The Outmigration from Illinois Cities and the Impact it has on People Left Behind

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Abstract

The state of Illinois has had one of the highest rates of outbound migration in America. This paper evaluates the impact of out-migration on the communities these people leave behind, in particular the financial hub of Chicago and the small city of Bloomington. These cities are compared to the growth city of Phoenix, whose population has exploded in this decade and is one of the most popular destinations for those migrating out of Chicago and Bloomington. Human capital theory suggests that highly educated people with high wage potential are more likely to migrate than less educated people. This paper uses the American Community Survey Census database to test the hypothesis that communities with outbound migration (Chicago and Bloomington) face increases in poverty and lower levels of educational attainment on average than the cities with inbound migration (Phoenix). This hypothesis is explored through difference-in-difference and OLS regression analysis of poverty, education, and standard of living variables.

Introduction

Migrating in the United States is a difficult decision to make. There are many costs associated with moving and many risks as well. These costs are only amplified when considering the personal connections and networks left behind. On top of this are the psychic costs of leaving behind family, friends, and a home. Despite these costs, about 40 million Americans move at least once in a year (USA Today, 2018). These migrators are driven to leave their homes because of opportunity. While job opportunities are the biggest driver of migration, other variables, like better schooling or a better climate factor into decisions to migrate as well. No matter what one's reason for migration, it is a decision that greatly impacts one's earnings potential and quality of life.

The migration decision not only affects the individual but communities as well. Migration into a community is a sign of economic prosperity, as people moving in see it as a place of opportunity and growth. Out-migration often spells a loss of tax dollars for public services as well as a loss of highly skilled labor. Out-migration is becoming a problem in Illinois. According to the North American Moving Service (2019), Illinois has ranked in the top five states in the U.S. for the highest percentage of outbound migration since 2011. The state has been number one in this category several times over this period. As the Illinois population declines, so do its cities.

Bloomington, a small city in central Illinois, has faced population decline since 2013. Bloomington is home to a diverse blend of industries. The major employers in Bloomington include State Farm Insurance, one of the largest insurance providers in the United States, Country Financial Insurance and Financial Group, several hospitals, and two universities (Illinois State University and Illinois Wesleyan University). This industrial diversity is changing. For

example, Bloomington was formerly home to a major Mitsubishi Motors plant, which closed its doors in 2015. State Farm, the community's largest employer, has built several large regional hubs in Dallas, Atlanta, and Phoenix, and has stopped growing in the Bloomington community.

Chicago is the heart of Illinois commerce and by far the largest city in the state. It is an economically diverse city and is known as one of the biggest financial service hubs in the Midwest. Chicago also faces extreme poverty and violence on the city's south and west sides. While poverty and violence have decreased in recent years, it is still an issue within the city (Chicago Police Department, 2020). While Chicago has not faced the population decline that Bloomington has, it has not grown since 2010. While this financial hub remains one of the largest cities in America, the lack of growth is troubling.

Arizona's population has moved in the opposite direction from Illinois', as it has seen population growth since 2000 and particularly extensive growth within the last ten years. Just as Illinois has ranked among the top states for out-migration, Arizona has ranked among the top states for in-migration (North American Moving Survey, 2019). Phoenix, Arizona's capital and largest city, has also experienced a series of large growth years. It has a large manufacturing base, an aeronautical sector, and a growing financial services industry. As mentioned above, State Farm recently built a regional hub in Phoenix's suburb Tempe. This growth should result in economic prosperity in the region as money from new positions flows into the community, thereby creating more spending and more tax dollars.

The purpose of this paper is to understand how both net in- and out-migration impacts the economic circumstances of communities and the people who reside in them. This paper is a case study of how poverty and standard of living change in cities with stagnant and negative population growth compared to cities experiencing rapid population growth. It is important to

note that this case study does not examine individuals moving to or from these places, but rather the people who are currently residing in them. The goal is not to examine the impact of moving on individuals, but rather the impact on the communities that experience population change. This paper will compare Phoenix, a high population growth metropolitan area, to Chicago, a city that has suffered from stagnant growth for several decades, and Bloomington, a city of population decline (U.S. Census Bureau, 2020).

Literature Review

Migration is an investment in human capital, which consists of the skills, knowledge, and experience possessed by individuals that increases their economic capabilities (Gabriel et. al, 1995). Migrants often move to locations in which their skills and knowledge can be leveraged better. Since the migrant's human capital can be better utilized in the new destination area, the migrant's wages will likely be higher.

There are several characteristics that are commonly found in migrants, as it is more likely that those who possess these traits will gain human capital by moving. Age is an important characteristic of the migration decision. Older people, as they approach retirement, are less likely to move for work as they have little time remaining to earn wages, and therefore have less to gain from moving. They also lose firm and job-specific human capital when they move. However, they have other reasons to move. Many older people have an easier time in warmer climates than in the northern regions of the country, which encourages many of them to move south as they approach retirement. Migration is only possible if they have the means. If people desire to move to a warmer climate but cannot afford the costs of the move, they will be forced to remain in the colder climates. Thus, older individuals who are poor and likely less educated are more likely to be left behind.

Young people are incredibly mobile. For the most part, they are single individuals with few family restrictions like marriage and children preventing them from moving. This means that there are very few "anchors" preventing them from migrating (Orchard 2019). Workers are likely to go where their human capital can be better utilized and therefore, their lifetime wages are higher. When one's earnings potential is higher in a different location, the earlier in one's career the move is, the more profitable the move is for the individual, as the individual can capitalize on the difference in earnings for more years (Greenwood 1975). An expanding city like Phoenix with a growing white-collar sector will attract many young professionals.

Higher education levels are another characteristic common in people who migrate (Greenwood 1975). Those with higher education levels are more likely to have higher wages. As a result of this, their expected wages are likely higher in areas where high-skill jobs are increasing rapidly, resulting in a higher likelihood that the benefits of moving from low-growth areas will outweigh the costs. The highly educated also have higher levels of human capital and are therefore often harder to replace than individuals with less education. Since these workers are highly valuable to their employers, firms are more likely to transfer these highly skilled individuals to different locations as firms leave communities. People with higher levels of education are also more likely to be better informed about their migration decision. They are often more likely to have connections to different areas of the country than those with lower levels of education (Greenwood 1975). The loss of highly educated individuals results in a "brain drain" effect in communities with population decline. These communities lose out on their investments in the education of the constituents who leave. Communities often pay for the education of individuals, but if these same people move out of the community, the tax dollars migrate out of the communities as well (Greenwood 1975).

