI^*/dK^* = dM/dK^* + P^*dR/dK^* - I_m - K^*dIm/dK^*$

Given the fact that the rate of return of capital in the manufacturing sector is constant as capital increases (see footnote 9), the last term of the equation is equal to zero. The rest of (19) could be transformed into:

(20) $dNI^*/dK^* = dM/dK^* + PdR/dK^* - I_m + (P^* - P)dR/dK^*$

Substituting for dM/dK^* and dR/dK^*:

(21) $$\frac{dNI^*}{dK^*} = \frac{\partial m}{\partial K} + \frac{\partial m}{\partial L_m}\frac{dL_m}{dK^*} + P\frac{\partial r}{\partial L_r}\frac{dL_r}{dK^*} - I_m$$
$$+ (P^* - P)\frac{\partial r}{\partial L_r}\frac{dL_r}{dK^*}$$

Using the first order conditions of profit maximization
we can simplify (21) to:

$$(22) \quad \frac{dNI^*}{dK^*} = W_m \frac{dL_m}{dK^*} + W_r \frac{dL_r}{dK^*} + (P^* - P) \frac{W_r}{P} \frac{dL_r}{dK^*}$$

The first two terms on the right hand side of equation
(22) give the change in national income evaluated at domestic
prices (this is equivalent to equation (17)) while the last
term of (22) makes the adjustment needed when a tariff exists
in the economy and domestic prices are different from
international prices. Substituting equations (9) and (11)
into (22) and using some algebra we have:

$$(23) \quad \frac{dNI^*}{dK^*} = \left[\frac{-\partial^2 m / \partial L_m \partial K}{\partial^2 m / \partial L_m^2} \right] \left[W_m - \frac{W_r (P^*/P)}{(W_r/W_m) - (L_m/L_r)(E_{wr})} \right]$$

The first bracket of equation (23) is positive, while
the sign of the second bracket is ambiguous. Therefore, the
direction of change of national income -evaluated at
international prices- as foreign capital flows into the
economy depends on the sign of the second bracket. After some
algebra we can conclude that:

$$(24) \quad \frac{dNI^*}{dK^*} \begin{array}{c} > \\ < \end{array} 0 \quad \text{if} \quad \frac{-L_m W_m}{L_r W_r} E_{wr} \begin{array}{c} > \\ < \end{array} t$$
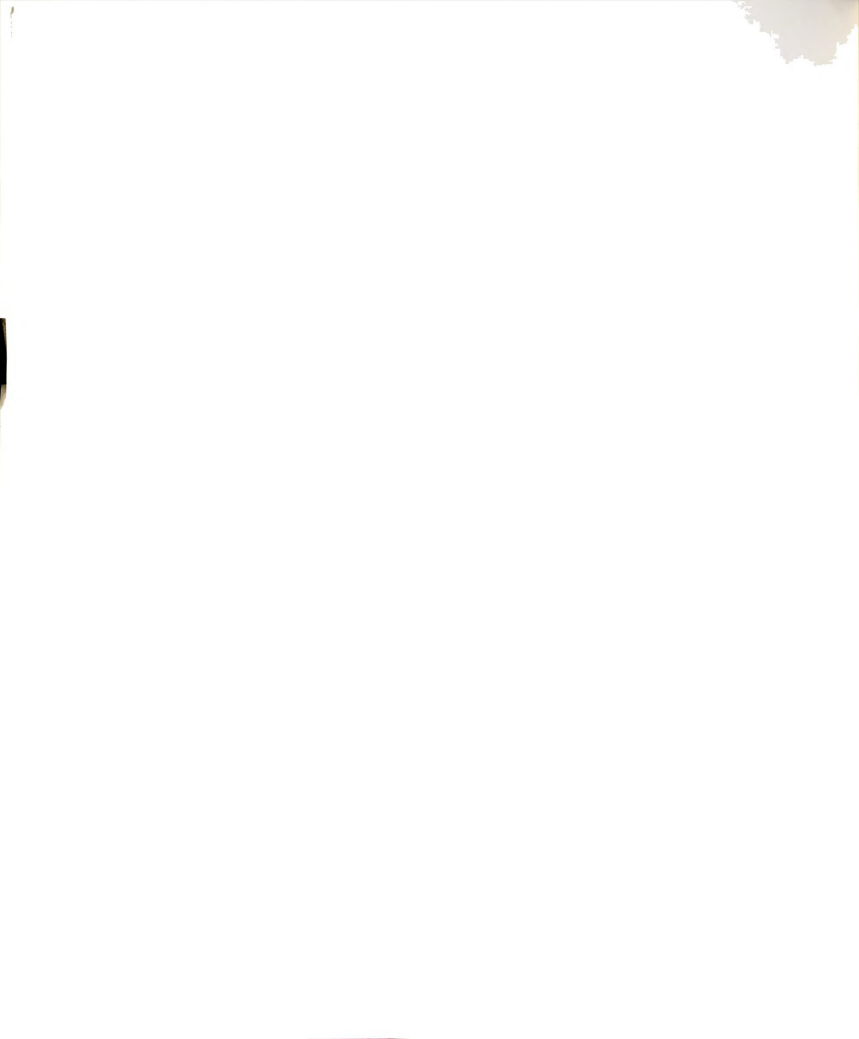
Equation (24) states that foreign investment will increase national income evaluated at international prices if the ratio of actual labor income in manufacturing over the rural labor income, times the elasticity of the rural wage is larger than the tariff rate on the importable (manufacturing) good. Therefore, it is clear that the lower is the tariff rate, ceteris paribus, or the higher is the elasticity -in absolute terms- of the rural wage with respect to labor ceteris paribus, the larger is the probability that foreign investment will increase welfare of the host country. Finally, it should be pointed out that those countries where the urban sector is relatively more important than the rural sector, ceteris paribus, are more likely to benefit from inflows of foreign capital. This last conclusion suggests that import substitution strategies, where tariffs are imposed in the manufacturing sector to attract foreign investment in that area, are a better policy option for countries that have most of their economic activity concentrated in the urban areas. The intuition behind this result is that in those nations where the agricultural sector is relatively small, the fall in rural output is small compared to the increase in manufacturing output that results from the inflow of foreign capital. Hence, even though the economy is shifting production in the direction of a good that is valued less internationally than domestically, national output at international prices could increase.

A comparison of equations (24) and (13)[14] gives us some interesting results. First, if the tariff rate is higher than the relative wage differential in the economy, employment could increase as the result of foreign investment while national welfare falls. Secondly, if the tariff rate is lower than the relative wage differential, national welfare could rise at the same time that total employment falls. And finally, further support is found for import substitution strategies in mostly urban countries. The higher is the importance of the urban area with respect to the rural sector, ceteris paribus, the higher is the probability that both national income and total employment will increase as the result of foreign investment flows. Hence, an import substitution policy in a mostly urban nation, ceteris paribus, could improve national welfare and, at the same time, decrease unemployment problems.

Let us turn to the case where the earnings of foreign capital are taken in the form of the exportable(agricultural) good. Under this assumption, national income evaluated at international prices is given by:

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[14] Equation (13) could be transformed into:

$$\frac{dL_t}{dK^*} \begin{array}{c} > \\ < \end{array} 0 \quad \text{if} \quad \frac{-L_m W_m}{L_r W_r} E_{wr} \begin{array}{c} > \\ < \end{array} \frac{W_m - W_r}{W_r}$$

(25) $NI^* = M + P^*R - (P^*/P) I_m K^*$

And the change of national income as foreign capital flows into the economy is equal to:

(26) $dNI^*/dK^* = dM/dK^* + P^*dR/dK^* - (P^*/P) I_m -$

$\qquad (P^*/P) K^* dI_m/dK^*$

After transformations similar to the ones used for equation (19), we get:

(27) $\dfrac{dNI^*}{dK^*} = \left[\dfrac{-\partial^2 m/\partial L_m \partial K}{\partial^2 m/\partial L_m^2} \right] \left[W_m - \dfrac{W_r \ (P^*/P)}{(W_r/W_m) \ - \ (L_m/L_r)(E_{wr})} \right]$

$\qquad + I_m [1 - (P^*/P)]$

The first part of equation (27) is similar to equation (23), while the second part has a negative term that reduces national income. Hence, if foreign earnings are taken in the form of the exportable good, national income evaluated at international prices would be lower than the case when they take the form of the importable good. Nevertheless, there is not a definite result regarding the direction of the change of national income, it could go up or down as a consequence of flows of foreign investment.

The effects of foreign capital in a doubly-distorted economy could be shown with the help of Figure 2.2.[15] This figure describes the case of a small economy that presents unemployment and that has a tariff on its importable (manufacturing) good. On the axis we have the output of the manufacturing and rural sectors. The original equilibrium level of production determined by domestic prices -given by DD-is at point P; that must be inside the production possibilities curve (PPC) because of the presence of labor unemployment. Consumption occurs where the international price line II -that goes through P- intersects the income consumption line, OO, corresponding to domestic prices.[16] That is, point C. As capital flows into the nation, the economy moves along the "modified" (because of labor unemployment) Rybczynski line RR.[17] The new equilibrium point occurs at P', that is also inside the new PPC (not shown in

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[15] This follows the graphical approach used by Brecher and Diaz Alejandro(1977).

[16] As Brecher and Diaz Alejandro(1977) stated, linearity of OO simplifies the diagram but it is not essential for the derivation of the conclusions.

[17] The negative slope of the Rybczynski line is due to the increase in urban and fall in rural employment that occur as capital increases. These changes in employment are given by equations (9) and (11). Using them and the production functions (1) and (2) we can conclude that output in the urban area must increase and output in the rural sector must fall as foreign capital flows into the economy. The Rybczynski line cannot be linear because the marginal product of rural labor is increasing as workers migrate to the urban area.
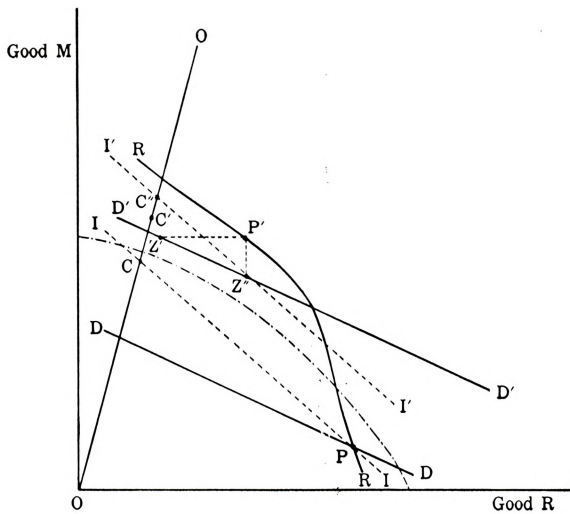
Figure 2.2

DFI in the Presence of Tariffs and Unemployment

the diagram) because of unemployment. After the repatriation of foreign profits takes place, the home country must be left with a national income line —given by domestic prices— above the original DD line. Figure 2.2 shows the case when the economy is left with a bundle between Z' and Z" (Z' would occur if the foreign earnings are taken in the form of the exportable while Z" represents the case when they take the form of the importable). This bundle of goods is exchanged at international prices for a level of consumption between C' and C". Clearly, welfare has improved even after foreign earnings are repatriated. Nevertheless, it must be pointed out that this is not a necessary result. The D'D' line could be lower than the one shown in Figure 2.2. Then, the immiserizing effects of foreign capital will be present again.[18]

To complete this analysis, let us reverse the pattern of trade. It is assumed, now, that the economy imports the agricultural good while it exports the manufacturing good.

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[18] It has been suggested to expand the model by making the capital inflow an endogenous variable following the Brecher and Findlay(1983) model. However, this is not possible. The heart of their model is that capital flows into a country as long as its rate of return is higher than the rate prevailing in the rest of the world and that this local rate of return falls with the investment inflow. In the model presented here, capital inflows do not change the rate of return of capital. Therefore, the capital inflow must be an exogenous variable set by the government of the host country.

Then the domestic price of rural output is:

$$P = P_r^*(1+t)/P_m^*.$$

Using equations (22) and (27) with this new definition of P, it is clear that national income evaluated at international prices must rise as the result of foreign capital inflows in manufacturing.[19] And this outcome is independent of the commodity composition of foreign earnings. This result is similar to the one reached for a full-employment economy in the literature.

Nevertheless, a strong result has been derived. The effects of capital inflows in manufacturing in a country with two distortions, one in the factor market and the other in the goods market, do not have to be immiserizing. Foreign capital could improve welfare under certain conditions. And this conclusion does not need any assumptions regarding the presence of initial foreign capital or the fall in its rate

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[19] This result can also be interpreted as saying that if the capital inflow goes into the sector which is not protected by the tariff, then it must improve national welfare. The intuition is simple: The capital inflow is making the unprotected sector grow; given the fact that this sector was originally smaller than its optimal size --due to the tariff--, then the capital inflow helps to reduce the distortion caused by the tariff. Using the same reasoning, if the pattern of trade is the same as the one used in the first sections of the paper (the economy imports the tariff-protected manufacturing good), then inflows of capital into the agricultural sector always increase welfare.

of return.[20] The implications of the study of Brecher and Diaz Alejandro(1977) do not necessarily apply for the case of nations with unemployment of the Harris-Todaro type.

Therefore, we can conclude that the policies followed by many LDCs to attract foreign investment do not have to be immiserizing. Then, they do not have to be discarded without further analysis.

VI. CONCLUSIONS.

The present paper analyzed the effects of foreign investment on a Harris-Todaro economy. It was shown that when the economy is characterized by sector-specific unemployment, inflows of foreign capital in the manufacturing sector may decrease or increase unemployment. However, these inflows in the absence of another distortion necessarily improve the welfare of the small economy independently of the pattern of trade. When a second distortion, in the form of a tariff, is added to the analysis, the welfare effects of foreign investment become ambiguous as well.

It was found that, holding other things constant, import substitution strategies are more likely to improve welfare and

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[20] Sapir(1983) found a similar result for a full-employment economy with imperfectly mobile factors. However, his conclusion depends on the existence of initial foreign capital and the fall in its rate of return.
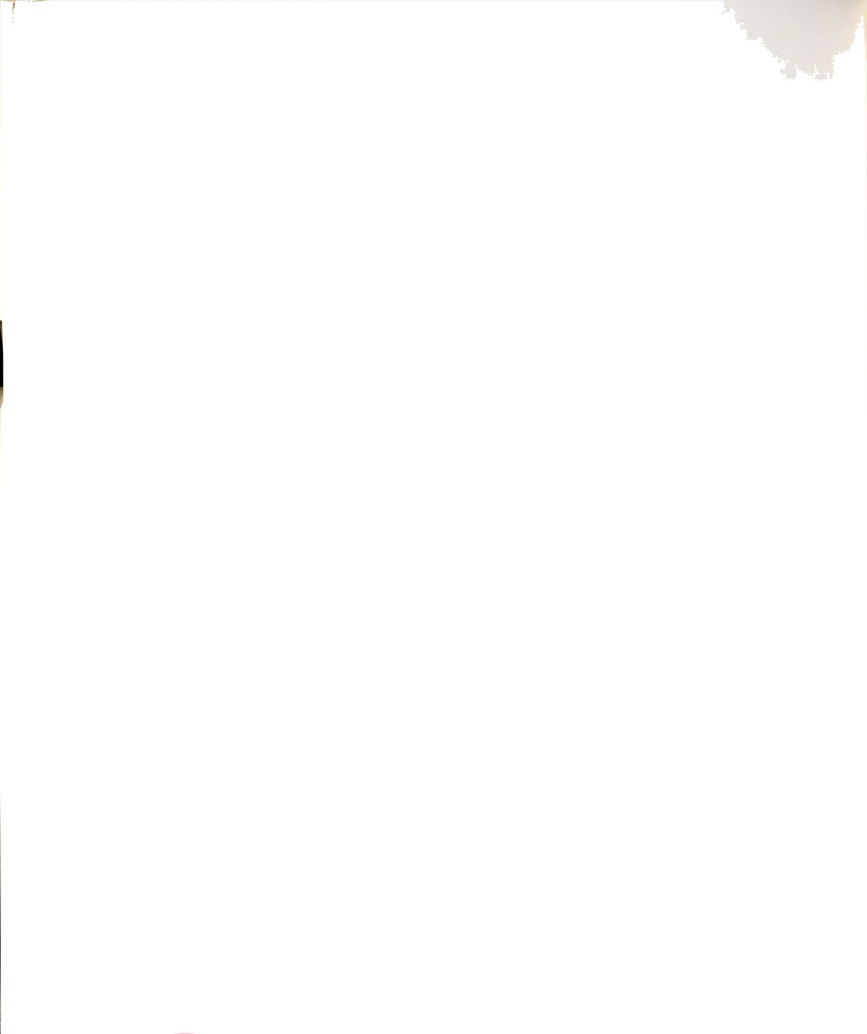
increase employment in those countries that present most of their economic activity in the urban areas. This suggests that import substitution strategies could be an appropriate policy for Latin American nations -that are mostly urban-, but that the same strategies are likely to be immiserizing for African countries -that present important rural sectors.[21]

The results of this paper are qualitative different from the rest of the literature since they point out the welfare-improving characteristics of foreign capital under more general assumptions. Moreover, a further step has been achieved by considering the case of an economy with unemployment and tariffs, which clearly represents a better picture of most of the countries characterized by foreign investment.

