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An Examination of Recent Migration to Arizona

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1. Introduction

Arizona's history has been characterized by continuing and significant levels of migratory population flows both into and out of the State. Inmigration to Arizona from other states has exceeded the numbers for most states for several decades, and the influx of new residents has been a key contributor to Arizona's growth. Internal Revenue Service (IRS) migration data indicate that domestic migration into Arizona reached 202,706 persons over the 2006-2007 timeframe, well above the 148,816 residents who left Arizona for other U.S. states. The level of migration flows has been attributed to numerous causes, including the low cost of housing, job availability, and quality of life.

The number of inmigrants is smaller than the numbers of new migrants in earlier years of the decade, and the number of migrants has continued to drop in more recent periods as migration in general has slowed with the downturn in the U.S. economy. Nevertheless, the gains in population over the past decade should result in an increase of one or two congressional seats for Arizona after the completion of the 2010 Census.

Among its many inmigrants, and perhaps the most recognized, are the large numbers of retirement-age persons Arizona attracts each year. A number of variables play a significant role in the migration decisions for this group of movers. In a study conducted for the Arizona Department of Commerce, Rex (2002) hypothesizes that the location decision is initially a function of the impression of a community that future migrants developed during the time of a previous tourist-related visit to the area.

Rex cites a number of other factors to explain Arizona inmigration including the distance from their current residence and from family and friends, the presence of a warm year-round climate with mild seasons, scenic beauty and recreational opportunities, proximity to urban areas in order to gain access to medical care, the presence of numerous cultural amenities which may not be available in smaller locations, and a general ability to obtain housing at average to below-average costs relative to other areas. Most observers will agree with Rex that Arizona's growth in retirement-age population has been fueled by a relatively low cost of living across much of the warmer portions of the state along with relatively low tax burdens on residents and a generous presence of numerous cultural amenities in the State's two largest metropolitan areas.

In considering movement among the entire population, the migration literature has fully documented examples that address the factors that lie behind the decision to migrate, and confirms that existing conditions in places of origin and destination are important along with other factors including the age of the migrant, ties to family and friends and a personal attachment to the location where the individual currently resides (Muth, 1971; Greenwood, 1975, 1985; and Partridge and Rickman, 2006).

The presence of a favorable climate and the existence of natural amenities were modeled as long ago as the 1950's by Ullman (1954). More recently, the role of amenities in the migration decision has generated considerable research, particularly as lifestyle changes have become more important. Vias (1999) investigated changing preference patterns to include environmental amenities and a rural lifestyle as opposed to reasons aligned with improving economic opportunities. Vias also recognized the importance of nonemployment income in the migration decision for those persons who are motivated to relocate but who are not seeking employment.

In addition to the specific impacts of climate, other factors comprising the quality of life also have been shown to be significant by Cushing (1987), Cebula (2005), and Cebula and Payne (2005) as has the role of location-specific amenities (McGranahan, 1999; Green, 2001; Deller et al., 2001; Graves (1973, 1979, 1980); and Gunderson and Ng, 2006.) Climate and quality of life take on different meanings as people age, and thus people will migrate for quite different reasons over the course of their life cycle (Whisler et al., 2008), and Plane and Jurjevich (2008) use age-specific migration flows to examine the relative propensities of persons to migrate up or down the urban hierarchy.

The factors noted above play primary, but general, roles in the decision as to whether or not to migrate, and may serve as general macro indicators concerning what is important to the migrant.

However, a more specific set of factors may emerge when the decision reaches the local (micro) level. The decision to move to Arizona may be based upon climate factors; however, a separate decision occurs when the migrant must consider factors such as job opportunities or the cost of housing which may vary across cities and counties within the state.

Some migrants will weigh the tradeoffs that exist among the numerous economic and amenity variables that are present in a region (Porell, 1982). In other instances, the pull of favorable environmental factors has outweighed economic considerations (Roback, 1982; Blanchflower and Oswald, 1994).

This paper examines domestic migration flows of United States residents into Arizona for the 2006-2007 time period. While elderly migration is clearly an important component of this migration, we will examine migration for all ages. Migration flows are analyzed on the basis of spatial components with a focus on the characteristics of the counties of origin for many of these migrants. In the following sections, we will summarize flows by Arizona county, then focus on the origin locations of inmigrants, examine migration to Arizona in the context of movement within the urban hierarchy, and, finally, examine gravity models describing the inmigration flows as a function of distance, sending county population, and selected economic characteristics.

2. Data and Summary of Flows by Arizona County

The data used for this paper are largely based on the IRS Statistics on Income County-to-County migration dataset for 2006-2007. Population movements are tracked by the IRS using changes in addresses linked to individual tax returns from one year to the next. Thus, the data for this study are based on tax returns filed in 2007 that reflect migration flows occurring between 2006 and 2007.

During this twelve month period net migration into the State was 53,890 persons, reflecting the difference between the 202,706 persons moving in and 148,816 persons moving out of Arizona. Only Texas and Florida experience significantly larger net migration flows, with Georgia and North Carolina experiencing similar levels of net inmigration.

In order to gain a better grasp of the effect of conditions in the destination state of Arizona, it is useful to first examine the urban geography of Arizona, which is summarized in Figure 1, the Census Bureau map of metropolitan and micropolitan areas. The Phoenix metropolitan area consists of the two counties of Maricopa, with over three million residents, and Pinal, with another quarter million residents. The other major metropolitan area, Tucson, consists of the single county of Pima with about one million residents. In addition, Arizona has the less-known metropolitan areas of Flagstaff, Prescott, and Yuma, each of which is a single county. Six of the remaining counties comprise the five micropolitan statistical areas, and only three counties are neither metropolitan nor micropolitan.

Figure 2 provides a picture of total out-of-state inmigration to Arizona for 2006-2007. Maricopa County received over 119,000 persons, or 59 percent of the total new migrants. Pima County received 13 percent. Each of the remaining 13 Arizona counties experienced smaller numbers of domestic migrants from other states. (See Table A1 in the appendix for specific migration flows for each of the counties.)

Net migration patterns are shown in Figure 3. These numbers are important since they represent a proxy for the relative attractiveness of Arizona counties for persons moving in and out of Arizona. Overall, Arizona experienced net inmigration of 53,890 domestic residents with Maricopa County accounting for 32,000 of this number or about 60 percent of the net gain to the state. Pinal County, which borders the eastern side of Maricopa, received 13 percent of the net gain, and the Tucson region (Pima County) was the recipient of almost 11 percent of the net migration numbers. Ten of the 12 less-populous counties experienced positive net migration; however, Apache and Coconino counties recorded net population losses as a result of the migration flows.

We obtain a clearer picture of the relative attraction of counties when we examine demographic efficiency, where net migration is compared to the sum of in- and out-migration. Using this measure, Pinal County's demographic efficiency exceeds 40 percent, greatly exceeding the efficiency ratio for Graham County (27%), the second largest percentage. The demographic efficiency in each county is highlighted in Figure 4. A cursory review of the numbers shows that demographic efficiency is generally higher for the southern and western counties in the state. These counties typically include the warmer climate regions of the state, while the two counties that experienced negative demographic efficiency are from higher-altitude, colder regions.

Figure 1. Arizona Metropolitan and Micropolitan Areas.