Gabriel and Schmitz (1995) investigated the idea that those who migrate are not randomly selected but rather positively selected for migration. This study reviewed young white males and investigated whether those who migrated had higher earnings than those who did not. Their findings agreed with their hypothesis that these individuals are positively selected for migration and that those that move are likely to be individuals with more economic strength. Borjas, et al., (1992) tested a similar hypothesis that individuals are more likely to move when their skills are not rewarded adequately in their original location. Thus, individuals who find a "comparative advantage" in other areas are likely to migrate (Borjas 1992). This paper looks to add to these previous works by evaluating the differences of specific locations of growth (Phoenix) and the locations of decline (Bloomington and Chicago) instead of evaluating individual incentives to move.

Theory: Human Capital

Human capital, as previously mentioned, is the skills, knowledge, and experience possessed by individuals which increase their economic capabilities, and it is an important concept in this research. It is the gains to individuals' human capital which are so vital to communities. Individuals with more human capital often command higher wages and thus generate more tax dollars. Human capital is often gained through school or training, but also from work experience. As an individual continues their career, their human capital usually becomes increasingly specific, and therefore less transferrable. Individuals that spend much time working at firms in specific positions will not be able to transfer all the skills they have accumulated to different positions in different firms (Rosen 2008). Firms and communities invest heavily in cultivating and maintaining these highly skilled workers (Greenwood 1975). All levels of government often subsidize higher education and training in the hope that these individuals

will earn more money and thus generate more tax dollars. However, if these people then take this education and income out of the community, the tax dollar benefit is never seen within the community.

Another element of human capital that is important to migration and employment is signaling. Signaling is the idea that individuals demonstrate their worth to potential employers by signals in their background. An example of this is someone completing a bachelor's degree. Not only does this accomplishment signal to employers that these individuals are knowledgeable in their field of study, but that they are also trainable and capable of completing challenging tasks. Signaling, however, can also be negative; if people remain unemployed for an extended period, this can be a signal to employers that they may not be fit to work at their firm (Rosen, 2008). This aspect of signaling is a risk of migration. When one migrates and enters a community looking for work, the time to find work is limited. The longer they look for work, the less likely it is that they will find a position that matches their earnings potential.

Theory: Migration Decision

The reasoning and equations below formalize the thinking individuals go through when deciding to migrate. They examine their opportunities at each location and then base their migration decision on these opportunities. Different individuals with different varieties and amount of human capital will have different opportunities at each location that affect their choice to move or stay. By considering these variables, we can begin to hypothesize what types of individuals migrate from a city and what impact this has on the city.

Borjas (2020) explains that different economic conditions and opportunities are the primary cause of migration. The migration decision equation he uses is represented in Equations 1 and 2. Equation 1 defines the present value of the individual's lifelong earnings in each

location, year by year. The wage in one year is divided by one plus the discount rate put to the power of the year. This calculation puts the wage into present value terms. These individual yearly wages are summed to get the present value of lifelong wages in that individual's location. $PVwage_m$ represents the present value of anticipated wages for the potential migrants in the new location if they move. $PVwage_s$ represents the present value of the anticipated wages for the potential migrants in the home community if they choose not to move.

Equation 1

Present Value of Wages of Migration

$$\boldsymbol{PVwage_m = \sum_{t=1}^{n} \frac{W_m}{(1+r)^t}}$$

Present Value of Wages of No Migration

$$\boldsymbol{PVwage_s = \sum_{t=1}^{n} \frac{W_s}{(1+r)^t}}$$

The net gain to migration is the present value of leaving, minus the present value of staying, minus the migration costs, C (Equation 2). If the net gain to migration is greater than zero, the individual migrates. If it is equal to zero, the individual is indifferent to migration. If it is less than zero, the individual remains in their current location. Note that migration costs, C, are not discounted because they are in this theory assumed to be incurred at the time of migration.

Equation 2

$$\boldsymbol{Net\ Gain\ to\ Migration = PVwage_m - PVwage_S - C}$$

If the net gain of migration is zero, then one is indifferent to moving. From this starting point of zero net gain, if the wage in the migratory location $PVwage_m$ increases, or the wage in the current location $PVwage_s$ or the cost of moving, C, decreases, individuals will decide they are

better off migrating than staying put. On the other hand, if $PVwage_s$ decreases or $PVwage_s$ increases or C increases, individuals would decide to stay in their current location.

Borjas's equation makes an important connection between wage and the cost of movement, in that the individual must formulate whether moving will have an economic benefit before migrating. However, financial variables are not the only factors that have a bearing on an individual's decision to move. There are many other variables one must consider when migrating, such as children changing schools, moving away from family or friends, or moving into a more agreeable climate. These aspects all have an impact on one's decision to migrate.

These variables have financial values associated with them that are different for each individual (Greenwood 1975). These values can be either positive or negative, depending on whether these variables are a net benefit or a net cost to migration. One way of thinking about these variables is to ask the question, "How much more money would I need to move or stay because of this variable?" For example, moving children to a different school may have a higher nonpecuniary benefit/cost associated with it for a family with young children versus a family with children in high school, or moving to a warmer climate may be seen as a positive for some and a detriment to others. The monetized present value of these non-wage benefits/costs of migration can be represented as follows:

Equation 3

Present Value of Non-wage Benefits of Migration

$$\boldsymbol{PVother_m = \sum_{t=1}^{n} \frac{Other_m}{(1+r)^t}}$$

Present Value of Non-wage Benefits of not Migrating

$$\boldsymbol{PVother_s = \sum_{t=1}^{n} \frac{Other_s}{(1+r)^t}}$$

where, $PVother_m$ represents the non-wage benefits/costs that come from migration, and $PVother_s$ represents the benefits/costs that the potential migrant realizes by not migrating. The Borjas theory in Equations 1 and 2 is easily extended to account for these other non-wage benefits/costs of migration in Equation 4.

Equation 4

$$\boldsymbol{Net\ Gain\ to\ Migration = (PVwage_m + PVother_m) - (PVwage_S + PVother_s) - C}$$

As before, migration will occur if the net gain of migration is positive and will not occur if the net gain to migration is negative. The benefit of this broader interpretation of migration is that it allows for consideration of important non-wage determinants of migration. Much like in Borjas' equation, Equation 4 looks at the lifetime earnings in both locations but also considers the other values as well. The other variables, PVother, are added to the wages for each year. The cost of moving is subtracted from the net benefit of migrating. As the cost of moving is a one time and current expense, it is already in its present value.

