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Undocumented Migration from Mexico: Economic Incentives and the Effects of NAFTA

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HONORS THESIS

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I. Introduction

The flow of migrant workers from Mexico played a significant role in the development of the U.S. economy in the twentieth century. The initiation of the Bracero guestworker program in 1942 began a long period of growth in the flow migrant workers, both legal and illegal across the U.S.-Mexico border. The Bracero program was designed to bring workers from Mexico into the United States to relieve labor shortages during World War II and continued to help the agricultural industry feed the post-war baby boom. The program was terminated in 1964 due to public opinion towards poor living conditions for migrant workers, but workers have continued to migrate north from Mexico each year for seasonal work. The U.S. economy, particularly the agricultural sector, has relied heavily on this supply of temporary and seasonal labor. Immigration and Naturalization Services estimated approximately five million undocumented immigrants living in the United States in 1996. Washington States agricultural employers estimate that illegal workers account for approximately fifty to seventy percent of the agricultural labor force (*The Seattle Times*, June 2001).

There are many economic, political, and social issues that arise as a result of the flow of both documented and undocumented migrant labor. Essentially, many industries in the U.S. economy have been able to benefit from the cheap labor that migrant workers provide, but in general we are not willing to share with these workers the benefits of legal or permanent residency. There are two main questions that will be addressed in this paper regarding the flow of Mexican migrant workers. First, what are the driving factors that cause illegal migration from Mexico to the U.S.? And secondly, using the evidence from the first question, what is the best means of decreasing the flow of undocumented

migration from Mexico to the U.S. in order to minimize the burdens placed upon illegal migrants?

These questions will be discussed in this paper in the context of an empirical analysis of the flow of undocumented migrant labor from Mexico to the U.S between 1977 and 2000. This analysis will look at the impact of an immigration reform act of 1986 as well as the effect of the North American Free Trade Agreement of 1994. The results of this analysis help provide insight into possible outcomes of future reform acts or free trade treaties, such as the Free Trade Area of the Americas agreement, which is to be enacted by the year 2005. The FTAA would have similar implications for migrant labor as NAFTA, but would be expanded to affect the flow of migrant workers who come to the U.S. from countries such as El Salvador and Guatemala.

The analysis of migrant labor for this paper is in the form of an ordinary least squares regression to estimate the flow of undocumented migrant labor. The empirical results can be used to determine what factors have the most significant effect on the flow of undocumented migration. When considering the current issues with respect to undocumented seasonal migration we must look at both the economic and social perspectives. This paper will attempt to provide both of these perspectives and discuss the implications of future proposals headed by President Bush and President Vicente Fox of Mexico, both of whom appear to be interested in expanding guestworker programs for Mexican migrants. President Fox has also expressed an interest in moving towards an open border system for labor mobility between the U.S. and Mexico.

Section II of this paper gives a review of previous literature regarding migrant labor. Section III discusses the economic theory of the flow of undocumented migrant

workers. Section IV discusses the data used for the empirical analysis of the flow of migrant labor. Section V provides a discussion of the statistical methods and the predicted results of the model. The empirical results of the regression analysis are given in Section VI, followed by a conclusion given in Section VII. The conclusion will include a discussion of the social implications of the current system and proposed options for the future, which must be considered along with the empirical evidence.

II. Literature Review

A considerable amount of research has been done regarding international migration, particularly with respect to the relationship of international trade and labor mobility. Lalonde and Topel (1997) discuss the impact of migrants on the labor market and the net benefits of migrant labor to the receiving country. Lalonde and Topel state that wage differentials are the main driving force of migration. According to this theory, as wages and living standards between the two countries converge, migration will decrease. Lalonde and Topel's research included a study of the overall net contribution of immigrant workers to the receiving country's economy using U.S. data from 1950 to 1974. The study used data of estimated tax payments by immigrant workers, and total government transfers received by these workers. Total transfers include unemployment insurance, public welfare, food stamps, social security, Medicare, Medicaid, and education for children. The study also subtracted an additional amount calculated as the per family government expenditure on public goods that immigrants benefit from. The overall net benefit received by the U.S. economy from the average immigrant worker was determined to be approximately $1,300 for each sample in the study (Lalonde and Topel,

1997). This amount may have decreased since the study was done because the average number of immigrants living below the poverty line has increased, which suggests an increase in government transfers received by immigrants.

Razin and Sadka (1997) discuss the implications of trade barriers for labor mobility. Their article suggests that labor mobility in many cases serves as a substitute for capital movement and trading of goods and services. However, labor mobility can also serve as a complement to flows of capital and goods and services, in some cases. The question of whether increased trade can decrease migration, according to Razin and Sadka, depends on whether labor migration is viewed as a substitute or a complement to trade.

Razin and Sadka also agree that wage differences between countries are the driving force of labor migration. Social frictions related to migration, according to their article, arise during times of unemployment in the receiving country or when social welfare programs are too comprehensive. When the labor market is tight, migrant workers with lower reservation wages tend to exacerbate the problem of unemployment. Migrant workers who are receiving lower wages also tend to make greater use of social welfare programs such as food stamps or Medicaid. Many native workers do not want to see government funds spent on workers who are not U.S. citizens, many of whom do not even have legal residency.

Acevedo and Espenshade (1992) give a summary of their prediction of the effects of a North American Free Trade Agreement on the flow of migration. Their research predicted that NAFTA would lead to increased migration in the short run due to increasing capital in Mexico that would replace labor, and the commercialization of

agriculture that would destroy jobs for many rural Mexicans. This implies that labor mobility would be a complement to the flow of capital in the short run. However, Acevedo and Espenshade predict that in the long run a free trade agreement would improve Mexico's economy, increasing wages and employment, which would lead to a decrease in migration to the U.S. The long run relationship between the flow of migrant labor and the flow of capital would therefore be assumed to be substitutes. Currently we are only able to look at five years worth of post-NAFTA data, so it is difficult to say whether we are looking at the long run effect on the flow of migration, or whether we are still experiencing short run impacts from the free trade agreement.