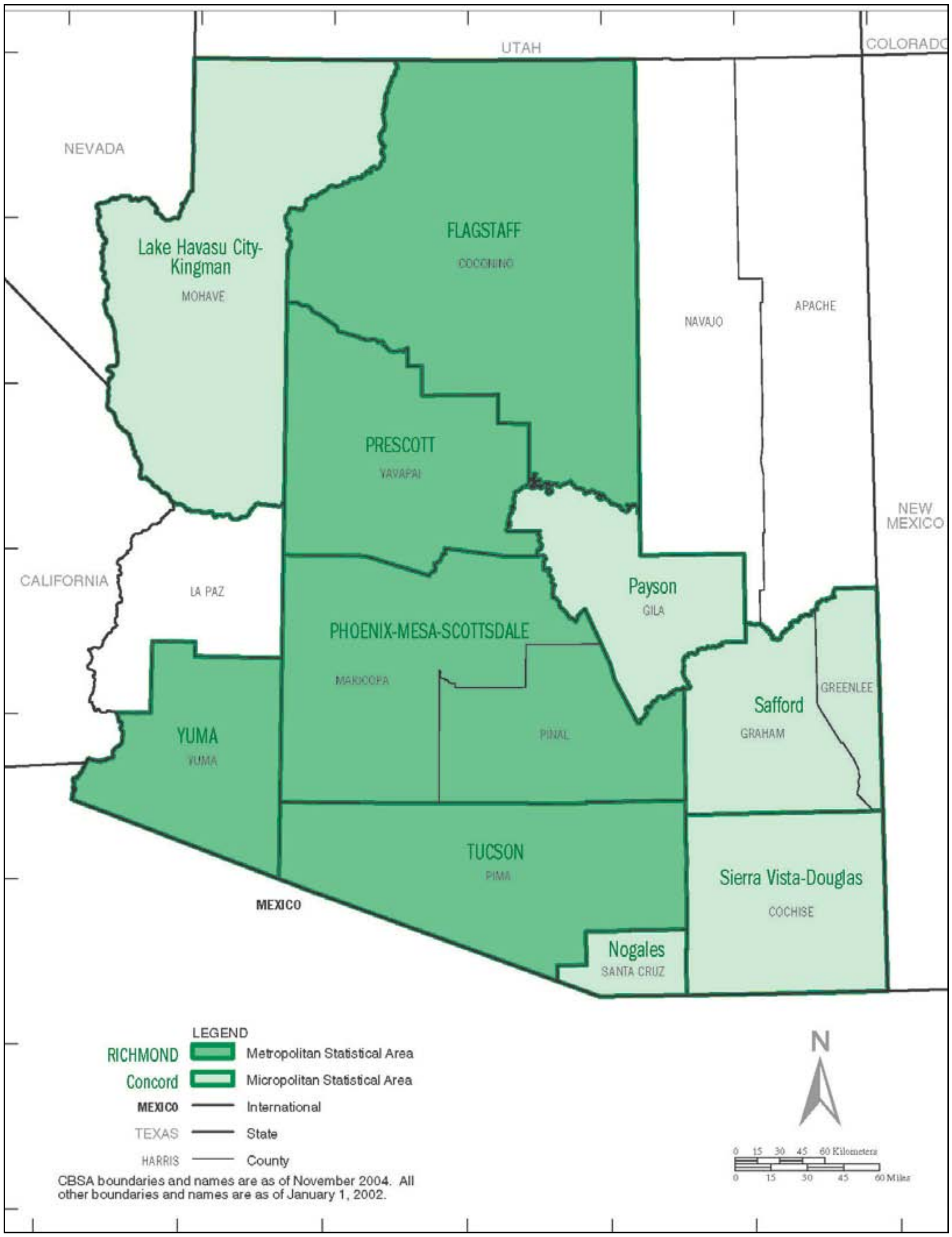


Figure 2. Out-of-State Inmigration by Arizona County.

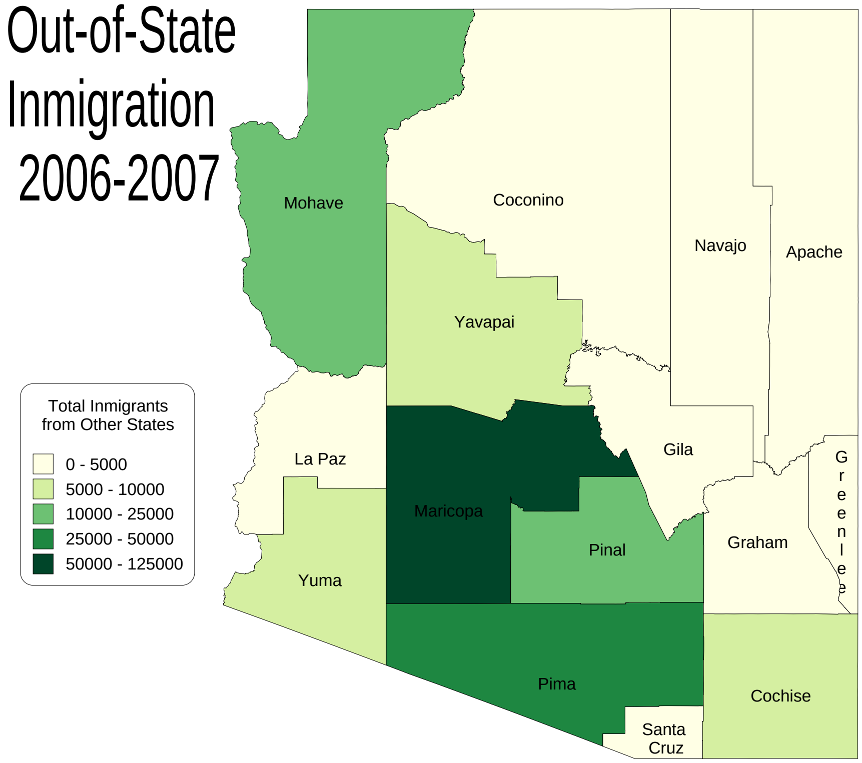


Figure 3. Net Out-of-State Inmigration by Arizona County.

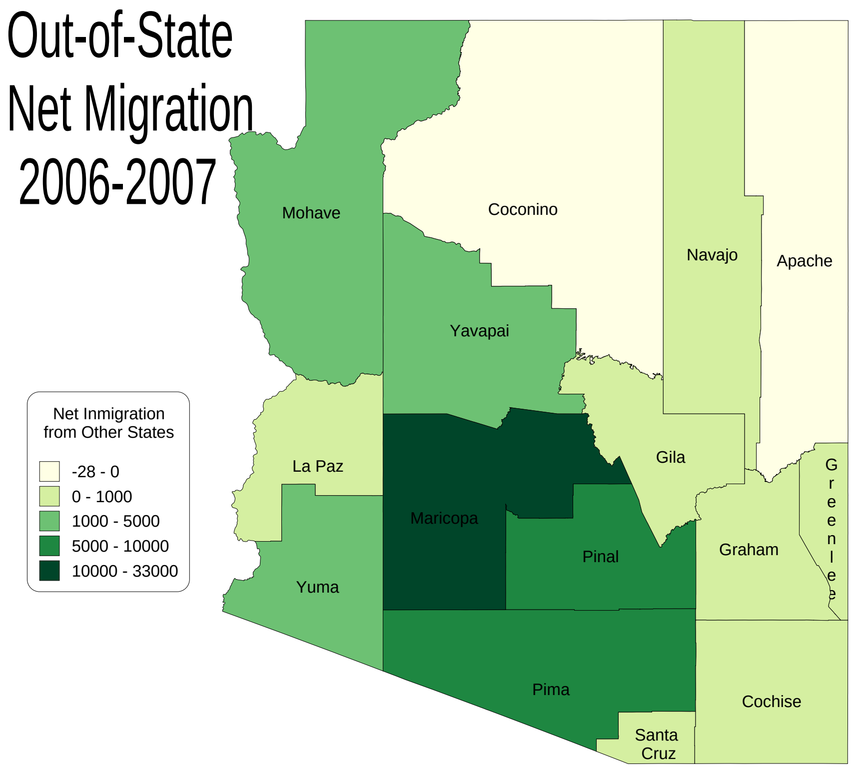
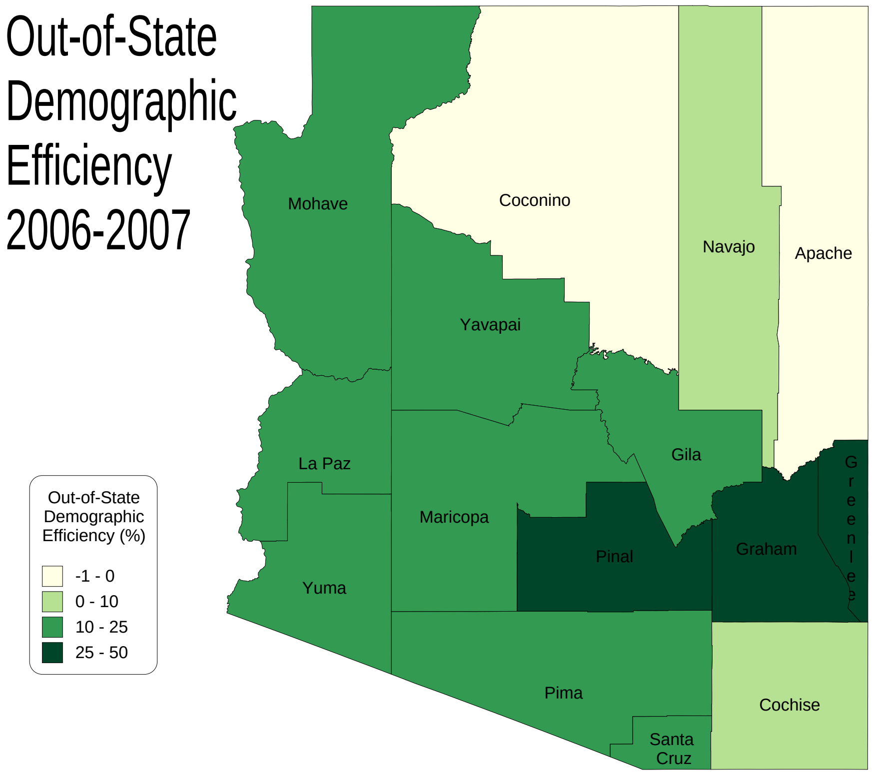


