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AN ANALYSIS OF FACTORS AFFECTING NET-MIGRATION TO CLARK COUNTY

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ABSTRACT

An Analysis of Factors Affecting Net-Migration to Clark County

By

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Clark County has experienced rapid population growth during the 1990s. The reasons for this rapid growth are a combination of proximity to other population centers, economics, quality of life, and demographic factors. Using OLS and GLS regression methods on pooled time-series county-level data between the years 1990 and 1997, several factors proved to be significantly correlated with the net-migration to Clark County. The most important factors affecting net-migration to Clark County are climate and demographics.

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CHAPTER 1

INTRODUCTION

This study examines the factors affecting net-migration to Clark County, Nevada. The direct result of migration over the past several years was rapid population growth of Southern Nevada[1], especially Clark County. The population of Clark County was 770,280 in 1990 and 1,394,440 in 2000 according to the Nevada State Demographer. The population has increased over eighty-one percent in just ten years. Contrast that number to the United States as a whole which increased from 248,709,873 to 281,421,906 persons per the U.S. Census Bureau for an increase of just over thirteen percent in the same time period.

The reasons can be economic, which is to say people migrate for economic opportunity. According to the U.S. Bureau of Economic analysis, in 1990 there were 375,142 employed in Metropolitan Las Vegas. In 2000 there were 703,742 employed which is better than an eighty-seven percent increase in the city that accounts for a vast majority of Clark County's economic activity.

The motivations can also be non-economic. These reasons are quality-of-life (QOL) factors, which are sometimes harder to quantify, but their effects are real nonetheless. Weather seems to be an attractive QOL factor, as people prefer warm climates to cold, and weather seems to be easily quantifiable. Traffic and air quality may be the result of population growth. Crime is another QOL causal factor for migration, although it may be the result of population density, at

[1] The terms Clark County, Southern Nevada, and Las Vegas are used throughout the study. Even Las Vegas is not identical to the Las Vegas Standard Metropolitan Statistical Area (SMSA) that the Census Bureau uses. Even though these terms do not refer to the exact same geographical area, for population purposes they can be considered very similar. The bulk of the population in Southern Nevada resides in the Las Vegas area.

least in part. Determining the causes and their relative effects on migration is the main goal of this paper, since that may help policymakers deal with or possibly avert the consequences of migration. The consequences of rapid migration are concerns for policymakers. Clark County faces shortages in some indispensable professions like teaching and nursing as reported in the Las Vegas Review Journal on February 21, 2003 and the Las Vegas Sun January 12, 2002, respectively. Tax income and expenditure for the government are affected by migration, either for better or worse. Also, natural resources can be stressed. Land and water can be depleted by overbuilding due to migration.

Urban sprawl is the expansion of a city that destroys the natural landscape. Natural beauty is certainly an attraction to many people. That attraction may encourage growth that diminishes or eliminates the very element that attracted these migrants in the first place. Additionally, the rapid urban expansion causes traffic problems that can adversely affect residents both psychologically and physically due to stress and poor air quality.

The lack of infrastructure is a problem often experienced in growing cities. The rapid increase in the number of families requires more schools to be built. If those schools are not built quickly enough, there is overcrowding. A poor educational system suddenly becomes a disamenity. Other issues are government support, like the Department of Motor Vehicles, welfare offices, fire fighters, and police officers.

Natural resources like water and fuel are finite. Rampant in-migration can increase quantity demand beyond the quantity supply. The solution could be relatively painless in that more capital is placed in the form of pumping stations and pipelines. If that infrastructure cannot be built quickly enough the costs could rise substantially, creating a disamenity for the residents.

Also, many of the growth factors will be relevant across regional boundaries. Even areas without a large tourist industry have some economic focus that can be built upon. Alternatively, rapid growth may saturate the area. For this reason, quelling the growth may be desirable to maintain the standard of living for the residents.

Although this issue has been analyzed previously, this research expands upon previous research in two very crucial ways. First, previous research used state variables as predictors of migration. Aggregating crime, climate, and cost of living variables into one value for an entire state may induce error. This study will use county data available from the Internal Revenue Service to disaggregate the effects studied.

Second, this study will use data from the years 1990 to 1997. The 1990s represent a sustained period of economic growth for the United States. For that reason, if the agglomeration variables that attract migrants to Clark County are considered normal goods, then their effect should be most pronounced in a boom economy. In other words, amenities such as good weather, low crime rate, and positive employment prospects may be purchased just like any other good.

The rest of the study will be organized into five sections. Chapter two is the literature review where previous research will be discussed. That research will encompass migration factors, methodologies, and Nevada-specific studies. Next, in chapter three, will be a discussion of the empirical model, which will provide the theoretical foundation for this study. Chapter four will be the data section. That section will provide an overview of the data, list the sources of the data, and show some illustrative plots of key factors. Chapter five will be the results. That section will show which factors are affecting southern Nevada migration patterns and how strong the effect is for each factor. Lastly, in chapter six the results will be summarized and the value of the study assessed in the conclusions section.

CHAPTER 2

LITERATURE REVIEW

There is a voluminous literature on migration in the United States. These studies generally focus on either the determinants of migration or the methodology for analyzing and predicting migration patterns. The determinants of migration can be grouped into economic factors (e.g. unemployment, income, and cost of living) and non-economic (e.g. weather, crime rate, and recreational opportunities) factors. On the other hand, methodological studies are based on mathematical techniques and scope of analysis. Scope of analysis refers to location-specific analyses or a multi-location study of causal factors.