Borjas, Freeman, and Lang's 1991 study of undocumented Mexican-born workers in the United States used a regression analysis of the flow of migration across the U.S.-Mexico border similar to what is done in this paper. However, their study regarded the period from 1967 to 1984, and addressed issues such as the impact of the termination of the Bracero program. They concluded that the increase in illegal migration during the period preceding 1976 may have been a result of the decision to terminate the Bracero program, but also may have resulted from changing economic conditions in both the U.S. and Mexico. The regression done in this paper will address the impact of similar factors on the flow of undocumented migration, but looking at the period from 1977 to 2000.

III. Theory

In order to understand the flow of migrant labor we must first analyze the theory behind this migration behavior. The decision to migrate temporarily to another country for work can be modeled using an expected income equation for the gains from

migration. The decision to migrate is based on a number of factors such as the wage level that can be earned at home, the availability of jobs at home, the wages that can be earned in the foreign country, the availability of jobs in the foreign country, and the cost of migrating. The expected income from migrating can be modeled as follows:

$$EI_m = ER * W_f * (1 - UR_f) - A_e * (F + C),$$

where ER = exchange rate, W_f = foreign wage, UR_f = foreign unemployment rate, A_e = expected average number of apprehensions, F = fine that may be incurred as a result of apprehension and C = cost of migration. This equation calculates the amount of income that will be earned in the foreign country and subtracts the cost of migrating. The expected average number of apprehensions will be a function of the current probability of apprehension, and an individual's experience in illegal border crossing. The expected income from migration is compared with the expected income from staying at home:

$$EI_h = W_h (1 - UR_h),$$

where W_h = wage at home and UR_h = unemployment rate at home. According to economic theory, workers will maximize their total expected income. If the net expected income from migrating (EI_m - EI_h) is positive then a worker will choose to migrate. As wages abroad rise and unemployment abroad falls, then the expected income from migrating increases, leading to an increase in the flow of migration. As the probability of apprehension increases, the expected income from migrating falls, which will cause fewer people to migrate.

This model assumes that an individual will make as many attempts as necessary to cross the border successfully. The model would become more complex by adding the effect of the varying amount of time an individual plans to remain in the foreign country.

However, we will assume that the decision in this model is based on the intent to stay in the foreign country for one given period. For seasonal migrant workers from Mexico, this period is generally about six months. The wages in this case would then be equal to the income over the six-month period, however this is proportional to the hourly wage.

The cost of migration, C, includes various costs that are incurred both through travel and the costs of temporary relocation. One travel cost for many people crossing the U.S.-Mexico border is the need to hire someone to guide them safely across the border, called a "coyote", in order to decrease the risk of apprehension. Other costs include temporary housing costs, health care while away from home, education costs for families migrating with children, and many other costs associated with leaving one's home on a temporary basis.

The factors that affect the decision to migrate, discussed above, will be used in this paper to estimate a linear regression of the flow of migrant workers from Mexico to the U.S. The effects of the 1986 Immigration Reform and Control Act and the 1994 North American Free Trade Agreement are also included in the regression. Both of these policy reforms may have had a significant impact on the relative expected incomes from migrating and staying at home for many Mexican migrants.

IV. Data

By definition, the flow of undocumented migrant labor is difficult to measure. Because we do not have accurate measurements of this flow, we use data for border apprehensions provided by the Immigration and Naturalization Services as a proxy for the number of undocumented migrant workers who have entered the United States. INS

border apprehension data has been used frequently in previous research regarding the flow of undocumented migration (Espenshade, 1995). However, there are many difficulties with using this proxy data. For example, people who are apprehended at the border are sent back to Mexico and often make several attempts before a successful crossing and therefore may be counted multiple times. The number of border apprehensions tells us how many people are arrested at the border, but it does not tell us how many people succeed in crossing the border. The number of attempted crossings will be a function of the perceived success rate. Espenshade's 1995 research concluded that border apprehensions and successful crossings are correlated at 0.90. His analysis estimates that the actual flow of undocumented migrant workers is approximately 2.2 times the number of apprehensions.