Figure 4. Demographic Efficiency of Out-of-State Inmigration.



3. Sources of Migrants by Outflow from Major Destination States

When we turn our attention to the sources rather than the destinations of migration to Arizona, we find another interesting pattern of movement. Based on county migration flows of at least 10 IRS tax returns, the Top 10 states in terms of sending the highest numbers of migrants to Arizona over this period are shown in Table 1. California was the largest sending state as almost 56,000 Californians relocated to Arizona. Texas was the second highest sending state with over 12,000 residents moving to Arizona. Illinois, New Mexico and Washington round out the top five sending states, with each sending over 8,000 residents during the year.

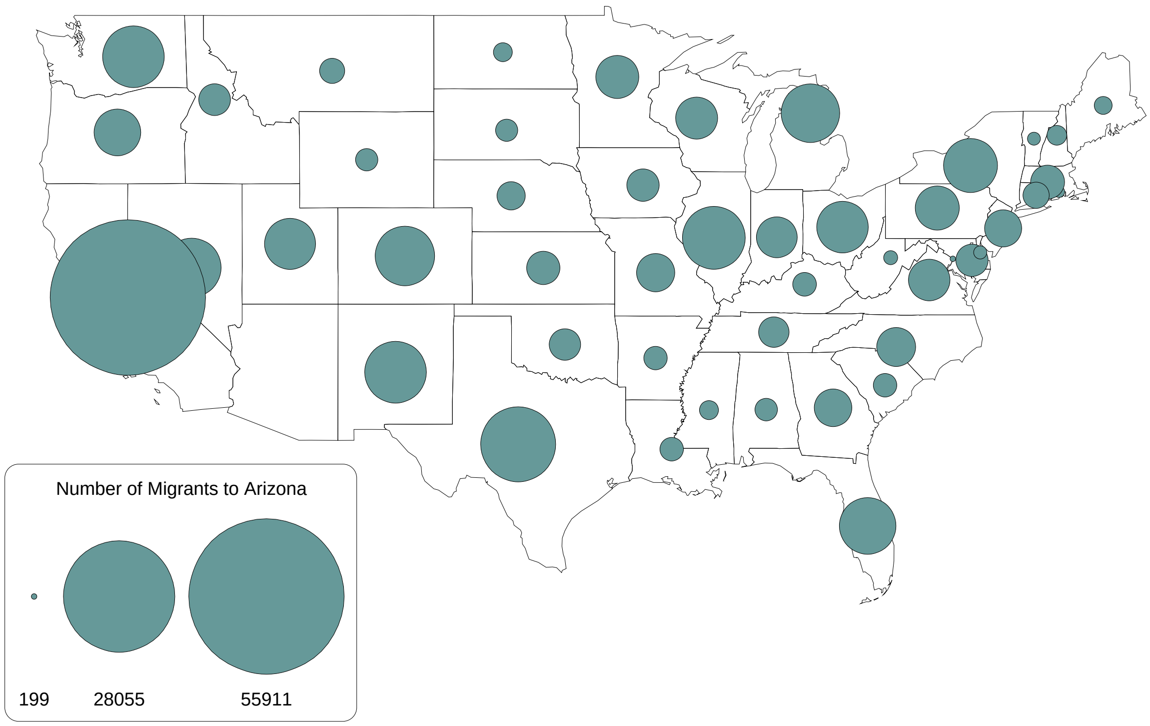
Table 1. Number of Inmigrants to Arizona Ranked by Top 10 Sending States.

California	55,911
Texas	12,178
Illinois	8,342
New Mexico	8,025
Washington	8,010
Colorado	7,420
Nevada	7,292
Michigan	7,172
Florida	6,674
New York	6,022

Source: Internal Revenue Service Statistics on Income State-to-State Migration 2006-2007.

Flows from all states are shown in Figure 5. We find significant magnitudes from additional North Central states such as Minnesota and Wisconsin in addition to several more populous east coast states. Despite similar or smaller sending-state populations, we see larger migration flows from the Northern plains and mountain states compared to northern New England and several Deep South states.

Figure 5. Arizona Inmigration by State of Origin.



3.1. Arizona Migration as a Percentage of Total State Outmigration

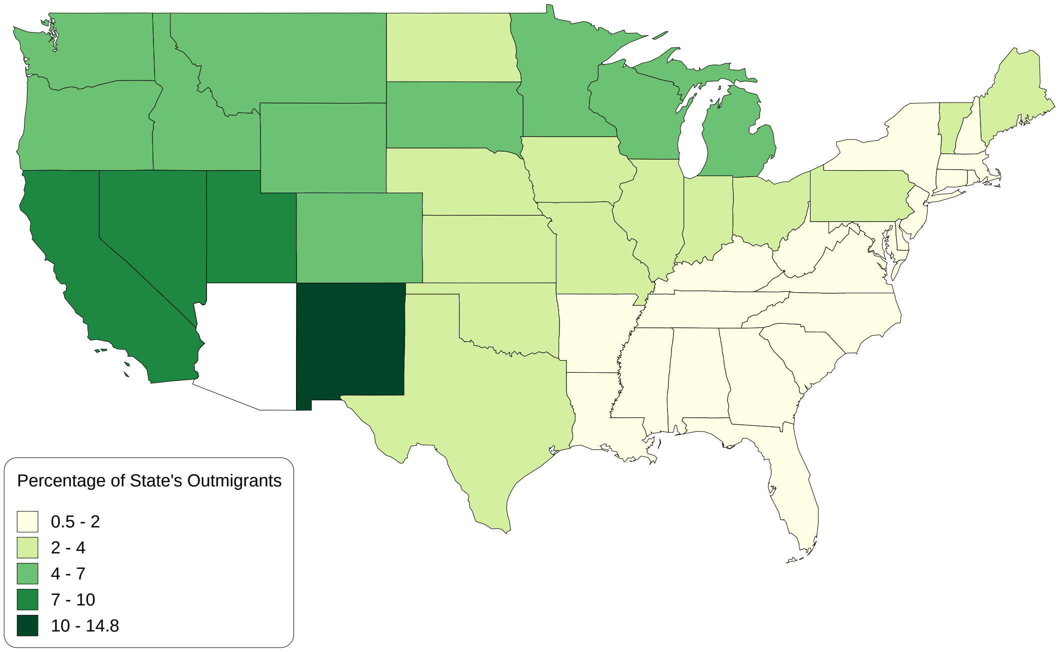
If viewed from a simple gravity formulation, none of the existing patterns is too surprising, i.e., higher levels of migration from nearby and more populous states. However, we can gain further insight by filtering the gross migration numbers through additional methods. First we consider the flow of migrants to Arizona as a percentage of all outmigrants from a state.