The ambiguous result with respect to the effects of foreign investment on the unemployment level, that at first might appear paradoxical, is supported by empirical evidence. Different countries present different employment outcomes when

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[21] Even in the cases when tariffs might produce immiserizing capital inflows, governments might be forced to use them. It is well known that the tax systems of many less developed countries are very inefficient and that tax evasion is common. Therefore, many countries have to rely on import tariffs to raise money to finance government expenditures.
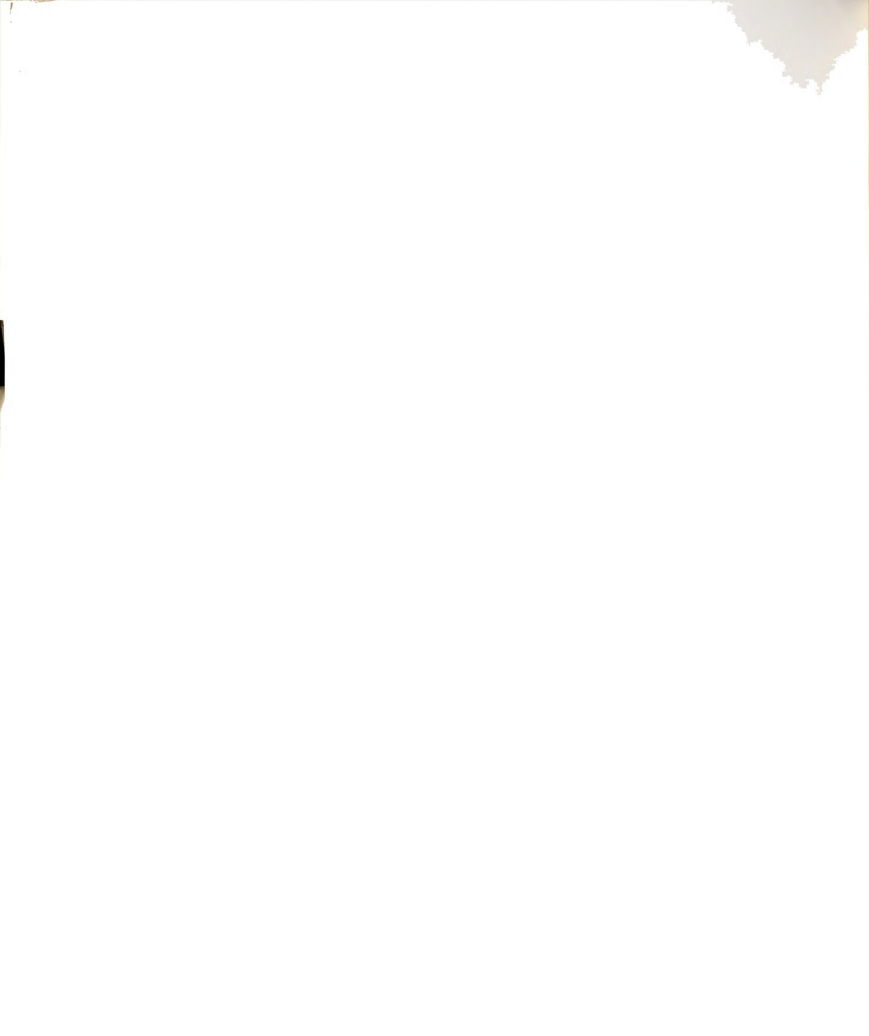
they receive foreign investment.[22] Those countries where the conditions in the rural sector (in this model they are measured by the rural wage level) improve dramatically as the result of the outflow of workers, will present a limited rural-urban migration and unemployment will fall with the capital inflow. On the other hand, in those countries where the rural living conditions do not change much with the outflow of workers, there will be important rural-urban migration and unemployment will be increased as a consequence of this process.

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[22] Even the same country may present different employment outcomes at different stages of its development.

ILLEGAL IMMIGRATION IN THE PRESENCE OF LABOR UNIONS

I. INTRODUCTION

Even though illegal aliens have existed ever since national boundaries were drawn, the topic of illegal immigration has not received much attention until recently. As disparities in national income and work opportunities between rich and poor countries have grown larger, the phenomenon of illegal immigration has acquired a new force. In the face of an increasing influx of illegal aliens into industrial nations, the governments of these countries have been forced to implement policies to control this flow. Due to the lack of appropriate research, however, policy makers have had to base decisions on what they "feel" is better for their country. The need to advance knowledge in this field is obvious.

The purpose of this chapter is to develop a general framework in which the effects of different policies with respect to illegal immigration can be analyzed. This study differs from other literature on the topic by incorporating a unionized sector in the host country. Since trade unions exist in all the industrialized countries that receive illegal aliens, a complete analysis must include this reality. The

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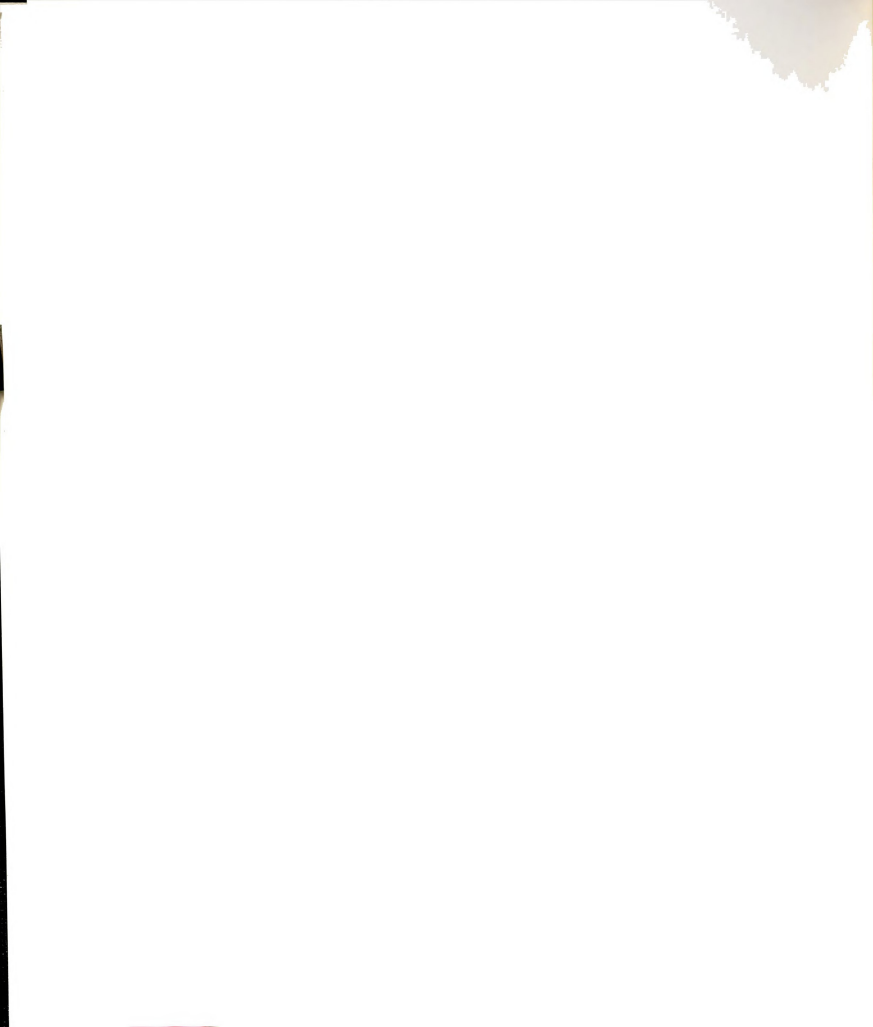
model introduced here is intended to bring the illegal immigration literature one step closer to the "real" world.

As Kuhn and Wooton(1988) have stated, the economics literature on labor migration is one of two types. On the one hand, the empirical effects of changes in factor endowments on factor prices have been studied, primarily by labor economists. A very good survey of this literature is given by Greenwood and McDowell(1986), who conclude that much work remains to be done. On the other hand, trade theorists have concentrated on the interaction between international flows of factors and goods, concluding that the latter are substitutes for the former. Among the studies that concentrate on factor mobility, the conclusion is that capital mobility is a perfect substitute for labor mobility. As Ethier(1986) has noted, however, it is important to study labor mobility on its own because of its distinctive characteristics[1] and because in some industries capital cannot move, and therefore labor must be mobile.[2] A number of trade theorists have examined a specific aspect of labor mobility, namely, the welfare effects of immigration on the workers who

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[1] One characteristic is that when labor moves, both the factor of production and its owner move.

[2] It is interesting to note that illegal immigrants tend to concentrate in industries characterized by immobile capital. The agriculture, construction, and service industries are prime examples. See Hill and Pearce(1987) and Dell'Aringa and Neri(1987).

do not leave their home country. Examples are the models of Rivera-Batiz(1982) and Djajic(1986).

In a pathbreaking paper, Ethier(1986) presented a model for studying the effects of different policies on the level of illegal immigration and the distribution of income. In an extension of Ethier's work, Bond and Chen(1986) added international capital mobility to the model. Dell'Aringa and Neri(1987), whose model assumes that capital is domestically mobile, studied the effects of illegal immigration in Italy. Finally, Hill and Pearce(1987) postulated a model that determines which industries are more likely to be monitored by immigration authorities and then studied the effects of stricter policies.

A vast literature is devoted to labor unions and their behavior. Oswald(1985) made an authoritative survey of the economic theory of trade unions, while Pencavel(1985) and Farber(1986) provided critical surveys of microeconomic modeling of union behavior. Although most studies have focused on the partial equilibrium level, some work has sought to incorporate general equilibrium analysis into union modeling. Johnson and Mieszkowski(1970) and Oswald(1982b) examined the effects of a union on the rest of the economy in a general equilibrium framework.

Going one step farther in incorporating union modeling into trade theory, Grossman(1984) and Brecher and Long(1987) examined the effects of changes in international trade on union decision making. Calvo(1978) incorporated unions into an internal labor migration model by using the work of Harris and Todaro(1970).

As previously indicated, the purpose of this research is to develop a framework in which illegal immigration and trade unions coexist in the same economy. This blends the incipient literature on illegal immigration with the modeling of union behavior. This framework is used to study the effects of immigration policy changes on the welfare of both alien and domestic workers.

The model is described in the first section of this chapter. The unionized sector of the economy is explained first by modeling the utility function of the union. Drawing on the work of Ethier(1986), a description is given of the nonunion sector of the economy, where illegal aliens find jobs. Next, the two-sector general equilibrium solution is offered, and the model then is used to study the effects of changes in immigration policy. Finally, conclusions are presented.

II. THE MODEL

The economy is divided into two sectors, a union and a nonunion sector. Illegal aliens only can be employed in the latter, while legal workers may choose the sector in which they want to work. These two sectors are described below.

The union sector is characterized by the existence of a union, which is assumed to be able to choose the wage that maximizes its utility. The utility function of the union is a derivation of the utilitarian form used by Oswald(1982a, 1985), among others. Departing from previous analysis, and for the sake of simplicity, it is assumed that unemployment benefits do not exist in the economy. Therefore, unemployed union members receive no compensation, and the union derives utility only from the income going to its employed members.[3] The utility of the union can be represented as:

(1) $R = NW^U$

where: R = utility of the union;
N = union members employed; and
W^U = union wage.

Equation (1) states that the union derives one unit of satisfaction for each dollar going to its employed members. Consequently, in order to maximize utility, the union maximizes the total wage bill in the sector. Algebraically, differentiating equation (1) we obtain:

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[3] A discussion of the effects of changing the form of the utility function of the union is presented later.

(2) $dR = NdW^U + W^U dN = 0$

which in turn implies that

(3) $[-W^U/N][dN/dW^U] = 1$

Equation (3) states that the union's utility is maximized when the elasticity of labor demand in the sector is equal to one. In other words, at this point the total wage bill is at its highest level.

Output in the union sector is a function of the number of union members being employed:[4]

(4) $Q^B = q(N)$

where: Q^B = output in nonunion sector.

In order to maximize profits, firms in the union sector hire workers up to the point at which their marginal product equals their wage.[5] Algebraically,

(5) $W^U = q'(N)$

As stated before, legal workers are free to work in either the union or the nonunion sector. Furthermore, these

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[4] Throughout this chapter the existence of capital is ignored, but the production functions could be assumed to include a fixed amount of capital that cannot move either internally or internationally.

[5] It is assumed that only one good is being produced and that its price is equal to one. Therefore, the value of the marginal product is the same as marginal product.

workers are assumed to be risk-neutral in their choice of
jobs. This implies that workers compare expected wages in
both sectors and move between them until these expected wages
are equalized. The expected wage in each sector is equal to
the sector's actual wage times the probability of employment.
Since unemployment is assumed to exist only in the union
sector,[6] the expected wage in the nonunion sector is equal to
the actual wage; the expected wage in the union sector is
lower than the actual wage due to the possibility of
unemployment.[7] Equation (6) gives the condition for expected
wage equalization:

(6) $W^L = [N/M]W^U$

> where: W^L = wage for legal workers in nonunion
> sector; and
> M = total union membership.[8]

The structure of the union sector can be represented with
the help of a diagram, shown in Figure 3.1. The vertical axis
measures the wage level, while the number of workers is
represented on the horizontal axis. Curve qq shows the
marginal product of workers in the sector. The union

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[6] It is assumed throughout that the wage set by the union is
high enough to produce some level of unemployment in this sector.

[7] While expected wages are equal in equilibrium, the actual
wage in the union sector is larger than that in the nonunion
sector.

[8] $M = L^T - L$; where L^T = Total legal labor force, and L =
legal workers employed in nonunion sector.
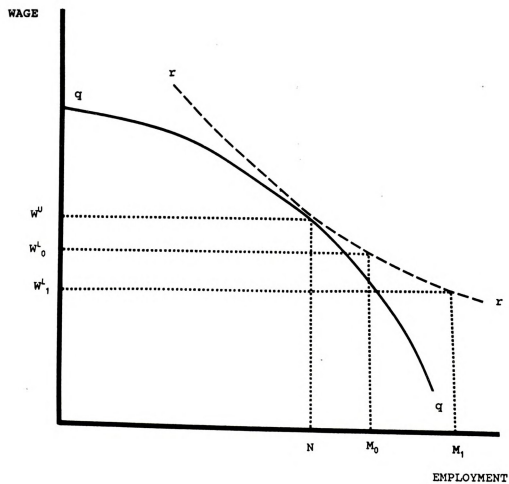
Figure 3.1

Union Sector in Isolation

maximizes utility by choosing the wage level that maximizes the wage bill, and this is found at the point at which the highest rectangular hyperbola is tangent to the curve showing the marginal product of workers in this sector.[9] Curve rr represents the rectangular hyperbola that maximizes the total wage bill. Consequently, W^U is the union wage, and N is the employment level in the sector. If union membership is given by M_0, then the only wage level in the nonunion sector which can bring expected wage equalization in both sectors is W^L_0.[10] If membership increases to M_1, then unemployment rises, and the expected wage in the union sector falls. As a result, the wage in the legal sector has to fall to W^L_1.

In the nonunion sector, firms produce output by hiring legal and illegal workers:

(7) $Q^A = f(L+I) = f(n)$

where: Q^A = output produced by nonunion sector;
         I = illegal workers employed in nonunion sector; and
         n = total employment in nonunion sector.

Firms in this sector hire both legal and illegal workers as long as their costs are the same. The cost of hiring a

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[9] The area under any rectangular hyperbola represents the wage bill. Consequently, the highest attainable hyperbola renders the maximum wage bill.

[10] From equation (6) we know that $W^L M = N W^U$, and therefore only combinations along rr bring expected wage equalization.

legal worker is given by the wage, W^L. The cost of hiring an illegal immigrant has two components: the wage and the expected penalty faced by firms hiring illegal aliens. In order to lure illegal immigrants into the country, the nonunion sector must offer them a wage that, given the possibility of being caught and deported, is at least equal to the wage these workers can earn at home.[11]

The probability of being caught while attempting to immigrate, given by g, is a function of the resources the government devotes to border enforcement.[12] In other words,

(8) g = g(E)

$$g(0)=0, \; g'>0, \; g''<0, \; g<1,$$

where: E = border enforcement (measured in dollars).

Therefore, the expected wage for the prospective immigrant depends on the probability of being caught, the

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[11] The domestic wage that potential migrants earn could be thought of as the monetary wage they receive plus compensation for the stress of moving from one country to another. However, this wage does not compensate for the probability of being caught and deported.

[12] The government is assumed to raise money for its general expenditures through a constant tax paid by all legal workers in the economy. The money spent on border and/or domestic enforcement comes out of the general budget of the government.

penalty faced if caught,[13] the wage at home, and the wage that could be earned if immigration is achieved. In equilibrium, this expected wage should be equal to the wage in the foreign country. Algebraically,

(9) $(W^* - K)g + W^I(1-g) = W^*$

where: W^* = home-country wage;
K = penalty for being caught; and
W^I = wage for illegal workers in host country.

Solving for W^I, we obtain:

(10) $W^I = W^* + K[g/(1-g)]$

Equation (10) gives the wage which must be paid to illegal immigrants to attract them into the country. This wage is positively related to home-country wages, to the probability of being caught, and to the penalty for being caught crossing the border.

In addition to border enforcement, the host government randomly checks firms in search of illegal immigrants already at work.[14] When these are found, the firms employing them are fined.[15] The expected penalty for hiring illegal immigrants

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[13] This penalty could be thought of as the opportunity cost of being caught, that is, the wages that could have been earned at home during the time spent on the failed immigration attempt.

[14] This is true of present U.S. immigration law.

[15] It is assumed that once illegal workers find a job, they cannot be deported, even if the employer is fined for hiring them. This assumption is also used by Ethier(1986).

is given by the probability of being caught times the level of the fines. Departing from previous work, here the probability of being caught is a function of government expenditures on domestic enforcement per illegal alien and of the proportion of illegal immigrants to the legal labor force of the country. In this manner, as immigration expenditures per alien increase, the probability of a firm being caught rises, and as the proportion of illegal to legal workers increases, the probability of being caught also rises.[16] This formulation is an improvement over the ones used before, since it takes into account not only the level of government expenditures but also the number of illegal aliens in the country. Algebraically, we have:

(11) $h = h(D/I, I/L^T)$

> where: h = probability of being caught hiring an illegal alien; and
> D = resources in domestic enforcement.