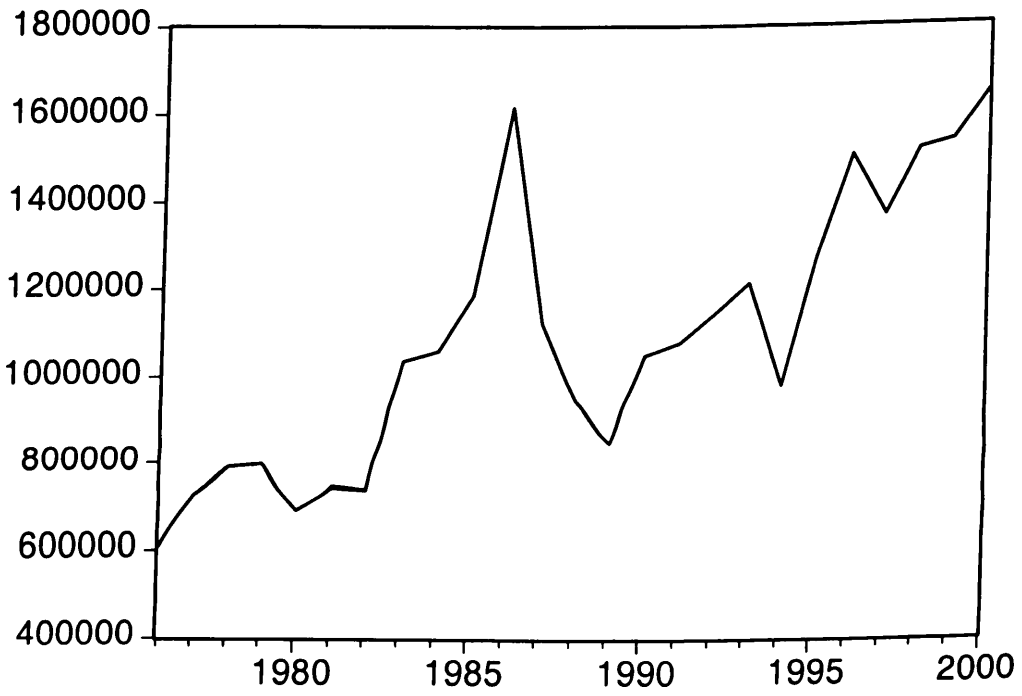
Espenshade's analysis is useful as an approximation, but it is very unlikely that the percentage of apprehensions remains constant over time. A recent *Seattle Times* article from June 2001 stated that the likelihood of border apprehension is currently about 20%. The INS has tried many different policy initiatives in order to find the best way of controlling the increasing number of undocumented aliens in the United States. At times INS policy emphasizes border control, and at other times they emphasize random raids of businesses and deportation of undocumented workers. For this reason, the probability of apprehension can change based on changes in INS policy. Hanson and Spilimbergo (1999) showed that border enforcement is negatively correlated with prices in certain industries (such as fruits, vegetables, and apparel) that typically rely on undocumented labor. Border enforcement also is found to increase during times of tight labor markets.

From this study it seems that INS policy adjusts to accommodate U.S. industries based on the demand for undocumented labor.

Borjas, Freeman, and Lang's research found that border patrol spending by the INS went from twenty million dollars in 1967 to forty-eight million in 1986 (calculated in 1967 dollars), a 140% increase in spending in a period of less than twenty years. For this reason they hypothesized that observed changes in border apprehensions could be attributed more to changes in border patrol spending rather than to changes in the actual flow of migration. Borjas, Freeman, and Lang's analysis using data regarding border patrol budgets from the INS concluded that during the period from 1967 to 1986 about one fourth of the observed increase in border apprehensions could be attributed to increases in spending for border enforcement. They concluded that the growth in illegal migration across the border is largely overstated by the use of border apprehensions for that period, and that the actual growth rate of migration during the sample period was approximately half of the growth rate of apprehensions. However, since there is no way to control for INS policy changes in this study, Espenshade's correlation coefficient of 0.90 will be used as an approximation.

Figure 1 below shows border apprehensions from 1976 to 2000.

Figure 1: Border Apprehensions



There is a noticeable spike in the data in 1986, which is most likely a result of the Immigration Reform and Control Act that was passed in that year. Besides this obvious deviation, there seems to be an overall upward trend in the data over time.

Other data used in this regression of the flow of migrant labor includes the U.S.-Mexico exchange rate and Mexico's minimum salary, as provided by the Bank of Mexico. The data for Mexico's minimum salary is given in pesos with a base year of 1978. The Economic Commission for Latin America and the Caribbean provides data for the unemployment rate in Mexico. We also look at the U.S. unemployment rate, as given by the Bureau of Labor and Statistics, and the U.S. federal minimum wage, which is given in nominal U.S. dollars. The U.S. unemployment rate variable might pick up some of the changes in border patrol enforcement that Hansen and Spilembergo found are

correlated with changes in the condition of the U.S. labor market. Graphs of the exchange rate data, and minimum wages in both countries are given in Figures 2, 3, and 4. The exchange rate and Mexico's minimum wage both show large changes in the trend in 1994. This is most likely a result of the peso crash that occurred during this year.

Figure 2: Exchange Rate

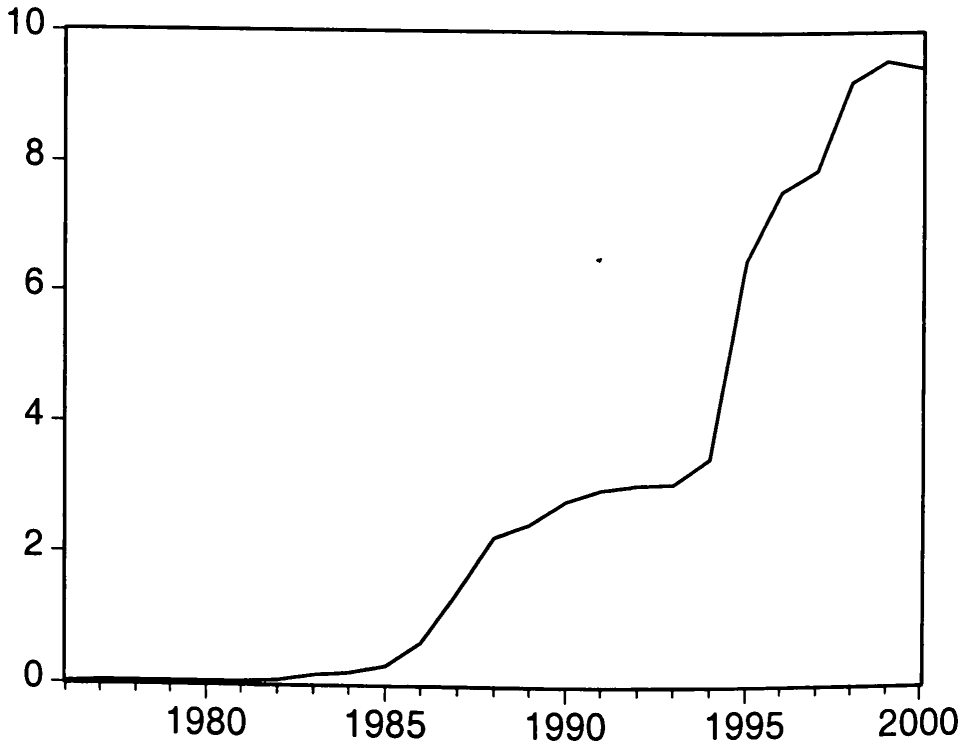


Figure 3: Minimum Wage in Mexico (pesos)