The results are shown in Figure 6. Since this standardization largely controls for population, we expect to see a major distance effect, which is evident on the map. However, the pattern is more complex than a simple distance effect. For the closest states, New Mexico has a much stronger link with Arizona, sending almost fifteen percent of outmigrants to Arizona, a full five percentage points higher than California. In the second grouping of states, seven to ten percent, the absence of Colorado and Texas, considerable migration magnets themselves, stands out. In the four to six percent bracket, the extension eastward to include South Dakota, Minnesota, Wisconsin, and Michigan captures what is most likely an amenity effect and historical migration link.

When one examines the lower percentages, the north/south split of the eastern U.S. is also fascinating. The exceptionally low percentages from the Deep South and Appalachian states and the mid-Atlantic and southern New England again capture weaker associations of those states' populations with Arizona or, if one prefers, arguably a stronger attachment to alternative migration destinations.

If we consider a simple association between distance from Arizona and the percentage of a state's migrants moving to Arizona, the effect of other factors can be further examined. A simple regression in logarithms with the percentage of migration to Arizona as the dependent variable and the distance between state population centroids as the independent variable explains about half of the migration

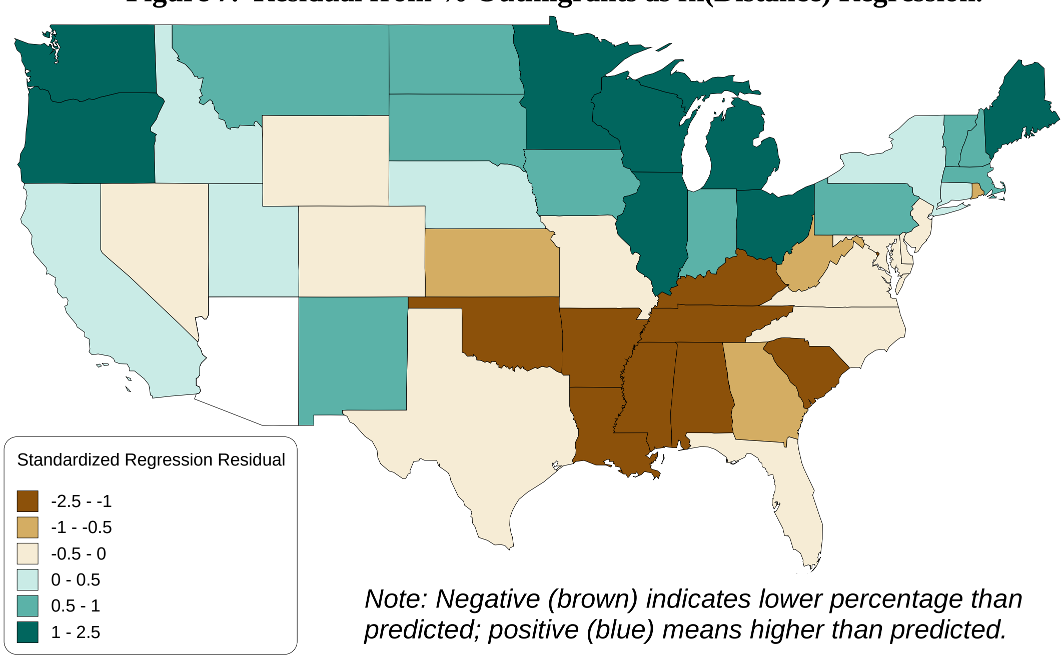
Figure 6. Percentage of State's Outmigrants Moving to Arizona.



percentage. The residuals from the regression yield insight into the more exceptional cases with relatively more or less attachment to Arizona as a destination.

The standardized residuals are mapped in Figure 7. The lighter shades capture those states with the least deviation from the predicted values of the distance regression. The darker positive shades indicate percentages greater than predicted based on the regression. Three clusters stand out in the most extreme category: Northwest, North Central, and extreme northern New England. In addition, several other northern states are under-predicted. The most extreme overprediction captures the Deep South, but also includes Tennessee, Kentucky, Arkansas, and Oklahoma, a region that spreads further north and west than might be expected.

Figure 7. Residual from % Outmigrants as fn(Distance) Regression.

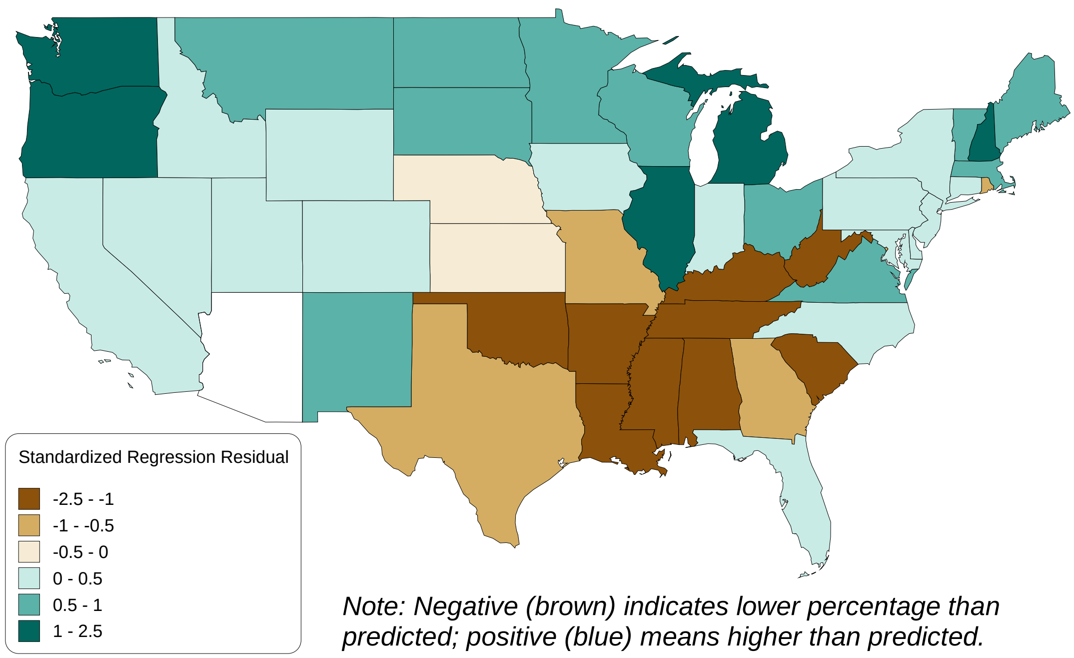


3.2. A State-to-State Gravity Model Perspective

Much the same pattern emerges if one addresses population differences in sending states by using a more formal gravity model formulation. A basic gravity formulation of $M_{ij} = k\frac{P_i P_j}{d_{ij}^{\beta}}$ is used for the model, where M_{ij} is the inmigration flow from the other state to Arizona, P_i is the other state's population, P_j is Arizona's population, d is the distance between the state population centroids, β is the distance decay parameter, and k is a constant. The natural logs of migration flow, distance, and populations were used to transform the model into a functional form suitable for OLS regression: $\ln(M_{ij}) = \alpha + \gamma_1 \ln(P_i) + \gamma_2 \ln(P_j) + \beta \ln(d_{ij}) + \varepsilon$. Since all flows are to a single place, the Arizona population term is incorporated into the constant, leaving two independent variables. Alaska and Hawaii were excluded from the regression. The model explains about ninety percent of the variation in migration flows and indicates a distance decay parameter point estimate of -1.18.

The residuals of the regression are shown in Figure 8. The North Central and northern New England clusters are not as pronounced, but one still sees the clear northern tier of underpredicted states. Among the overpredicted states, Texas and Missouri are now more prominent. Interestingly, Virginia and North Carolina are now underpredicted.