It is assumed that the effect of rising illegal to legal employment on the probability of being caught dominates that of reduced expenditures per alien as more illegal immigrants enter the country. In other words, as their number rises, illegal aliens become more visible and easier to detect; even if government expenditures per alien fall, greater visibility

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[16] This derives from the fact that as the proportion of illegal immigrants increases, their visibility rises, and it becomes easier for government agents to locate firms employing them.
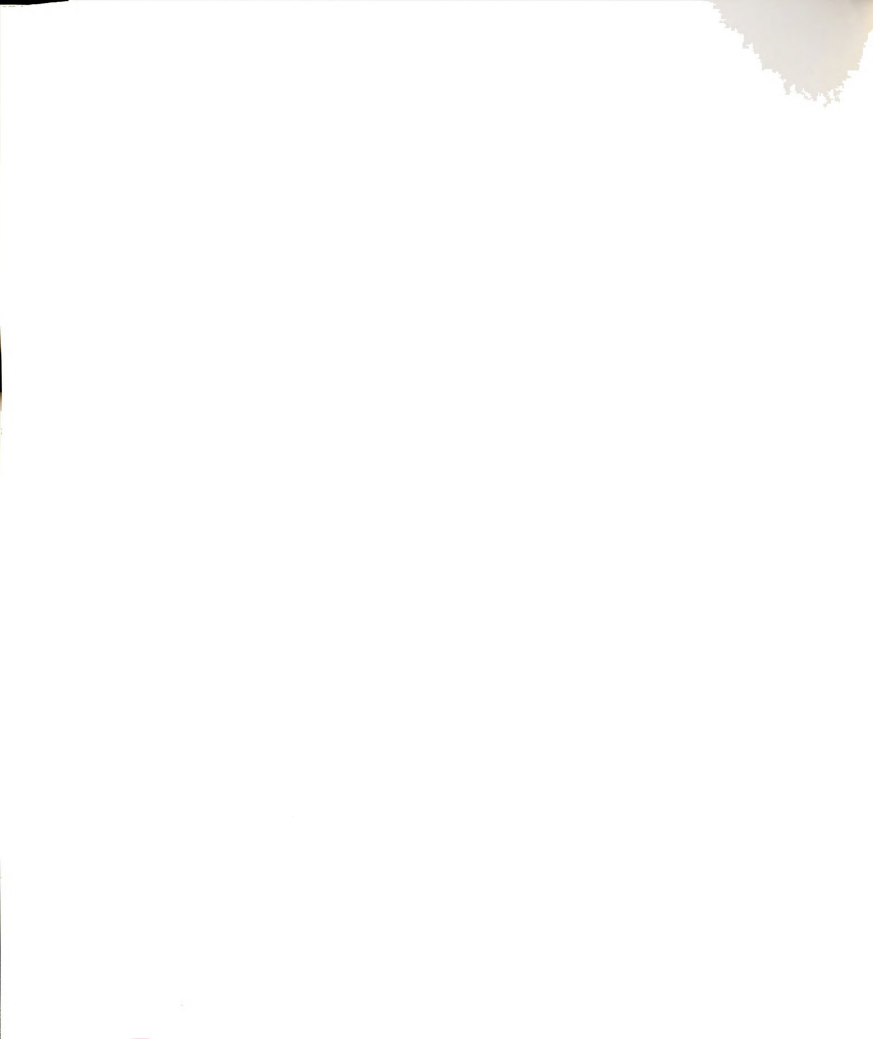
increases the probability of detection. Furthermore, when the level of illegal immigration is equal to zero, the probability of being caught is assumed to be zero.[17] We then have the characteristics of equation (11):

$$h_p > 0, \ h_I > 0, \ h(I=0) = 0.$$

Once the total costs of hiring illegal immigrants are defined, it is possible to examine the equilibrium condition for the employment of legal and illegal workers in the nonunion sector. As stated before, both types of workers are hired only when their costs are the same; this is represented by equation (12):

$$(12) \quad W^L = W^I + hS$$

> where: S = penalty per worker paid by firms caught employing illegal aliens.

Equation (12) implies that, for any given level of W^L, the wage firms are willing to pay illegal aliens varies inversely with their employment level. The intuition behind this result is simple. As the number of illegal aliens hired increases, the probability of being caught hiring them increases, and this raises the expected penalty. Since their total cost must remain equal to W^L, firms have to lower the wage paid to illegal aliens. When this relationship --which

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[17] This simply means that when there are no illegal workers, the probability of detecting them is equal to zero.

gives the demand for illegal labor-- is combined with equation (10) --which states that the supply of illegal immigrants is perfectly elastic at W^I-- the equilibrium level of illegal aliens hired in the economy is found. This is represented in Figure 3.2.

In Figure 3.2, the vertical axis measures the wage, while the horizontal axis depicts illegal workers. The supply curve of illegal immigrants, given by I^s, is perfectly elastic at W^I. The demand for illegal aliens, I^d, falls with the level of employment.[18] The equilibrium level of employment, I, occurs at the point at which illegal labor demand is equal to the supply of illegal workers. The distance between W^L and W^I represents the expected penalty to the firm.

In order to maximize profits, firms in the nonunion sector hire legal and illegal workers up to the point at which their marginal product is equal to their wage. Thus:

(13) $W^L = f'(n)$

Equation (13) states that employment in the nonunion sector is equal to n. If at W^L the number of illegal immigrants is I, then the demand for legal workers in the

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[18] The slope of the illegal labor demand is given by $dW^I/dI = -h_I$. The shape of this curve depends on the sign of h_{II}. In Figure 3.2, it is depicted as a straight line ($h_{II}=0$), but this is not necessary for the conclusions reached here.
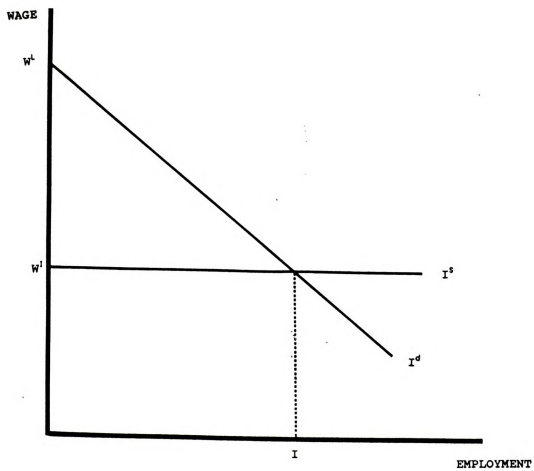
Figure 3.2

Labor Market for Illegal Aliens

nonunion sector must be given by:[19]

(14) $L^d = n - I$

> where: L^d = demand for legal workers in nonunion sector.

These results are shown in Figure 3.3. This diagram is similar to Figure 3.2, but now the curve representing the marginal product of workers in the nonunion sector has been added. This curve is represented by ff. In Figure 3.3, when the wage level for legal workers is equal to W^t, firms are willing to hire n employees in the sector. Of those workers, I is the number of illegal immigrants hired, while L^d represents the number of legal workers demanded by firms in the sector.

For the labor market to clear, it is necessary that the demand for legal workers in the nonunion sector be equal to the number of workers willing to work in the sector. In Figure 3.3, as the wage for legal workers increases, the demand for illegal workers increases, and the quantity of legal workers demanded declines. The intuition behind this result is straightforward. As the wage of legal workers increases, the wage differential between legal and illegal

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[19] Because of the order of the exposition, it might appear that the demand for legal workers is a residual, but this is not the case. Once the whole model is described, the equilibrium values of all variables are found simultaneously. Consequently, none of them are residuals of others.
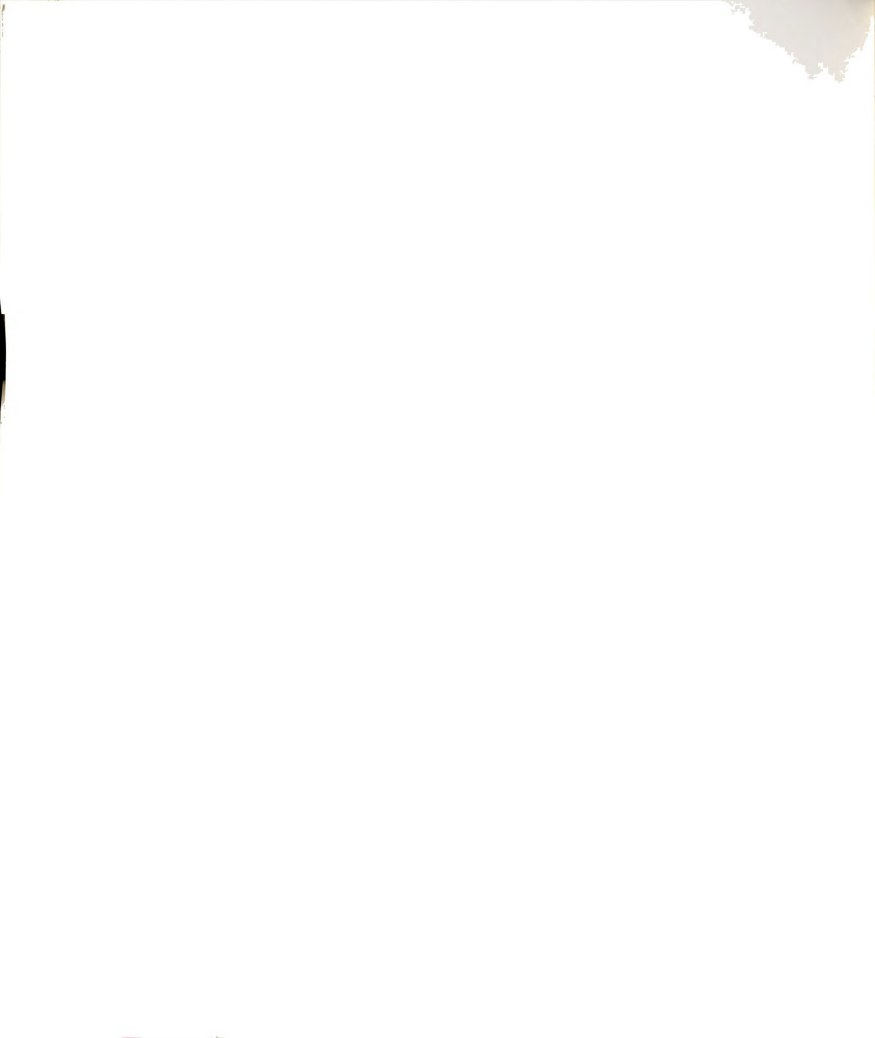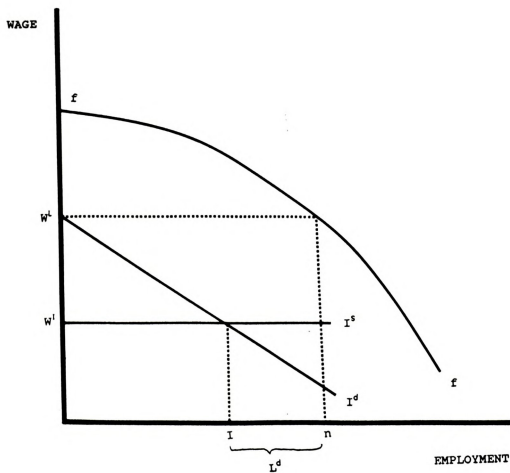
Figure 3.3

Nonunion Sector in Isolation

workers widens. Since this wage differential gives the expected penalty that firms can afford to face, a larger differential allows firms to hire more illegal aliens. Furthermore, as the wage for legal workers increases, total employment in the sector falls. Hence, with larger illegal alien employment and lower sectoral employment, the number of legal workers demanded must fall.

The demand for legal workers in the nonunion sector is shown in Figure 3.4 by curve L^d. In order to derive the supply of legal workers in the nonunion sector, it is necessary to go back to the equilibrium condition for expected wage equalization between the union and nonunion sectors. This condition was specified in equation (6). Given the fact that the total wage bill in the union sector is constant at its highest level, any increase in the nonunion sector's wage attracts some union members to that sector. This movement of workers continues until the expected wages in both sectors are equal again. Therefore, for a given wage bill in the union sector, the expected wage equalization condition gives the supply of workers to the nonunion sector. This labor supply is given by L^s in Figure 3.4.[20] According to Figure 3.4, when the wage for legal workers is W^{L*} and L^* workers are hired in the nonunion sector, the labor market has achieved

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[20] The supply of legal workers is the mirror image of the rectangular hyperbola rr in Figure 3.1.
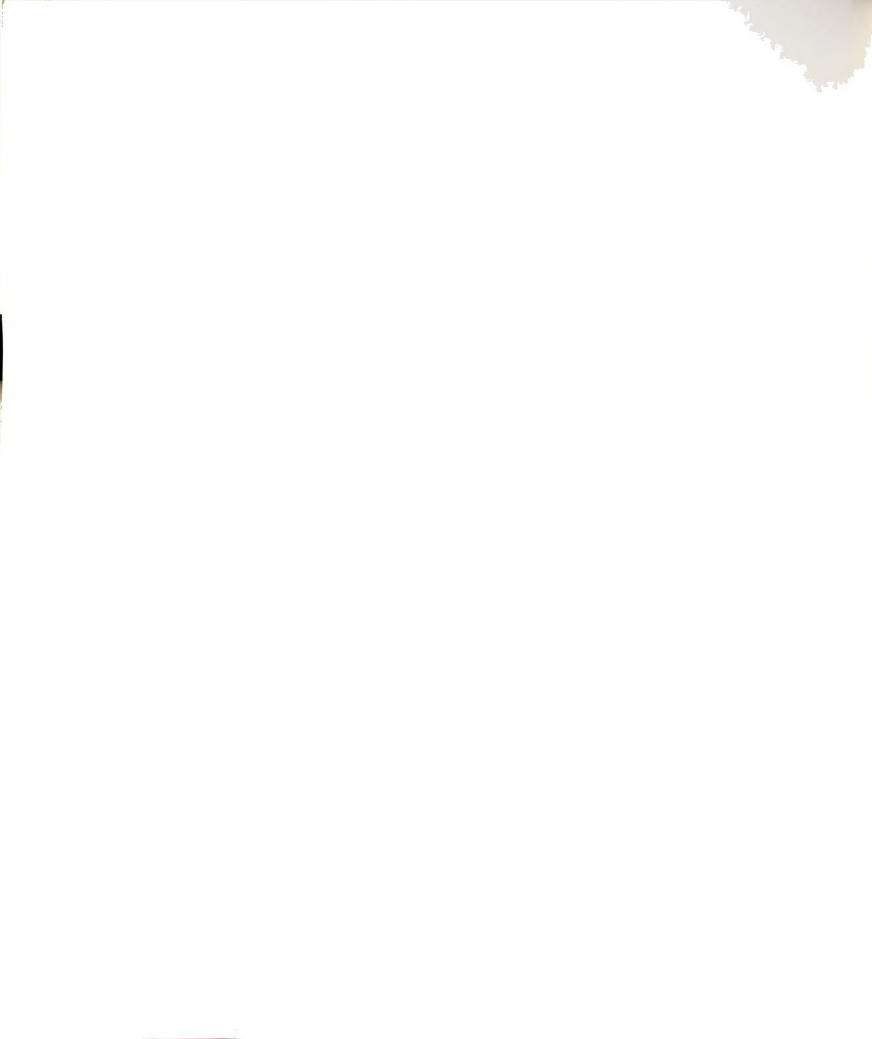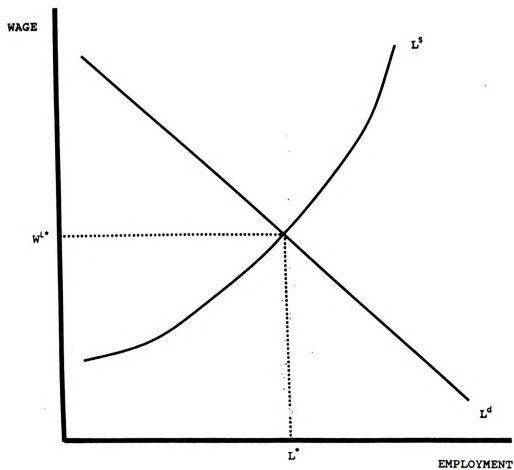
Figure 3.4

Nonunion Labor Market for Legal Workers

equilibrium. In the union sector, the wage and employment combination is the one which maximizes the wage bill. Union membership is equal to total legal labor force minus nonunion employment, and unemployment is equal to the difference between membership and employment level in the sector. In the nonunion sector, wage for legal workers is W^{L*}, for illegal workers it is W^I, L^* legal and I illegal workers are hired, and these two add up to n.

The general equilibrium of the labor market can be shown with the help of a diagram. Figure 3.5 embodies all the previous diagrams: The portion to the left is the same as Figure 3.1; the portion to the right is similar to Figures 3.2 and 3.3; the middle porion is the reverse image of Figure 3.4. The distance between O_0 and O_1 shows the number of legal workers in the economy, while illegal aliens are represented to the right of O_1. As shown in Figure 3.5, the union sets the wage that maximizes the total wage bill. This wage is equal to W^U. At W^U, N legal workers are employed in the union sector. The rectangular hyperbola rr becomes the supply curve of legal workers for the nonunion sector when it is viewed from O_1. The demand for legal workers in the nonunion sector is depicted by L^d. Therefore, the equilibrium wage in that sector is equal to W^L. Given W^L and W^I --which depends on exogenous factors-- the equilibrium level of employment of illegal aliens is at I. Clearly, the distance between L and
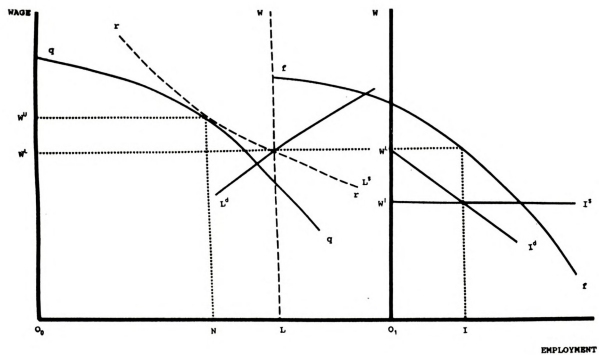
Figure 3.5

Labor Market General Equilibrium

I represents total employment in the nonunion sector, where LO_1 is employment of legal workers, and O_1I is the number of illegal aliens hired. Finally, the distance between N and L represents the number of workers who remain unemployed in the union sector.

III. CHANGES IN IMMIGRATION POLICY

The model developed above can be used to analyze the effects of changes in immigration policy on the different sectors of the economy. The government seeks to stop illegal immigration through border enforcement and random checks of firms.

