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Location Decisions of Undocumented Migrants in the United States

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Abstract. Many states have experienced a large influx of undocumented migrants in recent years. It has resulted in contentious debates regarding the burdens and benefits of their presence in the U.S. and in individual states and the need for comprehensive immigration reform. This research examines factors that influence the location decisions of undocumented migrants in the U.S. Greater economic opportunities, the existence of migrant networks, and the share of agriculture, accommodation, and food services sectors in the Gross State Product have a positive and significant impact on percentage of undocumented migrants at the state level. Undocumented migrants also appear to locate in states with policies that foster greater individual freedoms. The evidence of clustering of undocumented migrants in states with large migrant networks could pose challenges for states trying to regulate the size of their undocumented migrant population.

“One of the most pervasive features of undocumented immigration is that it is overwhelmingly driven by supply and demand: immigrants want to work in the United States, and many American employers want to hire them. Such a simple fact, however, has complex economic, humanitarian, and security-related implications.” (Economic Report of the President, 2005, p. 110)

1. Introduction

The influx of undocumented migrants, the burdens and benefits of their presence in the U.S., and the need for comprehensive immigration reform have been contentious topics of debate.¹ More and more state governments are being drawn into this debate due to the dispersion and settlement of undocumented migrants in states that had previously experienced very little undocumented immigration. While traditional “gateway” states such as California, Florida, Illinois, New York, and Texas still have

large percentages of undocumented migrants, they are increasingly settling in other states such as Alabama, Arkansas, Colorado, Delaware, Georgia, Idaho, Kentucky, Minnesota, Nebraska, Nevada, New Mexico, North Carolina, Tennessee, South Carolina, and Utah. This research examines factors that influence the location decisions of undocumented migrants in the U.S.

Related literature has examined the decision to immigrate to the U.S. For example, Hanson (2006) concludes that an increase in the relative size of the working-age population in Mexico, greater volatility in relative wages between the U.S. and Mexico, and changes in U.S. immigration policies have all contributed to the increased flow of undocumented immigrants from Mexico to the U.S. Our focus is on factors that determine where illegal immigrants chose to locate in the U.S. rather than on factors which influence the choice of the U.S. as a destination country.

There is limited previous research on factors that influence the location decisions of undocumented immigrants. Hence, we also draw upon the broader

¹ Borjas (2013) documents that the number of illegal immigrants rose from 3.5 to 11.7 million between 1990 and 2010.

literature on factors influencing migration decisions (see, for example, Riew, 1973; Cebula and Alexander, 2006; Snarr and Burkey, 2006) to inform our analysis. We examine four broad sets of factors at the state level that influence the percentage of undocumented migrants in a state, namely *economic opportunities, industrial structure, size of migrant network, and quality of life*.

Undocumented migrants are more likely to locate in states that offer greater economic opportunities, consistent with income-maximizing behavior. Various studies have proxied economic opportunities at the state level by median family income, welfare benefits, lower cost of living, state tax rates, and rates of unionization. States with lower levels of unionization are likely to have greater employment opportunities for undocumented migrants (Cebula et al., 2013; Cebula et al., 2014). Foreign-born welfare recipients whose objective is to maximize their incomes may be clustered in the states that offer the highest benefits (Borjas, 1999).² Undocumented migrants would likely prefer states with no income tax, *ceteris paribus*, as residing in such states would lower both their tax burden and the probability of detection by the government and law enforcement authorities (Tullock, 1971; Conway & Houtenville, 2003; Gale & Heath, 2000; Cebula & Alexander, 2006). Migrants are also more likely to locate in faster growing economies. A 2010 study by the non-partisan Migration Policy Institute notes, "The responsiveness of unauthorized immigrant flows to the economic cycle has been well documented in a growing body of evidence coming from both the U.S. and Mexican governments as well as from other researchers" (Papademetriou, 2010, p. 26). Other studies suggest that the slowdown in the flow of unauthorized migrants from Mexico during the Great Recession was partly due to the limited economic prospects in the U.S. during the recession and that unauthorized migration appears to be picking up as the U.S. economy recovers (Fix et al., 2009; Hoefer et al., 2009; Passel and Cohn, 2009).