Figure 8. Residual from Gravity Model Regression.

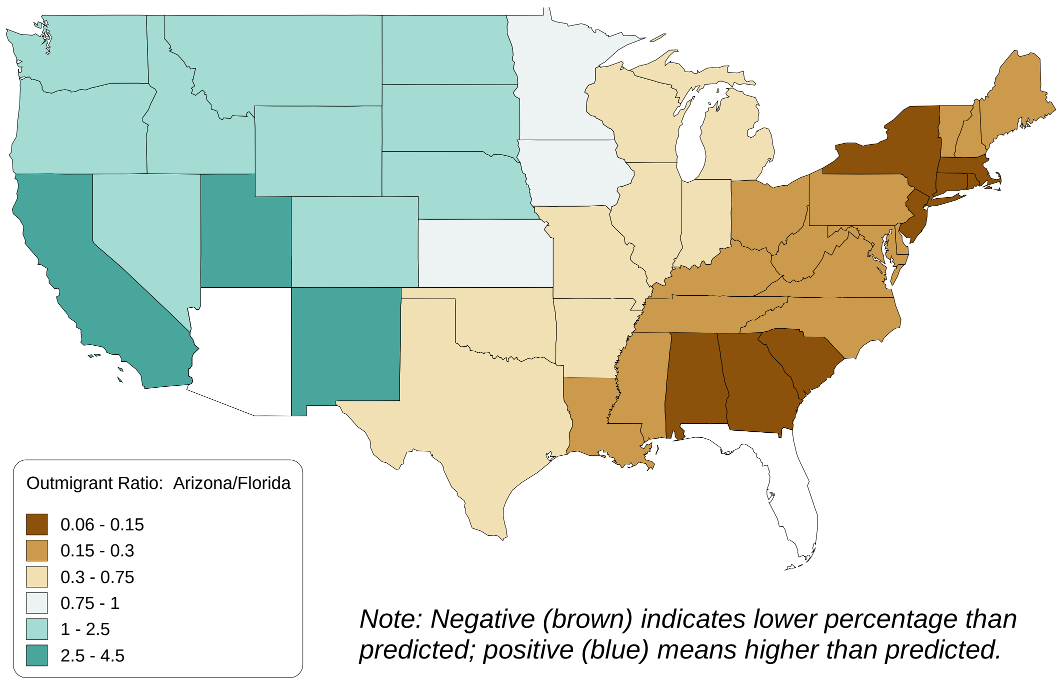


3.3. Arizona vs. Florida

These findings, especially those pertaining to the low levels of migration from southeastern states, invite speculation about the elderly migration split between Arizona and Florida. While other destinations are gaining in popularity, these two states remain the leading destinations for elderly migration. According to the most recent American Community Survey state-to-state estimates (2004-2005) for both gross and net inmigration, Florida had by far the most elderly inmigrants (68,160) followed by Arizona and Texas (27,140 and 26,640, respectively), but the *net* elderly inmigrant split was much closer, (18,630, 13,790, and 12,480 for Florida, Arizona, and Texas, respectively).

Focusing on the Arizona/Florida comparison, we can see a clear geographic split in Figure 9, which examines the ratio of elderly migrant flows to Arizona and Florida. Among Arizona's neighbors, it is interesting to note that Nevada and Colorado fall into the second grouping, between a 1 to 2.5 ratio of Arizona migration to Florida migration, rather than the higher group comprised of California, Utah, and New Mexico. The other western states send more migrants to Arizona than to Florida, as do the Dakotas and Nebraska. Kansas, Iowa, and Minnesota send more to Florida, but their ratio of Arizona to Florida migrants is between 0.75 and 1. Keeping in mind that Florida has a population about three times the size of Arizona's, which could justify a greater attraction to Florida, this range might be considered somewhat neutral between the states.

Figure 9. Ratio of Outmigrants to Arizona vs. Outmigrants to Florida.

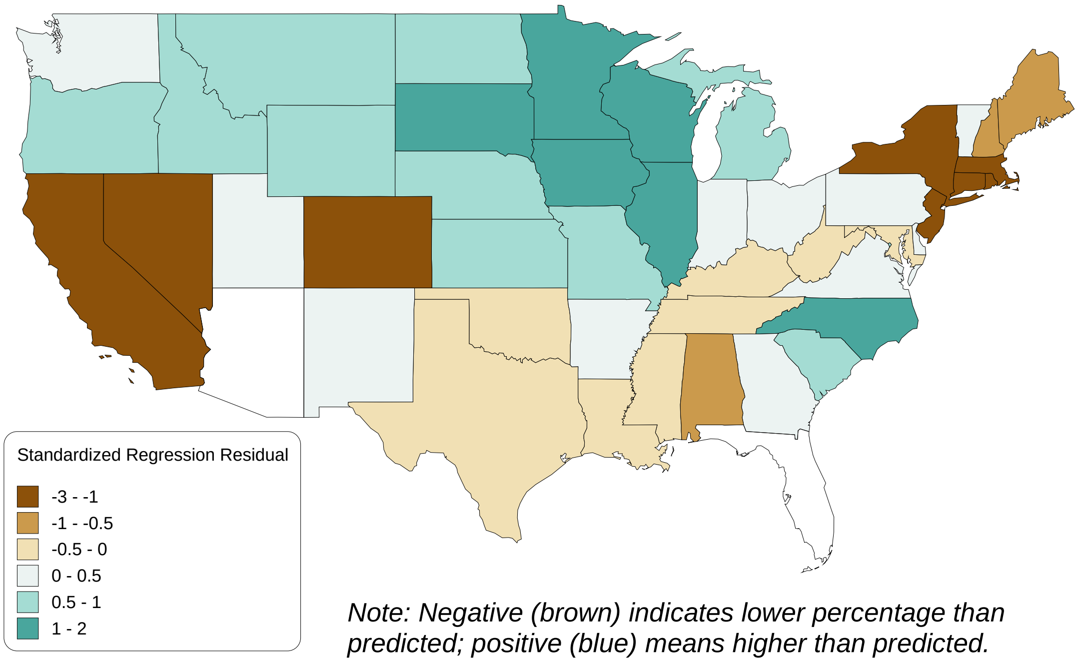


Among the other states, a couple of southwest to northeast diagonal groupings appear, with the Texas to Michigan corridor ratio of Arizona to Florida migrants being between 0.3 and 0.75, and states further east sending much higher numbers to Florida than Arizona. Within the eastern grouping, we see evidence of the strong ties between Florida and New York/New Jersey/southern New England.

We fit another simple regression to examine the relationship between the relative distances and the relative numbers of migrants to Arizona and Florida, with the migrant ratio (migrants to Arizona/migrants to Florida) as a function of the distance ratio (distance from state to Arizona/distance from state to Florida), with both variables transformed into logarithms to allow for a nonlinear relationship. About ninety percent of the variation was explained.

The residual pattern that emerged from this model was interesting. In addition to the expected cluster around New York, we also found that the ratios for California, Nevada, and Colorado all were seriously overpredicted by the model, i.e., less attraction to Arizona than the model would predict. We again find a north central cluster but also observe a Virginia/Carolinas grouping that exhibits a greater link to Arizona than the model predicted based on relative distance.

Figure 10. Residual of AZ/FL Migrant Ratio as fn(AZ/FL distance ratio).



3.3. Migration from Other States to Specific Arizona Counties

The state-to-state figures, while interesting, do not capture the different attractions that may apply to the various counties of Arizona, so migration from other states to the individual counties of Arizona was also examined, as summarized in the left-hand column of numbers in Table 2. These numbers are followed by additional columns that show the percentage of migrants arriving by particular states of origin. The final column in the table shows the percentages of county out-of-state inmigrants coming from the top eight sending states to Arizona. For example, in Apache County, over 90 percent of persons moving to the county originated in New Mexico, while 29.5 percent of movers to Maricopa County originated in California. However, it is important to remember that these percentages only provide partial information since detailed information on migration movements is suppressed in order to protect the identity of individual persons where outmigration flows were recorded in fewer than ten IRS returns. Therefore, the specific county-to-county outmigration flows that are available in the dataset only capture 79.5 percent of or 161,155 of the 202,737 of the total new migrants to the state. The percentage of migrants actually reported varies by county; and the reader is cautioned to note that in smaller sized counties (Gila, Graham, Greenlee, La Paz) where 100 percent of new migrants appear to have originated from a single state, we only are accounting for migration flows where there were sufficient numbers of IRS returns to disclose the information.