A. Changes in Border Enforcement

When expenditures on border enforcement are increased, the probability of an alien being caught in an immigration attempt rises. Looking back at equation (9), when this probability --given by g-- increases, the wage required to attract illegal immigrants into the country also rises. As this wage increases, the number of illegal immigrants hired in the host-country declines, and the demand for legal workers rises. As a result, the wage paid to legal workers in the nonunion sector increases. This causes an erosion of union membership, since workers leave the union sector for higher wages in the nonunion sector. This process continues until the expected wages in both sectors are equal again.
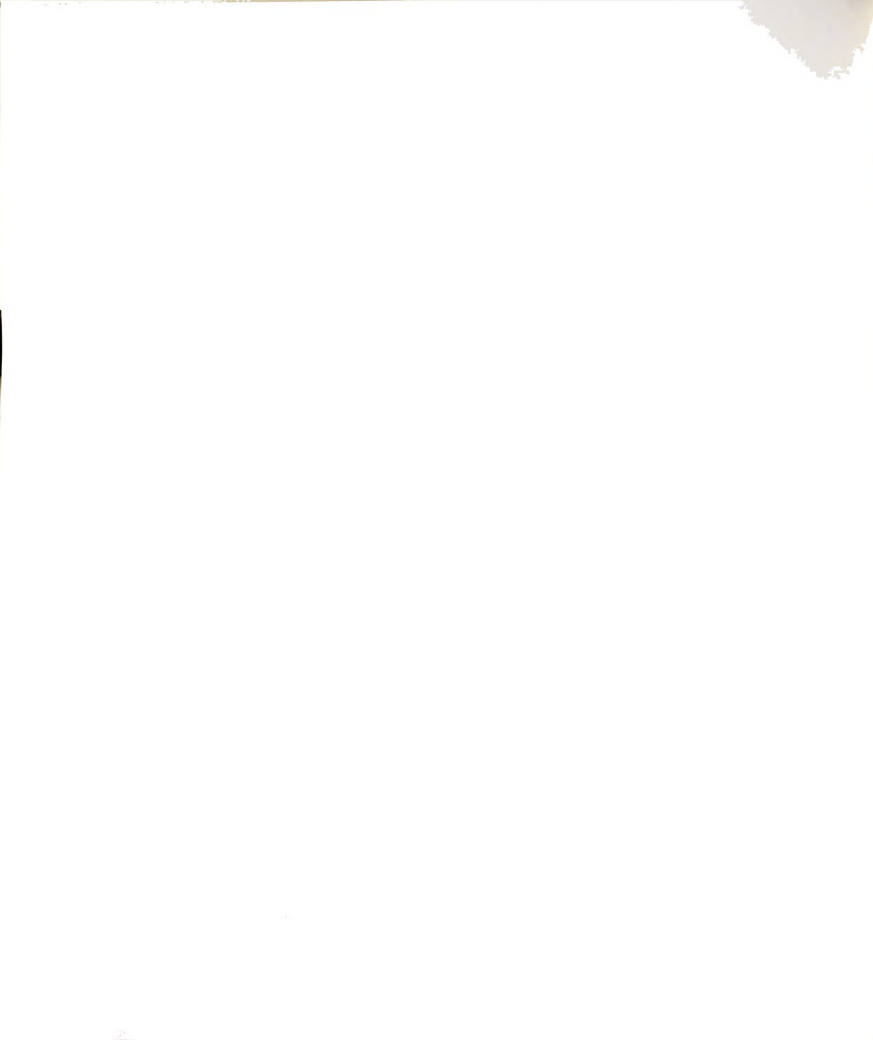
All these results can be shown with the help of a diagram. Figure 3.6 depicts the effects of stricter border enforcement on the labor market of the host-country. In Figure 3.6, the original equilibrium is given by W^U, N, W^L_0, L_0, W^I_0, and I_0. As more money is spent on border enforcement, the wage required by illegal immigrants increases from W^I_0 to W^I_1. This results in a shift in the supply of illegal immigrants from I^s_0 to I^s_1. Faced with a new supply curve of illegal immigrants, firms now are willing to hire more legal workers at every wage level. This means that the labor demand for legal workers in the nonunion sector increases from L^d_0 to L^d_1. As labor demand increases, the equilibrium wage for legal workers rises from W^L_0 to W^L_1. This produces a slight increase in the demand for illegal immigrants, which moves from I^d_0 to I^d_1. At W^L_1, the equilibrium in the whole labor market is achieved. Employment and wages in the union sector do not change, but membership falls from O_0L_0 to O_0L_1. With this membership decline, the nonunion sector grows, shifting its origin from L_0 to L_1. Employment of legal workers increases from L_0 to L_1, while employment of illegal immigrants falls from I_0 to I_1.[21]

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[21] Total employment in the nonunion sector falls because the cost of both types of workers has increased.
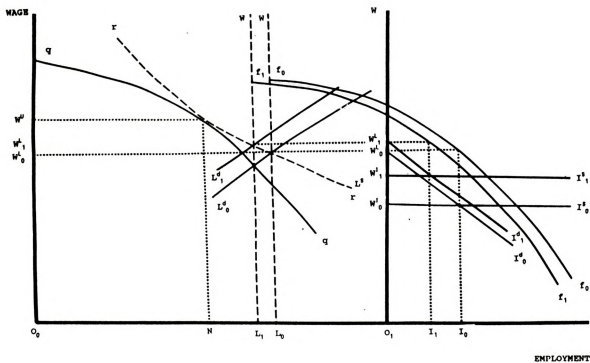
Figure 3.6

Effects of Stricter Border Enforcement
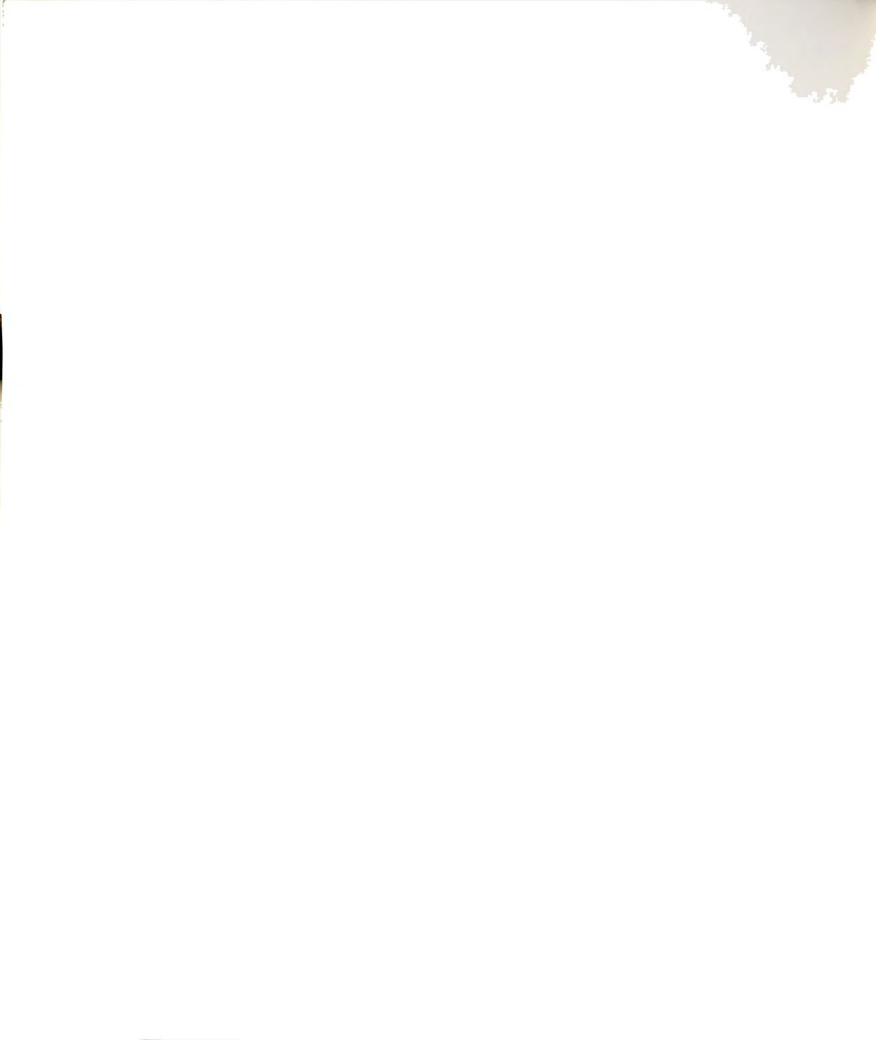
In sum, stricter border enforcement benefits all legal workers in the economy. Those in the union sector receive a higher expected wage because of reduced union membership, while legal workers in the nonunion sector also receive a higher wage.[22] The wage received by illegal immigrants increases as well. Consequently, those illegal immigrants who manage to enter the country are made better off by the tighter immigration control of the government.

Even though the model does not provide enough information to evaluate the size of the changes in the variables, some speculation can be undertaken. It is likely that very large changes in the illegal immigration population and in its wage would be required to produce a rather modest change in the wage of legal workers. It is clear that this magnitude of change can be achieved only if the resources devoted to border control are augmented greatly. If the increase in these resources is limited, then the wage required by illegal immigrants does not alter much, and the final change in the wage of legal workers is negligible.

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[22] It should be pointed out that capitalists in the nonunion sector are hurt by stricter border enforcement. They are forced to pay a higher wage, and their output falls. Capitalists in the union sector are not affected by those changes. This explains the lobbying activities with respect to immigration policy of different capitalist groups.

Another interesting point is that the gains in employment for legal workers always are lower than the number of jobs lost by illegal aliens. In other words, it cannot be assumed that every job left by an illegal immigrant will be available for a legal worker, since some of those positions simply will cease to exist. This derives from the fact that stricter immigration control increases labor costs in the nonunion sector and reduces the level of employment.

The model developed here assumes that the objective of the union is to maximize the total wage bill. The utility function of the union can be changed and the effects of stricter border enforcement reevaluated. It should be noted that the analysis presented here would remain intact as long as the new specification of the utility function renders a union wage which does not vary with membership. Alternatively, a utility function could be employed which produces changes in the optimum wage as immigration enforcement and membership vary. One such case occurs when the union tries to maximize the average wage bill per member; once again, stricter enforcement of the immigration laws results in an increased demand for legal workers in the nonunion sector. However, as union members are attracted to the other sector by rising wages, the union is able to increase its utility by raising the minimum wage. Consequently, the supply of legal workers to the nonunion

sector falls.[23] Therefore, with higher labor demand and lower supply, nonunion wages for legal workers are certain to increase. The effects on employment are ambiguous and depend on the relative variations in labor demand and supply.

B. Changes in Domestic Enforcement

A second means available to the government to hinder illegal immigration is domestic enforcement. By increasing expenditures in this area, the government raises the probability of a firm being caught hiring an illegal immigrant, as stated by equation (11). This, in turn, boosts the expected penalty faced by firms. As illegal labor costs increase, firms reduce their demand for illegal aliens and increase their demand for legal workers. As the demand for illegal immigrants falls, the wage of these workers remains unchanged; consequently, their employment level must decline. As the demand for legal workers increases, their wage and employment levels rise.

The effects of stricter domestic enforcement can be shown with the help of Figure 3.7. The original equilibrium depicted there is the same as described previously for Figure 3.6. Increased expenditure on domestic enforcement raises the

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[23] In Figure 3.6, the original legal workers supply would be located under L^s. When border enforcement is tightened, this supply curve increases and moves closer to L^s.
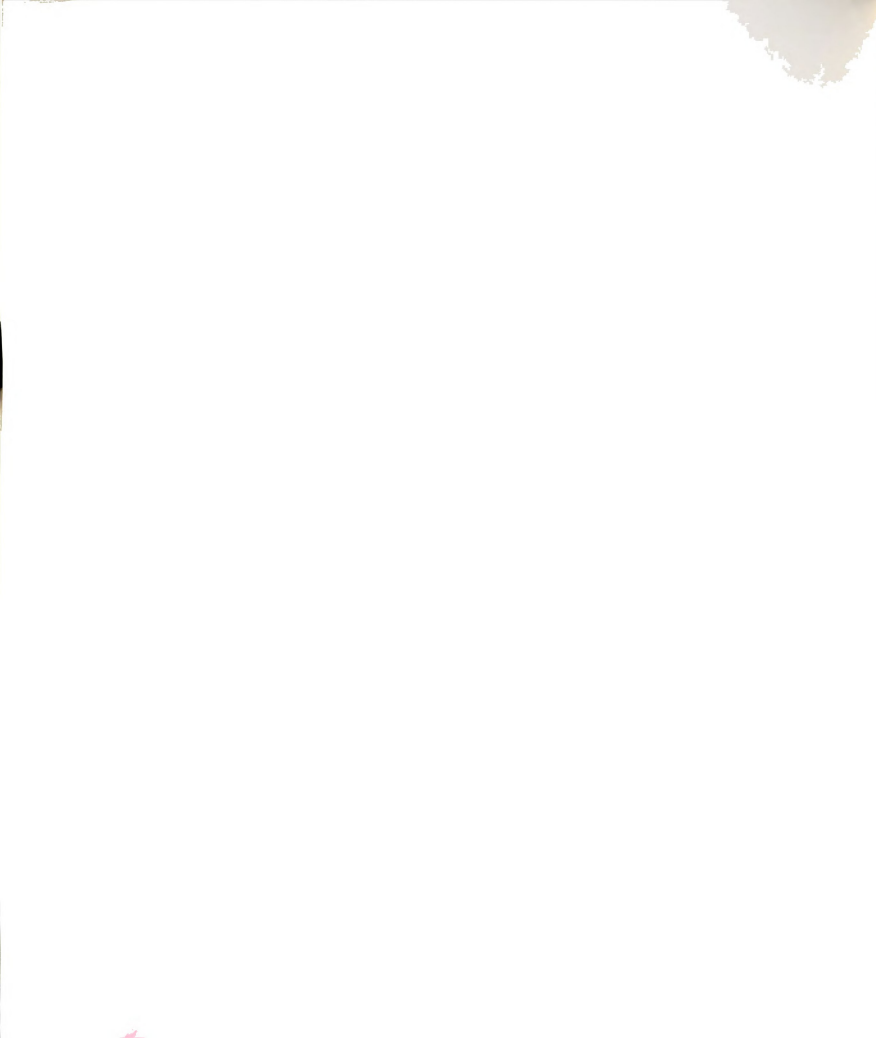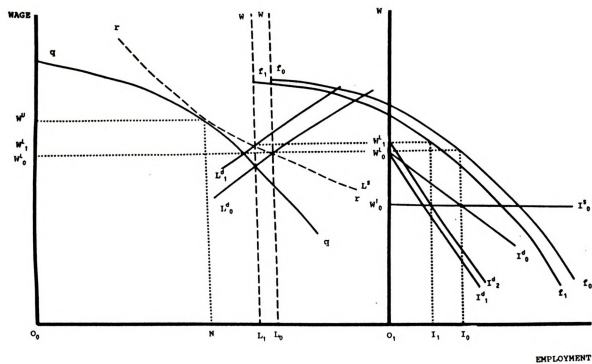
Figure 3.7

Effects of Stricter Domestic Enforcement

probability that a firm will be caught hiring illegal immigrants at every level of employment. This reduces the demand for illegal workers, as shown in the rotation of I^d_0 to I^d_1.[24] As the demand for illegal labor falls, the demand for legal workers increases from L^d_0 to L^d_1. Once these changes take place, the new equilibrium wage in the nonunion sector increases to W^L_1. The demand for illegal workers rises slightly, to I^d_2, as the result of the increase in W^L.

At the new labor market equilibrium, the changes in employment and wages for legal workers are similar to those which occur when border enforcement is changed. However, there is an important distinction between the effects of the two policies on the earnings of illegal aliens. When border enforcement is used, the wage for those illegal immigrants who remain in the country increases; when the government chooses stricter domestic enforcement, the wage for illegal workers is unaffected. In the latter case, the total increase in the cost of illegal workers is given by higher expected penalties. Therefore, if the government of the host-country does not include the money going to illegal workers as part of its national product, then domestic enforcement is a

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[24] This rotation around W^L_0 occurs because when no illegal immigrants are hired, the expected penalty is zero, regardless of the level of domestic enforcement. However, changes in domestic enforcement are assumed to have stronger effects on the expected penalty as employment of illegal workers increases.

welfare-superior   policy   in   comparison   to   border enforcement.[25,26]

Nevertheless, it can be speculated, once again, that very dramatic changes in illegal alien employment are necessary to produce a small change in the wage of legal workers. In addition, the increase in employment of legal workers is smaller than the decline in the number of illegal aliens hired. As explained before, this is due to the increase in labor costs in the sector.

There is a third policy option for governments. Rather than spend more money on enforcement, a government can increase the penalties paid by illegal immigrants caught crossing the border (K) or by firms caught hiring illegal workers (S). The opportunity cost of illegal immigrants

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[25] This assumes away the cost efficiency of one policy in comparison to the other. It is conceivable that if border enforcement is a much more cost-efficient policy, then the conclusion just presented could be reversed.

[26] It would be interesting to expand the model by analyzing the efficiency of dollars spent on border and/or domestic enforcement. In this manner, the government should divide its expenditures on both immigration control tools so that the marginal benefits from the last dollar spent on each activity are the same. There are a various alternatives for measuring the marginal benefits of enforcement. One way could be by counting the number of illegal aliens caught. Another could be to compare the percentage increase in the probabilities of capture brought by increasing expenditures by one dollar. Other possibilities are to measure the increase in the number of jobs available for legal workers, or the increase in the wages brought by the last dollar spent on either activity.

caught(K) should not be thought of as a sum of money paid to the government, but as the opportunity cost of the time lost in the failed immigration attempt. The government can raise this cost by increasing the detention time a captured illegal immigrant must serve. The effects would be similar to those of stricter border enforcement discussed earlier and presented in Figure 3.6. Governments may be reluctant to adopt this policy, given the strong international reaction it might cause, especially from the home country of the illegal aliens.

Increasing the fine paid by firms hiring illegal immigrants produces effects similar to those of stricter domestic enforcement, explained above and shown in Figure 3.7. The advantage of heavier fines over more extensive domestic enforcement is that the government would not have to increase spending, but a very strong lobbying effort against this policy could be expected.

IV. CONCLUSIONS AND SUGGESTIONS FOR FURTHER RESEARCH

The most important contribution of this analysis lies in setting up a general model for the study of illegal immigration in the presence of labor unions. This framework can be used to examine a wide range of policy changes and to evaluate their effects on different sectors of the economy. An important characteristic of the model is that it blends

the analysis of illegal immigration with the study of union behavior. Even though the model uses a simple form of the utility function of the union, it is a step in the right direction. The analysis can be extended by changing the definition of this utility function, as was done in Section III. The labor economics literature offers many alternative specifications to explain union behavior. The model used here could be changed by including different utility functions. These are interesting extensions that would move the model even closer to the real world.