The literature review will be comprised of three parts. The first will examine the research that focused on the determinants of human migration. The second will look at the research that deals with different methodologies to examine migration. The last section will discuss the research that focused on Nevada migration.

(1) Determinants of Human Migration

Greenwood (1968, 1969, and 1972) has done extensive and influential studies on migration, by focusing particularly on the economic factors. Greenwood concluded that people move from low to high income areas and that unemployment rates are surprisingly of little value in predicting migration. In subsequent research (1980), he concluded that housing and amenities may even be of more significance than employment opportunities. And in later research (Greenwood, et. al. 1991, 1993), wage rates, employment participation, and cost of living were considered as the economic amenities that attract migrants to a state.

Blanco (1964) focused on employment-based interstate migration. More specifically, she developed a measure called prospective unemployment which was based on the change in unemployment and the change in the working age of the population. This measure explained about eighty-five percent of the variance of interstate migration in her study.

Cullen and Leavitt (1999) examined non-economic factors by correlating crime rates to out-migration from 127 cities. The crime rates were shown to be positively correlated with out-migration. A problem with this conclusion is whether the out-migrants move to an entirely different region or to the nearby suburbs. Also, they concluded that Blacks are more likely to remain in a given city rather than migrate. However, whether this conclusion also means that Blacks are less likely to leave a county is unclear.

Hinze (1977) performed one of the most rigorous studies on non-economic factors. Using Standard Metropolitan Statistical Area (SMSA) census numbers for 1960-1970, Hinze considered population density, temperature, race, age, and air pollution in conjunction with various economic factors to determine the causal factors in net migration. He concluded that warm climates, specifically warm January temperatures, attract migrants. Other factors, such as population density and air pollution did not appear to be significant amenities to migrants.

Weather is even used as an explanatory variable. Cebula (1974) included cold weather as the only non-economic independent variable alongside welfare payments, property taxes, income, and unemployment. The coefficient on weather was significant in most cases. Furthermore, all of the economic variables considered worked well as predictors in that study.

(2) Methodology

A number of studies have focused on the methodology used to analyze migration. Usually the methodology is a variant of the gravity model which treats population and distance between origin and destination locations as inversely related independent variables in a similar way that mass and distance are inversely related in physical gravity equations (Ziph, 1946).

Lowry (1965) replicated Blanco's work using Metropolitan Statistical Areas (MSA's) as opposed to states. The use of MSA's is valuable as they are much smaller regions than states. Also, the distance between MSA's has more meaning. One part of a state can be bordering another state, while another part of the state could be hundreds of miles away.

Douglas (1997) uses in-migration and out-migration to compare states head-to-head. This technique is used to rank states and to evaluate the probability of migration flow. Furthermore, that research introduces a method to determine equilibrium, which means migration to a state is as likely as migration from a state. These findings could be valuable in ascertaining the direction in which the local demographics are moving, thus assisting policymakers in creating the appropriate infrastructure for a changing economy.

Some studies use a human capital approach relying on wages, housing, or amenities, for example. The human capital approach adopted by Molho (1986) correctly suggests that people migrate from areas of lesser opportunity to those of greater opportunity. This very microeconomic approach is of value for defining attractive regional variables.

Efforts to improve upon the traditional gravity model persist. Congdon (1991) compared gravity model approaches for migration analysis in London and South East England. Congdon used log-normal and Poisson models to analyze London migration in two studies and South East England migration in a third, all with different sample sizes. The studies had the same variables which were gravity, housing, and job growth variables. He concluded that the spatial scale (counties versus states, for instance) can affect the direction and significance of the regression coefficients. He also concluded that general linear models are both simple and rigorous when modeling migration flows.

Still other studies attempted to examine the variables affecting migration for a very small area. Hempstead (2002) examined foreign immigration and internal migration to New York City with the purpose of assisting policy makers. That research relies upon zip code level data and ignored cross-state migration.

(3) Previous Studies on Nevada

A number of studies have specifically examined Southern Nevada migration patterns. Hicks (1999) emphasized QOL variables by conducting surveys of residents to discover what they consider important. She concluded that ownership of residence, parks and recreation, police services, employment opportunities, contributed to in-migration. Although survey research often has reliability problems when analyzing human behavior (Krosnick and Schuman, 1988), this approach provided valuable support to her study.

Venturella (1986) examined the factors affecting migration to Southern Nevada using Department of Motor Vehicles (DMV) records for the years 1980-1985. She found that distance and population of the migration source significantly affect migration patterns. Employment and economic variables also correlate very highly to in-migration. Migrants consider quality of life factors and weather when relocating. Lastly, crime increases out-migration, but has no effect on in-migration. A shortcoming of that study is that it used state variables. Five times as many migrants came from California as from the next most common migrant source, New York.

Winston (1996) conducted a similar study examining migration to Henderson, Nevada, a suburb of Las Vegas. As with Hicks (2000) this study relied upon survey data to ascertain the determinants of migration. Furthermore, sources of migration are states and not counties or cities. Even so, the results seem to be quite similar between the two studies in that economics and amenities both play a significant role in attracting residents. Lastly, Winston detailed the growth during the years 1985 to 1990.

CHAPTER 3

EMPIRICAL MODEL

This study will examine factors contributing to the net-migration to Clark County. The model adheres to the following specification.

$$\textbf{NETMIG} = \textbf{f(gravity, economic, QOL)} \quad (1)$$

Where,

NETMIG	=	Net-migration to Clark County from another U.S. County;
Gravity	=	Source county population divided by the square of the distance from Clark County;
Economic	=	Variables based on the financial well-being of the migrants;
QOL	=	Quality of life variables.