4. Migration from U.S. Counties to Arizona

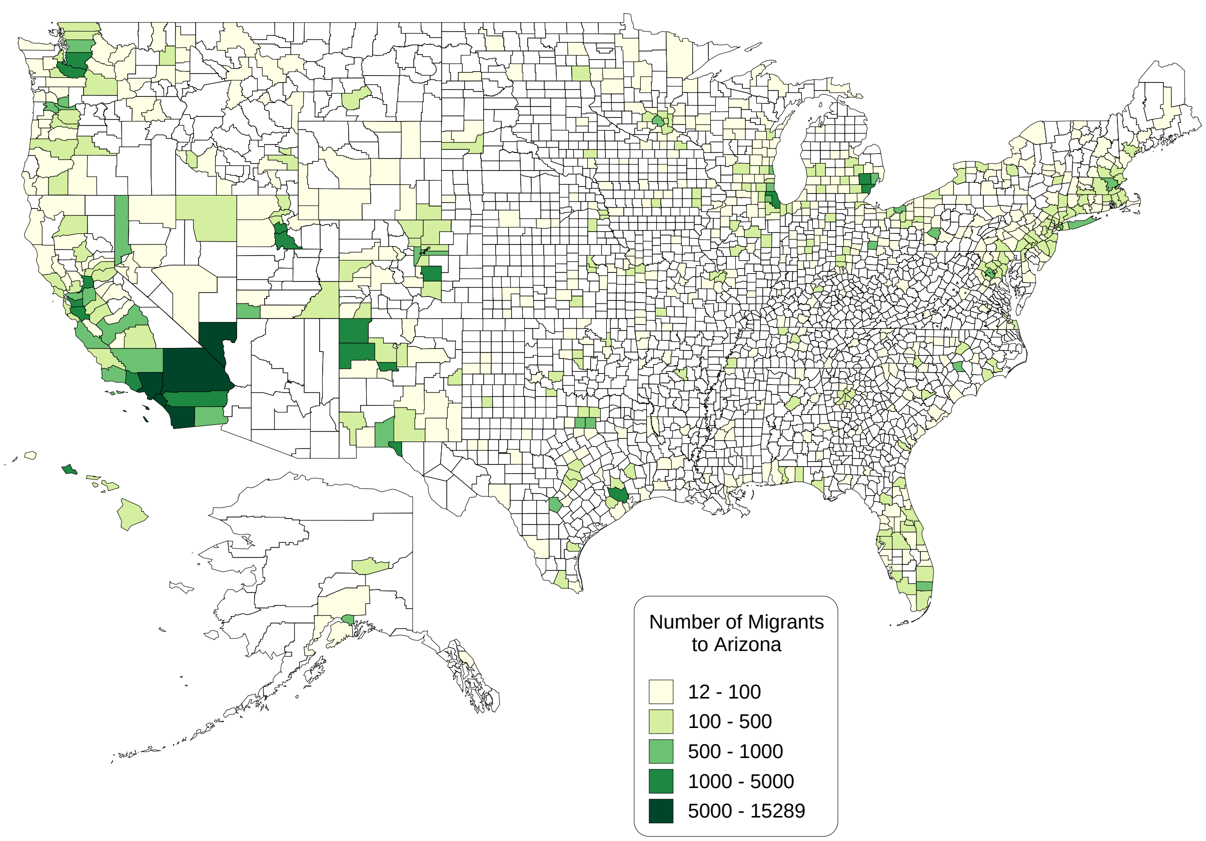
Examining the source counties of migration rather than source states provides another interesting perspective on migration to Arizona. Figure 11 shows the origins of migrants from all U.S. counties into Arizona. From the map, it is apparent that the largest number of persons moving into the state originated from locations in southern California as well as the Las Vegas region. Counties in northwest New Mexico also provided large numbers of new migrants along with the Chicago, Denver, Seattle and Houston areas. Other metropolitan areas are also evident upon closer inspection.

Table 2. Out-of-State Migration to AZ Counties By Primary Sending States (2006-7).

County	County-Specific Immigration	Percentage of County Out-of-State Inmigrants Coming From:				
		California	Nevada	New Mexico	Texas	Total From Top 8
Apache	2011	3.2	1.0	90.1		100.0
Cochise	2636	20.6	2.5	0.9	16.5	54.2
Coconino	1639	32.8	14.6	20.1	3.1	93.4
Gila	184	100.0				100.0
Graham	38			100.0		100.0
Greenlee	46			100.0		100.0
La Paz	188	100.0				100.0
Maricopa	110801	29.5	2.9	2.8	5.8	56.7
Mohave	6460	61.7	22.6	0.5	1.0	95.8
Navajo	874	27.8	8.1	49.8		100.0
Pima	20262	27.8	3.4	3.8	8.5	58.9
Pinal	7200	50.4	5.8	1.9	4.4	79.4
Santa Cruz	242	84.7	15.3			100.0
Yavapai	3985	62.7	8.3	1.4	2.0	86.0
Yuma	4589	70.8	3.1	0.4	5.3	88.8
State	161155	33.3	4.1	4.2	5.8	62.5

Source: Internal Revenue Service Statistics on Income County-to-County Migration 2006-2007.

Figure 11. Origin of Inmigrants to Arizona by County (2006-2007)



4.1. Urban Hierarchy Effects

While metropolitan origins stand out on the county migration map, the effect of migrants' situations within the urban hierarchy extends well beyond the metropolitan areas. Place within the urban hierarchy is a potentially important factor in migration decisions, and much recent literature has focused on migration flows between levels of the urban hierarchy. While numerous ways of defining the hierarchy exist, we use the Rural-Urban Continuum Codes (RUCC), also known as Beale Codes, developed by the Economic Research Service of the USDA. Table 3 provides a summary of the nine codes, which range from a top category of counties in metropolitan areas of one million or more people to a bottom category of completely rural or less than 2,500 urban population, not adjacent to a metropolitan area.

Table 3. Rural-Urban Continuum Code Descriptions.

2003 Rural-urban Continuum Code	Description
Metro Counties:	
1	metro area with 1 million population or more
2	metro area of 250,000 to 1 million population
3	metro area of fewer than 250,000 population
Nonmetro Counties:	
4	Urban population of 20,000 or more, adjacent to a metro area
5	Urban population of 20,000 or more, not adjacent to a metro area
6	Urban population of 2,500-19,999, adjacent to a metro area
7	Urban population of 2,500-19,999, not adjacent to a metro area
8	Completely rural or less than 2,500 urban population, adj. to metro area
9	Completely rural or less than 2,500 urban population, not adj. to metro area

Source: Economic Research Service, U.S. Department of Agriculture.

Migration to differing county types to Arizona counties is shown in Table A2, organized by the RUCC of the receiving county. In addition, the percentage migrating to each RUCC level is summarized for the group. As one would expect, inmigrants to the large metropolitan areas tend to migrate from other metropolitan areas, with almost two-thirds relocating from other large metropolitan areas and almost one-third from smaller metropolitan areas. None of the remaining five percent migrated from rural counties. Inmigrants to mid-sized metropolitan counties were even more likely to come from metropolitan counties in other states, with only three percent migrating from non-metropolitan counties, none of them rural. For these counties, two-thirds of inmigrants were actually moving to smaller metropolitan areas, while a quarter were moving within the same class of county.

Inmigrants to smaller metropolitan areas were likewise overwhelmingly coming from metropolitan origin counties. In this case, eighty-five percent of inmigrants were moving to smaller metropolitan areas. Similar to the situation in the larger counties, there was no reported migration from rural counties.