The conceptual framework developed here was used to study the effects of changes in border and domestic enforcement on the welfare of the two types of workers in the economy. Several important conclusions emerged. Legal workers benefit from stricter enforcement of the immigration laws. Employment and wages in the nonunion sector increase, while the expected wage in the union sector also rises. With respect to illegal aliens, stricter immigration control reduces their employment either through a fall in their supply (caused by stricter border enforcement) or a decline in their labor demand (due to stricter domestic enforcement).

Another important conclusion is that domestic enforcement is a welfare-superior policy with respect to border enforcement if policy makers are not interested in the welfare

of illegal immigrants. The persistence of border enforcement
practices around the world may mean that governments are
indeed concerned about the welfare of illegal aliens,
although recent changes in U.S. policy may indicate that the
authorities are becoming less so.

In addition to the suggestions stated above, numerous
extensions of this model are possible. Changes in the
functions that give the probability of border apprehensions
and the probability of a firm being fined could be made. The
first term has been assumed to be a function of the level of
government expenditures, but this can be altered to
incorporate the number of border crossing attempts. In other
words, the probability of being caught at the border can be
defined to be a function of government expenditures per
crossing attempt and of the actual number of attempts.[27] With
respect to the probability of a firm being caught hiring
illegal workers, it has been assumed that this probability
rises with their employment level. This assumption can be
reversed and the implications evaluated. Furthermore, it was
assumed that when a firm is caught hiring an illegal worker,
the firm is fined, but the illegal alien is not deported.

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[27] In this manner, when expenditures per illegal crossing
attempt decline, the probability of capture falls. When the number
of attempts increases, so does the probability of capture.

This also can be changed to allow for deportation.[28] Finally, the role of capital has not been considered. It would be possible to derive a model in which capital is mobile, either between sectors or among countries.[29]

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[28] The effect would be to reduce the supply of illegal aliens, who then would require a higher wage in order to enter the country.

[29] The model developed by Dell'Aringa and Neri(1987) allows for internal capital mobility, while the one presented by Bond and Chen(1986) permits international flows of capital. However, neither work includes a union sector.

CHAPTER 4

**ILLEGAL IMMIGRATION AND THE IMMIGRATION REFORM
AND CONTROL ACT OF 1986**

I. INTRODUCTION

Alan C. Nelson, commissioner of the Immigration and
Naturalization Service (INS), has described the Immigration
Reform and Control Act of 1986 (IRCA) as one of the great
social experiments of our time.[1] This legislation was
discussed in the U.S. Congress for more than 15 years before
it was enacted. As Chiswick(1986) comments, the IRCA came at
the time when the United States was celebrating the 100th
anniversary of the presence of illegal aliens in the country.
Because little analysis exists on the impact of illegal
immigration, the IRCA was enacted without adequate theoretical
examination of its effects. This chapter extends the analysis
of the previous chapter in order to evaluate the possible
effects of the IRCA on legal workers in the United States.

This discussion departs from the existing literature in
that it incorporates the amnesty provision of the IRCA into
the theoretical framework. Only by so doing is it possible
to evaluate fully the domestic impact of the IRCA.

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[1] U.S. Department of Justice(1988b).

The structure of this chapter is as follows. Section II describes the IRCA's provisions and mentions some comments of critics. Section III develops the theoretical model and incorporates the amnesty provision. Section IV adds employer sanctions to the model. In Section V the effects of the amnesty provision in the presence of employer sanctions are investigated. Section VI presents a partial equilibrium simulation of the impact of the IRCA on the employment level of illegal workers in the United States. Conclusions are offered in Section VII.

II. THE IMMIGRATION REFORM AND CONTROL ACT OF 1986

The Immigration Reform and Control Act of 1986 (IRCA) has a long history.[2] Its origins can be traced back to 1971, when the Judicial Committee in both chambers of Congress began discussing the need to reform immigration laws. It was not until 1984 that definite steps were taken to produce a new piece of legislation. In that year, President Reagan appointed a cabinet-level task force to study the immigration issue and propose changes. As a result of the activities of the task force, Senator Alan Simpson and Representative Romano Mazzoli, introduced two immigration bills in the Senate and the House of the 97th Congress in 1982. The Simpson-Mazzoli bill was passed by the Senate but was not voted on by the

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[2] See Congressional Digest(1986).

House. Reintroduced to the 98th Congress in 1983, the bill
was passed by both chambers, but disagreement about
antidiscriminatory measures that had to be attached to the
bill caused it to die in a joint House-Senate conference
committee.

After a number of compromises were reached, the bill
resurfaced again in the 99th Congress. This time,
Representative Peter Rodino sponsored the bill in the House,
and Representative Mazzoli was cosponsor. The Simpson-Rodino
bill was passed by the Senate on September 19, 1985, and by
the House on October 9, 1986. It was signed into law by
President Reagan on November 6, 1986.[3] After 15 years of
debate, a new piece of immigration legislation was produced.

As stated by the Congress, the major purpose of the IRCA
was to control illegal immigration into the United States.[4]

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[3] See U.S. House of Representatives(1986).

[4] U.S. House of Representatives(1986). The history of the
IRCA is vary similar to that of most trade legislation in the
United States: The purpose of the law was obscured by the many
lobbying groups involved in its enactment. Therefore, it is hard
to determine specifically the goal that this legislation is
supposed to achieve. To some groups, the fairness of giving
amnesty to law-abiding residents was the goal. To others,
increased employment opportunities and wages for legal workers was
seen as the purpose. Others saw this legislation as a way to stop
population growth in the United States, which in their view was
having a terrible effect on the environment. Yet other groups saw
in amnesty a way to hire cheap labor. The March 1986 issue of
Congressional Digest summarizes some of the debate in Congress over
the IRCA.

Its major provisions involve providing amnesty for certain illegal aliens, imposing employer sanctions, and granting working visas for special agricultural workers.[5]

A. Amnesty

The amnesty provision allows illegal aliens who have continuously resided in the United States since January 1, 1982, to legalize their status and become permanent residents. Eligible aliens were required to apply for legalization between May 5, 1987, and May 4, 1988.

The main purpose of this provision was to "bring out of the dark" the millions of illegal aliens who have been law-abiding and productive residents of the country but who were being abused by society because of their illegal status. The granting of amnesty was an implicit acceptance on the part of Congress of the inadequacy of previous immigration laws.

As Bhagwati(1986) pointed out, the existence of an underclass of illegal aliens offends the moral sensibility of a civilized society. Despite any moral justification, however, the amnesty provision has faced much criticism. This could be classified into two categories according to whether it is based on legal or economic arguments. On the one hand,

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[5] Chiswick(1988a) provides a good summary of the IRCA provisions.

amnesty has been criticized on the grounds that it rewards lawbreakers and is offensive to the concept of legal migration. On the other hand, almost every author dealing with the economics of amnesty has stated that the final effect will be to encourage more illegal immigration. The latter group reasons that prospective illegal immigrant now will see amnesty as a possibility in the future; since it was granted once, it may be granted again. Therefore, holding everything else constant, an immigrant will be even more likely to emigrate now than before, since the expected gain has increased.

The granting of amnesty to a large number of illegal immigrants has not been popular among the general public in the United States. In a summary of public opinion polls, Simon(1987) found that in 1977 only 39% of the population favored amnesty for illegal aliens, and by 1985 this percentage had dropped to 35%.

Despite all the criticism, the IRCA contained an amnesty provision. Original estimates by the Immigration and Naturalization Service (INS) indicated that up to 4 million illegal aliens would take advantage of the program and become legal permanent residents of the United States,[6] but the

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[6] See Chiswick(1988a).

final count of applications was considerably lower. In its 1987 Statistical Yearbook, the INS reported that 1,731,683 applications were received.[7]

There may be two explanations for the number being lower than expected. First, the INS may have begun with an exaggerated estimate of the number of illegal aliens in the country and therefore arrived at an unrealistic projection. Meissner and Papademetriou(1988) estimated that the number of illegal aliens eligible for amnesty was between 1.834 million and 2.56 million, which is closer to the final figure. Second, many aliens who were eligible may have decided not to come forward. A number of institutional factors could explain this behavior,[8] but perhaps the most important is that dependent family members may not have qualified for amnesty. Instead of facing family separation, many aliens may have chosen to remain illegal. Another factor is the difficulty of obtaining the necessary documentation to prove continuous stay in the country since 1982. Finally, the fear illegal aliens have of any government official, especially of INS officers, probably prevented some aliens from coming forward.

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[7] In addition to these applications, the INS received 648,692 applications for legalization under the Special Agricultural Worker (SAW) program. This program will be discussed later in this section.

[8] See DeParle(1988) for a discussion of these factors.

B. Employer Sanctions

The IRCA makes it illegal to hire an alien who is not authorized to work in the United States. An employer who knowingly hires such workers faces civil fines and even criminal penalties for "pattern of practice" violations. First offenders face civil fines of $250 to $2,000 per each alien involved. The fines for a second and third offense range, respectively, from $2,000 to $5,000 and $3,000 to $10,000 per alien. Criminal penalties of up to six months imprisonment and/or an additional $3,000 fine are possible for continuous violators.[9]

According to the new immigration law, employers are responsible for verifying the eligibility of all new hires by examining the appropriate documents.[10] However, the employer is not responsible for verifying the authenticity of these documents.

When President Reagan signed the IRCA, he said that employer sanctions will "remove the incentive for illegal immigration by eliminating the job opportunities which draw illegal aliens here."[11] That is, if employer sanctions prove

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[9] See Chiswick(1988a) and U.S. House of Representatives(1986).

[10] These documents include a U.S. passport, a U.S. birth certificate, and a social security card, etc.

[11] U.S. Department of Justice(1988b).

effective in making the employment of illegal aliens more costly than the output they can produce, then illegal immigration will lose its "pull" factor.

Employer sanctions have been opposed by many people. Businesses are against the policy because of the increased hiring costs due to the paperwork that has to be filed. Minority groups, especially the Hispanic community, oppose this provision because of the potential for discrimination against U.S. nationals who look or sound foreign. Others have talked about the substantial costs to the federal government for effective enforcement. Some critics have said that employer sanctions will result in a shift in employment of illegal workers from large firms to small and less visible establishments.[12] Considering all these problems, Bhagwati(1986) has joined the large group of critics who predict the ineffectiveness of employer sanctions.

Public opinion polls reveal strong support for banning the employment of illegal aliens. Simon(1987) reports that in 1977 72% of the public favored such a provision; by 1983 the percentage had grown to 79%, and in 1984 it was 75%. Simon(1986) also shows that the general public has more negative attitudes toward illegal immigrants than toward legal

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[12] See Reynolds and McCleery(1988) and Hill and Pearce(1987).

immigrants. **There are** many reasons for these attitudes, but **Bean, Telles, and Lowell(1987) say that most of them are based on misperceptions about** the size and impact of the illegal immigrant population.

C. Special Agricultural Workers

In order to secure some support for the IRCA from the agricultural sector, a compromise had to be made. Farmers feared that closing the border to illegal workers would mean bankruptcy. Many farmers have relied on illegal aliens for years for daily work, and especially during harvest time. The IRCA contains two provisions to prevent the shortage of seasonal agricultural workers.

First, the existing program for the admission of H-2 nonimmigrant temporary agricultural workers was streamlined. The IRCA makes it easier and faster for a farmer to obtain temporary help from aliens.

Second, special regulations were included in the IRCA to make amnesty easier for agricultural workers to obtain. Under the Special Agricultural Worker (SAW) provisions, an illegal alien only has to prove 90 days' employment in agriculture between May 1, 1985, and May 1, 1986, to be eligible for legalization. Furthermore, SAW allows for the use of new
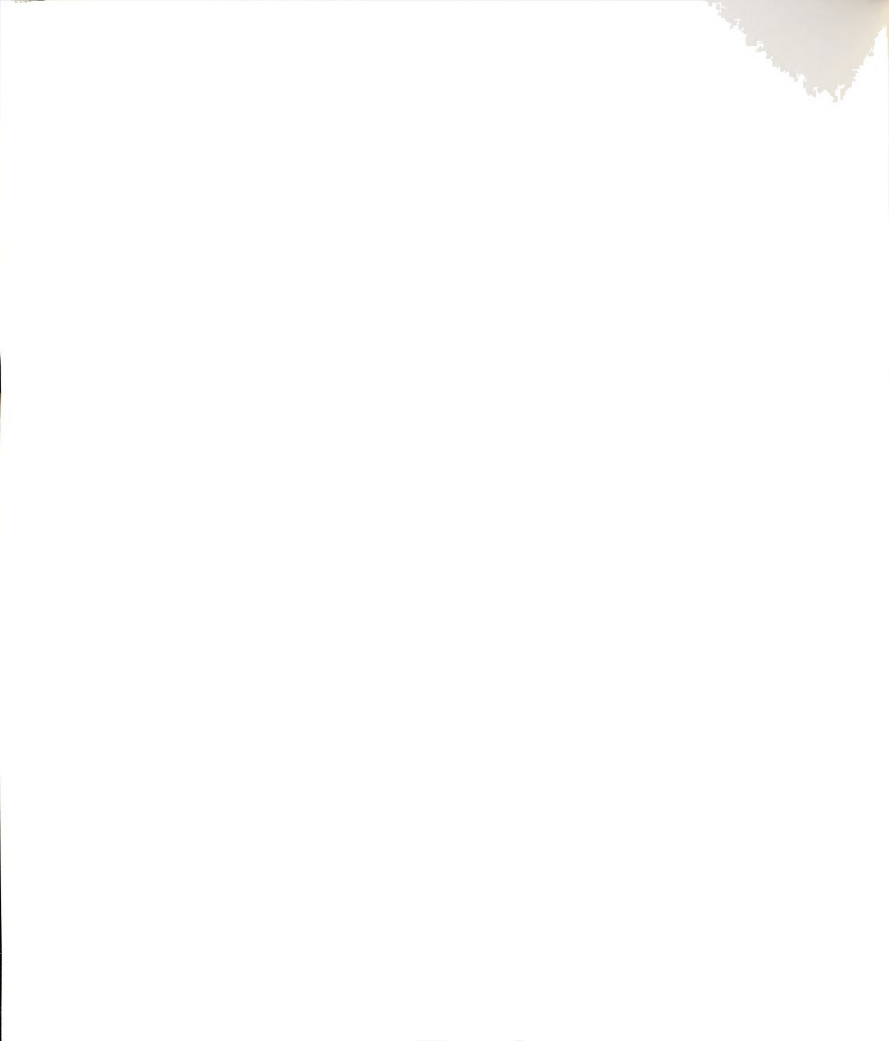
aliens in agriculture as long as they work at least 90 days per year. After three years, these new aliens are eligible for permanent residency.

According to the 1987 Statistical Yearbook of the INS, as of June 24, 1988, 648,692 illegal aliens had applied for amnesty under SAW. The deadline for application under this program was November 30, 1988.

The IRCA contained another provision that is seen as a compromise with the agricultural sector. INS officers now need permission of the owner or a search warrant to enter an outdoor agricultural operation for enforcement purposes. This provision gives farmers the same treatment that other employers enjoyed before the IRCA was enacted.

Finally, the IRCA recognized that the INS needed more resources to carry out its duties. The law increased INS funding by $422 million in FY#1987 and $419 million in FY#1988. This will enable the INS to have more than 3,000 agents patrolling the border and 1,600 agents checking employer records by 1989.[13]

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[13] U.S. News and World Report, September 14, 1987, pp. 25-26. The checking of employer records is to be made in conjunction with the Department of Labor's wage and hours inspectors.

III. CONCEPTUAL FRAMEWORK OF THE AMNESTY PROVISION

The model used here draws on the framework developed in the previous chapter. The labor market consists of two sectors that produce the same good, a nonunion sector where legal and illegal workers can find jobs, and a union sector where only legal workers can be employed. The purpose of this section is to incorporate the amnesty provision of the IRCA into the model.

A. Union Sector

The structure of the union sector used here is the same as previously developed.[14] It is assumed to employ only legal workers, and output is a function of the number of legal workers hired:

(1) $Q^B = q(N)$

where: Q^B = output in union sector; and
N = union members employed.

Firms in this sector face a minimum wage imposed by the union. Hence, the profit-maximizing condition of the firm is given by:

(2) $W^U = q'(N)$

where: W^U = wage set by the union.

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[14] The presentation of the union sector in this chapter is very concise. For a more detailed explanation of the model and its possible extensions, please refer to Chapter 3.

In order to set the wage, the union maximizes a utility function of the utilitarian type.[15] The union derives utility for each dollar going to its members. Since unemployed members are assumed to receive no income at all, the union's utility can be expressed as:

(3) $R = NW^U$

         where: R = utility of the union.

Equation (3) implies that for the union to maximize its utility, it has to maximize the total wage bill. The utility maximization condition of the union is given by:

(4) $[-W^U/N][dN/dW^U] = 1$

Equation (4) indicates that the union maximizes its utility when the wage it chooses is that at which the elasticity of labor demand is equal to one. This condition guarantees that the wage bill is at its highest possible level.

Legal workers are free to enter or leave the union sector at any time. They are assumed to be risk-neutral, which in turn implies that they move between sectors until the expected

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[15] Oswald(1982a; 1985) uses this type of utility function. Quibria(1988) recently incorporated a utilitarian utility function into an internal migration model.

wages in both are equal. This condition is expressed by equation (5):[16]

(5) $W^L = [N/M]W^U$

where: W^L = wage for legal workers in nonunion sector; and
         M = total union membership.[17]

According to equation (5), union membership varies inversely with the wage in the nonunion sector. In order to determine W^L and M, the nonunion sector has to be described.

B. Nonunion Sector

Since illegal aliens only can work in the nonunion sector, this is the first one to be directly affected by the amnesty provision of the IRCA. The change in status of a number of illegal aliens has a direct impact on the nonunion sector.

Following the framework developed previously, output in the nonunion sector is a function of the employment of legal and illegal workers:

(6) $Q^A = f(L + I) = f(n)$

where: Q^A = output in nonunion sector;
         I = number of illegal workers in nonunion sector; and

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[16] It is assumed throughout that unemployment always exists in the union sector.