Hypothesis

My hypothesis is that poverty in Bloomington and Chicago will increase relative to Phoenix as a result of migration. Also, I hypothesize that education and standard of living levels will decrease relative to Phoenix as a result of migration. These relative changes are caused by the migration out of Bloomington and Chicago and the migration to areas like Phoenix. The people who are likely to be moving out of Bloomington and Chicago and towards a booming southern city like Phoenix are likely to be the young and the highly educated. Older people approaching or entering retirement have a propensity to move as well. Bloomington, since it faces a proportionally larger population decrease, is likely to be worse off than Chicago compared to Phoenix.

As Phoenix has been growing larger, the number of job openings is likely increasing. As argued earlier, highly educated individuals are most likely to move into the region. While opportunities may be offered to low skill workers as well, the differences between wages in their current location and where they are considering migrating will likely not be substantial enough to make moving worth it, after considering all the costs of moving and their limited resources. Thus, it is likely that low-skilled workers with low incomes will be less likely to move than high skilled workers.

These groups of highly educated young workers, as well as wealthier retirees, are likely to be relatively well off at the time of migration. As these people leave the community, they are leaving behind the poor and uneducated. As Bloomington and Chicago decline in population, it is likely that the poor and uneducated people will remain in these cities. Since the wages of these less educated people are generally lower than the wages of the highly educated workers, location-based differences in wages are lower for less-educated workers, and thus the potential benefit of moving is not enough to surpass the costs of moving across the country. Also, poor people are often less informed about potential positions, and often have less of an understanding of the job market in other locations. Impoverished families are often larger and include extended families under one roof. This situation makes moving costlier, as more people would have to not only physically move their possessions to a new location, but also find work in their new location as well. For these reasons, wealthier, more highly educated individuals are more likely to migrate. Therefore, it is hypothesized that poverty in Bloomington and Chicago will increase relative to Phoenix as a result of migration. In addition, I hypothesize that education and standard of living levels will decrease relatively compared to Phoenix as a result of migration.

Explanation of Standard of Living Index, Poverty Rate, and ALICE Rate

The measures of community well-being analyzed in this paper are: Standard of Living index, the poverty rate, and the ALICE rate. These variables are described briefly in this section.

The Standard of Living Index variable takes the total family income and divides it by the poverty line for a family of that size. For example, if a family of two adults and a child has a total income of $60,000 and the poverty line for a family of this size was $20,780, the Standard of Living Index would divide $60,000 by $20,780 to get 2.89. This is then multiplied by 100 to get this family's Standard of Living Index score of 289. The scores are capped at five times the poverty line, so all families that are wealthy enough to exceed five times the poverty line receive a score of 501. The poverty rate is defined as the percent of individuals in the sample who fall below the poverty line. A person is classified as poor if they have a Standard of Living Index score of less than or equal to 100.

Asset limited, income constrained, employed (ALICE) is a concept created by "The United Way of America Organization" to describe those individuals who are not below the poverty line but are still living from paycheck to paycheck. The ALICE line is an important concept in this study because it includes a group of people that are likely struggling but are not included under the absolute poverty line. The ALICE line is calculated as the minimum amount of money a household would have to make to achieve a minimum survival budget with little to no savings. These items include housing, childcare (if children are part of the family), food, transportation, healthcare, technology, taxes, and miscellaneous expenses. The ALICE line changes not only for family size but also based on the cost of living where the household resides.

In McLean County, where Bloomington is located, it is estimated that a single adult must have an income of $19,980 to be above the ALICE line, while a family of four (two parents, one

preschooler, one infant) would need to have an income of around $62,884 in order to pay for all of their expenses. The ALICE income levels are roughly 2.5 times the poverty line levels of income. These numbers do not include household savings. Note that the cities of Bloomington and Normal have two of the highest percentages of individuals below the ALICE line in McLean county at 37 and 42 percent respectively in 2017 (New Jersey United Way, 2019).

The United Way only provides ALICE statistics for single people and families of four. This study also uses the Standard of Living index to define ALICE, using a similar method as was used to define the poverty rate. A family is in poverty if it receives a score lower than or equal to 100. The ALICE line for Bloomington is a Standard of Living Index of 250 ($62,884 divided by poverty line for a family of four of $25,100, multiplied by 100). The ALICE line of 250 was used for all cities in the study.

Methodology

Testing this hypothesis will be undertaken through two methods. The first will be difference-in-difference testing with descriptive statistics, and the second method will be testing using a multivariate equation and interaction variables. The data source used for this study is the American Community Survey (ACS), which is accessed through the University of Minnesota's IPUMS site (Ruggles, et al., 2020). This study extracts data from the ACS for two time periods and three metropolitan areas: Bloomington, Chicago, and Phoenix. This study uses two time periods: the year 2000 and the period of 2016-18. The years (2016-18) will be pooled, as only a one percent sample is available each year during this time. A five percent Census sample is available for the year 2000, which means no pooling is necessary.

Difference-in-difference testing compares how statistics in two cities change over time. Bloomington and Chicago are never directly compared to each other. Each table below contains

either Chicago or Bloomington and compares that city to Phoenix. The difference-in-difference analysis is a three-step process. The first step is finding values of a specific performance measure (e.g., poverty rate) for each location. This process is done in both the 2000 and 2016-18 time periods. The second step is calculating the difference in this specific performance measure for the two time periods. This is done for both the city of population decline (Chicago or Bloomington) and the city of population growth (Phoenix). The third step calculates the difference-in-difference result by subtracting the difference in the city of population decline (Bloomington or Chicago) by the difference in the city of population growth (Phoenix). This difference-in-difference result shows the relative change in the performance measure between 2000 and 2016-18 in Bloomington or Chicago as compared to Phoenix.

The two time periods in this difference-in-difference testing will coincide with the changes in population. The first period, the year 2000, is before the population in Chicago and Bloomington had started to decline. The second period, 2016-18, is the most recent available time period and is after several years of population decline in Bloomington and Chicago. The percentage of households below the poverty and ALICE lines will be tested in this manner. It is expected that the poverty situation in Chicago and Bloomington will deteriorate relative to Phoenix. Changes in educational attainment in Chicago and Bloomington will also be compared to changes in educational attainment in Phoenix. It is expected that educational attainment has deteriorated faster in Chicago and Bloomington relative to Phoenix.