The three groups of explanatory variables assumed to explain net-migration (NETMIG) are: the gravity variable, economic variables, and quality of life (QOL) variables. The variables and their expected signs are shown in table 1.

(1) Gravity Effects

The gravity effects capture migration due to the populations of counties and distances between counties. Analogously to the physics equation for gravitational pull[2], the gravity term (GRAV) in the migration equations is described in Equation 2.

[2] The gravity equation in physics is described by:

$$g = \frac{Gm_1 m_2}{d^2}$$

where, g is gravitational pull between objects; G is the gravitational constant; m_1 and m_2 are the masses of the two objects, and d is the distance between the two objects.

$$GRAV_i \approx \frac{\alpha P_i P_0}{{d_i}^2} \quad (2)$$

where,

$GRAV_i$	=	Migration between Clark County and county i due to gravity;
α	=	Constant coefficient;
P_i, P_0	=	Populations of county i and Clark County, respectively;
d_i	=	Distance between county i and Clark County, respectively.

This equation indicates that more populated counties will attract more migrants from Clark County and more migrants will be attracted from more populated counties. Furthermore, migrants are much more likely to move to nearby counties than remote ones. In a county that has more in-migrants than out-migrants, such as Clark County, the expected sign of net-migration is positive.

(2) Economic Factors

In-migrant and out-migrant median adjusted gross income (INADJINC AND OUTADJINC) are considered. These variables are chosen to reflect the overall economies of the counties considered. Treating the location of residence as a normal good, the expected sign for these variables would be positive.

Another economic variable used is the county unemployment rate (ANNUNEMP). Although this variable is related to the median adjusted gross income, its use may be more appropriate. Unemployment is more causal, whereas income is a reflection of unemployment and other factors. Also, there tends to be high collinearity among economic variables. For these reasons, unemployment will be used in most of the analyses where economic causal variables are used. Since high unemployment counties will drive residents out, presumably to a low unemployment place like Clark County, unemployment rate is expected to be positively correlated with net-migration in this study.

(3) Quality of Life Factors

The four quality of life factors considered here are crime, climate, population density, and demographics. Studies suggest that crime has no discernible effect on in-migration, although it affects out-migration (Cullen and Leavitt, 1999). High crime drives people from a location. Therefore, net-migration is expected to display a positive sign in this study with people leaving high crime rate communities. Crime can be proxied by several variables such as burglary, murder, rape, motor vehicle theft, and arson; but to avert multicollinearity problems among crime variables and to keep the analysis manageable, only burglary (BURGLARY) was considered as the representative crime factor. Burglary was also chosen because it is the crime with the most reported occurrences providing the best statistical distribution.

Since the hypothesis is that people are moving to warmer, dryer climates, two climatological factors are considered. The first is the average high temperature of the source county, and the second is annual precipitation of the source county. The expected temperature sign is negative, which means counties with lower temperatures will generate more migrants to warmer climates like Clark County. The expected precipitation sign is positive as people move to dry climates.

Population density (POPDENS) is also considered a QOL factor with people preferring less dense locations. The expected sign for this variable is positive, with more people migrating from densely populated areas.

Some of a region's population growth can be explained by the changing demographic of the area (Frey and DeVol, 2000). The two most obvious demographic factors are age and race. Longer life expectancies have caused the nation's population to age. Even though the focus of this study is net-migration, not population growth, the age and race of migrants could be indicative of QOL factors. If Clark County is an attractive retirement area, then one would expect its population to grow from the migration of elderly as well as the slower death rate. Therefore, the expected sign for the percentage of the population older than 64 years (AGEGT64) is positive. Similarly, if the QOL factors are conducive to raising a family, more children and teenagers will

migrate as a consequence of the family migrating. The expected sign would be positive for both AGEGT64 and AGELT20. That is, counties with a surplus of a demographic will tend to generate more out-migrants (i.e. in-migrants to Clark County) of that demographic.

Although no overt attempts are made to attract minority in-migrants, this demographic should be considered to evaluate the migration patterns of Clark County. For the purposes of this study, two racial demographics were considered: the percentage of the population comprised of Hispanic minorities (PCHISP) and the percentage of the population comprised of Blacks (PCBLACK). Minority migration is expected to account for a significant portion of the county migration. As with the age demographic, counties with a surplus of minorities are expected to produce more minority migrants. Therefore the expected signs for PCHISP and PCBLACK are positive for net-migration.

Table 1: Model Variables, Descriptions, and Expected Signs

Variable	Description	Expected Sign
Dependent Variable		
NETMIG	Net migration to Clark County	
Independent Variables		
Gravity		
GRAV2	Source pop. * sink pop./ distance^2	+
Economic		
INADJINC	Adjusted gross income, in-migrant	+
OUTADJINC	Adjusted gross income, out-migrant	+
ANNUNEMP	Annual county unemployment rate	+
QOL of Source County		
AGELT20	Percent of population younger than 20 years	+
AGEGT64	Percent of population older than 64 years	+
PCHISP	Percent of the population that is Hispanic	+
PCBLACK	Percent of the population that is Black	+
POPDENS	Population / Land Area	+
NRMMAX	Average maximum yearly temperature (F)	-
NRMPCP	Average annual precipitation (in)	+
BURGLARY	Number of burglaries per 100,000 people	+

CHAPTER 4

DATA

The data are based on counties covering the period of 1990 to 1997. Data were collected for 242 U.S. counties during the years 1990 to 1997. These data cover gravity, economic, and quality of life variables. Since there is a large and diverse dataset, some discussion is helpful for understanding the process of generating results. First, there will be an explanation of the sources of the raw data. Second, the methodology of transforming the raw data into usable inputs will be explained. Then the summary statistics will be discussed. Lastly, some illustrative scatterplots will be shown and their relevance to the study discussed.