[17] $M = L^T - L$; where L^T = total legal labor force, and L = legal workers employed in nonunion sector.

n = total employment in nonunion sector.

Illegal workers are attracted to the country by high wages, but they face the possibility of being caught at the border and sent back. The probability of being caught is a function of the resources devoted by the government to border enforcement:[18],[19]

(7) $g = g(E)$

$g(0)=0$, $g'>0$, $g''<0$, $g<1$,

where: E = border enforcement (measured in dollars).

Potential immigrants compare the wage they can make at home to the expected wage if they immigrate. The latter is a function of the wage they will receive if immigration is successful, the probability of being caught, the probability of receiving amnesty, and the gains from receiving amnesty. The expected wage of the illegal worker is given by:

(8) $W^{IE} = (W^* - K)g + [W^I + zt](1-g)$

where: W^{IE} = expected wage of illegal worker;
W^* = home-country wage;
K = penalty for being caught;
W^I = wage for illegal workers;
z = probability of receiving amnesty;
and

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[18] The analysis of illegal immigration is based on Ethier(1986).

[19] As stated in the previous chapter, the model can be extended by allowing g to be a function of enforcement expenditures per illegal crossing attempt and of the actual number of illegal attempts to cross the border.

t   = gains from amnesty.

Equation (8) includes two new terms not used previously, z and t, which are the direct result of the IRCA amnesty provision. Many authors have talked about the effects that amnesty will have on future flows of immigrants,[20] and the term zt incorporates this idea into the model. z is the perceived probability of receiving amnesty in the future. Presumably, when there is no history of amnesties, z is equal or very close to zero; once amnesty is granted, immigrants raise their expectations about future amnesties, and z becomes a positive term.[21] Once illegal aliens receive amnesty, they should be able to obtain all the benefits to which a legal worker is entitled. These benefits could include a higher wage if illegal aliens are paid less than legal workers. The gains from amnesty are represented by 't'.

Summing up, it can be said that the primary effect of amnesty is to increase the expected wage of the prospective immigrant. Clearly, if everything else remains constant, the number of illegal aliens should increase as the result of the granting of amnesty.

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[20] Some of these authors are Bhagwati(1986), Chiswick(1988a), and Todaro and Maruszko(1987).

[21] Since z is a probability, it ranges from 0 to 1.

Recalling equation (8), equilibrium in the model occurs when the expected wage of the illegal immigrant is the same as the wage to be made at home. We then have:

(9) $(W^* - K)g + [W^i + zt](1-g) = W^*$

Solving for W^i, we obtain:

(10) $W^i = W^* + K[g/(1-g)] - zt$

Equation (10) states that the wage that must be paid to illegal immigrants in order to attract them to the country is a positive function of the wage they can receive in their home country, the penalty they face if caught in the immigration attempt, and the probability of being caught. However, this wage is inversely related to the probability of receiving amnesty and to the gains from amnesty. In other words, employers would be able to offer lower wages to illegal aliens if their perceived probability and gains from amnesty increase.

The amnesty provision has another very important effect in this model due to the fact that all illegal immigrants who take part in the legalization program leave the illegal labor market and enter the legal sector. Hence, the jobs available for legal workers now are allocated not only among the original legal worker population but also among the enlarged work force, which includes the newly legalized aliens. In order to evaluate the effects of this change in the model, the

IRCA employer sanctions have to be added. This is done in the next section.

IV. EMPLOYER SANCTIONS IN THE CONCEPTUAL FRAMEWORK

The imposition of fines on employers found hiring illegal aliens is a key provision of the IRCA. Its basic effect is to increase the cost of hiring an illegal alien. This increase in cost, that is given by the expected fine, acts as a deterrent in the hiring of illegal aliens.

The expected penalty firms face is a function of the probability of being caught hiring illegally. This probability is given by:

(11) $h = h(D/I, I/L^T)$

$h_0 > 0$, $h_1 > 0$, $h(D=0)=0$, $h(I=0)=0$, and $h<1$

where: D = total resources in domestic enforcement.

Equation (11) states that the probability of being caught hiring an illegal immigrant is positively related to total resources devoted to domestic enforcement per illegal alien and to the proportion of illegal to legal workers in the economy. Furthermore, it is assumed that the positive effect of an increase in the number of illegal aliens on the second parameter of equation (11) always dominates its effect on the first term of this equation. In other words, when the

proportion of illegal to legal employment rises as a result of larger illegal immigration, the probability of being caught hiring an illegal immigrant increases, even though domestic immigration expenditures per alien are falling.[22]

The probability of being fined was given by equation (11); equation (12) presents the expected penalty to the firm hiring illegal immigrants:

(12) $S^E = hS$

> where: S^E = expected penalty for hiring illegal workers; and
> S = penalty per worker paid by firms employing illegals.

The expected cost of hiring an illegal immigrant is given by their wage plus the expected penalty for hiring them:

(13) $W^{IE} = W^I + hS$

> where: W^{IE} = expected cost of hiring an illegal immigrant.

Substituting equation (10) into (13), we obtain:

(14) $W^{IE} = W^* + K[g/(1-g)] - zt + hS$

Since employers are assumed to face perfect competition in the labor market, they hire both legal and illegal workers as long as their costs are the same. The cost of hiring legal workers is simply given by their wage, W^L. The cost of hiring

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[22] As stated previously, this assumption could be reversed and its implications analyzed.

illegal workers, given by equation (14), includes their wage and the expected penalty firms face for hiring them. Therefore, firms hire both workers as long as equation (15) is satisfied:

(15) $W^L = W^I + hS$

Equation (15) implies that the introduction of employer sanctions has the effect of creating wage discrimination in the United States. Several studies have focused on this issue. Upon reviewing the existing literature, Massey(1987) found a group of authors who believe there is discrimination in wages, while another series of studies concluded that wages are the same for legal and illegal workers.[23] Based on his examination of the available empirical studies and his own empirical work, Massey(1987) concludes that once the differences in human capital are taken into account, there is no difference in the wages earned by legal and illegal workers. Chiswick(1988b) agrees with Massey(1987) and concludes that wage discrimination does not appear to prevail in the U.S. labor market for illegal workers.[24]

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[23] Massey(1987) mentions Briggs(1975,1984) as a representative of the first group, while Cornelius(1978) is cited as a representative of the latter.

[24] Chiswick(1988b) cites labor mobility and the elaborate information network among illegal immigrants as the most important factors deterring discriminatory practices by employers.

Given these empirical findings, it will be interesting to see whether once the provisions of the IRCA are fully operational, wage discrimination appears in the United States, as this model predicts.

Once total labor costs have been found, employers in the nonunion sector maximize profits by hiring workers --both legal and illegal-- up to the point at which their marginal product is equal to their cost:

(16) $f'(n) = W^L = W^I + hS$

With equation (16) the model is complete, and the effects of amnesty can be evaluated. This is done in the next section.

V. EFFECTS OF AMNESTY IN THE PRESENCE OF EMPLOYER SANCTIONS

The primary effect of the amnesty provision of the IRCA lies in its impact on the supply of illegal aliens. This supply is described by equation (10), according to which aliens perceive that they have some possibility of receiving amnesty and, if this is true, that they will enjoy a higher wage. Consequently, they are willing to enter the country for a lower wage than before.

The reduction in their acceptable wage is a function of both the probability of receiving amnesty and the gains to be

obtained from amnesty. As either of these factors increase, their expected wage increases, and illegal aliens accept lower wages than before. The probability of receiving amnesty is an exogenous parameter, but once it is granted for the first time, illegal aliens perceive larger probabilities of future amnesties. The gains from receiving amnesty, represented by t, are assumed to be equal to the wage differential between legal and illegal workers. From equation (16) it is clear that this wage differential is equal to the expected penalty faced by firms that hire illegal immigrants, hence:

(17) $t = hS$

According to equation (17), the wage differential between legal and illegal workers expands with increases in either the probability of being caught hiring illegal aliens or employer sanctions. Furthermore, recalling equation (11), this probability increases with expenditures on domestic enforcement and with the level of illegal alien employment. Consequently, the advantages of being a legal worker compared to being illegal increase with stricter domestic enforcement, larger illegal worker employment, and rising employer sanctions.

Figure 4.1 shows the effect of the amnesty provision of the IRCA on the supply of illegal aliens. The vertical axis depicts wages, while the horizontal axis measures the number
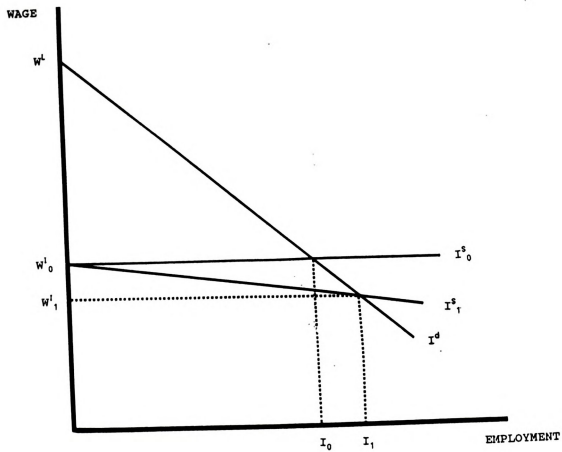
Figure 4.1

Amnesty and the Labor Market for Illegal Aliens

of illegal aliens hired. Before any amnesty is given, workers assume that the probability of receiving amnesty is equal to zero. Therefore, the wage they require to enter the country depends only on the home-country wage and the penalty for and probability of being caught while attempting to cross the border. Under these circumstances, this wage is exogenous and is given by W_0^I in Figure 4.1. The supply of illegal immigrants is perfectly elastic at this wage level, represented by I_0^S. Once amnesty is given, however, the probability of receiving amnesty in the future becomes positive, and the wage illegal aliens are willing to accept falls with the expected gains from receiving amnesty. In Figure 4.1, when zero illegal workers are hired, the expected penalty to the firm is zero. Hence, gains from amnesty are also zero and workers are willing to come into the country for the same wage as before, W_0^I. However, as employment of illegal aliens increases, the probability of firms being caught hiring illegally increases, and this raises the expected fine faced by firms. As a result, the wage differential between legal and illegal workers rises, which enlarges the gains from amnesty. Consequently, as employment of illegal aliens increases, these workers are willing to receive lower wages. In other words, the supply curve of illegal workers is downward sloping, as I_1^S in Figure 4.1.

In order to evaluate the impact of this change on the illegal labor supply, it is necessary to derive the demand for this type of worker. Recalling equation (15), firms hire legal and illegal workers when their total costs are the same. Therefore, firms are willing to pay illegal immigrants an amount equal to the difference between the legal workers' wage and the expected penalty of hiring illegal aliens. Algebraically:

(18) $W^I = W^L - hS$

If we remember that h increases with more employment of illegal aliens, then equation (18) can be interpreted as the demand curve for illegal aliens. This equation is represented by curve I^d in Figure 4.1.

Once the demand and supply curves for illegal aliens are included in Figure 4.1, it is possible to evaluate the effects of amnesty on the level of employment of illegal aliens when everything else remains constant in the model. Referring to Figure 4.1, before amnesty is given the equilibrium level of illegal alien employment is I_0. Once amnesty is included in the model, the equilibrium level of illegal alien employment increases to I_1, and their wage falls to W^I_1. This result is important, since it suggests that the granting of amnesty by the IRCA, ceteris paribus, has the effect of increasing the number of illegal immigrants in the economy. This conclusion,
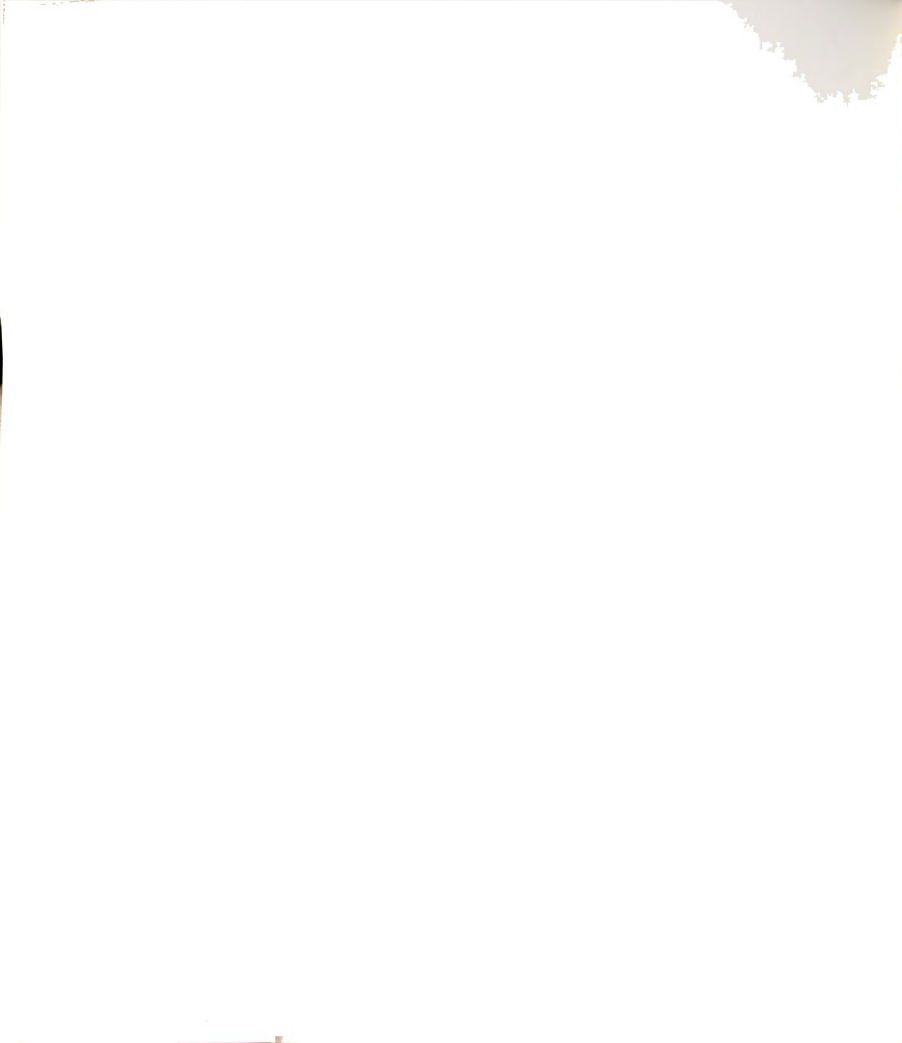
derived from the model, agrees with the intuition presented by other authors.

According to the previous result, the granting of amnesty increases the employment of illegal workers. This implies that the demand for legal workers should fall. This result is depicted in Figure 4.2, which is similar to Figure 4.1 but with the addition of curve ff, representing the marginal product of workers in the nonunion sector. Before amnesty is granted, and with a legal workers' wage of W^L, employment in the nonunion sector is given by n. In this case, employment of illegal workers is given by I_0, their wage is W^i_0, and the demand for legal workers is equal to L^d_0. Once amnesty is granted and the supply curve of illegal aliens shifts to I^s_1, keeping W^L constant, employment of illegal immigrants increases to I_1, their wage falls to W^i_1, and the demand for legal workers falls to L^d_1. The same exercise can be conducted for different levels of W^L, and in all cases the demand for legal workers is smaller than before. In other words, the granting of amnesty reduces the demand for legal workers in the nonunion sector.

To find the general-equilibrium effects of amnesty on the earnings of workers requires the complete model. This implies that the union sector needs to be incorporated into the analytical framework. Figure 4.3 presents the geometrical
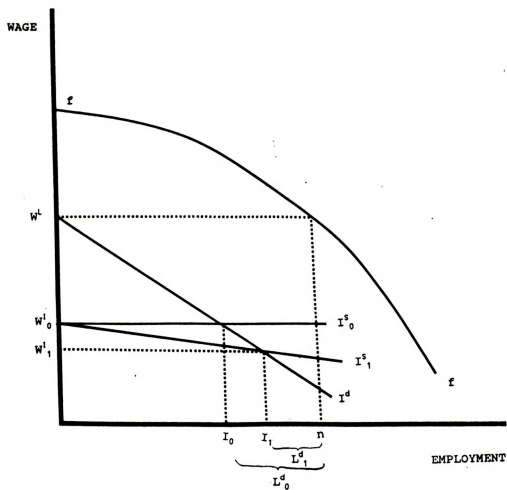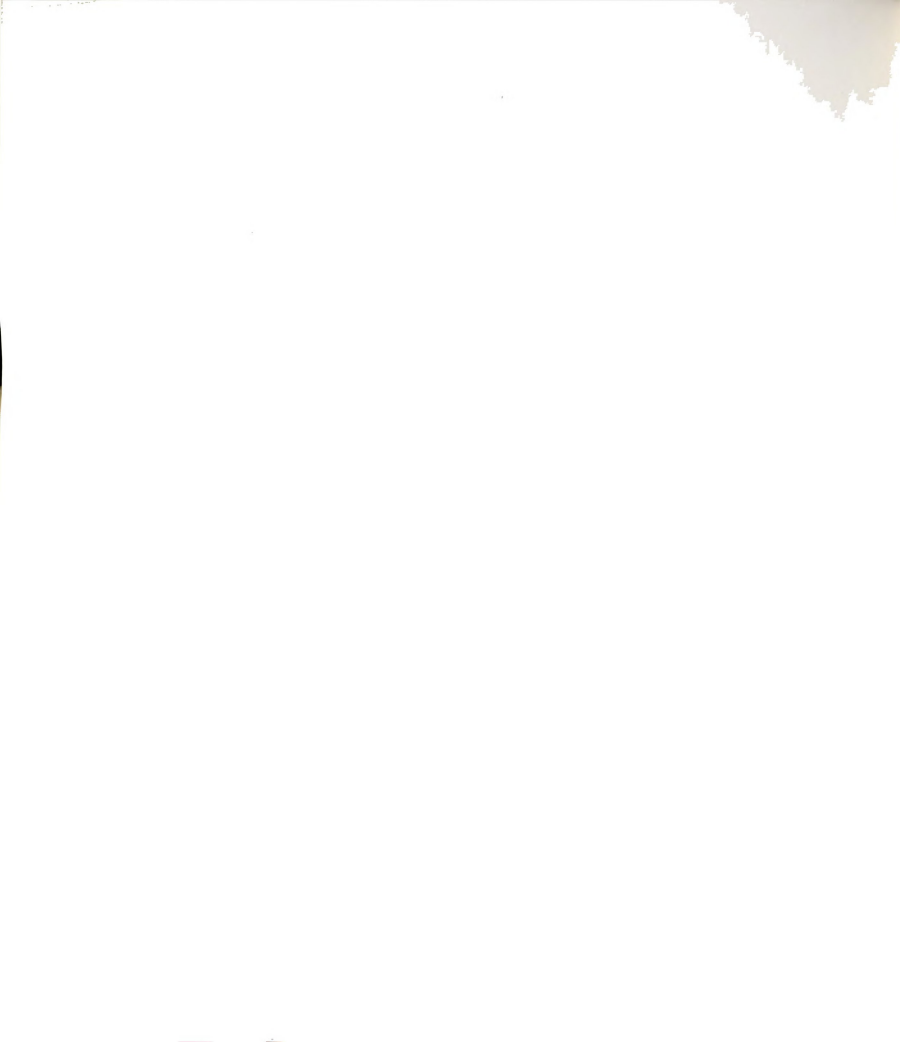
Figure 4.2