The next section of the research will use Ordinary Least Squares (OLS) regression testing and interaction variables to determine the impact of living in Chicago and Bloomington as compared to Phoenix. The dependent variables being investigated in this section are the poverty ratio and Standard of Living index that was previously explained in the ALICE section. Each

model contains a sample from one (but not both) declining growth city (Bloomington or Chicago). In essence, an OLS regression model creates a linear equation to estimate how much the dependent variable is affected by changes in the independent or control variables.

The focus of each of these regression equations is the interaction variable because it tells a similar story to the difference-in-difference statistics stated above. A dummy variable for place (e.g., Chicago) is interacted with a dummy variable for the most recent time period (i.e., 2016-18) to see if the place (Chicago) is losing ground over the time period to Phoenix. The comparison group for the years is 2000, and the comparison group for location is Phoenix. The coefficient of this interaction variable is the difference-in-difference estimation. The difference-in-difference is what is used to test the hypothesis that Bloomington and Chicago have made statistical losses relative to Phoenix. This equation will be run for two dependent variables: poverty rate and the Standard of Living index (γ_i). The independent variables remain the same for all regressions and are stated in these equations:

Equation 5: Bloomington Versus Phoenix Regression

$$\gamma_i = \beta_0 + \beta_1 Bloomington + \beta_2(2016-18) + \beta_3(Bloomington * 2016-18) + \beta_4 Black + \beta_5 Asian + \beta_6 Hispanic + \beta_7 Female + \beta_8 Married + \beta_9 Female * Married + \beta_{10} High\ School\ Graduate + \beta_{11} Some\ College + \beta_{12} Bachelors\ Degree + \beta_{13} Masters\ Program + \beta_{14} Age + \beta_{15} Age^2 + \mu_i$$

Equation 6: Chicago Versus Phoenix Regression

$$\gamma_i = \beta_0 + \beta_1 Chicago + \beta_2(2016-18) + \beta_3(Chicago * 2016-18) + \beta_4 Black + \beta_5 Asian + \beta_6 Hispanic + \beta_7 Female + \beta_8 Married + \beta_9 Female * Married + \beta_{10} High\ School\ Graduate + \beta_{11} Some\ College + \beta_{12} Bachelors\ Degree + \beta_{13} Masters\ Program + \beta_{14} Age + \beta_{15} Age^2 + \mu_i$$

Equation 5 is the regression model that is run for the sample from the Bloomington and Phoenix metropolitan areas. Equation 6 is the model that is run for the sample from the Chicago and

Phoenix metropolitan areas. The sample was restricted to working-age adults who were no longer in school, as the large student population in the Bloomington area often alters poverty results in ways that do not represent the permanent community correctly. The table below shows the variables in the regression with a description of each variable.

Table 1: Variable Definitions

Variable	Description
Dep. Variables	
Std_of_Lvg	Index equal to 100*(Family Income/Poverty level income)
Poverty	Dummy variable indicating individual in family is below the poverty level of income
ALICE	Dummy variable indicating individual in family is below the ALICE level of income
Ind. Variables	
Bloomington	Dummy variable indicating Individual lives in Bloomington
Year2016-18	Dummy variable indicating years 2016-18
BL2016INT	Interaction between Bloomington and the years 2016-18
Black	Dummy variable indicating Black Race
Asian	Dummy variable indicating Asian Race
Hispanic	Dummy variable indicating Hispanic heritage
Female	Dummy variable indicating Individual of female gender
Married	Dummy variable indicating Individual that is married
Fem_Married	Interaction between Female and Married
HS_Grad	Dummy variable indicating Individual that completed High school only
Some_Col	Dummy variable indicating Individual completed some college
Col_Grad	Dummy variable indicating Individual with a bachelor's degree
Masters	Dummy variable indicating Individual with at least some higher education beyond bachelor's degree
Age	Age of individual
Age_Squared	Age Squared

Results: Difference-in-Difference Summary Statistics

The ten tables below show the Bloomington, Chicago, and Phoenix summary statistic difference-in-difference results. As stated before, the categories of the table include the percentage of individuals below the poverty line, percentage of individuals below the ALICE line, the average Standard of Living index, as well as education variables. The education categories used were the following: individuals who did not complete high school, individuals

with a high school degree, individuals with some college experience, individuals with a bachelor's degree, and individuals who have had college beyond a bachelor's degree. For the purpose of conciseness, only the percentage with no high school diploma and those with a bachelor's degree will be displayed, but the other tables will be displayed in Appendix one. According to the theory discussed above, we expect to see negative difference-in-difference results for poverty rates, ALICE rates, and high school dropout rates, and positive difference-in-difference results for Standard of Living index and college graduation rates.

Table 2: Difference-in-Difference for Percent of Individuals below the Poverty Line in Bloomington and Phoenix

	Year(s)		
City	**2000**	**2016-18**	**Difference**
Bloomington	4.6%	7.9%	-3.3%
Phoenix	10.4%	11.0%	-0.6%
Difference-in-Differences			**-2.7%**
Significance (P-Value)			(.000)

In Table 2, the first row of figures displays the percentage of the population that is below the poverty line in Bloomington for 2000 and 2016-18, as well as the difference in the 2000 and 2016-18 poverty rates. Similarly, the second row of figures displays the percent of the population that is below the poverty line in Phoenix for 2000 and 2016-18, as well as the difference in the 2000 and 2016-18 poverty rates. The differences are calculated by subtracting the 2016-18 poverty rate from the 2000 poverty rate. The difference-in-difference row displays the difference between the difference calculated in the Bloomington and Phoenix rows above. The p-value for the difference-in-difference result is stated in the last row. Tables 3-11 are displayed in the same manner.

The significance of the difference-in-difference result is determined from a simple regression. The formula for this regression is:

$$\gamma_i = \beta_0 + \beta_1 Bloomington + \beta_2(2016 - 18) + \beta_3(Bloomington * 2016 - 18).$$

The dependent variable is a dichotomous variable that indicates if the individual is poor. The difference-in-difference coefficient is β_3, which is the interaction term between Bloomington and the time-period 2016-18. The p-value in table 2 indicates the probability that the difference-in-difference is equal to zero. For this research, a p-value of less than .05 indicates a statistically significant difference-in-difference result. Therefore, the p-value of .000 in Table 2 indicates a statistically significant difference-in-difference. The p-values in Tables 3-11 also present p-values that are presented in this manner.