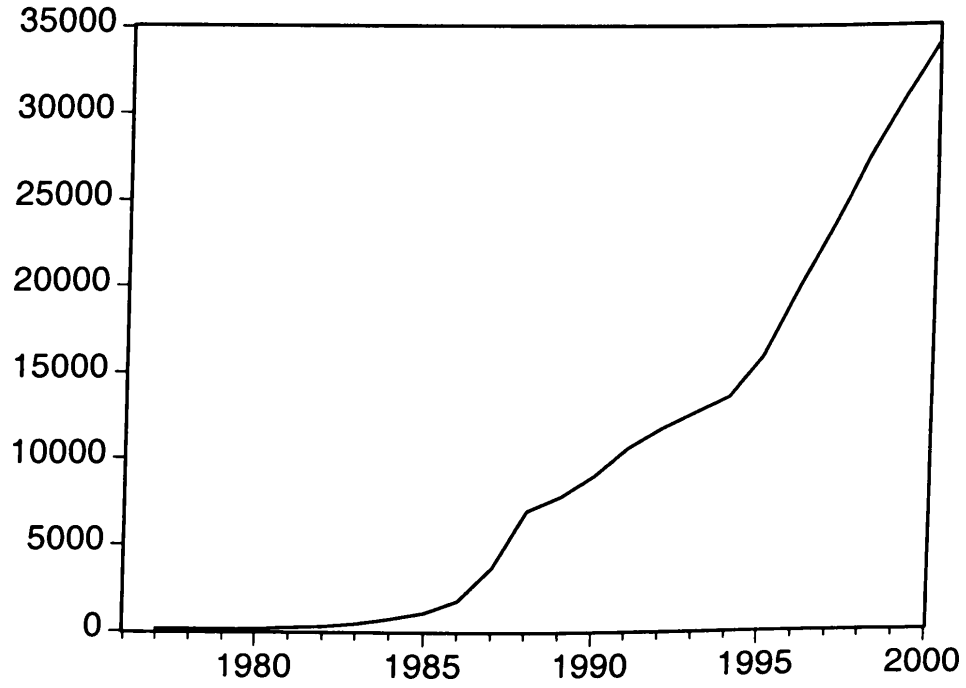
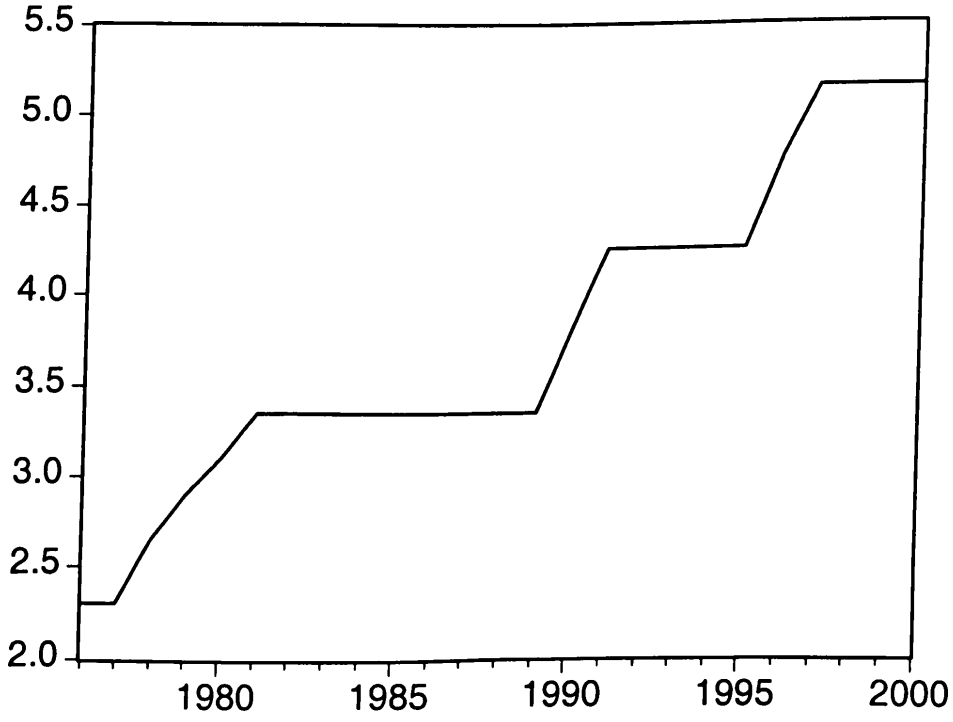


Figure 4: U.S. Minimum Wage ($)