(1) Sources

The number of migrants and median adjusted gross income are culled from annual tax records by the Internal Revenue Service (IRS) and purchased from their Statistics of Income (SOI) division. Populations of counties, distances between counties, and county areas are available from the U.S. Census Bureau, who keep detailed records of geography on line through their Topologically Integrated Geographic Encoding and Reference system (TIGER®). County age and race demographics are also from the U.S. Census Bureau. The yearly average maximum temperature and average annual precipitation for a county are from the National Oceanic and Atmospheric Administration (NOAA). Crime data are retrieved from the Department of Justice, Office of Justice Programs, Bureau of Justice Statistics website. The unemployment rate data are from the U.S. Department of Labor, Bureau of Labor Statistics website.

(2) Methodology

The migration dataset approximates migration based on the number of exemptions listed in IRS tax returns. For example, if a taxpayer files taxes from Los Angeles County in 1992, and files from Clark County in 1993, the number of exemptions that taxpayer claimed in 1993 would be added to the total number of migrants from Los Angeles County to Clark County from year 1992 to 1993. Obviously, this method is only an approximation. This method assumes honesty on the part of the filer, and does not account for people who do not file taxes. But, even unemployed people are required to file taxes, and non-working minors would be claimed as exemptions on their guardian's tax returns. Another limitation is that the dataset is not all-inclusive. Before 1990 only counties with more than 50 migrants were included in the dataset distributed by the IRS; but, starting in 1990, those with 11 or more were included.

The gravity variable is computed from populations and distances between counties. Since the official Census is only performed every ten years, the populations are yearly estimates courtesy of the United States Census Bureau. The distances between counties are between geographic centers of the counties. The latitude and longitude coordinates are also provided by the U.S. Census Bureau via the internet. The computation of the distances was done using trigonometric techniques assuming a spherical Earth. For the purposes of this analysis, the Earth's oblateness should cause only negligible errors.

The weather variables are yearly averages for a county. Only one number per variable was used for each county, despite the fact that the weather will change from year to year. Changes beyond the normal year-to-year variations are also not considered as those changes would be too gradual to quantify over this brief study.

The demographic data used includes both age and race. The age groups specified are county percentages of people less than 20 years old (AGELT20) and those older than 64 (AGEGT64), thus accounting for the effects of the family and elderly migration. The two race variables used are the percentages of people who were Hispanic (PCHISP) and those who are Black

(PCBLACK). That ethnic distinction is made both to conform to Census Bureau data and to account for the regional differences in minority populations.

Crime data, specifically burglary data, were retrieved from the Department of Justice, Office of Justice Programs, Bureau of Justice Statistics website. Those data were available for only the 50 largest counties, thus limiting their use in this study.

(3) Summary Statistics

Table 2 shows the summary statistics, means, standard deviations, minimums, and maximums of the variables used in the study. First, notice that the net-migration to Clark County is not always positive. The minimum value of -892 corresponds to a net of 892 migrants to Nye County, NV, which borders Clark County but has fewer than 20,000 residents. Observe that the gravity variable has a range from 6,173 to 328,000,000. The minimum value belongs to Kauai County, HI which is distant (2790 miles from Clark County) and has a population of about 50,000. On the other end, the maximum value is attributable to Los Angeles County, CA which is both the most populated county in the U.S. and very near to Clark County (226 miles). Also note the population density. Its minimum is 0.40 people per square mile (corresponding to Lincoln County, NV). The maximum density is in New York County, NY with 70,589 people per square mile. Since this variable is population divided by county land area it may be slightly erroneous. County lines may extend far beyond the city limits and the population may be denser than it appears, and much of the land may be uninhabitable due to terrain or government ownership. Despite these imperfections, these data will provide a good foundation for migration studies.

Table 2: Summary Statistics

Variable	Description	Mean	SD	Min	Max
Dependent Variable					
Migration					
NETMIG	CC in-migrants minus out-migrants	105.97	635.01	-892	10361
Independent Variables					
Gravity					
GRAV2	Source pop. * sink pop./ distance^2	4.16E+06	2.46E+07	6172.89	3.28E+08
Population	County population in a given year	648201	1196039	3913	13059154
Distance	Distance of county from CC (mi)	1242.98	690.26	98	2790
Economic					
INADJINC	Adjusted gross income, in-migrant	19277	5898	6499	87499
OUTADJINC	Adjusted gross income, out-migrant	18117	6487	4444	74999
ANNUNEMP	Annual county unemployment rate	5.82	2.37	1.60	20.60
QOL of Source County					
AGELT20	Percent of population younger than 20 years	30.15	3.89	18.200	43.50
AGEGT64	Percent of population older than 64 years	11.94	4.12	2.900	33.80
PCHISP	Percent of population that is Hispanic	7.31	7.47	0.466	46.34
PCBLACK	Percent of the population that is Black	9.76	10.63	0.000	61.50
LAND	Land area in the county (sq. mi)	1875	3066.50	28.370	20057
POPDENS	Population / Land Area	1767	6690.32	0.400	70589
NRMMAX	Yearly average maximum temperature (F)	65.88	8.91	36.500	87.90
NRMPCP	Average annual precipitation (in)	31.29	14.41	3.200	105.20
BURGLARY	Number of burglaries per 100,000 people	54.05	28.26	0.000	196.10