Inmigrants to urbanized counties adjacent to metro areas (RUCC 4) followed a pattern remarkably similar to the metropolitan destinations, with only four percent migrating from non-metropolitan areas. Even allowing for data suppression having a stronger effect on flows from smaller counties, the numbers suggest an attraction to Arizona beyond typical tendencies to move upward in the urban hierarchy.

Not until the RUCC 6 category (urban population of 2,500-19,999, adjacent to a metro area) do we observe a majority of inmigrants from non-metropolitan counties. For this group, a little less than half of inmigrants came from metropolitan counties, with a similar number from the largest non-metropolitan counties. Only two percent came from similar counties in other states while four percent migrated from smaller counties.

The location pattern percentages described for the groups are far from uniform, as shown in Table A3. For the two large metro area counties, for example, three-fourths of the Pinal County inmigrants moved from other large metropolitan areas, compared to the 62% of Maricopa County inmigrants from large metropolitan counties. About fifteen percent of the Maricopa inmigrants came from small metropolitan counties or smaller counties, while only four percent of Pima inmigrants came from that grouping. Among the three smaller metropolitan counties Yavapai County had a much higher percentage from larger counties. There is even greater variation among the counties in the larger non-metropolitan group adjacent to metropolitan areas (RUCC 6). While Gila and Santa Cruz Counties received all of their inmigrants from large metropolitan counties, and Mohave received almost all of its inmigrants from large and intermediate metropolitan counties, Navajo and Cochise Counties had a more dispersed distribution of inmigrants among origin counties.

5. Regression Modeling of Migration Influences

Regression modeling was employed in order to bring together spatial effects and the relative attractiveness of destinations of different sizes. Initially, a traditional gravity/spatial interaction model was fit. Distances were measured using highway miles, as provided between all pairs of U.S. counties by the Center for Transportation Analysis. The July 1, 2006, U.S. Census estimate of population for the Arizona and origin counties was used.

The basic gravity formulation of $M_{ij} = k\frac{P_i P_j}{d_{ij}^{\beta}}$ is used for the initial model, where M_{ij} is the inmigration flow from the out-of-state county to an Arizona county, P_i is the out-of-state county population, P_j is the Arizona county population, d is the distance between the counties, β is the distance decay parameter, and k is a constant. The natural logs of migration flow, distance, and populations were used to transform the model into a functional form suitable for OLS regression: $\ln(M_{ij}) = \alpha + \gamma_1\ln(P_i)+\gamma_2\ln(P_j)+\beta\ln(d_{ij})+ \varepsilon$. The initial model with origin and destination county population counties entered separately revealed very similar coefficients, so the product of the population was used in all of the models shown here. The number of observations was pared back to exclude the Alaska and Hawaii observations, for which distance data were not comparable, leaving 1,465 observations.

The basic model, using only population and distance, revealed highly significant coefficients on both variables in the expected directions (Table 4). The distance decay parameter, while negative, was only -0.8, revealing only a somewhat modest effect. The gravity model explained a bit more than half of the variation among the migration flows.

In order to investigate any possible effect of the urban hierarchy beyond that captured by population, two versions of RUCC differences between counties were used. In the first, the origin (out-of-state) RUCC was subtracted from the destination (Arizona) county RUCC, generating possible values from -8 (from a rural county to a large metro county) to 8 (the opposite movement). If movement tends to be up the urban hierarchy, we would expect negative coefficient values, although it is clear that much migration actually occurs between similar counties or adjacent types. To allow for the similarity effect, the absolute value was also used as an explanatory variable, with the expectation that larger absolute differences would generate smaller migration flows.

The results of the expanded regressions with the RUCC terms have population and distance decay parameters similar to the simple model. The RUCC coefficient in Model 2 is positive and significant, capturing the observed tendency to actually move down the urban hierarchy when moving to Arizona.

The absolute value coefficient in Model 3 has the expected sign and is statistically significant. However, both regressions provided only a slight gain in explanatory power over the simple model, with the absolute difference measure slightly superior.

An additional model was fit to allow for the effect of two traditionally important summary economic measures of economic vitality. The first economic variable is the difference in unemployment rate between the origin and destination counties (Arizona county minus out-of-state county). The unemployment rates for 2006 were obtained from the Bureau of Labor Statistics website. Differences in per capita income were also included. The per capita income data, also for 2006, were obtained from the Bureau of Economic Analysis' Regional Economic Information System website. Including the new variables entailed the loss of 18 observations.

Table 4. Regression Results for State Gravity Models.

Variable	Model 1: Basic Gravity Model		Model 2: Add RUCC Difference		Model 3: Add RUCC Difference Abs. Value		Model 4: Add Economic Variables	
Intercept	-5.50905		-5.45728		-4.11444		-4.31381	
	-15.41	***	*-15.26*	***	*-10.75*	***	*-10.84*	***
ln(Distance)	-0.8043		-0.79324		-0.83083		-0.8326	
	-27.78	***	*-27.11*	***	*-29.27*	***	*-29.1*	***
ln(Pop_iPop_j)	0.57226		0.56778		0.53302		0.54076	
	41.15	***	*40.54*	***	*37.37*	***	*36.83*	***
$RUCC_i$-$RUCC_j$			0.02155					
			2.44	**				
Abs. Value of					-0.11121		-0.10804	
$RUCC_i$-$RUCC_j$					*-8.83*	***	*-8.26*	***
$Unemp_i$-$Unemp_j$							0.01152	
							1.47	
PCI_i-PCI_j							-8.83E-07	
							-0.55	
F Value	954.22	***	640.3	***	695.67	***	418.98	***
R^2	0.5662		0.5680		0.5882		0.5925	
Adjusted R^2	0.5656		0.5671		0.5874		0.5911	
n	1465		1465		1465		1447	

*Note: Numbers in italics are t-statistics. *** Indicates 0.0001 significance; ** indicates 0.01 significance.*

The new model (Model 4 on Table 4) included the distance and population measures, the absolute RUCC measure, and both economic measures. The coefficients on the previously used variables changed little. The per capita income variable was negative, contrary to expectations as we would expect people to be more likely to migrate to counties with significantly higher per capita incomes (i.e., with higher values of destination minus origin per capita income). The unemployment variable coefficient was positive, also unexpected. Neither variable, however, was statistically significant. The percentage of explained variation was insignificantly increased through the addition of the economic variables.

A final set of regression models was run on the individual counties to see if they differed significantly in terms of population and distance effects. Given the small amount of explanation added through the RUCC and economic variables, we employed parsimonious models, involving only the destination county population and distance. All of the variables were kept in logs for the county estimations. We ran these models on only those counties with at least twenty reported flows from out-of-state locations.

The county estimation results, summarized in Table 5, revealed some interesting differences in coefficients. With the exception of the Cochise County model, which had a very poor fit and atypical parameter values, the county models seem reasonable, typically having significant coefficients for both independent variables. The distance decay parameters varied from about -0.75 to -1.14. The largest counties had lower distance decay coefficients, as expected given the presumed stronger appeal of larger urban areas. Maricopa County had the largest population coefficient, 0.87, and the next three most populous counties (Pima, Pinal, and Yavapai) had the next largest population coefficients. Several of the county models had R^2 values well in excess of 0.5, the highest being in Maricopa County, where almost eighty percent of the variation in migration flow magnitude is explained through a simple gravity specification.

Table 5. County-Specific Gravity Models.

		Coefficients			
	N	Intercept	ln(Distance)	ln(Pop_j)	R^2
Cochise	46	6.57	-0.26	-0.07	0.05
Coconino	30	6.10	-0.91	0.25	0.53
Maricopa	767	-0.30	-0.82	0.87	0.78
Mohave	50	5.70	-1.14	0.42	0.62
Pima	316	2.09	-0.75	0.56	0.61
Pinal	106	2.39	-0.75	0.50	0.63
Yavapai	62	3.11	-1.01	0.55	0.75
Yuma	49	8.06	-0.77	0.07	0.43

Conclusion

The domestic influx of new residents to Arizona has been a key contributor to the State's long-term growth. Arizona's low housing costs, widely available job opportunities, and a favorable quality of life are often cited as pull-factors among migrants moving to the state. Our study employs data for state and county migration patterns for movers from all counties across the United States to Arizona and its individual counties for use in descriptive analysis and a traditional basic gravity model regression-based analysis.