The Pew Hispanic Center's research and data on the characteristics of undocumented migrants also motivates this research. They use the term unauthorized migrant to refer to "a person who resides in the United States but who is *not* a U.S. citizen, has *not* been admitted for permanent residence, and is *not* in a set of specific authorized temporary statuses

² The Economic Report of the President (2005, p. 110) notes "To obtain work, some undocumented immigrants resort to using false documents, such as fake Social Security cards or green cards."

permitting longer-term residence and work". Thirty percent of the foreign-born population in the U.S. in 2005 was comprised of undocumented migrants. There was also considerable variation in the percentage of undocumented migrants across states, with California (24%), Texas (14%), Florida (9%), New York (7%), Arizona (5%), Illinois (4%), New Jersey (4%), and North Carolina (3%) having the highest concentrations of undocumented immigrants in 2005.³ They estimated that undocumented immigrants constituted approximately "24% of all workers employed in farming occupations, 17% in cleaning, 14% in construction and 12% in food preparation industries" (Passel, 2006).

An undocumented migrant's location decision may also be a result of network-based migration. The argument in the literature is that economic and non-economic costs of immigration are lower in host countries with existing migrant networks, which therefore influence the choice of the destination country (Carrington, Detragiache, and Vishwanath, 1996; Bauer, Epstein, and Gang, 2002; Cebula et al., 2013). This same argument is applicable to the choice of the destination state once the undocumented immigrant is in the U.S. The Economic Report of the President (2005) notes, "Once workers are here, additional undocumented immigration may take place as family members and friends join the workers" (p. 110).

The literature identifies several quality of life variables that impact location decisions of migrants, such as climatic conditions and proximity to the sea-coast. Migrants of all types are more likely, *ceteris paribus*, to gravitate towards warmer and more comfortable climates and proximity to the coast (Saltz, 1998; Cebula and Alexander, 2006; Gale and Heath, 2000; Cebula et al., 2013). States which value economic and personal freedoms more highly are also more likely to provide environments conducive to entrepreneurship and economic and social inclusion.⁴ Hence, undocumented migrants are more

³ Passel (2005) states, "The appearance of Arizona and North Carolina on this list highlights another recent trend. In the past, the foreign-born population, both legal and unauthorized, was highly concentrated. But, since the mid-1990s, the most rapid growth in the immigrant population in general and the unauthorized population in particular has taken place in new settlement areas where the foreign born had previously been a relatively small presence."

⁴ Wadhwa et al. (2007) found that 25.3% of the engineering and technology companies started in the U.S. from 1995 to 2005 had at least one key foreign-born founder. Separate figures for undocumented workers are unavailable.

likely, *ceteris paribus*, to choose states with policies that foster more economic and personal freedoms.

This study uses data on percentage of undocumented migrants at the state level from the Pew Hispanic Center to examine factors that influence location decisions of undocumented migrants in the U.S. in 2005. The key results indicate that greater economic opportunities and the existence of migrant networks have a positive impact on percentage of undocumented migrants at the state level. The share of the agriculture, accommodation, and food services sectors at the state level are also important determinants of the percentage of undocumented migrants in a state. Undocumented migrants also appear to locate in states with policies that foster greater individual freedom, proxied by a combination of both economic and personal freedoms.

2. Methods and data

The assessment of the location decision of an undocumented migrant should capture the expected costs and benefits over the lifetime of the migrant. An undocumented immigrant who has decided to migrate to the U.S. from home country i now has the choice of migrating to any of the j U.S. states (where j ranges from 1 to 50). An undocumented migrant from country i will chose to migrate to a U.S. state j if and only if the expected net discounted present value from that action, DPV_{ij} , is both positive and is the highest net discounted present value in comparison to locating in any other state.⁵ This is captured by equation (1) below:

$$DPV_{ij} > 0; \text{ and } DPV_{ij} = \max(DPV_{ij}) \text{ across all } j, (1) \\ \text{where } j = 1, 2, \dots, 50$$

The Tiebout-Tullock hypothesis provides a framework for this analysis as it emphasizes that the consumer-voter evaluates both the government goods and services and the tax burden at the potential locations of choice in determining whether to migrate to state j . Several other papers have followed this approach and considered two broad sets of determinants that impact DPV_{ij} , namely economic conditions and quality of life conditions in those states (Riew, 1973; Cebula and Chapin, 1973; Renas, 1983; Vedder et al., 1986; Cebula and Alexander, 2006). The present study follows this approach and examines four broad sets of factors at the state level

that influence DPV_{ij} and thus the percentage of undocumented migrants in a state: *economic opportunities, industrial structure, size of migrant network, and quality of life*.