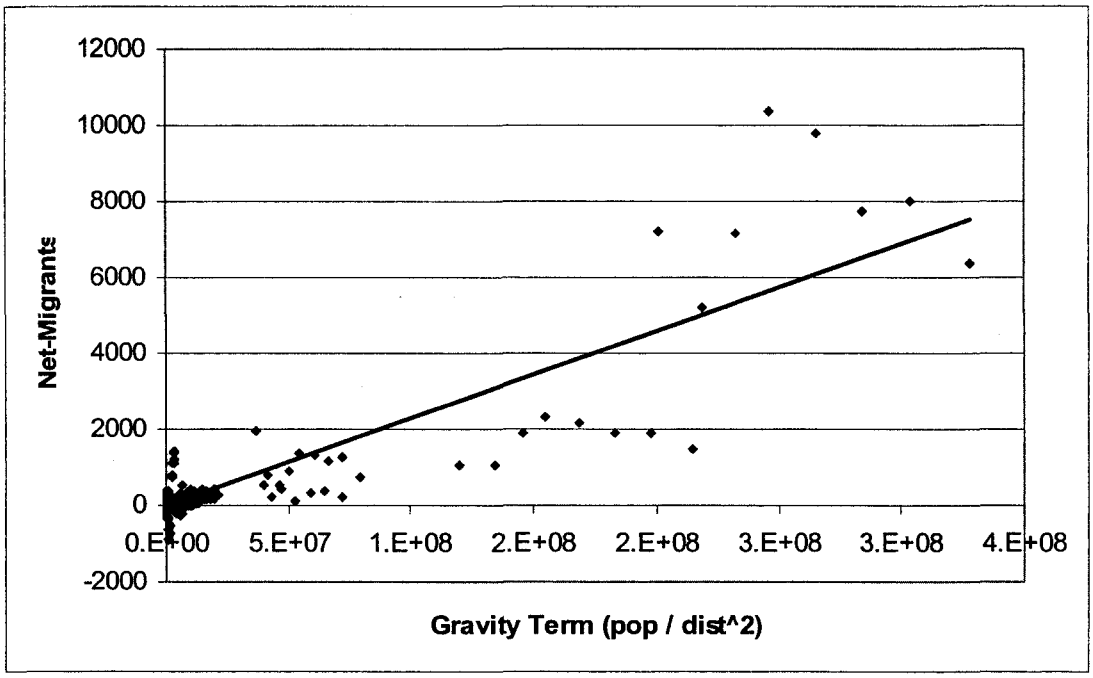
(4) Scatterplots

It is interesting to look at some key variables individually. First, consider the gravity variable (Graph 1). Clearly there is a positive relationship between gravity and net-migration. The values at the far right of the graph represent Los Angeles County. With its very high population and proximity to Clark County, it is expected that many migrants would come from there.

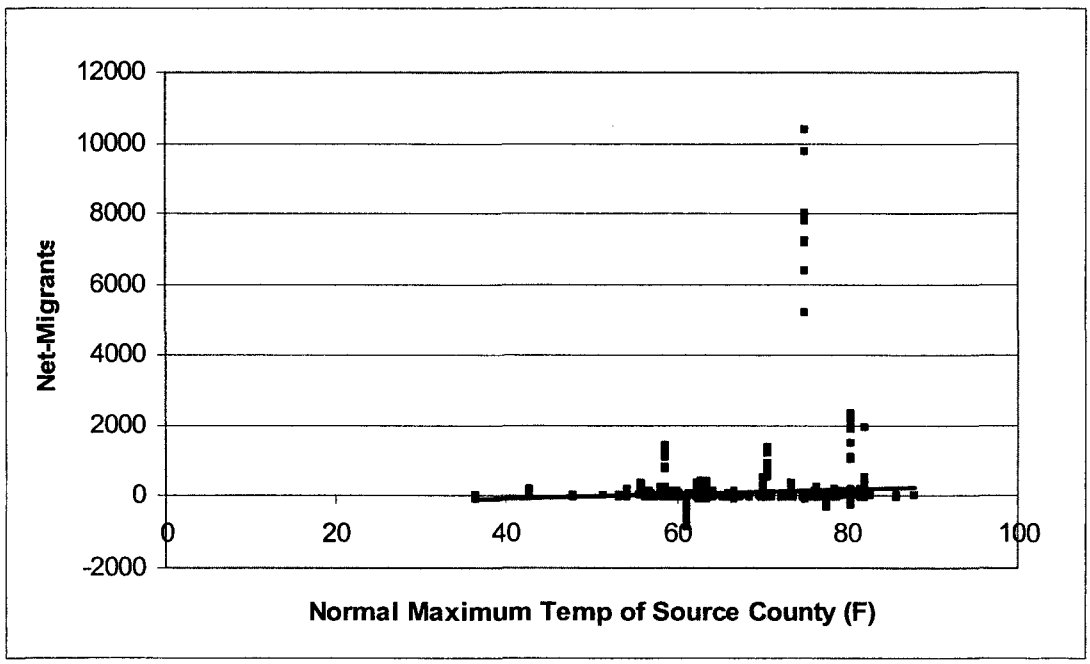
Temperature (Graph 2) shows a positive relationship between temperature and net-migration to Clark County. This result is the opposite of what theory would predict. That is, if people move to warmer climates, then the relationship should be negative with migrants from colder locales coming to Clark County. As will be shown in the results section, when analyzed in concert with other variables, the effect is negative. The migration from Southern California and Arizona is largely attributable to the gravity effect.