V. Statistical Methods

The border apprehension data is used to do an ordinary least squares regression analysis of the flow of undocumented migrant labor as a function of Mexico's unemployment rate and minimum wage, the U.S. unemployment rate and minimum wage and the U.S.-Mexico exchange rate. The regression is done using Eviews; a computer program for economic data analysis. The relationship between each of these variables and the flow of migrant workers can be predicted using the model of migratory behavior discussed in Section II. The predicted relationship of the flow of migration and Mexico's unemployment rate is positive. According to the theory, as the probability of finding employment in Mexico falls, the relative expected income from migration increases. The minimum wage in Mexico is predicted to have a negative effect on the flow of migrant labor. When workers are able to find higher paying jobs in Mexico, they are less likely to risk being apprehended at the border and incur additional costs of migration. The predicted effect of the U.S. unemployment rate is negative because as unemployment rises in the U.S., Americans are more likely to fill the lower-paying agricultural jobs, leaving fewer jobs available for migrant workers, decreasing the expected income from migration. As the U.S. minimum wage rises we expect more migrant labor from Mexico because of the possibility of higher paying jobs in the U.S., increasing the expected income from migration. However, the federal minimum wage laws, in general, are not applicable to agricultural labor and are often ignored in the case of undocumented workers, so this may not have a significant impact on the flow of undocumented migrant labor.

It is possible that the minimum wage and unemployment rates in the two countries may display some characteristics of multicollinearity, meaning there is a high correlation between the explanatory variables. Changes in the minimum wage, according to economic theory, will often cause changes in the unemployment rate, implying that the two pairs of variables may be significantly correlated. However, it is unlikely that the unemployment rate responds only to changes in the minimum wage, and so we cannot exclude either of the variables. Also included in this regression is the impact of the exchange rate of pesos per dollar. We expect that as the exchange rate increases, the flow of migrant labor will increase because workers can get more pesos for every dollar earned, increasing the expected income from migration.

Two additional dummy variables are added to this regression to take into account the impact of the 1986 Immigration Reform and Control Act and the 1994 North American Free Trade Agreement. Each of these variables may have had a direct impact on the expected incomes from migrating to the U.S. and from remaining in Mexico.

The Immigration Reform and Control Act of 1986 was designed to decrease undocumented immigration to the United States. One portion of IRCA was to provide an amnesty opportunity for people who had been living continuously in the United States since before 1982. These people were given the opportunity to apply for legal residency through the INS. IRCA granted legal residency to approximately 2.8 million U.S. residents. This amnesty opportunity most likely would not have a significant impact on the flow of seasonal migrant laborers because the people who met the eligibility criteria were not necessarily migrant workers, but rather those who had already established long term, undocumented residency in the United States. It is possible however, that this

amnesty would cause more people from Mexico to choose to cross the border in anticipation of another amnesty opportunity in the future, leading to an increase in border apprehensions.

Another portion of IRCA designated specific penalties for employers who hired undocumented workers. Employers, under IRCA, are now subject to a $250 to $10,000 fine for each undocumented worker, in addition to a possible six-month prison sentence. These penalties give significant incentives for employers to require valid documentation of all workers, and could decrease the number of employers willing to hire illegal migrant workers. Due to this decrease in the number of available migrant jobs, consequently decreasing the expected income from migrating, we expect IRCA to have a negative impact on the flow of undocumented migrant labor. Because the agricultural industry has relied so heavily on undocumented seasonal workers, they were given more time to make the transition to documented labor. The provisions of IRCA stated that agricultural employers had until December 1, 1988 to comply with the new regulations regarding documentation. For this reason the dummy variable for IRCA begins in 1988.

Looking at the graph of border apprehensions we see a spike in the data around 1986, which may have been an initial short-run reaction to the new regulations. If workers expected a decrease in the number of available jobs starting in 1988, there may have been an initial increase in the number of migrant workers during the period before the regulations were to be implemented in the agricultural industry. Another explanation for this spike in the data is that the INS may have increased border patrol at the time immediately following the enactment of IRCA, which would cause a change in the correlation of border apprehensions and the actual flow of migrant workers.

IRCA also included a provision to begin a guestworker program called H-2A. This program gives agricultural employers the opportunity to use alien migrant workers for seasonal or temporary work during times of labor shortage. There is a significant amount of paperwork involved in using H-2A workers and many restrictions are placed on the employers. Due to the difficulty of hiring H-2A workers, many agricultural employers continue to use undocumented workers, even with the threat of fines.

The North American Free Trade Agreement of 1994 is another policy that may have significantly impacted the flow of undocumented migration. NAFTA allowed free trade and free mobility of capital between the U.S., Mexico and Canada starting in 1995. This meant U.S. companies were able to move their businesses to Mexico, which many did in order to have access to a large pool of cheap labor. Acevedo and Espenshade predicted short run increases in the flow of migration from Mexico, but a long run improvement in Mexico's economy that would eventually decrease the flow of migrant workers to the U.S. If we assume an increase in available jobs in Mexico provided by American owned factories in the long run, we would predict NAFTA to have a negative impact on the flow of undocumented migrant labor due to the increased expected income from remaining in Mexico. This assumes that agricultural migrant workers are now taking factory jobs in Mexico. If the wages paid are significantly higher than what can be earned in agriculture, it is safe to assume that at least some agricultural workers are transitioning to factory work in order to receive higher wages. The fact that American factories are paying higher wages than Mexican owned factories implies that overall wages in Mexico are increasing, which leads to a decrease in the relative returns to migration. If we predict a negative effect from NAFTA on the flow of migrant labor, than

we are assuming that according to Razin and Sadka's research, labor mobility is a substitute for the flow of capital and goods and services. The social implications that arise as a result of both NAFTA and IRCA will be discussed further in the conclusion section of this paper.

VI. Empirical Results

The results of the ordinary least squares regression of border apprehensions on the seven variables discussed above are shown in Table 1. An initial test of the data indicated the presence of autocorrelation, which means that the error terms for the regression may be correlated from one year to the next, a common problem with time series data, causing the coefficient estimates to be inefficient. An additional lagged dependent variable, AR(1), was added to account for the correlation over time.