Descriptive analysis revealed interesting differences among Arizona's counties in terms of overall net migration and origin states. While distance effects were clear, maps of the residuals from regression models showed regional clusters indicating other factors affecting migration to Arizona. Comparisons of flows classified according to origin and destination urbanization showed that there is a tendency to actually move down the urban hierarchy when migrating to Arizona.

In the state-level gravity models, the coefficients for the distance and population variables were highly significant in the expected directions. Almost 56 percent of the variation among migration activity was explained by the basic model. ERS Rural-Urban Continuum Codes were added in two follow-up models as a means of analyzing the effects of individuals moving up and down the urban hierarchy. The positive value of the coefficient in Model 2 indicates a tendency for migrants to move down the urban hierarchy when moving to Arizona. The coefficients in both Model 2 and Model 3 were significant; however, the predictive power of both models was only slightly above the results in the initial model.

Model 4 added two traditionally important economic variables – the differences in unemployment rates as well as differences in per capita incomes in origin and destination counties. The sign on the per capita income variable was negative. This was unexpected since this would have indicated migrants are moving to areas with lower per capita incomes; however, neither of these two variables was significant in this model.

Finally, regression models using the population and distance variables were tested for each of the individual Arizona counties to ascertain whether these variables differed significantly across counties. With one exception, the results for the counties for both the population and distance variables were significant, and the distance decay coefficient was higher for the larger counties, which also was expected given the greater appeal of a larger metro region for many movers.

This study has produced some preliminary analysis of population movement into Arizona; however additional research is suggested in order to better capture prevailing trends over a longer period of time or a broader geographic region, and perhaps a comparison of similar movements for multiple jurisdictions across the nation. Introducing more formally defined amenities could also be useful for capturing some of the ‘residual’ patterns noted in the descriptive analysis.

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Appendix

Table A1. County Migration by In-State and Out-of-State Destination.

	Total				With Other States				Within State			
County	**Out**	**In**	**Net**	**Efficiency**	**Out**	**In**	**Net**	**Efficiency**	**Out**	**In**	**Net**	**Efficiency**
State	224,947	278,837	53,890	10.7	148,816	202,706	53,890	15.3	76,131	76,131	0	0.0
Apache	4,817	4,829	12	0.1	2,711	2,690	-21	-0.4	2,106	2,139	33	0.8
Cochise	8,521	8,495	-26	-0.2	6,023	6,355	332	2.7	2,498	2,140	-358	-7.7
Coconino	8,383	7,890	-493	-3.0	4,123	4,095	-28	-0.3	4,260	3,795	-465	-5.8
Gila	2,247	2,807	560	11.1	808	1,026	218	11.9	1,439	1,781	342	10.6
Graham	1,060	1,852	792	27.2	364	634	270	27.1	696	1,218	522	27.3
Greenlee	480	677	197	17.0	132	310	178	40.3	348	367	19	2.7
La Paz	911	953	42	2.3	519	671	152	12.8	392	282	-110	-16.3
Maricopa	122,333	140,371	18,038	6.9	86,900	119,417	32,517	15.8	35,433	20,954	-14,479	-25.7
Mohave	9,279	11,622	2,343	11.2	7,435	10,078	2,643	15.1	1,844	1,544	-300	-8.9
Navajo	5,207	6,098	891	7.9	2,089	2,194	105	2.5	3,118	3,904	786	11.2
Pima	29,493	35,012	5,519	8.6	20,776	26,652	5,876	12.4	8,717	8,360	-357	-2.1
Pinal	13,420	34,334	20,914	43.8	5,207	12,240	7,033	40.3	8,213	22,094	13,881	45.8
Santa Cruz	1,821	1,831	10	0.3	534	808	274	20.4	1,287	1,023	-264	-11.4
Yavapai	9,086	12,907	3,821	17.4	5,472	7,705	2,233	16.9	3,614	5,202	1,588	18.0
Yuma	7,904	9,190	1,286	7.5	5,738	7,862	2,124	15.6	2,166	1,328	-838	-24.0

Table A2. Migration by Sending and Receiving County Rural-Urban Codes.

	Receiving County Rural-Urban Continuum Code								
	1	2	3	4	5	6	7	8	9
RUCC1 Counties:									
Maricopa	69547	24217	10241	2860	2225	1067	628	0	16
Pinal	5509	1452	181	0	30	28	0	0	0
Totals	75056	25669	10422	2860	2255	1095	628	0	16
Group Percentage	63.6%	21.8%	8.8%	2.4%	1.9%	0.9%	0.5%	0.0%	0.0%
RUCC2 Counties:									
Pima	12675	5035	2028	149	193	120	62	0	0
Group Percentage	62.6%	24.8%	10.0%	0.7%	1.0%	0.6%	0.3%	0.0%	0.0%
RUCC3 Counties:									
Coconino	885	389	210	121	0	34	0	0	0
Yavapai	3074	728	149	20	0	14	0	0	0
Yuma	2429	1117	895	0	124	24	0	0	0
Totals	6388	2234	1254	141	124	72	0	0	0
Group Percentage	62.5%	21.9%	12.3%	1.4%	1.2%	0.7%	0.0%	0.0%	0.0%
RUCC4 Counties:									
Cochise	1096	1101	284	48	87	20	0	0	0
Gila	184	0	0	0	0	0	0	0	0
Mohave	5222	737	426	22	29	24	0	0	0
Navajo	314	119	169	234	0	0	38	0	0
Santa Cruz	242	0	0	0	0	0	0	0	0
Totals	7058	1957	879	304	116	44	38	0	0
Group Percentage	67.9%	18.8%	8.5%	2.9%	1.1%	0.4%	0.4%	0.0%	0.0%
RUCC6 Counties:									
Apache	86	113	652	1073	0	42	45	0	0
Graham	0	0	0	0	0	0	38	0	0
La Paz	188	0	0	0	0	0	0	0	0
Totals	274	113	652	1073	0	42	83	0	0
Group Percentage	12.2%	5.1%	29.1%	48.0%	0.0%	1.9%	3.7%	0.0%	0.0%
RUCC7 Counties:									
Greenlee	0	0	0	0	0	0	46	0	0
Group Percentage	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%

Table A3. Migration Percentages to Receiving County Rural-Urban Codes.

	County	*Receiving County Rural-Urban Continuum Code*								
County	RUCC	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
Apache	*6*	4.3	5.6	32.4	53.4	.	2.1	2.2	.	.
Cochise	*4*	41.6	41.8	10.8	1.8	3.3	0.8	.	.	.
Coconino	*3*	54.0	23.7	12.8	7.4	.	2.1	.	.	.
Gila	*4*	100.0	.	.	.	.	.	.	.	.
Graham	*6*	.	.	.	.	.	.	100.0	.	.
Greenlee	*7*	.	.	.	.	.	.	100.0	.	.
La Paz	*6*	100.0	.	.	.	.	.	.	.	.
Maricopa	*1*	62.8	21.9	9.2	2.6	2.0	1.0	0.6	.	0.0
Mohave	*4*	80.8	11.4	6.6	0.3	0.4	0.4	.	.	.
Navajo	*4*	35.0	13.3	18.8	26.1	.	.	4.2	.	.
Pima	*2*	62.4	24.8	10.0	0.7	1.0	0.6	0.3	.	.
Pinal	*1*	76.1	20.1	2.5	.	0.4	0.4	.	.	.
Santa Cruz	*4*	100.0	.	.	.	.	.	.	.	.
Yavapai	*3*	77.1	18.3	3.7	0.5	.	0.4	.	.	.
Yuma	*3*	52.9	24.3	19.5	.	2.7	0.5	.	.	.
State	*NA*	63.0	21.7	9.5	2.8	1.7	0.9	0.5	0.0	0.0