Table 2 shows how poverty rates in Bloomington and Phoenix have changed since 2000. Bloomington has a lower percentage of individuals in poverty in both time periods. Bloomington and Phoenix increased the percentage of individuals in poverty, but Phoenix only increased by 0.6 percent and Bloomington increased by 3.3 percent. The difference between these numbers is the –2.7 percentage point difference in the difference-in-difference row. This percentage point difference is quite large considering that they are percentage point changes rather than percent changes. This result supports the hypothesis that Phoenix has improved its poverty situation over this time period compared to Bloomington.

Table 3: Difference-in-Difference for Percent of Individuals below the Poverty Line in Chicago and Phoenix			
	Year(s)		
City	**2000**	**2016-18**	**Difference**
Chicago	8.2%	8.70%	-0.5%
Phoenix	10.4%	11.0%	-0.6%
Difference-in-Differences			**0.1%**
Significance (P-Value)			(.830)

Table 3 compares poverty rates in Chicago and Phoenix. Both locations saw small increases in poverty of less than one percent. Chicago's poverty rate increase is a little less than Phoenix's, as seen in the meager .1 percentage point difference-in-difference. This difference-in-difference result is not statistically significant according to the p-value. The results do not support our hypothesis of a negative difference-in-difference because the difference-in-difference result is not significantly different from zero.

Table 4: Difference-in-Difference for Percent of Individuals below the ALICE Line in Bloomington and Phoenix			
	Year(s)		
City	**2000**	**2016-18**	**Difference**
Bloomington	21.30%	25.40%	-4.10%
Phoenix	34.20%	33.00%	1.20%
Difference-in-Differences			**-5.30%**
Significance (P-Value)			(.000)

ALICE rates in Bloomington and Phoenix tell a similar story to poverty rates (Table 4). Bloomington, in both time-periods, is better off than Phoenix. However, while the percentage of individuals below the ALICE line in Bloomington increased over this period, this rate decreased by 1.2 percentage points in Phoenix. Phoenix thus closed the gap with Bloomington, going from having a 12.9 percentage point difference between the two cities in 2000 to a 7.6 percentage

point difference in 2016-18. This results in a statistically significant -5.3 percentage point difference-in-difference found in Table 4 and supports our hypothesis.

Table 5: Difference-in-Difference for Percent of Individuals below the ALICE Line in Chicago and Phoenix			
	Year(s)		
City	**2000**	**2016-18**	**Difference**
Chicago	25.50%	26.30%	-0.8%
Phoenix	34.20%	33.00%	1.20%
Difference-in-Differences			**-2.00%**
Significance (P-Value)			(.000)

As Table 5 shows, the percent of individuals below the ALICE line moved in opposite directions for Chicago and Phoenix from 2000 to 2016-18. While the percentage of Chicago's ALICE individuals increased by a little more than a percentage point, the percentage of Phoenix's ALICE individuals decreased by a percentage point, resulting in a –2.00 percentage point difference-in-difference. Chicago still has a lower ALICE population overall, but over this time-period Phoenix's ALICE population got smaller, while Chicago's increased. This data again supports the hypothesis that Phoenix will make relative gains on Chicago.

Table 6: Difference-in-Difference for the Standard of Living Index in Bloomington and Phoenix			
	Year(s)		
City	**2000**	**2016-18**	**Difference**
Bloomington	374.31	363.44	10.86
Phoenix	328.56	331.96	-3.40
Difference-in-Differences			**14.26**
Significance (P-Value)			(.007)

As seen in Table 6, the Standard of Living index comparison of Bloomington and Phoenix tells a similar story to the poverty and ALICE ratios. Bloomington has a much higher average Standard of Living Index for individuals in both 2000 and 2016-18. Bloomington's Standard of Living Index decreased while Phoenix's average increased, albeit by a relatively small margin. This results in the 14.27 Standard of Living difference-in-difference. While this change is relatively small, it is statistically significant and positive, which does support the hypothesis of Phoenix improving compared to Bloomington.

Table 7: Difference-in-Difference for the Standard of Living Index in Chicago and Phoenix

	Year(s)		
City	**2000**	**2016-18**	**Difference**
Chicago	363.50	365.18	-1.68
Phoenix	328.56	331.96	-3.40
Difference-in-Differences			**1.72**
Significance (P-Value)			(.005)

As seen in Table 7, the Standard of Living Index table for Chicago and Phoenix shows increases for both Chicago and Phoenix, which is positive for both communities. Chicago remained with the higher Standard of Living Index, but Phoenix did have a larger increase over this time period. This results in the difference-in-difference of 1.72 Standard of Living units, as seen in the table above. While this is a small number, its positive sign and statistical significance still supports the hypothesis that Phoenix should improve as compared to the stagnant growth city of Chicago.

Table 8: Difference-in-Difference for Individuals not Graduating High school in Bloomington and Phoenix			
	Year(s)		
City	**2000**	**2016-18**	**Difference**
Bloomington	6.70%	3.40%	3.30%
Phoenix	21.30%	12.30%	9.00%
Difference-in-Differences			**-5.70%**
Significance (P-Value)			(.000)

As seen in Table 8, the percentage of individuals who did not complete high school was much higher in Phoenix than Bloomington in the year 2000. Between 2000 and 2016-18, both Bloomington and Phoenix saw decreases in rate of individuals without high school diplomas, but the decrease was much greater in Phoenix than it was in Bloomington. This results in a difference-in-difference of –5.70 percentage points, which supports our hypothesis. It should be noted, though, that Bloomington has a very low percentage of individuals without high school diplomas. It is hard for a city to have lower rates than in Bloomington. Therefore, the difference-in-difference is not surprising.

Table 9: Difference-in-Difference for Individuals not Graduating High school in Chicago and Phoenix			
	Year(s)		
City	**2000**	**2016-18**	**Difference**
Chicago	17.90%	9.30%	8.60%
Phoenix	21.30%	12.30%	9.00%
Difference-in-Differences			**-0.40%**
Significance (P-Value)			(.062)

While from 2000 to 2016-18 both the cities of Chicago and Phoenix decreased in rates of individuals without high school diplomas (Table 9). Chicago had lower rates in both periods. Despite remaining relatively close, Phoenix closed the gap by 2016-18. This results in a

difference-in-difference of –0.40 percentage points. Since the difference-in-difference is not statistically significant at the .05 level, it does not support the hypothesis that Phoenix decreased the rate of high school dropouts faster in comparison to Chicago despite being close to the significance level criterion and having the right sign.