Table 1 describes the variables and data sources, and Table 2 provides the correlation coefficients of the key variables used in the analysis. The dependent variable $umrate_{ij}$, is the log of the percentage of undocumented migrants in state j in 2005. We express the stock of undocumented migrants as a percent of the state's total population to facilitate comparisons of the undocumented immigrant location decisions across states. The Pew Hispanic Center estimates the total stock of undocumented migrants in the U.S. in 2005 to be 11.1 million (Passel, 2005).

The independent variables include proxies for economic opportunities, industrial structure, size of migrant network, and quality of life. The *economic opportunities* in state j are proxied by the log of real median income in 2004 ($rmedinc_j$), the growth rate of the Gross State Product between 2000 and 2004 (gr_gsp_j), log of real minimum wage rate in 2004 ($minrwage_j$), and the state income tax rate dummy (inc_tax_j), which equals 0 when the state has no income tax.⁶ We use lagged values of the independent variables to address endogeneity issues and also because migration decisions in year t are often based on economic conditions prevailing in the previous period. The four-year growth rate of state GSP provides a robust proxy for the health of the state's economy.⁷ We include state j 's real minimum wage because undocumented workers are more likely to find employment in states with a higher real minimum wage rate. The use of real instead of nominal values obviates the need for the cost of living index in our analysis.

The concentration of undocumented workers in certain industries previously discussed in the literature review has motivated us to include state-level industry structure variables as explanatory variables. The industry structure is proxied by the percentage contribution to a state's GSP from the agriculture (ag_gsp_j), manufacturing ($manuf_gsp_j$), construction ($constr_gsp_j$), and accommodation and food services ($accomd_gsp_j$), sectors. The proxy for the size of the migrant network is the log of total documented Hispanic population at the state level $network_j$, as 56% of the unauthorized migrants in

⁵ We do not consider factors such as distance and moving costs in calculating DPV_{ij} , as reliable data are largely unavailable in the case of undocumented migrants.

⁶ The coefficients of the logged independent variables are interpreted as elasticities.

⁷ Employment growth often lags behind economic recovery, so the four-year growth rate of a state's economy would provide a more accurate signal about employment prospects.

the U.S. in 2005 were from Mexico (Passel (2006)). We also use the log of the documented foreign-born

population at the state level as an alternate measure of migrant networks.

Table 1. Definition of variables and data sources.

Variable Name	Variable Name - Descriptive	Description	Source
$umrate_j$	% undocumented immigrants (in logs)	% undocumented immigrants in state j's population - 2005	Pew Hispanic Center (2013), U.S. Census Bureau <i>Table 17</i> (2007).
$networks_j$	Hispanic population (logs)	total Hispanic population in state j	Population Division, Census Bureau, <i>Table 4</i> , July 1, 2004 (SC-EST2004-04)
$minrwage_j$	Min. real wages 2004 (logs)	real minimum wages in 2004 in state j - non-farm workers	Department of Labor: www.dol.gov/whd/state/stateMinWageHis.htm
$rmedinc_j$	Median real income 2004 (logs)	real median family income in 2004 in state j	Census Bureau, <i>Table H-8. Median Household Income by State: 1984 to 2012</i>
gr_gsp_j	% 4-year average real GSP growth	real GSP growth rate in state j for period 2000-2004	calculated from Bureau of Economic Analysis data on GDP by State
inc_taxs_j	State income tax dummy	=1 if state has income tax, 0 otherwise	U.S. Census Bureau (2005, <i>Table 455</i>)
jan_temp_j	Average Jan. temperature	average temperature in January in state j	U.S. Census Bureau (2005, <i>Table 378</i>)
$costal_j$	Costal State	=1 if state j is a costal state; 0 otherwise	U.S. Department of Commerce, NOAA, <i>The Coastline of the United States, 1975</i> .
jan_ofree_j	Freedom Index (Overall)	index of economic and personal freedoms in state j	Ruger W. P. and Sorens J. (2009).
ag_gsp_j	% GSP ag	% GSP from agriculture	Bureau of Economic Analysis: www.bea.gov/regional/downloadzip.cfm
$accomd_gsp_j$	% GSP serv/accomm/food	% of GSP from accomodation & food service	same as above
$manuf_gsp_j$	% GSP manuf	% of GSP from manufacturing	same as above
$constr_gsp_j$	% GSP constr	% of GSP from construction	same as above