Unemployment (Graph 3) is the most important economic factor addressed in this study. The relationship is positive, suggesting that higher unemployment drives people to Clark County. Two things are worth noting about this relationship. First, Los Angeles County had very high unemployment in the 1990s, which could skew the results. Second, if choice of locale is a normal good, then low unemployment locales would have residents who are better able to migrate. These two reasons will be discussed in more detail, but again show the importance of considering the different variables in tandem to generate meaningful results.

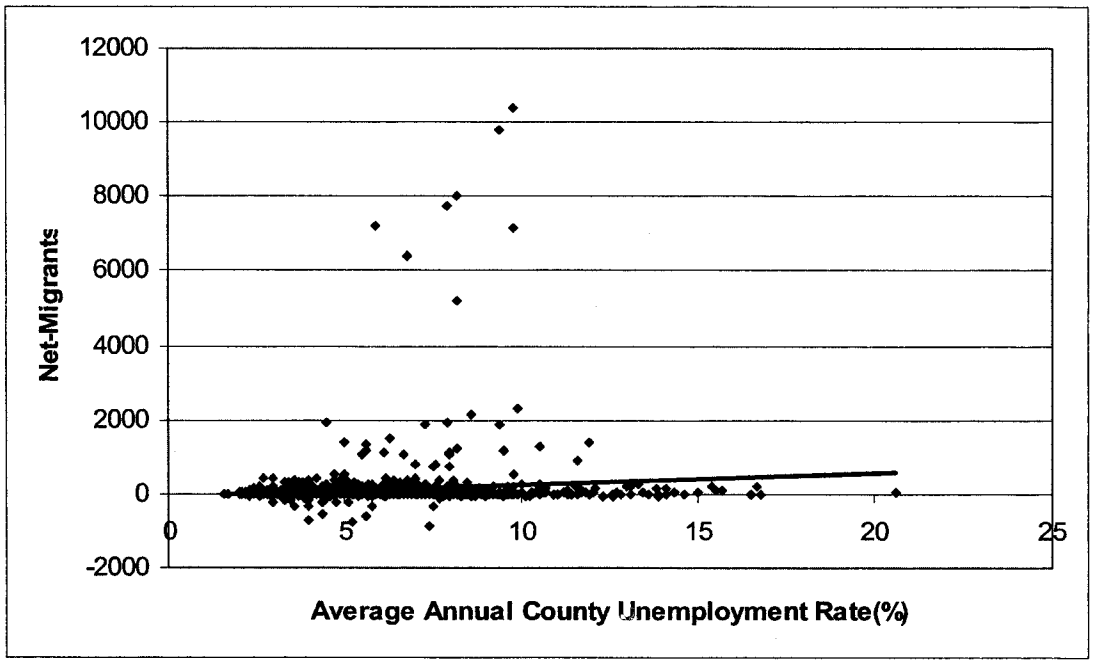
Graph 1: Net-Migration vs. Gravity 1990-1997



Graph 2: Net-Migration vs. Average Maximum Temperature 1990-1997



Graph 3: Net-Migration vs. Unemployment 1990-1997



CHAPTER 5

RESULTS

Shown in Table 3 are two models.[3] The first model is the Ordinary Least Squares (OLS) model used as the benchmark model. Since the study is based on both cross-section and time-series data, a Generalized Least Squares (GLS) model was used to correct for serial correlation and heteroskedasticity. The GLS method uses a non-scalar covariance matrix whereas the OLS method uses a scalar covariance matrix. Hence the GLS version of the matrix generates accurate estimates despite heteroskedasticity and serial correlation. Previous southern Nevada studies relied upon OLS methods, and GLS should improve upon those.

The signs of the coefficients are consistent with expectations in both models. Furthermore, the magnitudes of the coefficient estimates are very similar for both models. All of the variables except unemployment (ANNUNEMP) are significant within a 1 percent level in the GLS model, and all are within 10 percent level of significance in the OLS model.

The overall significance of the two models is high. Using the F-test for the OLS model and the log-likelihood test for the GLS, both are significant within a 1 percent level. The GLS model seems to be the better model here since it corrects for heteroskedasticity and serial-correlation and the results are more statistically significant.

Some explanation of the meaning of the coefficient values is helpful here. So below is a discussion of each of the model regressors.

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[3] Six independent variables are used in the final. Model (Table 3); but thirteen variables are originally considered. Alternative models are shown in the Appendix. Additional variables beyond those used in Table 3 added little to the goodness-of-fit and, in some cases, generated inconsistent results.

Table 3: Regression Models (Dependent Variable is Net-Migration to Clark County)

	OLS		GLS	
Intercept	3.149E+02	***	2.136E+02	***
	(5.006)		(7.80)	
GRAV2	2.314E-05	***	2.010E-05	***
	(68.171)		(0.00)	
PCHISP	3.682E+00	***	2.857E+00	***
	(2.665)		(0.18)	
PCBLACK	4.070E+00	***	2.922E+00	***
	(5.290)		(0.10)	
NRMLMAX	-6.606E+00	***	-4.465E+00	***
	-(6.466)		(0.15)	
AGEGT64	6.169E+00	***	4.138E+00	***
	(2.882)		(0.20)	
ANNUNEMP	-1.782E+00		-9.678E-01	
	-(0.488)		(0.34)	
R-Squared	0.797			
F	879.630	***		
Wald Chi-Squared			1832.140	
Log-Likelihood			-7036.793	***
N	1350		1350	

Note: The statistical errors are in parentheses below each coefficent's estimate. The asterisks, *, **, ***, indicate statistical significance of 0.01, 0.05, 0.1 respectively.