Table 10: Difference-in-Difference for Individuals Graduating College in Bloomington and Phoenix			
	Year(s)		
City	**2000**	**2016-18**	**Difference**
Bloomington	24.00%	29.50%	-5.50%
Phoenix	15.30%	20.70%	-5.40%
Difference-in-Differences			**-0.10%**
Significance (P-Value)			(.927)

As seen in Table 10, the percentage of individuals with bachelor's degrees in Bloomington and Phoenix followed a similar trend from 2000 to 2016-18. Both percentages grew by almost 5.5 percentage points. Bloomington had a higher percentage of college graduates in 2000, and the difference between the two cities grew a little larger in 2016-18. This result does not support our hypothesis because the difference-in-difference is not statistically different from zero.

Table 11: Difference-in-Difference for Individuals Graduating College in Chicago and Phoenix			
	Year(s)		
City	**2000**	**2016-18**	**Difference**
Chicago	19.30%	26.70%	-7.40%
Phoenix	15.30%	20.70%	-5.40%
Difference-in-Differences			**-2.00%**
Significance (P-Value)			(.000)

Chicago increased the percentage of college graduates as compared to Phoenix (Table 11). Chicago's difference was higher than Phoenix's at 7.40 percentage points compared to 5.40 percentage points. This results in the –2.00 percentage point difference-in-difference seen above. This result runs counter to the hypothesis that Phoenix would close the education gap compared to Chicago during this time.

Again, the remaining level of education difference-in-difference tables are presented in the Appendix for the interested reader. The difference-in-difference results generally provide support for the expectation that Phoenix would show greater progress between 2000 and 2016-18 compared to Bloomington and Chicago. On one hand, the difference-in-differences for ALICE, Standard of Living, and poverty for Bloomington were are as expected based on the theoretical framework. The poverty ratio difference-in-difference for Chicago was not statistically significant. Chicago's ALICE ratio and Standard of Living index were rather small differences as well, and although it did carry the expected sign and were statistically significant, Chicago shows fewer signs of decline than the Bloomington results. Bloomington being worse off than Chicago does fit into the hypothesis, as Bloomington faces sharper population decline than Chicago.

The education figures also give mixed results. Phoenix improved on Bloomington as far as decreasing the percentage of high school dropouts. However, the difference-in-difference result for high school dropout rates in Chicago was statistically insignificant as compared to Phoenix. Surprisingly, Phoenix was not able to increase the number of college graduates as compared to Bloomington and Chicago.

The difference-in-difference results for the percent of college graduates was unexpected. These results showed that the college graduate rates were increasing relatively faster in Bloomington and Chicago than in Phoenix. These results may be in part due to the types of jobs

found in the separate markets. Chicago and Bloomington are towns that are strongly driven by finance, and while the financial markets in Phoenix are growing, manufacturing positions are more prevalent in Phoenix than the two Illinois cities. Many of these positions do not require advanced degrees, which decreases the incentive for Phoenix individuals to graduate from college. This industrial difference in part explains why the high school dropout difference-in-difference percentages had the sign we expected, while the college graduate results did not.

Results: Difference-in-Difference OLS Regression

The tables below display the regression results for Bloomington and Chicago versus Phoenix. Tables 12 and 14 show the regression results for the sample that includes the Bloomington and Phoenix metropolitan areas, while Tables 13 and 15 show the regression results for the Chicago and Phoenix metropolitan areas. The key statistics in this study are the location (Bloomington or Chicago) variable, the time (2016-18) variable, and the interaction between these variables. A positive coefficient for the interaction term in the poverty ratio regression shows that Bloomington (or Chicago) has become worse off in terms of poverty as compared to Phoenix. A negative coefficient to the interaction term in the standard of living regression shows that Bloomington (or Chicago) has become worse off as compared to Phoenix.

The coefficient of the interaction term works like a difference-in-difference estimate. This coefficient tests the hypotheses that low population growth metropolitan areas (Bloomington and Chicago) are losing ground to high population growth areas (Phoenix) in terms of poverty rates and standard of living. The interaction term looks at the combined impact of living in Bloomington or Chicago and the time period (2016-18). It shows the change from the year 2000 to 2016-18 in the Poverty ratio or Standard of Living index in Bloomington (or Chicago) as compared to Phoenix, much like the summary statistic difference-in-difference

testing did. The advantage of using regression analysis is that it controls for many variables that also impact poverty and standard of living.

Although the difference-in-difference coefficient is important for this research, it does not measure the absolute difference between the cities. To find the absolute difference between the cities, the interaction term coefficient is added to the coefficients of the interacted terms on their own. In this case, the coefficient for Bloomington (or Chicago) is added to the time period 2016-18 coefficient, and that sum is added to the coefficient for the interaction between the two terms. This summation of the coefficients of three variables (Bloomington or Chicago, 2016-18, and BL2016-18INT) shows the abolute impact of living in Bloomington (or Chicago) in 2016-18 as compared to living in Phoenix in 2000. It should be noted that it is predicted that Phoenix will be catching up to Bloomington and Chicago, but not necessarily surpassing them.

A key part of regression analysis is testing the significance of the results, or the likelihood that the results could have occurred randomly. The lower the significance level, the less likely the results are random. For example, if one were to say this result is significant at the 10 percent level, then there is less than a 10 percent likelihood of that result being a random occurrence. The p-value is stated on the far right side of the following tables. The p-value should be lower than .05, so we can accept our research hypothesis that the coefficient is different from zero with a high level of confidence. The standard error is another measure of statistical significance. The standard error is an estimate of the standard deviation of the coefficient estimate. The smaller the standard error relative to the coefficient, the more precisely the coefficient is estimated. The standard error is presented in the middle column of the tables below.