Table 2. Correlation matrix.

Variable Name	1	2	3	4	5	6	7	8	9	10	11	12	13
1. % undocumented workers (logs)	1												
2. Hispanic population (logs)	0.76	1											
3. Min. real wages 2004 (logs)	0.08	-0.07	1										
4. Median real income 2004 (logs)	0.46	0.19	0.42	1									
5. % 4-year avg. real GSP growth	0.25	-0.09	0.05	0.07	1								
6. State income tax dummy	-0.2	-0.08	-0.19	-0.15	-0.31	1							
7. Average Jan. temperature	0.35	0.42	0.06	-0.14	0.18	-0.05	1						
8. Coastal State	0.29	0.22	0.46	0.28	0.04	-0.09	0.46	1					
9. Freedom Index (Overall)	-0.07	-0.2	-0.43	-0.24	0.11	-0.15	-0.08	-0.4	1				
10. % GSP ag	-0.26	-0.4	-0.24	-0.4	0.22	-0.08	-0.32	-0.4	0.36	1			
11. % GSP serv/accomm/food	0.18	-0.02	0.02	0.11	0.37	-0.33	0.26	-0.04	-0.04	-0.16	1		
12. % GSP manuf	-0.23	0	-0.26	-0.47	-0.35	0.39	-0.05	-0.17	0.17	0.06	-0.37	1	
13. % GSP constr	0.32	0.14	-0.12	0.13	0.5	-0.36	0.28	-0.03	0.19	-0.16	0.67	-0.4	1

Note: Correlation coefficients in bold typeface are significant at the 5% level.

The quality of life in a state is captured by three variables: climatic conditions, proximity to the coast, and the state level index for overall freedom. The mean January temperature at the state level (jan_temp_j) for the period 1971-2000 is a proxy for climatic conditions. A dummy variable ($coastal_j$) indicating whether a state borders the Atlantic Ocean, the Pacific Ocean, or the Gulf of Mexico is used to proxy for proximity to the coast. The Overall Freedom Index ($ofree_j$) from the Mercatus Institute “ranks the American states according to how their public policies affect individual freedoms in the economic, social, and personal spheres.” Its components include both economic freedoms such as fiscal and regulatory freedoms and personal freedom.⁸ Lower values of this index are indicative of states with lower overall (individual) freedoms. There is considerable variation in the value of this index across states. The range of the Overall Freedom Index in our data extends from a value of -0.78 for New York to a value of 0.43 for New Hampshire.

The basic model is estimated using Equation (2) below:

$$\begin{aligned} umrate_j = & \alpha_1 + \alpha_2 network_j + \alpha_3 minrwage_j \\ & + \alpha_4 rmedinc_j + \alpha_5 gr_gsp_j + \alpha_6 inc_tax_j \quad (2) \\ & + \alpha_7 jan_temp_j + \alpha_8 coastal_j + \alpha_9 ofree_j + \varepsilon_j \end{aligned}$$

We also report other specifications with the total foreign born population in each state and state industry structure. We expect positive and significant coefficients for all independent variables except jan_temp_j and inc_tax_j , which we expect to be negative and significant. We report results estimated using OLS with robust standard errors in Tables 3 and 4.

