12-20-2011

Catching a Cold: A Look at the Expected Contagion Effect of Neighboring Income Inequality

Jared Dellinger
Illinois State University

Catching a Cold: A Look at the Expected Contagion Effect of Neighboring Income Inequality

By Jared Dellinger

Abstract: Previous literature relative to income inequality has made available a number of demographic, economic, and policy determinants. This paper, using growth transmission literature as a basis for analysis, develops an argument showing that these results are biased and unreliable due to an omitted variable bias and a model misspecification. The model developed in this paper corrects for the bias by including a missing spatial factor that accounts for a contagion effect experienced by neighboring states. Income inequality is shown to be transmissible through multiple channels and may therefore be combatted only through a concerted group effort, rather than through individual state policy efforts.

I. Introduction

Increasing wage discrepancies throughout the United States have caused an ever-increasing gap between income groups. The main determinants of income inequality have been the focus of much debate throughout academia. A wealth of literature from both economic and sociological disciplines provide a number of determinants with which to examine income inequality in a manner that provides a meaningful understanding of the existing relationships and their consequences for policy makers. An understanding of the channels through which they interact in an economic sense, allows one to focus on how those determinants contribute to economic growth and ultimately income inequality.

Previous literature related to the field of growth transmission has examined the possibility of spillover effects across borders, meaning a spatial factor is at play. A variety of avenues have been shown to exist through which growth may be transmitted, such as the proximity to neighboring capital stocks, both physical and human, whereby access to existing infrastructure encourages an environment where economic growth and development may occur with greater ease. Additionally, it may be shown that an individual entity initiating policies with the intent of growth, results in a beneficial impact not only for the country in question, but to their neighbor's opportunities as well. Convergence literature regarding developing and developed nations implies the existence of a spatial factor associated with growth. Essentially, this literature indicates a transmission effect exists among entities, suggesting a similar relation may also exist for income inequality.

Previous research has provided an abundant background on the subject of income inequality; however, the manner in which the unit of observation is examined has resulted in biased and inconsistent results. While literature has begun to explore the possibility of a contagion effect with regard to growth, there has yet to be any research regarding whether income inequality itself is also transmissible. This paper answers the question by allowing for a spatial factor among adjacent U.S. states and examines Census Bureau data over a 20-year time span to determine that a significant transmission effect does exist among U.S. states.

II. Literature Review

An increasing standard of living through the achievement of economic growth and rising real wages carries with it the possibility of positive as well as negative externalities. The communicable effects from these negative externalities fosters an environment where a more unequal distribution of income and wealth within a society causes a divergence among groups in terms of wealth, increasing social tensions within and across borders; thus, an intensification of income inequality may prove to affect not only the initial recipients but neighboring regions as well.

Growth literature relating to the transmission effects of economic activity has identified a variety of channels through which growth may be transmitted. Easterly and Levine (1998) argue that a social consensus among different ethnic groups within both individual borders as well as among groups of actors, as to the allocation of resources, proves to alleviate tensions or disagreements that may disrupt or cause unease for businesses looking to invest. Stable environments socially, allay fears of investors and encourage investment, providing an incentive for government entities to encourage cooperation among its citizens. As Zak and Knack (2001) explain, a steady social atmosphere increases levels of trust among economic agents leading to an increase in the levels of investment and growth. Untrustworthy governments or societies indicative of internal strife and disagreement, lead to a reduction in opportunities for not only the locale in question but for neighbors as well, reducing the appeal for immigration and the supply of human capital (Easterly and Levine, 1998)

Politically, unity allows for the ratification of policies conducive and attractive to potential spending. Policies that work toward decreasing the cost associated with doing business, such as tax incentives, have been shown to encourage the relocation of businesses because of the benefits associated. In Africa, Easterly and Levine (1998) found that effective policies tend to be copied by neighboring countries creating a multiplicative effect of approximately 2.2 times for the entire group of nations enacting similar policies. Perotti (1993) shows that growth may be influenced by the degree of liberalization with regard to redistribution. Perotti finds that the focus of investment may carry with it positive externalities for the labor force in an effort to increase productivity. Policies aimed to encourage economic freedom, which allows for greater economic activity with lesser regulation, have been shown to achieve higher growth rates than those with more regulation (Carter, 2006; Barro, 2000; Ashby and Sobel, 2007; Berggren, 2007), supporting the finding of Perotti, whereby educational attainment may be increased in conjunction with economic freedom. Greater deregulation allows businesses to operate more freely, encouraging greater economic activity and the creation of jobs. In theory, potential earnings are increased for those participating in the labor force, helping to increase per-capita income.

Economically a more stable environment both socially and politically impacts potential and existing growth rates, the impacts of which may be found in existing capital stock levels. Physical as well as human and social capital appeal to businesses due to the potential increases in productivity and a reduction in operating costs. Complementary capital levels found in neighboring areas encourage businesses to locate where these externalities may prove to spillover and benefit their individual operations. Bazo et. Al (2004) show through a simple Solo growth model, that the return to capital experiences a significant multiplicative return when taking into account neighboring capital levels. These returns were influenced through the proximity to adjacent regions in the European Union (EU) whose infrastructure and capital resemble that of their own. Revenues can then be shown to surpass those experienced individually, confirming the existence of a growth contagion among neighboring regions in the EU. Additional research, through the incorporation of a spatial lag model, supports this finding in U.S. states, showing a 1% increase in income growth to be positively contributing to the growth rate of income for neighbors by 0.23% (Garret et Al., 2007).