Amnesty and the Nonunion Sector in Isolation
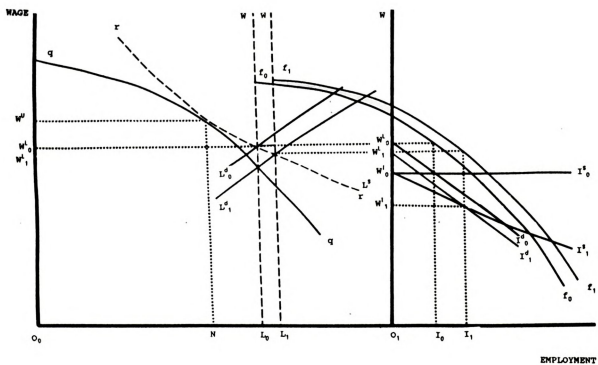
Figure 4.3

Partial Effects of Amnesty on the Labor Market

exposition of the complete model. The distance between O_0 and O_1 represents the size of the legal labor force, while illegal aliens are counted to the right of O_1. The left portion of the diagram presents the union sector. Given the marginal product of workers --represented by qq-- the union chooses that wage, W^u_1, which maximizes its wage bill. Employment is set at N by firms in the sector. The supply of workers for the nonunion sector is given by the rectangular hyperbola rr when viewed from O_1.[25] The demand for workers in the nonunion sector is represented by L^d_0. Consequently, L_0 legal workers are hired, and their wage is W^l_0. With this wage, the demand for illegal aliens is given by I^d_0, while their supply is depicted by I^s_0. With these curves, I_0 illegal immigrants are hired, and their wage is W^i_0. Total employment in the nonunion sector is given by $L_0 I_0$.

When amnesty is granted, the supply of illegal aliens shifts to I^s_1. This causes a reduction in the demand for legal workers, which falls to L^d_1. With the new demand curve and unchanged supply, the wage falls to W^l_1, while employment falls to L_1. With unchanged union wage and employment, unemployment in the economy increases. On the illegal employment side, the demand for illegal aliens falls slightly with the decline in the nonunion wage. In the new equilibrium, the wage for

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[25] This guarantees that the expected wages in both sectors are equalized.

illegal immigrants falls to W^I_1, while their employment increases to I_1. In the nonunion sector as a whole, employment increases from $L_0 I_0$ to $L_1 I_1$.[26]

Before any conclusions are drawn from this analysis, the secondary effect of amnesty has to be incorporated. The granting of amnesty not only increases the probability of future amnesties but also enlarges the legal labor force. This derives from the fact that those illegal aliens who receive amnesty leave the illegal labor market and join the pool of legal workers. This is likely to have further negative effects on the earnings of legal workers and also should be studied.

Figure 4.4 presents the total effects of amnesty on the economy. Original equilibrium is the same as in Figure 4.3, with W^U, N_0, W^L_0, L_0, W^I_0, and I_0. As stated before, when amnesty is granted the supply of illegal immigrants shifts to I^S_1, while the demand for legal workers in the nonunion sector falls to L^d_1. The secondary effect of amnesty is the incorporation of a part of the illegal worker population into

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[26] It is possible to conclude that total employment rises, even though legal worker employment falls, because labor costs in the sector have fallen from W^L_0 to W^L_1.
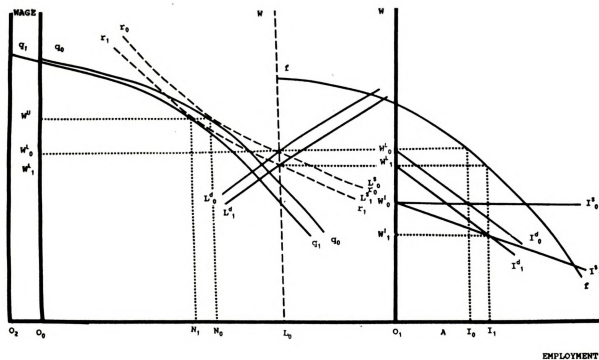
Figure 4.4

Total Effects of Amnesty on the Labor Market

the legal labor force. This is represented by the shift of the origin of the union sector from O_0 to O_2.[27]

The enlargement of the legal force results in an increase in the supply of legal workers in the nonunion sector. This is represented by the shift of L^s_0 to L^s_1.[28] With lower demand and higher supply, the wage in the nonunion sector certainly falls. This results in higher employment in the sector, but these jobs can go either to legal or illegal workers. The final outcome depends on the magnitude of the change in their respective demand and supply. Figure 4.4 presents the case in which the demand for legal workers falls by the same amount as their supply. In this scenario, employment of legal workers remains unchanged at L_0. Even though employment does not change, unemployment in the legal sector increases because the labor force has grown, and the economy has not been able to expand employment opportunities. Therefore, expected wages in both sectors fall as a result of amnesty.

When legal labor employment remains unchanged, all the gains in nonunion employment go to illegal workers. The number of these workers hired increases from I_0 to I_1. It

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[27] The distance between O_0 and O_2 depicts the number of illegal immigrants who receive amnesty.

[28] The legal labor supply curve shifts together with the rectangular hyperbola rr.

should be noted that the new influx of illegal immigrants resulting from amnesty not only equals the difference between I_0 and I_1 but also includes the distance between A and I_0. This distance represents the number of illegal aliens who receive amnesty and vacate their positions in the illegal labor market, which are filled by new illegal immigrants. In sum, the total of these new illegal workers who come as a result of amnesty is equal to AI_1.

As stated before, the change in employment level in the nonunion sector depends on the magnitude of the change in labor demand and supply. A shortcoming of the theoretical framework is that it provides only the direction of change in these curves. In order to quantify these variations, empirical studies are needed. However, it is possible to speculate on the outcome of these changes. Even when employment of legal workers rises, the increase is unlikely to be large enough to absorb all the newly legalized aliens. In the illegal labor market, even when employment falls, the fall is unlikely to be as large as the number of legalized aliens, which means that amnesty is likely to result in a new inflow of illegal aliens. With respect to wage levels, amnesty definitely lowers the wages for both legal and illegal workers.

Summing up, an amnesty provision hurts every legal worker in the economy. Those in the union sector suffer a reduced expected wage due to higher unemployment, and workers in the nonunion sector also face a lower wage.[29] In view of these outcomes, it is not surprising that the amnesty provision of the IRCA was opposed by the majority of the general public in the United States. As stated previously, Simon(1987) shows consistent opposition to amnesty in public opinion polls.

It is important to remember that the IRCA also includes employer sanctions. As noted in the previous chapter, an increase in domestic enforcement or employer sanctions results in higher employment and wages for legal workers and lower employment of illegal immigrants. These effects are likely to be small, however, and in the presence of amnesty their impact is diminished even more; as sanctions increase, the gains from amnesty and the supply of illegal immigrants increase. As the supply grows, the reduction in illegal employment and the rise in demand for legal workers are smaller than before.

Summarizing, employer sanctions reduce the level of employment of illegal aliens and increase employment of legal workers. In the past, however, these reductions have been

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[29] However, it should be pointed out that capitalists benefit from lower labor costs.

overstated. The failure to recognize the impact of employer sanctions on the gains from amnesty causes an overestimation of the effects of the sanctions on employment.

The two main provisions of the IRCA --namely amnesty and employer sanctions-- work in opposite directions in the model. While amnesty reduces the wage of legal workers, employer sanctions increase this wage. In the context of employment for legal workers, employer sanctions increase it, while amnesty can make it move in any direction. Furthermore, even when amnesty raises the employment level of legal workers, unemployment is likely to increase because of the enlarged labor force that amnesty brings. Therefore, it is not possible to predict theoretically the direction of change resulting from these provisions of the IRCA.

With respect to illegal immigrants, both amnesty and employer sanctions have the effect of lowering their wage, but the change in their employment level is ambiguous. Nevertheless, one point should be recalled. Even if employment of illegal aliens falls as the result of the IRCA, this does not imply that some illegal workers will have to leave the country. If the decrease in employment is smaller than the number of illegal aliens who receive amnesty, then some of the positions they leave will be taken by new illegal immigrants. Not only will all previous illegal aliens stay

in the country, but also new immigrants will flow into the economy as a result of the provisions of the IRCA.[30]

The final effect of the sanctions-cum-amnesty provisions of the IRCA cannot categorically be determined by the theoretical model. The relative strengths of the effects of both will determine the direction of change in employment and in the wage of legal workers. Those questions cannot be answered until the IRCA is fully operational and empirical data is available, but simulations can be done to predict some of the effects on the economy. The next section presents a simple partial equilibrium simulation of these effects on the level of illegal alien employment.

VI. SIMULATION OF THE IRCA'S EFFECTS ON ILLEGAL EMPLOYMENT

Supporters of the IRCA claim that it will eliminate job opportunities for illegal aliens in the United States.

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[30] It is theoretically possible that the relative changes in labor demand and supply would be such that the number of positions lost in the illegal labor market equals the number of illegal aliens who receive amnesty. Under this scenario, the IRCA would produce no increase in the number of illegal aliens entering the country. In the market for legal workers, their supply increases because of amnesty, and their demand also rises due to stricter immigration control. Therefore, it is possible to predict an increase in their employment level, but their wage level can move in either direction depending on the magnitude of the changes in labor demand and supply. Once again, this empirical issue cannot be resolved within the theoretical framework.

According to this point of view, by making it illegal to hire undocumented immigrants, employers will shut their doors to these aliens. The theoretical analysis presented here suggests that this conclusion is incorrect. The model indicates that the provisions of the IRCA could reduce the level of employment of illegal workers but by no means eliminate it. The purpose of this section is to simulate the impact of the IRCA on the level of employment of illegal aliens in the United States using a simple partial equilibrium model.

According to the model developed here, the effect of employer sanctions is to increase the cost of hiring illegal immigrants, but this is offset somewhat by the lower wage required by illegal aliens. Once amnesty is given, illegal aliens expect it to be offered again and are willing to work for less in the meantime. A third factor was mentioned earlier but has not yet been discussed: The IRCA provides the INS with more resources to tighten border control. As shown in Chapter 3, stricter border enforcement boosts the wage required by illegal aliens. For simplicity, it is assumed that the effects of amnesty and tight border enforcement cancel each other out. In other words, the wage required by illegal aliens has not changed due to the enactment of the IRCA, and thus the increased cost of hiring

illegal aliens is equal to the expected penalty faced by firms employing them.

The first step in simulating the IRCA'S effects is to find the expected penalty firms face. The expected fine is equal to the probability of being caught hiring an illegal worker times the fine that must be paid. The text of the IRCA explicitly describes the level of these fines (from $250 to $10,000 per alien).[31] For the purpose of this simulation, firms perceive that if fined they would have to pay $3,000 per alien.[32]

The probability of being caught employing illegal immigrants is not available directly and has to be estimated from the scarce existing data. It has been suggested elsewhere that for each government agent checking employer records, there are 26,000 new hires in the United States every year.[33] Assuming that agents are able to check 8 records per day and work 50 weeks per year, the total number of records checked per employee is 2,000. This implies a 7.7% probability that the record of a given illegal alien will be

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[31] See Section II.

[32] This level is above the IRCA's $2,000 limit for the first offense. This high perceived fine was chosen to show that even a high fine has a minimal effect.

[33] U.S. News and World Report, September 14, 1987, 25-26.

checked. This percentage can be used as a proxy for the probability of being caught and fined for employing a particular illegal immigrant. It is assumed that each employer caught is actually fined, but in reality this is unlikely. The IRCA establishes an affirmative defense for employers who comply with the verification procedure in good faith, employers are not responsible for checking the authenticity of the work permits presented to them by prospective employees. Therefore, even when an illegal immigrant is found working, the employer might be able to avoid fines. Despite this fact, the 7.7% probability of being fined will be kept as the most likely estimate of this parameter.

The expected fine faced by firms now can be estimated. When the probability of being fined is 7.7% and the fine level is $3,000, the expected fine is equal to $231. In other words, the imposition of employer sanctions increases the cost of hiring illegal workers by $231 per alien per year. In order to evaluate the importance of a $231 cost increase, it is necessary to find the total wage paid to the alien annually. If it is assumed that illegal immigrants receive minimum wage ($3.35 per hour) and work 52 weeks per year, their annual wage is $6,968. Hence, the imposition of employer sanctions increases the cost of hiring an illegal alien by 3.3%.

The last parameter needed to evaluate the effect of the IRCA provisions on the employment of illegal aliens is the elasticity of demand for this type of worker. According to Borjas(1987), this elasticity should be 0.7168.[34] Thus, at a 3.3% increase in the cost of hiring an illegal immigrant there should be a 2.4% fall in their employment in the United States. In sum, the provisions of the IRCA decrease the number of jobs available to illegal aliens by 2.4%.

The number of illegal aliens working in the United States before enactment of the IRCA has been the subject of much debate. Estimates range from 2 million to 10 million. According to Bhagwati(1986), some of these estimates have appeared because "any statistics will win against no statistics." In a recent paper, Bean, Telles, and Lowell(1987) review some of the available data and conclude that the number of illegal workers in the country before enactment of the IRCA was about 3.8 million.

Assuming there were 4 million illegal aliens working in the United States before the imposition of employer sanctions,

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[34] Borjas(1987) calculated the factor price elasticity, which is the inverse of the elasticity of labor demand. The estimate used here corresponds to the elasticity of Hispanic immigrants. This value is used here because the vast majority of illegal immigrants are of Hispanic origin.

then a 2.4% decrease in the number of jobs available means that 96,000 positions were lost by illegal aliens because of law. It is obvious that the expectations of IRCA supporters definitively are not going to be fulfilled in reality. The simulation presented here is in line with the assessment of most economists who have predicted the failure of the provisions of the IRCA.

In order to evaluate the robustness of the above conclusion, a sensitivity analysis can be conducted by changing the basic parameters of the model. In the previous analysis, the probability of being fined was assumed to be 7.7%; the values for this parameter now will be set at 2% and 25%. The elasticity of demand for illegal immigrants was assumed to be 0.7168; an elasticity equal to 1 and to 0.50 also are considered.

The results of these simulations are presented in Table 4.1. When the probability of being fined is equal to 2%, the impact on the cost of illegal aliens is 0.9%.[35] At that cost and with an elasticity of labor demand equal to 1, the employment level of illegal immigrants falls 0.9%. This implies that 36,000 positions were lost as a result of the provisions of the IRCA. The rest of the cells in the table

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[35] This is derived in the same fashion as the simulation done above.

Table 4.1

Effect of the IRCA on Employment of Illegal Aliens
(wages assumed at $3.35 per hour)

		Probability of Being Fined (% increase in cost)		
		2%	7.7%	25%
		(0.9%)	(3.3%)	(10.8%)
	1.00	0.9% [36,000]	3.3% [132,000]	10.8% [432,000]
Elasticity of Labor Demand	0.7168	0.65% [26,000]	2.4% [96,000]	7.74% [309,000]
	0.50	0.45% [18,000]	1.7% [68,000]	5.4% [216,000]

Note: The first number in each cell represents
the percentage decline in the employment
of illegal aliens. The second number (in
brackets) gives the actual number of
positions lost when original employment
is equal to 4 million.

can be read in a similar fashion.

Table 4.1 shows that when the elasticity of labor demand increases, the effectiveness of employer sanctions increases. Similarly, as domestic enforcement becomes more effective, employment of illegal aliens falls. According to these estimations, the lower bound for the change in illegal employment is 0.45%, while the upper bound to 10.8%. Based on the projections of Table 4.1, it is evident that the IRCA is very unlikely to produce major change in the employment of illegal workers. An extremely optimistic probability of discovering and fining employers of 25% is needed in conjunction with a coefficient for the elasticity of 1 to obtain a reduction of 10.8% in the employment of illegal aliens. Therefore, the vision of millions of illegal aliens returning to Mexico and leaving behind jobs for their U.S. counterparts is completely unfounded.

Table 4.1 is based on the assumption that the wage level received by illegal aliens before enactment of the IRCA was equal to the minimum wage, but recent empirical research by Chiswick(1988b) shows this is not true. According to him, the average wage paid to illegal aliens of Mexican origin was $4.42 per hour, while the average wage of all other illegal aliens was $4.73 per hour. Table 4.2 reproduces the analysis done in Table 4.1 but uses Chiswick's(1988b) estimate of $4.42

Table 4.2

Effect of the IRCA on Employment of Illegal Aliens
(wages assumed at $4.42 per hour)

		Probability of Being Fined (% increase in cost)		
		2%	7.7%	25%
		(0.65%)	(2.51%)	(8.16%)
	1.00	0.65% [26,000]	2.51% [100,400]	8.16% [326,400]
Elasticity of Labor Demand	0.7168	0.47% [18,800]	1.80% [72,000]	5.85% [234,000]
	0.50	0.33% [13,200]	1.26% [50,400]	4.08% [163,200]

Note: The first number in each cell represents
          the percentage decline in the employment
          of illegal aliens. The second number (in
          brackets) gives the actual number of
          positions lost when original employment
          is equal to 4 million.

per hour. As Table 4.2 shows, the higher wage makes the IRCA even less effective in reducing illegal immigrant employment.