3. Data analysis

Table 3 presents the results of the baseline model, with the t-statistics reported in parentheses under the coefficients. In Model 1, we find that migrant networks are an important determinant of undocumented migration, as the presence of a large documented Hispanic population in a state has a positive and significant impact on undocumented migration

at the 1% level.⁹ This suggests that there is likely to be clustering of undocumented immigrants in states with large migrant networks, as the economic and non-economic costs associated with locating in such states and becoming gainfully employed are lower. Our results also support the importance of economic opportunities in an undocumented migrant’s decision to locate in a state. The coefficients of the median real income and the four-year growth rate of real income in a state are both positive and highly significant at the 1% level. The state income tax dummy and the real minimum wage are insignificant. Our quality of life measures, the average January temperature and being a coastal state, are both insignificant.

In Model 2 we use the log of the documented foreign-born population at the state level as an alternate measure of migrant networks to verify the robustness of our results. The presence of a large documented foreign-born population in a state has a positive and significant impact on undocumented migration at the 1% level. The direction and significance of the other significant variables in the model remain unchanged in comparison to Model 1. In Model 3 we include the overall freedom index as an additional explanatory variable to the specification in Model 1. The results indicate that the quality of life in a state as captured by the overall freedom index is an important determinant of the location decisions of undocumented immigrants. The coefficient of the Overall Freedom Index is positive and significant at the 1% level. The significance and positive impact of migrant networks, real median family income, and the four-year growth rate of GSP all remain robust to alternate specifications and are consistent with the previous literature.¹⁰

The specifications in Table 4 include proxies for the state industry structure. We include separately in our analysis the share of agriculture, accommodation and food services, manufacturing, and construction in GSP, as the correlation matrix indicates a significant degree of correlation among the last three variables. We also drop the four-year growth rate in GSP in models reported in Table 4 because of the significant correlation between the four-year growth rate in GSP and the shares of accommodation and

⁸Ruger and Sorens (2009). This index is based on 2006 data. However, as values of this index change very slowly, we consider it appropriate for our analysis of undocumented migration in 2005. Details regarding the calculation of this index are available at <http://freedominthe50states.org/how-its-calculated>.

⁹ This can be interpreted as a 1% increase in the total Hispanic population in a state leading to a 0.36% increase in the percentage of undocumented migrants in a state.

¹⁰ For example, papers such as Cebula and Clark (2011), Cebula et al. (2013), and Cebula et al. (2014) have used both economic freedom index and personal freedom indices separately in identifying determinants of migration patterns.

food services, manufacturing, and construction in GSP. The results of this analysis are reported in Models 1-4. The coefficients of shares of agriculture and accommodation and food sectors are both positive and significant at the 5% and 1% levels respectively (Models 1 and 2), while the corresponding results for manufacturing and construction are insignificant. This suggest that while a large number of undocumented migrants may eventually find employment in construction, it may not be a significant factor in the location decision of an income maximizing undocumented migrant as it is a seasonal occupation and is strongly impacted by the downturn in the business cycles. In the case of the manufacturing sector, an analysis that separates

high-skill and low-skill manufacturing is likely to offer additional insights.

Migrant networks and the median real income are both robust to changes in specification and continue to be positive and highly significant at the 1% level. The coefficient of the Overall Freedom Index, while still positive, is now significant only at the 5% level in Models 1 and 3 and at the 10% level in Models 2 and 4. Based on the above analysis, we can conclude that migrant networks, economic opportunities, the policy environment in a state as proxied by the Overall Freedom Index, and the state industry structure are all variables that have a positive and significant impact on an undocumented migrant's location decisions.

Table 3: Factors Affecting Location Choices of Undocumented Immigrants Baseline Model
(Dependent variable: % undocumented workers (in logs)).