The Gravity term (GRAV2) is used to account for the migration from nearby counties. Without that control term, the characteristics of Southern California (e.g. warm weather, higher than average unemployment, large Hispanic population) would dominate the analysis. Table 4 shows the five most populated U.S. counties in descending order. Their distances are also shown. Obviously, Southern California counties with their large populations and close proximity will affect the results. As expected, those California counties also produced three of the five highest migration totals. The other two were San Bernardino County, which is also in Southern California, and Maricopa County in Arizona.

Table 4: Populations and Distances from Clark County

State	County	1999 Population	Distance From Clark County(mi)
CA	Los Angeles County	13,471,306	226
IL	Cook County	6,123,213	1486
TX	Harris County	4,158,457	1194
CA	Orange County	3,567,775	230
CA	San Diego County	3,562,745	237

Source: U.S. Census Bureau

There are two distinctions between this gravity model and that used in previous analysis of Clark County in-migration. First, only one expression was used to account for source county population and distance from Clark County. Second, the distance term is non-linear and inversely related to migration. This formulation is consistent with that developed by Lowe and Moryadas (1975). The results of the gravity model in this study help confirm its validity.

An economic variable to consider is the unemployment rate (ANNUNEMP). The coefficient is negative indicating low unemployment counties generate more net-migration to Clark County. But the t-statistic indicates that this variable is not significant in the OLS model. The data suggests that Clark County is attracting migrants from both low and high unemployment counties. High unemployment counties may generate net migrants pursuing better opportunities. Low unemployment counties may generate net migrants because location is a normal good, and more affluent people are better able to choose their place of residence. Based on U.S. Census Bureau income estimates, per capita income and unemployment had a correlation coefficient of -0.33 in the year 1995. The negative coefficient suggests counties with more unemployment had less income. Therefore, an attractive locale may be appealing to both low and high unemployment counties.

The temperature variable coefficient (NRMLMAX) is negative, meaning that people are moving from colder climates to come to Clark County. This result is interesting since the largest

portion of migrants come from Southern California and Arizona, which have similar climates to Clark County. Those nearby migrants are largely accounted for by the gravity term.

The age demographic characteristics of a county also appear worth examining. The variable AGEGT64 has a positive coefficient suggesting that counties with more elderly residents generated more migrants to Clark County. The positive relationship between elderly population and migration to Clark County does not conclusively show that the elderly were the people migrating to Clark County. Research suggests that people are more likely to migrate at or near retirement age (Rogers, 1988). Also, the percentage of elderly increased from 9.84% in 1990 to 10.26% in 1999 (Table 5), all while the population in the county was nearly doubling. Based on these data and previous results it appears that Clark County was a popular retirement destination in the 1990s.

The race demographic, particularly Hispanic, also merits consideration. The positive coefficient for PCHISP suggests that people are migrating to Clark County from counties with a large Hispanic population. Table 5 shows that from 1990-1999 the percentage of Hispanics in Clark County increased from 10.14% to 15.25%. Furthermore, according to the National

Table 5: Clark County Demographics 1990-1999

Year	Age0-19	Age20-24	Age25-44	Age45-64	Age65+	Black	Hispanic
1990	29.35%	7.83%	33.69%	19.29%	9.84%	8.72%	10.14%
1991	28.71%	7.52%	34.40%	19.44%	9.93%	8.74%	10.53%
1992	28.79%	7.14%	34.12%	19.76%	10.19%	8.84%	10.89%
1993	29.18%	6.82%	33.65%	19.84%	10.50%	8.84%	11.31%
1994	29.40%	6.64%	33.40%	20.03%	10.52%	8.91%	11.87%
1995	29.62%	6.51%	33.09%	20.25%	10.53%	8.92%	12.57%
1996	29.99%	6.39%	32.55%	20.49%	10.58%	8.90%	13.13%
1997	30.35%	6.45%	31.98%	20.79%	10.43%	8.84%	13.97%
1998	30.94%	6.46%	31.21%	21.04%	10.35%	8.89%	14.65%
1999	31.38%	6.52%	30.45%	21.39%	10.26%	8.92%	15.25%

Source: U.S. Census Bureau

Center for Education Statistics, the percentage of Hispanics in the Clark County School District increased from 12% in 1990 to almost 29% in 2000. The growth of Hispanics in the school district suggests that many migrated to Clark County with multiple children. Southern Nevada's appeal to the Hispanic community, seems to be a strong driver for net-migration to Clark County.

The percentage of Blacks in a county is also a statistically significant factor for analysis of net-migration to Clark County. The choice to include a separate variable for Blacks is not redundant despite the presence of a variable for Hispanics. The two race variables are actually slightly inversely related, as table 6 shows.

Table 6: Model Correlation Coefficients

	NETMIG	ANNUNEMP	GRAV2	NRMLMAX	PCBLACK	PCHISP	AGEGT64
NETMIG	1.000						
ANNUNEMP	0.118	1.000					
GRAV2	0.888	0.126	1.000				
NRMLMAX	0.091	0.145	0.171	1.000			
PCBLACK	0.008	0.087	-0.048	0.102	1.000		
PCHISP	0.303	0.342	0.351	0.385	-0.113	1.000	
AGEGT64	-0.098	0.112	-0.117	0.179	-0.067	-0.241	1.000

The regression model suggests that counties with a higher percentage of Blacks will produce more net-migrants to Clark County. The reasons for this positive relationship could be economic or cultural. The percentage of Blacks in Clark County did increase slightly in the 1990s. Even so, the migrants from counties with a high percentage of Blacks are not necessarily Black.