Furthermore, according to the INS, more than 2 million illegal aliens are taking advantage of the amnesty provision. These workers will leave their jobs in the illegal labor market and enter the legal labor market. Therefore, a reduction in the number of jobs available in the illegal market does not mean that illegal workers unable to legalize their status will lose their job and have to return home. Rather instead of having 2 million new illegal immigrants enter the country to take the positions left behind by the legalized aliens, the new influx of illegal workers will be reduced by the number of jobs lost. In other words, if employment of illegal aliens falls by 100,000 positions, then only 1.9 million new undocumented immigrants will enter the country as a result of the IRCA. Only if the number of positions lost is larger than 2 million will there be no new influx of illegal workers and an exodus of some workers. From the projections of Tables 4.1 and 4.2, it is clear that the new law will not have this effect on the illegal labor market. Obviously, legalized aliens will not move out of the illegal labor market instantaneously, but as the process takes place, a new flow of illegal immigrants will be entering the country.

In sum, the simulations presented here predict that the IRCA will have a very modest impact on the employment of illegal aliens in the United States. Mexico does not have to fear massive deportations, which could destabilize its fragile economy, and U.S. employers do not have to worry about chronic labor shortages.[36] In its present form, the IRCA is likely to become the "modern day equivalent of Prohibition."[37]

VII. CONCLUSIONS

When the IRCA was enacted, its supporters claimed the illegal alien "problem" was going to be solved. A theoretical framework was developed here to examine the provisions of the IRCA.

It was found that the primary effect of the amnesty provision of the IRCA will be to reduce the wage required by illegal aliens in order to immigrate. Hence, the result is

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[36] Recent articles in the <u>Wall Street Journal</u> (May 26, 1989, p. B1) and in the <u>New York Times</u> (June 18, 1989, p. Y1) provide early evaluations of the effects of the IRCA. Both articles agree these effects have been minimal. The New York Times article highlights the divergence of opinions between the INS and immigration scholars. While the former has stated that some success has been achieved, the latter refute the INS numbers and conclude that employer sanctions have been ineffective in stopping the flow of illegal immigrants. A reason mentioned to explain the ineffectiveness of the new law centers on the lack of resources that the INS has to enforce the IRCA.

[37] <u>U.S. News and World Report</u>, September 14, 1987, p. 25.

likely to be an increase in the number of illegal immigrants hired in the country. Employer sanctions have two effects on employment. One is to increase the cost of hiring illegal immigrants by the value of the expected fine faced by firms caught employing this type of worker. This has a negative effect on the employment of illegal aliens. The is to increase the prospective gains from amnesty, which in turn decreases the wage illegal aliens require. This tends to raise their employment level. The final effect of both provisions depends on which force dominates.

Nevertheless, even when the forces pushing up the cost of hiring illegal workers are dominant, it can be speculated that the IRCA is likely to cause a new influx of illegal aliens. By virtue of amnesty, a number of illegal immigrants legalize their status and move to the legal sector. The positions left behind are likely to be filled by new illegal aliens. Therefore, even when the total employment of illegal aliens falls, the size of the total United States labor force increases.

The model also was used to study the effect of the IRCA on legal workers. It was shown that employer sanctions increase their wages and employment, while amnesty reduces their wage and has an ambiguous effect on their employment level.

A simple partial-equilibrium simulation of the effects of the IRCA on the employment level of illegal immigrants was conducted. It was shown that, even with very optimistic assumptions regarding the level of enforcement of employer sanctions, the effects of the IRCA are very modest. The employment level of illegal immigrants never falls more than 10%, and under more realistic assumptions the drop is only 2-3%.

This analysis could be extended in several directions. First, all the suggestions presented in Chapter 3 for the modification of the model also apply to this chapter, since the same framework is being used. Some other extensions also come to mind. All workers have been assumed to be homogeneous; it would be interesting to add another type, skilled workers, and study the effects of the IRCA on their earnings. Both sectors have been assumed to produce the same good; this assumption could be changed and the additional effects of price changes evaluated. The foreign wage has been assumed to be fixed, and the international trade of goods has been ignored; incorporating a second country into the model could give useful insights, since it is well known that goods mobility is a substitute for factor mobility. The simulation exercise could be extended to study the effects of the IRCA on the employment level of legal workers. In sum,

the model developed here is useful not only because of the predictions already discussed but also because it can be used to build new models.

The results presented here support the idea that an immigration law which fails to address the real causes of illegal immigration is doomed to be ineffective. Any legislation that erects artificial barriers against economic forces is not likely to succeed. Illegal immigrants exist in the United States because of both "pull" and "push" effects. The IRCA focuses on the former and tries to hinder it ineffectively. The latter effect also should be dealt with. Unless steps are taken to provide illegal workers with good jobs at home, they will continue to come to the United States.

There are several options for improving job opportunities in home countries. Opening the borders to the free trade of goods produced by these workers abroad is one such alternative, and the flow of foreign investment into their home countries is another. Reactivating the economies of these countries is a necessary condition for the success of these alternatives. Presently, the most important limitation to their economic growth is the external debt burden they face. Consequently, a fist step in solving the illegal alien "problem" in the United States should be the

aggressive   pursuit of debt relief programs for Third World
countries.

According to economic theory, the free flow of goods and
resources across borders increases the welfare of each
country.   If a country wants to restrict labor flows for
ethnic identity purposes or any other reason, then this
country should encourage the free flow of other resources and
goods to make its immigration policy effective and to avoid
welfare losses.

CHAPTER 5

SUMMARY OF CONCLUSIONS

Following a review of the literature, this dissertation
consists of three essays. These will be reviewed in turn.

I.   DIRECT FOREIGN INVESTMENT IN THE PRESENCE OF SECTOR
     SPECIFIC UNEMPLOYMENT

This chapter studies the effects of foreign investment
on an economy characterized by unemployment of the Harris-
Todaro type. In this model, the economy is divided into two
sectors: manufacturing and agriculture. The former is assumed
to have a minimum wage, and workers move between sectors until
their expected wages are equalized. The expected wage is
equal to the probability of employment times the actual wage
in each sector. Hence, the expected wage in the rural sector
is equal to the actual wage in the sector, while that of the
urban sector is lower than its actual wage because of the
existence of sectoral unemployment.

The first part of the chapter is devoted to an analysis
of the employment effects of a small inflow of sector-specific
foreign capital into the manufacturing sector of the economy.
As capital flows into the country, the marginal product of
workers in the urban sector rises. With a higher marginal
product and a constant minimum wage, employment in this sector

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increases.[1]   Consequently, the expected wage in the manufacturing sector also rises,[2] which creates some migration from the rural sector. As workers leave agriculture, the rural wage rises. This is due to the fact that by having fewer workers in the rural sector, the marginal product of the last worker is higher. Since firms maximize profits by equating the marginal product with the wage level, as workers leave, employers are willing to pay higher wages to the remaining workers. As workers leave the rural sector, the expected wage in this sector increases; when workers arrive in the manufacturing sector, their expected wage there falls. This derives from the constant minimum wage, which produces a given level of employment. As the number of workers rises, wages and employment are unchanged, so unemployment increases, and expected wages fall. This migration continues until the expected wages in both sectors become equal. At the new equilibrium level, the capital inflow increases employment in the manufacturing sector but also causes some migration from the rural sector, which results in lower agricultural employment. When these two effects are combined, it is impossible to determine categorically the direction of the

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[1] It is assumed throughout that the wage floor is binding. In other words, there is never an excess demand for labor in the manufacturing sector at the minimum wage.

[2] As stated before, this expected wage is equal to the probability of employment times the actual wage. By increasing sectoral employment, foreign capital raises the probability of finding jobs.

change in total employment. If the increase in manufacturing employment is larger than the migration from the rural sector, then total employment increases, and vice versa. A factor that determines the size of this migration is the elasticity of the rural wage with respect to labor demand.[3] If this elasticity is large, then as workers leave the rural sector the wage in this sector rises rapidly, and wage equalization is achieved with low levels of migration. Consequently, if this elasticity is high, foreign capital is likely to increase employment in the host-country. Another factor that determines the changes in employment is the original ratio of manufacturing to agricultural employment. If the economy is mostly urban, then the size of the migration flow is small relative to the manufacturing sector, and total employment is likely to rise.

The analysis then evaluates the welfare effects of direct foreign investment in the presence of the labor market distortion produced by the minimum wage. It is shown that capital inflows in a Harris-Todaro economy must be welfare improving independently of the pattern of trade. The intuition behind this result is the following. As capital flows into the economy, the expected wages of all workers

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[3] This term is also called factor price elasticity by labor economists. It is the inverse of the elasticity of labor demand with respect to the wage.

increase, improving their well-being. The earnings of capitalists in the urban sector remain unchanged,[4] while any losses to landlords in the rural sector are transferred as gains to workers in that sector. Another interpretation of this result is that foreign capital closes the gap between the wage levels in the two sectors of the economy, thereby reducing the labor market distortion. In other words, foreign capital represents an alternative policy instrument to alleviate a labor market distortion to the well known wage tax/cum subsidy in both sectors.

The last section of the chapter examines the welfare effects of foreign investment in the presence of an additional distortion, namely, a tariff on the manufactured good. It is shown that foreign investment need not be immiserizing in the presence of a tariff as long as unemployment exists in the economy. Foreign investment has two effects: It reduces the labor market distortion and moves the economy to specialize in the "wrong" commodity due to the distorted domestic tariff-ridden prices. The relative size of these effects determines the direction in change of national welfare. That change depends on the elasticity of the rural wage with respect to

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[4] This is true because prices and the wage in that sector are fixed, implying that for profit maximization the capital-labor ratio must remain constant, which means that the return to capital is also unchanged. In other words, if the capital-labor ratio does not change, then the marginal product of capital is unchanged as well.

labor, the ratio of manufacturing to agricultural employment, and the size of the tariff itself.

An important conclusion of this chapter is that the import substitution strategies followed by many countries need not be immiserizing. The possibility of immiserizing foreign investment still persists, but it is no longer a necessary outcome. Furthermore, countries with high ratios of urban to rural employment are more likely to benefit from this strategy than are mostly rural nations. In other words, import-substitution strategies might be appropriate for Latin American countries but are likely to be harmful to African nations.

II. ILLEGAL IMMIGRATION IN THE PRESENCE OF LABOR UNIONS

This chapter developes a conceptual framework in which the effects of different policies with respect to illegal immigration can be analyzed. The framework is characterized by the inclusion of a union sector, so that the economy is divided into a union and a nonunion sector.

Employment in the unionized sector is restricted to legal workers and is determined by the wage level set by the union. The latter is assumed to set the wage level by maximizing its utility function, which states that the union derives utility from each dollar received by its members. Since unemployed

members are assumed to receive no income, the union maximizes
utility by setting that wage level which yields the highest
possible wage bill.

Only in the nonunion sector can illegal workers find
employment and compete directly with legal workers. In order
to attract illegal workers into the country, firms have to pay
them a wage that compensates for the wage they can make at
home and for the expected costs of being caught crossing the
border. These expected costs depend on the probability of
being caught and on the opportunity costs of an unsuccessful
border crossing. In addition to the wage paid to illegal
workers, firms face an additional expense in the form of an
expected penalty. The government inspects firms in search of
illegal aliens; when a firm is caught, it is assessed a fine.
Therefore, the total cost of hiring an illegal immigrant is
equal to his wage plus the expected penalty for hiring him,
which is equal to the fine times the probability of being
caught.

Firms in the nonunion sector hire legal and illegal
workers only if their costs are the same. The cost of hiring
a legal worker is equal to his wage, while the cost of hiring
an illegal alien is equal to his wage plus the expected
penalty. This latter depends on the probability of a firm
being caught, which in turn is an increasing function of

illegal immigrant employment.[5] This implies that the wage firms are willing to pay illegal workers falls with their employment level. Then, for any legal worker wage, firms are willing to hire the number of illegal aliens that makes their expected cost equal to that wage.

For any legal wage level in the nonunion sector, firms maximize profits by equating the marginal product of workers to this wage; therefore, firms know the total number of workers they want to hire at a given wage. At this wage, employment of illegal workers is given by the point at which their labor demand meets their supply.[6] The difference between the total number of employees that firms demand and illegal employment gives the demand for legal workers in the sector.

Once both sectors have been defined, it is possible to find the general equilibrium for the labor market. Legal workers are the only factor of production which can move between sectors; therefore, when they are indifferent between working in either sector, the economy achieves equilibrium.

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[5] As more illegal aliens are employed, it is easier for the government to discover them, thereby increasing the probability of being caught.

[6] The illegal worker supply is perfectly elastic at that wage which equates their home-country wage to the expected wage it they immigrate.

These workers are assumed to be risk-neutral in their search for jobs, which means that they move between sectors up to the point at which the expected wages in each sector are equal.[7] The expected wage is equal to the actual wage in each sector times the probability of employment in that sector. The expected wage in the nonunion sector is the same as the actual wage,[8] while that of the union sector is equal to the sector's wage times the probability of employment. Given the fact that the union wage is fixed at the level which maximizes the wage bill, the expected wage equalization condition determines the supply of legal workers to the nonunion sector. Hence, general equilibrium occurs when the demand and supply of legal workers in the nonunion sector are equalized.

The essay proceeds to evaluate the labor market effects of stricter immigration control. The case of increasing expenditures on border enforcement is the first one described. Stricter border enforcement increases the probability of an alien being caught while trying to cross the border. Since this raises the wage that has to be paid to illegal workers, firms are willing to hire fewer illegal immigrants. There is

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[7] The model assumes that the union workers do not have to pay any dues. If dues have to be paid, then union workers would compare their expected wages net of dues to the wage in the nonunion sector.

[8] Since there is no unemployment in this sector, the probability of employment is equal to one.

a resulting increase in the demand for legal workers, which in turn raises their wage and employment levels. In the union sector, membership falls as some workers leave for the higher wages in the nonunion sector; as membership declines, the expected wage in the union sector rises. Once equilibrium is reached, every legal worker benefits from stricter border enforcement. Workers in the nonunion sector receive higher wages, while union members enjoy higher expected wages. In the employment context, total employment of legal workers increases and that of illegal aliens falls.

Next evaluated are the effects of stricter domestic enforcement of the immigration laws. The primary effect is to increase the probability of firms being caught hiring illegal immigrants, which raises the expected penalty faced by firms. The consequences are similar to those of stricter border enforcement, with one important difference. While stricter border enforcement increases the wage paid to illegal immigrants, more stringent domestic enforcement does not. This last policy heightens the cost of hiring illegal immigrants not by increasing their wage but by raising the expected penalty for hiring them. Therefore, if the government of the host-country considers the money going to illegal immigrants as a payment to a foreign factor of production, then domestic enforcement is a better policy in comparison to border enforcement.

III. ILLEGAL IMMIGRATION AND THE IMMIGRATION REFORM AND CONTROL ACT OF 1986

This chapter employs and extends the model developed previously in order to evaluate the labor market effects of the IRCA. An important characteristic of the analysis is that it incorporates the amnesty provision of the IRCA into the theoretical framework.

Following a historical review of the IRCA and a summary of its main provisions, the conceptual framework begins with the study of the effects of amnesty. Since the prospective illegal immigrant views the first amnesty as increasing the probability of others and hence the probability of benefiting from them, his expected wage increases by the potential gains from amnesty. This has the effect of lowering the wage he is willing to accept in order to enter the country. Therefore, the granting of amnesty increases the supply of illegal immigrants entering the country. As this supply increases, the demand for legal workers falls. Hence, in the absence of any other changes, amnesty results in higher employment of illegal aliens and lower employment of legal workers. Furthermore, the granting of amnesty reduces the wages paid to both types of worker.

Another consequence of amnesty is the incorporation of a portion of the original illegal alien population into the legal labor force, thereby increasing the supply of legal workers. When all the effects of amnesty (increase in supply of legal and illegal workers and decrease in demand for legal workers) are evaluated, the following results emerge. Because of larger supply of legal and illegal workers, their wages definitively fall. The changes in employment depend on the magnitude of the variations in labor demand and supply, but it can be speculated that, even when employment of legal workers rises, this increase is unlikely to be large enough to absorb the many newly legalized aliens. Consequently, unemployment in the economy is likely to increase, and all legal workers are hurt by the granting of amnesty. Those in the nonunion sector receive lower wages, while those in the union sector face lower expected wages due to the rise in unemployment. In the illegal labor market, even when employment falls, this decline is unlikely to be as large as the number of legalized aliens. Hence, new illegal aliens enter the country to fill some of the positions left by the legalized aliens.[9]

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[9] It is theoretically possible that the relative changes in labor demand and supply could result in no new inflow of illegal aliens. However, as is shown in the simulations, this is unlikely.

In the presence of amnesty, the effects of employer sanctions are diminished. As stated previously, these increase the cost of hiring illegal aliens, but this increase is no longer equal to the full value of the expected penalty to the firms. In the presence of amnesty, employer sanctions increase the gains from obtaining amnesty and therefore reduce the wage required by illegal aliens, thereby increasing their supply.

Given the fact that the sanctions-cum-amnesty provisions of the IRCA work in opposite directions, it is impossible to predict the direction of change in the labor market. This depends on the relative strength of the effects of sanctions and amnesty. If employer sanctions are very effective, legal workers might benefit from the IRCA. If the effects of amnesty dominate, then legal workers might lose as a result of the new law.

In the last section of the chapter a partial equilibrium simulation of the effects of the IRCA on the illegal labor market is conducted. Under realistic parameters, the employment level of illegal immigrants falls by 2.4% as a result of the IRCA. This implies that 96,000 positions initially occupied by illegal aliens are lost. When a sensitivity analysis is conducted and the parameters of the simulation are changed, the fall in illegal immigrant

employment ranges from 0.33% to 10.8% of its original level, implying a loss of 13,200 to 432,000 positions. These numbers represent the quantity of jobs left by newly legalized aliens and not available to new illegal immigrants. Therefore, if 2 million workers receive amnesty under the provisions of the IRCA and 100,000 positions are lost, then 1.9 million new illegal workers will enter the United States as the result of the IRCA.

From the analysis it is argued that the provisions of the IRCA are unlikely to achieve their purposes. Illegal immigration is due to both "pull" and "push" factors, and unless both causes are dealt with, any legislation is doomed to be ineffective.

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