Table 12: Bloomington vs. Phoenix Poverty Regression			
Variable	**Coefficient**	**Std. Error**	**P-Value**
Bloomington 2016-18 Int.	**0.021**	**.007**	**.002**
Bloomington	**-0.019**	**.005**	**.000**
YEAR 2016-18	**0.017**	**.002**	**.000**
Black	0.051	.004	.000
Asian	0.01	.004	.011
Hispanic	0.042	.002	.000
Female	0.077	.002	.000
Married	-0.047	.002	.000
Female and Married	-0.078	.003	.000
High School Graduate	-0.113	.002	.000
Some College	-0.157	.002	.000
College Graduate	-0.18	.003	.000
Masters	-0.184	.003	.000
Age	-0.003	.000	.000
Age Squared	2.9×10^{-5}	.000	.000
(Constant)	0.291	.008	.000
R-Squared	.093		
Sample Size	165,064		

Table 12 displays the OLS regression results for how the above independent variables impact the chances of an individual being below the poverty line. The regression coefficients represent percentages; for instance, the result for having educational experience beyond a bachelor's degree is –0.184 compared to the reference group of high school dropouts. What this implies is that, conditional on all other factors remaining constant, a person is, on average, 18.4 percent less likely to be impoverished if they have a master's degree compared to the reference group of high school dropouts.

Bloomington, on its own, had a negative coefficient, meaning that a person is less likely to be impoverished if they live in Bloomington compared to Phoenix. The time period 2016-18, on its own, had a positive coefficient, meaning that a person is less likely to be impoverished if they live in the period 2016-18 as compared to 2000. However, the difference-in-difference estimate of 2.1 percentage points shows that Bloomington's poverty rates are increasing relative to Phoenix's poverty rates. The difference between this interaction coefficient result and the difference-in-difference result in Table 2 is small, and the result of the controls included in the regression. This further demonstrates that Bloomington has lost ground to Phoenix and supports this paper's hypothesis.

Table 13: Chicago vs. Phoenix Poverty Regression			
Variable	**Coefficient**	**Std. Error**	**P-Value**
Chicago 2016-18 Int.	**0.007**	**.002**	**.000**
Chicago	**-0.027**	**.001**	**.000**
YEAR 2016-18	**0.014**	**.001**	**.000**
Black	0.096	.001	.000
Asian	0.024	.002	.000
Hispanic	0.03	.001	.000
Female	0.063	.001	.000
Married	-0.052	.001	.000
Female and Married	-0.062	.002	.000
High School Graduate	-0.099	.001	.000
Some College	-0.141	.001	.000
College Graduate	-0.162	.001	.000
Masters	-0.163	.002	.000
Age	-0.001	.000	.002
Age Squared	4.59×10^{-6}	.000	.086
(Constant)	0.238	.005	.000
R-Squared	.096		
Sample Size	473,087		

Table 13 presents the poverty estimate for the Chicago and Phoenix sample. Just as in Table 12, the results in Table 13 represent percentages and a negative shows that that variable decreases the likelihood of an individual being in poverty. Much like in the Bloomington poverty ratio regression, the difference-in-difference coefficient is positive as hypothesized. While the 0.7 percentage point difference-in-difference coefficient estimate is small for practical purposes, the significance and the sign are supportive of our hypothesis. This result means that Chicago is

slowly losing ground to Phoenix in terms of poverty rates. This result also shows that by 2016-18, Phoenix had closed the gap of individuals living below the poverty line relative to Chicago. This difference-in-difference coefficient result supports the hypothesis that changes in the poverty rate between 2000 and 2016-18 are relatively less favorable in Chicago compared to Phoenix.

Table 14: Bloomington vs. Phoenix Standard of Living Index Regresson			
Variable	**Coefficient**	**(Std. Error)**	**P-Value**
Bloomington 2016-18 Int.	**-7.077**	**3.317**	**.033**
Bloomington	**9.439**	**2.147**	**.000**
YEAR2016_18	**-15.276**	**.725**	**.000**
Black	-54.075	1.786	.000
Asian	-17.808	1.954	.000
Hispanic	-56.196	.912	.000
Female	-24.001	1.039	.000
Married	62.688	1.010	.000
Female and Married	27.685	1.385	.000
High School Graduate	71.687	1.137	.000
Some College	111.952	1.124	.000
College Graduate	168.127	1.279	.000
Masters	185.486	1.521	.000
Age	2.571	.191	.000
Age Squared	-0.015	.002	.000
(Constant)	138.152	3.881	.000
R-Squared	.305		
Sample Size	165,064		

As explained above, the Standard of Living index is a continuous variable, for which higher numbers signify a higher yearly family income, compared to the poverty line for a family

of that size. A family that is living exactly at the poverty line level of income would have an index of 100. A family that has twice the poverty level of income would have an index of 200, and so on. In Tables 14 and 15, the results do not signify a percentage, but rather additional points on the scale. For instance, the coefficient for having education beyond a bachelor's degree is 185.486. This means that those with educational attainment beyond a bachelor's degree are on average going to have a Standard of Living Index that is 185.486 points higher than the control group of dropping out of high school.

Looking at the bolded key variables in Table 14, one can see that, once again, those living in Bloomington are better off than those living in Phoenix. However, the difference-in-difference coefficient is negative (–7.07), which supports the idea that the city of low growth (Bloomington) would decline in the Standard of Living index relative to Phoenix.

Table 15: Chicago vs. Phoenix Standard of Living Index Regression			
Variable	**Coefficient**	**Std. Error**	**P-Value**
Chicago 2016-18 Int.	**-4.618**	**.850**	**.000**
Chicago	**32.999**	**.566**	**.000**
YEAR2016_18	**-13.392**	**.697**	**.000**
Black	-74.626	.665	.000
Asian	-31.414	.945	.000
Hispanic	-60.574	.573	.000
Female	-29.458	.605	.000
Married	53.527	.595	.000
Female and Married	31.063	.803	.000
High School Graduate	66.118	.674	.000
Some College	107.188	.675	.000
College Graduate	158.611	.740	.000
Masters	173.273	.839	.000
Age	1.97	.114	.000
Age Squared	-0.011	.001	.000
(Constant)	168.718	2.349	.000
R-Squared	.309		
Sample Size	473,087		

Chicago tells a very similar story to Bloomington as shown in Table 15. The difference-in-difference coefficient (–4.618) is negative and statistically significant as hypothesized. This means that Phoenix is improving its standard of living at a faster rate than Chicago. By itself, when considering both time periods, living in Chicago leads to a higher average Standard of Living Index as compared to Phoenix. This is further evidence that while individuals living in Chicago may be better off as a whole, Phoenix is catching up to them from a standard of living perspective.