Ethnicity is not reported to the IRS. One can only speculate based on the regression results and the Clark County population data.

CHAPTER 6

CONCLUSIONS

The goal of this study was to analyze the migration patterns to Clark County and to analyze some of the causal factors. Although this type of study has been performed previously, this research expands and provides new insight.

The methodology was improved by pooling time series and cross-sectional data, which captures the effects of yearly changes in the independent variables. Also, county level data was used instead of statewide data. Some of the independent variables vary so widely across a state that the results of statewide studies are questionable. A different form of the gravity variable was used that improved the quality of the results. And lastly, Generalized Least Squares was used to generate more robust results.

The gravity variable, based upon the populations of the source county and Clark County and the distances between the county, is used as a control to facilitate the analysis of the Clark County characteristics that attract migrants. Gravity does not cause people to migrate. When people do migrate, migration to a nearby populated area is the tendency which is being accounted for by this variable.

After accounting for the gravity effect, the data suggests that the most significant causes of migration to Clark County are climate and demographics. People continue to migrate to warmer climates and there is no evidence of this trend reversing. Also, retirees seem to find Clark County appealing. Lastly, the percentage of Blacks and Hispanics in a county is positively correlated to the number of net-migrants to Clark County.

Ethnicity itself may simply be a manifestation of economic causes. That is, minorities may be attracted to the job opportunities in Clark County. Even non-minorities may migrate from minority-rich counties as a result of push migration. Push migrants are high school graduates, high school dropouts, and lower-income residents who migrate from high immigration metropolitan areas to areas of better economic opportunity (Frey, 1996). Essentially, immigrants are pushing those workers out of the area. Considering the number of migrants from Southern California, it is likely that many of the migrants to Clark County were push migrants.

It is important to note that if migrants continue to flock to Clark County, jobs must continually be created to avert high unemployment rates. Since much of the reason for Clark County's population growth is its proximity to Los Angeles, much of the migration could be beyond the control of local policymakers. Responding to the influx of migrants and preparing for future migration is crucial. A slowdown in gaming, which is the primary component of Clark County economic well-being, could have a devastating effect on Clark County. Although it has been thought that the jobs created by growth attract migrants, it is possible that those jobs simply prevented the unemployment of migrants who would have come to Clark County anyway.

These conclusions are speculative, but should be considered when policies regarding growth are made. Clark County has already experienced shortages in classrooms and traffic problems associated with unexpected growth. This trend is likely to continue for years to come, especially since the climate and economic opportunities of the southwestern United States are so attractive to migrants.

Although this model includes several variables associated with net-migration and the results are highly significant, some further research should be conducted particularly where policy decisions are concerned. First, some additional analysis could be performed to determine the long run effects, instead of the causes, of rapid population growth in Clark County. Further research may also include different explanatory variables. These variables include taxation, income, and housing data. Furthermore, if real income affects which locations people choose to

reside, GDP and cost-of-living data should be included. Another interesting extension would be a study focused on unemployment-related migration. An unemployment study could be done that considers the competing effects of people migrating to find employment and those migrating due to location being a normal good. Lastly, applying these methods to multiple locations to determine the nationwide significance of migration factors could provide much more general value.

APPENDIX

ALTERNATIVE OLS MODELS

Table 7: Alternative OLS Models

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Intercept	6.45E+02***	3.88E+03***	2.33E+03***	6.47E+02***	6.62E+02***	6.35E+02***
	-6.095	-3.257	-4.559	-4.92	-5.002	-6.153
GRAV2	2.33E-05***	2.36E-05***	2.64E-05***	2.33E-05***	2.32E-05***	2.33E-05***
	-70.953	-70.726	-37.204	-62.78	-62.477	-70.976
POPDENS	-2.30E-03***	1.70E-03	-3.60E-04	3.09E-03**	3.00E-03**	2.26E-03*
	-1.848	-1.371	-0.14	-2.124	-2.059	-1.825
ANNUNEMP	6.55E+00*	6.34E+00*	1.29E+01			6.88E+00*
	-1.761	-1.75	-0.919			-1.891
NRMLMAX	-3.52E+00***	-4.45E+00***	-1.41E+01***	-3.82E+00***	-3.66E+00***	-3.53E+00***
	-3.712	-4.594	-2.88	-0.51	-3.205	-3.729
NRMPCP		2.73E+00***				
		-4.058				
AGEGT64	-4.55E+00*	-2.50E+00	-2.88E+01*	-3.61E+00	-3.99E+00	-4.63E+00*
	-1.748	-0.948	-1.93	-1.194	-1.311	-1.786
AGELT19	-1.26E+01***	-6.06E+00*	-4.04E+01***	-1.13E+01***	-1.13E+01***	-1.27E+01***
	-4.462	-1.878	-3.389	-3.486	-3.504	-4.51
OUTADJGR					-1.52E-03	
					-0.998	
INADJGR				-5.79E-04	-1.18E-04	
				-0.357	-0.07	
BURGLARY			2.72E-02			
			-0.422			
R-Squared	0.797	0.8	0.83	0.797	0.797	0.797
observations	1350	1350	352	1044	1044	1350
F	753.838***	765.3***	239.384***	679.072***	582.202***	879.972***

Note: The statistical errors are in parentheses below each coefficent's estimate. The asterisks, ***, **, *, indicate statistical significance of 0.01, 0.05, 0.1 respectively.

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