Table 1

Dependent Variable: Apprehensions			
Variable	Coefficient	t-statistics	Probability
Constant	212175.5	0.227885	0.8230
Exchange Rate (pesos/$)	21772.31	0.116863	0.9086
Minimum wage (Mexico)	16.91427	0.429887	0.6738
Minimum wage (U.S.)	141730.9	0.489880	0.6318
Unemployment Rate (Mexico)	78025.96	1.244397	0.2338
Unemployment Rate (U.S.)	-5291.175	-0.089381	0.9300
NAFTA	-69979.06	-0.119461	0.9066
IRCA	-213226.4	-0.958824	0.3539
AR(1)	0.574088	2.469359	0.0270
R-squared	0.740683	F-Statistic	4.998493
Adjusted R-squared	0.592502	Probability (F-stat)	0.004390
Durbin-Watson	2.102448		

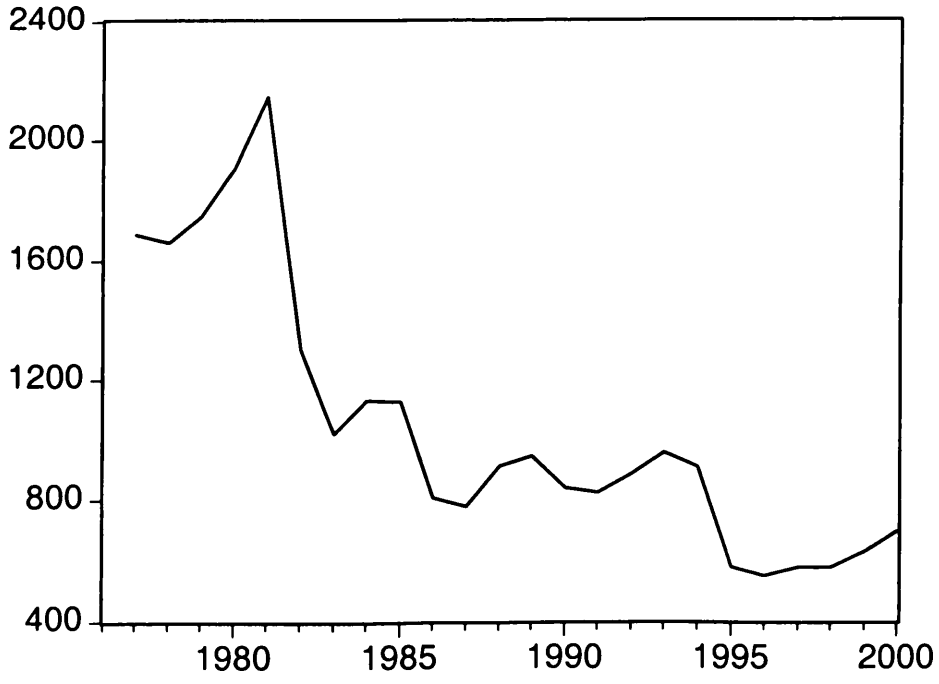
The probability of the F-statistic is 0.004, which means that the model overall gives significant information regarding border apprehensions. It is highly unlikely that all of the explanatory variables in this regression have no effect on the flow of migration. The R-squared value of 0.74 is equivalent to stating that this model can explain 74% of the deviations from the mean flow of migrant labor. Looking at the t-statistics and probability values, we see that none of the individual coefficients in this regression are statistically significant.

Most of the signs of the coefficients for this regression are consistent with what was predicted by the theory, however there are some discrepancies. Mexico's minimum wage in this regression has a positive effect on the flow of migration, contrary to what the theory predicts. However, the coefficient has a very low t-statistic of only 0.43, indicating that this result is not very significant. The U.S. unemployment rate has a negative coefficient indicating that unemployment in the U.S. has a negative impact on the flow of undocumented migrant labor. This result is consistent with the theory that U.S. workers will fill the low-wage agricultural jobs during times of high unemployment, leaving fewer jobs available for migrant workers. The U.S. minimum wage, Mexico's unemployment rate, and the exchange rate (pesos/dollar) all have positive effects on the supply of migrant labor, according to this regression. The U.S. minimum wage does not have a significant impact on the flow of migration, which is consistent with the prediction that the U.S. minimum wage would be less likely to have a significant impact on the flow of migrant labor due to the exclusion of agricultural labor in the minimum wage laws.

The coefficients of both dummy variables are negative as was predicted, but are not statistically significant.

The possible presence of multicollinearity among the variables could account for the lack of significant individual coefficients in this regression. Multicollinearity often causes the variance of the individual estimators to be large, yielding smaller t-statistics. It is possible to look at the effects of a wage ratio rather than the effects of the individual wages in each country, in order to decrease the number of explanatory variables, and possibly decrease the effects of multicollinearity. The wage ratio is calculated by multiplying the Mexican minimum wage by the exchange rate ($/peso) and then dividing by the U.S. minimum wage. The wage ratio is graphed in Figure 5 below.

Figure 5: Wage Ratio (Mexico/U.S.)



If we use the one wage ratio variable in the regression instead of the three independent variables, we can see how the flow of migrant workers has been impacted by the change

in Mexican wages relative to U.S. wages. The relationship of the wage ratio to the flow of migrant workers, according to the theory, is predicted to be negative. As wages in Mexico increase relative to U.S. wages, we expect that the flow of migration will decrease as a result of the decline in the relative returns from migrating. The results of this regression are given below. This regression did not indicate the presence of autocorrelation, and therefore the lagged dependent variable has been omitted.