Limitations and Further Research

The specificity of this study leaves much room for further research. For one thing, examining population growth and decline on a more national level could prove to be very productive. One such way to carry out this extension would be to select a large set of metropolitan areas with high population growth as well as a large set of metropolitan areas with population loss. This future research could then use the same techniques as in my study. This extension would be very informative to the hypothesis that places of population growth are improving more rapidly than the places with population decline. Another possible area of exploration is into other regression models besides OLS. While OLS is suitable for continuous variables, it is less effective with dichotomous variables such as the poverty ratio. Another extension of my current study would be to compare wage changes in a city of high population growth to a city of population decline using difference-in-difference analysis. While this paper focused primarily on poverty, investigating the differences in wages in places of population growth and decline could add to the narrative.

Another area of investigation could be looking into the people that migrate instead of the places which they are leaving and moving to. This route faces a pretty severe data challenge, as it is difficult to track the people who move within the United States with any consistency. It is a further challenge to track how they would be doing in the future. If a data set of this nature does become available, it would be very beneficial to migration research.

Conclusion

The above results used American Community Survey data to focus on two time periods, 2000 and 2016-18. These years correspond with stagnant and negative population growth in the Bloomington and Chicago areas as well as population growth in the Phoenix community.

Between 2000 and 2016-18 the population of Phoenix was growing at one of the fastest rates in the country, while Chicago was not experiencing population growth and Bloomington was losing population. The purpose of this study was to see if Bloomington and Chicago were losing ground in terms of poverty and standard of living as cities of population decline and stagnant growth compared to Phoenix, a city of positive population growth. This research focuses on analyzes the impact population change has on a community. It was done through the use of difference-in-difference testing of key summary statistics related to the well-being of the community, as well as regression testing using variables that interact time and place to compare Bloomington and Chicago to Phoenix.

While the summary statistic difference-in-difference results revealed mixed conclusions, the overall story in the OLS regression results are relatively clear. While Bloomington and Chicago may still be in a better place as it pertains to lower poverty rates and higher standards of living, the gap is narrowing. Chicago and Bloomington are losing ground in these categories as compared to Phoenix. Regardless of what causes the population loss, this study shows that population decline can have negative association with a community relative to growing economies.

This project shows the importance of population growth. The growth of Phoenix has improved its overall standard of living immensely. This growth is infectious. The creation of new business attracts more business. Population growth is part of the recipe for stopping the deterioration of communities and building them back to where they once were. Chicago, as a city of stagnant population growth, should be wary of the possible implications of not growing.

Bloomington may have a reason for concern. These adverse results are especially important in the face of growing concerns that State Farm, the largest employer in the

Bloomington area, could leave the city altogether. With the company would likely go thousands of workers from State Farm, as well as the supportive firms that keep State Farm running. This loss would hurt the community through the loss of tax dollars as well and only further increase the population decline. State Farm is a powerful entity, and replacing it would be no easy task.

It is easier said than done, but population growth will help in revitalizing the community that has shown signs of struggle. The once impeccable community of Bloomington has shown some weaknesses, and growth could ideally fix them. Fortunately, a new electric car manufacturer provides hope for such growth. The company Rivian has recently announced it will begin manufacturing its vehicles in the old Mitsubishi plant. With an already large demand for its vehicles, Rivian's presence in Bloomington will hopefully bring revitalization to the community.

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Appendix (One)

Bloomington Education Difference-In-Difference

Difference-in-Difference for Individuals not Graduating High school in Bloomington and Phoenix			
	Year(s)		
City	**2000**	**2016-18**	**Difference**
Bloomington	6.70%	3.40%	3.30%
Phoenix	21.30%	12.30%	9.00%
Difference-in-Differences			**-5.70%**

Difference-in-Difference for Individuals Graduating High school in Bloomington and Phoenix			
	Year(s)		
City	**2000**	**2016-18**	**Difference**
Bloomington	31.90%	25.40%	6.50%
Phoenix	24.30%	23.90%	0.40%
Difference-in-Differences			**6.10%**

Difference-in-Difference for Individuals with Some College in Bloomington and Phoenix			
	Year(s)		
City	**2000**	**2016-18**	**Difference**
Bloomington	27.70%	28.90%	-1.20%
Phoenix	31.80%	32.10%	-0.30%
Difference-in-Differences			**-0.90%**

Difference-in-Difference for Individuals Graduating College in Bloomington and Phoenix			
	Year(s)		
City	**2000**	**2016-18**	**Difference**
Bloomington	24.00%	29.50%	-5.50%
Phoenix	15.30%	20.70%	-5.40%
Difference-in-Differences			**-0.10%**

Difference-in-Difference for Individuals with Master's Degree Experience in Bloomington and Phoenix			
	Year(s)		
City	**2000**	**2016-18**	**Difference**
Bloomington	9.70%	12.80%	-3.10%
Phoenix	7.30%	11.10%	-0.30%
Difference-in-Differences			**-2.80%**

Chicago Education Difference-In-Difference

Difference-in-Difference for Individuals not Graduating High School in Chicago and Phoenix			
	Year(s)		
City	**2000**	**2016-18**	**Difference**
Chicago	17.90%	9.30%	8.60%
Phoenix	21.30%	12.30%	9.00%
Difference-in-Differences			**-0.40%**

Difference-in-Difference for Individuals Graduating High School in Chicago and Phoenix			
	Year(s)		
City	**2000**	**2016-18**	**Difference**
Chicago	25.20%	21.90%	3.30%
Phoenix	24.30%	23.90%	0.40%
Difference-in-Differences			**2.90%**

Difference-in-Difference for Individuals with College Experience in Chicago and Phoenix			
	Year(s)		
City	**2000**	**2016-18**	**Difference**
Chicago	26.80%	25.50%	1.30%
Phoenix	31.80%	32.10%	-0.30%
Difference-in-Differences			**1.60%**

Difference-in-Difference for Individuals Graduating College in Chicago and Phoenix			
	Year(s)		
City	**2000**	**2016-18**	**Difference**
Chicago	19.30%	26.70%	-7.40%
Phoenix	15.30%	20.70%	-5.40%
Difference-in-Differences			**-2.00%**

Difference-in-Difference for Individuals with Master's Degree Experience in Chicago and Phoenix			
	Year(s)		
City	**2000**	**2016-18**	**Difference**
Chicago	10.80%	16.80%	-6.00%
Phoenix	7.30%	11.10%	-0.30%
Difference-in-Differences			**-5.70%**