	Model 1	Model 2	Model 3
Hispanic population (logs)	0.363*** (8.231)		0.386*** (8.982)
Foreign born population (logs)		0.358*** (5.937)	
Real min. wage 2004 (logs)	-0.265 (-0.495)	-0.413 (-0.684)	0.254 (0.484)
Median real income 2004 (logs)	1.776*** (3.558)	1.741*** (2.599)	1.742*** (3.951)
% 4-year average real GDP growth	0.226*** (3.251)	0.249*** (2.932)	0.225*** (3.335)
State income tax dummy	-0.027 (-0.173)	-0.169 (-0.986)	0.08 (0.435)
Average Jan. temperature	0.002 (0.26)	0.007 (0.821)	-0.0003 (-0.068)
Coastal State	0.072 (0.441)	-0.087 (-0.454)	0.15 (0.933)
Freedom Index (Overall)			0.565*** (2.551)
Constant	-22.915*** (-4.301)	-22.266*** (-3.189)	-23.798*** (-4.847)
# Observations	50	50	50
R-squared	0.769	0.69	0.789

Note: Coefficients reported with t-values in brackets. Robust standard errors reported.

*, **, and *** indicates 10%, 5% and 1% level of significance, respectively.

Table 4: Location Choices of Undocumented Immigrants and State Industry Structure
Dependent variable: % undocumented workers (in logs).

	Model 1	Model 2	Model 3	Model 4
Hispanic population (logs)	0.371*** (6.805)	0.38*** (7.152)	0.359*** (7.465)	0.355*** (7.435)
Real min. wage 2004 (logs)	0.123 (0.167)	0.352 (0.508)	0.17 (0.226)	0.36 (0.518)
Median real income 2004 (logs)	2.486*** (4.229)	1.698*** (3.025)	1.769*** (2.696)	1.747*** (3.07)
State income tax dummy	-0.045 (-0.175)	0.048 (0.315)	-0.047 (-0.221)	-0.0004 (-0.003)
Average Jan. temperature	0.01 (1.366)	-0.001 (-0.138)	0.005 (0.783)	0.002 (0.234)
Coastal State	0.14 (0.736)	0.222 (1.212)	0.116 (0.663)	0.156 (0.933)
Freedom Index (Overall)	0.47* (1.745)	0.744** (2.416)	0.639** (2.177)	0.552* (1.993)
% GSP ag	0.099** (2.137)			
% GSP serv/accomm/food		0.081*** (3.225)		
% GSP manuf.			-0.014 (-0.854)	
% GSP constr.				0.133 (1.42)
Constant	-31.223*** (-4.923)	-23.118*** (-4.14)	-22.936*** (-3.342)	-23.754*** (-4.215)
# Observations	50	50	50	50
R-squared	0.756	0.749	0.73	0.74

Note: Coefficients reported with t-values in brackets. Robust standard errors reported.

*, **, and *** indicates 10%, 5% and 1% level of significance, respectively.

4. Conclusions

Many states have experienced a large influx of undocumented migrants in recent years. This research examines factors that influence the location decisions of undocumented migrants in the U.S. in 2005. Greater economic opportunities and the existence of migrant networks have a positive impact on percentage of undocumented migrants at the state level. The percentage of undocumented migrants in a state is an increasing function of the state's median real family income and the four-year real growth rate of GSP. The share of the agriculture and accommodation and food services sectors in GSP are important determinants of the percentage of undocumented migrants in a state. Undocumented migrants also appear to locate in states with greater freedom, proxied by a combination of both economic and personal freedoms.

This analysis suggests that there is likely to be clustering of undocumented migrants in states with large migrant networks, good economic opportunities, and where state policies support individual freedoms. Such clustering, *ceteris paribus*, is likely to act as a magnet for the influx of additional undocumented migrants and pose challenges for state governments trying to regulate the size of their undocumented migrant population. This also explains in part the rise of enforcement efforts as a deterrent mechanism in states that experience such clustering.

Among the limitations of this analysis is the lack of direct measures of the number undocumented migrants. The estimates of illegal immigrants, while calculated using rigorous methodology, are nonetheless subject to a margin of error. There may be several other factors that influence location decisions of undocumented migrants such as access to education, health care, intensity of deportation efforts at

the state level, and so forth, that this study does not explicitly address. Although the Overall Freedom Index captures the overall policy environment in a state, it may be useful to examine the state level policy environment in a more disaggregated manner. The present research is a cross-sectional study. As better quality longitudinal data becomes more readily available, a dynamic analysis will offer greater insights into the determinants of the location choices of undocumented migrants.

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