Table 3

Dependent Variable: Apprehensions			
Variable	Coefficient	t-statistics	Probability
Constant	1979498.	6.416207	0.0000
Wage Ratio	-467.7360	-4.450346	0.0003
Unemployment Rate (Mexico)	-41123.75	-1.643734	0.1176
Unemployment Rate (U.S.)	-20416.02	-0.630015	0.5366
NAFTA	299227.1	2.774119	0.0125
IRCA	-266860.1	-2.484884	0.0230
R-squared	0.805693	F-Statistic	14.92740
Adjusted R-squared	0.751719	Probability (F-stat)	0.000007
Durbin-Watson	2.137564		

The new regression gives a significantly better fit to the model, increasing the adjusted R-squared from 59% to 75%, which adjusts for the decrease in the number of explanatory variables. The F-statistic is still highly significant, and the individual t-statistics in this regression are much more significant than the original regression. The increased significance among the individual explanatory variables suggests that there may have been significant multicollinearity in the previous model.

The wage ratio variable is negative and highly significant, which is consistent with the theory that as wages in Mexico increase relative to U.S. wages, the flow of migration decreases. Mexico's unemployment rate in this regression has changed signs to have a negative effect on the flow of migrant workers. This result is contrary to the theory, which states that as jobs in Mexico become scarce, the relative returns from migration increase, leading to an increase in the flow of migration. However the coefficient is not highly significant and therefore the result is inconclusive in determining the relationship of unemployment in Mexico to the flow of migration.

The NAFTA dummy variable has also changed signs in this regression, however this result is highly statistically significant, whereas the previous negative coefficient was not significant. The positive effect of NAFTA on the flow of migration is contrary to what was predicted in this paper. It could be explained that the negative effects that were expected to result from NAFTA are picked up by the wage ratio variable. If the wage ratio accounts for changes in relative wages that resulted from NAFTA, then the effects that the NAFTA dummy variable picks up are difficult to predict.

Looking at the graph of the wage ratio, there is a noticeable change in the trend after 1995. Mexican wages appear to improve relative to U.S. wages during the period following NAFTA, reversing the downward trend of the wage ratio. By estimating the trend regression line for the decreasing wage ratio it is possible to look at the level of border apprehensions that would be expected if the trend had continued. The actual wage ratio in the year 2000 was 696, whereas the predicted wage ratio using the trend from 1977 to 1994 is approximately 257. If the trend wage ratio had continued the predicted number of border apprehensions in the year 2000 would have been approximately

1,715,511. The reported number of apprehensions for 2000 of 1,510,148 is a decrease of approximately 205,000 from the expected number of apprehensions using the trend wage ratio. This shift in the trend of the wage ratio could be attributed to the effects of increasing wages in Mexico relative to U.S. wages due to NAFTA.

The NAFTA coefficient tells us that after 1995 the number of annual border apprehensions increased by approximately 299,000. If the decrease in border apprehensions found to result from the change in trend of the wage ratio is attributable to NAFTA, then it is possible to calculate the effect of NAFTA to be a net increase in border apprehensions of approximately 94,000 for the year 2000. This positive effect of NAFTA, although contrary to the theory in this paper, it is possible according to Acevedo and Espenshade's prediction. Acevedo and Espenshade predicted a short run complementary relationship between the mobility of capital and the flow of undocumented workers, which could be what is seen from this NAFTA coefficient. Because we are only looking at a five-year post-NAFTA period it is possible that the long run effects of free trade that would eventually lead to a net decrease in the flow of migration, are not seen in this series of data.

If we attribute to NAFTA a net increase in border apprehensions of 94,000, then according to Espenshade's approximation, the actual flow of migration would have increased by about 206,800 after the signing of the North American Free Trade Agreement (approximately 2.2 times the increase in border apprehensions). The IRCA coefficient estimates that border apprehensions decreased by 267,000 after 1988, which means a decrease of about 587,400 in actual migrant flow. The results of both dummy variables are highly significant with confidence levels of one and two percent.

VII. Conclusion

The results of this regression analysis help explain the factors that influence the flow of undocumented migration. This information is necessary in determining the best means of controlling the increasing number of illegal workers in the U.S. As long as there exists a discrepancy between expected incomes from migrating to the U.S. and staying in Mexico, there will always be a flow of undocumented workers. The possibility of open borders between the U.S. and Mexico is highly unlikely anytime in the near future. The major driving force for the flow of migration in this regression is found to be the wage ratio between the U.S. and Mexico. This is consistent with previous research by both Lalonde and Topel (1997), and Razin and Sadka (1997). The empirical results of this regression indicate that the best way to decrease migration is to decrease the wage ratio through increased Mexican wages relative to U.S. wages.

If NAFTA is successful in improving Mexico's economy through free trade, this will lead to an eventual decline in the flow of undocumented migrant workers. The free trade agreement is predicted to increase employment opportunities in Mexico through the movement of capital from the U.S. to Mexico. The relocation of American-owned factories to Mexico should eventually increase the demand for labor in Mexico, leading to an increase in overall Mexican wages. An initial shift in the trend of declining Mexican wages relative to U.S. wages can already be seen during the post-NAFTA period. However, the results of this regression imply that we have not yet seen a net decline in undocumented migration resulting from NAFTA.

The net increase in the flow of migration resulting from the NAFTA dummy variable in this regression could be a result of the short run impacts of the deterioration of trade barriers that are discussed in Razin and Sadka (1997). Increased trade between the U.S. and Mexico may have led to the commercialization of the agricultural industry in Mexico, leading to the destruction of many agricultural jobs. Since much of the flow of undocumented migration is attributed to agricultural workers, it is quite possible that the destruction of agricultural jobs in Mexico would lead to an increase in the flow of migration.

A movement towards NAFTA was seen in 1965 with the beginning of the *maquila* program, which allowed U.S. industries to establish factories within 20 kilometers of the U.S.-Mexico border as long as all imported products were eventually re-exported. This program brought economic growth to the border regions of Mexico, even during periods of recession experienced by the rest of Mexico. The *maquila* program began a pattern of migration in which many families migrated from central Mexico to the Northern border region. The wives were able to find employment in the maquiladoras, while the husbands crossed the border to find even better paying jobs in the U.S. We can predict that a similar pattern of migration might eventually occur as a result of NAFTA. However, in this case we expect to see an increase in migrant workers coming from Guatemala and El Salvador to get jobs in Mexico and the U.S., assuming an eventual improvement in both the U.S. and Mexico's economy resulting from NAFTA. This is why policy makers realized that a free trade area in North America is not the final solution. In order to decrease the flow of migration across borders, we must eventually expand the free trade area to include Central and South America as well, this being the

purpose of the FTAA. There are many arguments against free trade regarding external costs to the environment and labor markets, but as far as a long run plan to decrease the flow of undocumented migration, free trade is a reasonable solution. Although the results of this paper do not show a definite decline in migration resulting from free trade, the theory indicates that the long run future impact of free trade will be to decrease undocumented labor migration.

The alternative solution to the problem of undocumented migration is through immigration policy reform. The regression analysis in this paper looked at the impact of the 1986 Immigration Reform and Control Act and the effect it had on undocumented migration. The empirical results of the regression determined that this reform act had a significant negative impact on the flow of undocumented migration. Another Immigration Reform Act was implemented in 1996, which may have also had a significant effect on the flow of migrant workers. However, since this reform act would have only affected the last four years of the data for this study, it is not likely to have had a significant effect for this particular regression.

The 1996 IRA increased resources available for border patrol to restrict illegal entry to the U.S. This included an increase in the number of border patrol agents, a $12 million budget to build a fourteen mile fence along the border, and provisions that increase fines for apprehended migrants who under IRA, now have to pay $50 to $250 for an initial arrest, and double that fine for each additional arrest (Espenshade, Baraka, Huber, 1997). One month previous to the signing of the Immigration Reform Act of 1996, a Welfare Reform Act was also signed by President Clinton, which could have had additional impacts on the flow of undocumented migrant workers. The Personal

Responsibility and Work Opportunity Reconciliation Act specified reduced access to social welfare programs for legal immigrants. Many undocumented migrants have relatives or social ties to legal immigrants in the United States. This provision could have affected the ability of legal migrants to help support undocumented migrants, decreasing the overall flow of migration.

It is not possible to separate the effects of the 1996 Immigration Reform Act from the effects of NAFTA in 1994. Some of the increase in border apprehensions found to result from the NAFTA dummy variable could be attributed to the increase in spending for border patrol that resulted from the 1996 IRA. It is difficult to say whether the increase in border apprehensions resulting after 1994 is a result of short run effects of NAFTA or a result of the increased budget for border patrol.

Guestworker programs, which are often associated with immigration policy, are another proposed solution to the problem of undocumented migration. These programs have many social implications that must be considered in determining whether this is an appropriate method to decrease undocumented migration. The current H-2A program may appear to be a good way to provide documentation so that both employers and workers can benefit from seasonal employment, however this program has its faults. People have frequently compared the guestworker programs to a form of indentured slavery for foreign agricultural workers. Workers are provided with minimal housing, they are paid less than most native workers are paid, and are constantly threatened with deportation. The threat of deportation discourages workers from complaining about being denied worker's rights and proper compensation. Currently there are 42,000 farm workers in the United States on H-2A visas (Yeoman, p. 42).

Proposals for a reformed guestworker program, called H-2C, have even fewer considerations for the workers, and exclude many of the previous provisions regarding basic rights for workers. The H-2C program would bring in an additional one million guestworkers, and would allow farmers to pay even lower wages to foreign laborers. The new program would require guestworkers to work a minimum of 180 days per year to be eligible for visas, but would also grant legal residency to workers who maintain eligibility in each of five years. Due to the short agricultural season, it is nearly impossible for workers to achieve the 180 days of required employment, therefore this is simply a false incentive that most workers will never achieve. Proposals also include suggestions to convert the required provided housing into housing vouchers for guestworkers. However, most of the areas in which the agricultural work is done have no cheap available housing that the vouchers could be used for.

The new program would also eliminate the current qualification that farmers are only to request guestworker visas when there is a shortage in the native labor force. Studies of the current H-2A program have found that farmers are easily able to obtain guestworker visas without exhausting possible native labor sources. Employers often turn away job applicants without reason, so that they can hire guestworkers at lower wages. The H-2C program, if passed by Congress, could have a significant effect on the wages and employment of American farm workers.

Although it may appear that guestworker programs are a suitable method to provide documentation to benefit both employers and migrant workers, we have not managed to come up with a legitimate program that does not take advantage of the guestworker's temporary status. Even if we were able to design a program in which

workers were treated as legitimate residents while they were here, we should still explore methods of decreasing the dependency of migrant labor for both the workers from Mexico, and U.S. employers.

The empirical results from the regression analysis indicate that the most influential factor in determining the flow of migration from Mexico to the U.S. is the relative wages in both countries. The best method for decreasing the flow of migration is to focus on the long run improvement of Mexican wages relative to U.S. wages. Although Mexico is the largest contributor of migrant workers to the U.S., it is one of many countries whose citizens migrate to the U.S. in search of higher wages and increased employment opportunities. The effects of globalization throughout these contributing countries of migrant workers will inevitably have a significant effect on the flow of undocumented migration to the United States in the near future.

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