The existence of a relation among U.S. states with regard to income transmission and growth carries with it the implication that income inequality may also exhibit this same characteristic. Income inequality convergence, examined by Panizza (2001) and Ezcurra and Pascaul (2009), discusses the possibility of a convergence among gini coefficients by showing that for the U.S., the average gini coefficient for the 48 contiguous states began to accumulate around the mean. This decrease in the tails shows that states are beginning to converge toward the mean, suggesting similar levels of income inequality. Falling inequality within more unequal states towards the mean, and rising inequality within states with more equal income distributions over time has implicit implications that a spatial factor among U.S. states is present. While the speed with which this occurs is uncertain, significant empirical evidence shows that it does exist. This theory falls in line with Kuznets (1955), who hypothesized that economic development and income inequality resemble an inverted U shape through the creation of new specialized skill industries. New revenue becomes directed toward the owners of capital while at the same time the labor forces gains specialized skills, increasing productivity and incomes for labor. This encourages income inequality until some apex on the curve, whereby income inequality will decrease as knowledge and skill spread throughout the population, redistributing the income concentration formerly enjoyed by the owners. Implicitly, this assumes high levels of development accompany increasing income, therefore, income inequality is predicted to decrease after an economy and per-capita income reaches some point. Additionally, Levernier et al (1995) point out that a transient labor force allows for mobility among levels of human capital for states. This flow of capital also presents evidence for the occurrence of a transmission effect in both growth as well as income inequality.

In all cases it may be shown that a proximity to neighboring entities exhibiting like characteristics socially, politically, and economically encourages economic growth and development. Literature associated with income inequality has thus far implicitly assumed the unit under observation to be an individual entity, thereby ignoring any spatial elements (Rey and Montouri 1998). Ignoring cross border influences or spillovers from various determinants means that previous research may be shown to suffer from an omitted variable bias. Including a spatial element into regression models, while controlling for previously identified determinants in the sociological and economic literature allows unbiased and consistent regression results regarding the determinants of income inequality. This study is the first to explore whether a contagion effect does in fact exist regarding income inequality between neighboring states in the U.S. Research into the transmission effects of inequality on neighboring states and regions are thereby warranted as a result of this possibility.

III. Data

This paper analyzes trends in income inequality for the contiguous 48 states. The states of Hawaii and Alaska were excluded because they have no adjacent neighbors, limiting any meaningful analysis with regard to these two states. Panel data following the conterminous U.S. was obtained from the Bureau of the Census, Bureau of Labor Statistics, and the Bureau of Economic Analysis for the years 1980, 1990, and 2000. The quality of the data and the homogenous nature of the states economically and politically allows for consistent regression analysis, eliminating any discrepancies normally found in cross-national studies. Summary statistics for control variables may be found in *Table 1*[1].

A brief description of control variables may be found in *Table 2*. The dependent variable for regression analysis is the gini coefficient, which measures the distribution of income over each individual state population. The gini coefficient ranges from 0 to 1 with values closer to 0 indicating more equality and 1 representing a concentration of wealth in fewer hands. State specific gini coefficients were obtained from census data for individual states thereby providing a unit of evaluation for analysis. The average gini value found in the 48 states over

[1] A correlation table for controls may be found in the appendix.

Table 1. Variable Names and Descriptions[2]	
VARIABLE	
GINI	State specific income inequality measures
Neighbor Gini	Average of surrounding state gini coefficients
Ethno-Linguistic Fractionalization Index	Measurement of the severity of diversity within a state. Calculated as one minus the sum of each ethnicity squared individually.
Log of Real Per-Capita Income	State log of real per-capita income
Female Head of Household	Share of single female heads of household, no husband present
Over 65	Share of population aged 65 years and older per state
Over 65^2	Share of Population aged 65 years and older squared
Urban Population	Share of population residing in metropolitan statistical area (MSA)
Urban Population^2	Share of populating residing in MSA squared
High School Degree	Population 25 years and older with a high school degree
Educational distribution	The ratio of the share of the population without a high school degree divided by the share of individuals with a bachelor degree or greater
Log of Transfers Payments	Log of Government transfer payments to individuals by state
Farm Employment	Share of agricultural employment by state
Manufacturing Employment	Share of manufacturing employment by state
Neighbor Variables[3]	Average of each variable for adjoining states

[2] Variables follow U.S. Census Bureau and other like government agencies heretofore mentioned. Variables have been modified in name only for the sake of simplicity and data adhere to U.S. Census Bureau guidelines and definitions. Occupational and educational shares were calculated as a percentage of total state employment and population.

[3] Note: neighbor variables do not include data for which the state in question is being calculated, only neighboring or adjacent states.

the sample period was 0.419[4]. Utah had the minimum value, 0.3625, during 1990 and Vermont had a maximum of 0.5071 measured for the year 2000. The independent variable of interest is the neighboring gini coefficient. For each of the 48 states, an average of the gini coefficient for the adjacent bordering states was calculated and used as a measure for surrounding inequality. For example, summing Idaho and Oregon's individual gini coefficient and dividing by 2 resulted in a neighbor gini for the state of Washington. The average level of neighboring inequality, measured at 0.4196, was only marginally different than that of the left hand side variable[5]. Maine experienced the lowest neighboring gini levels in 1990, 0.365, while Connecticut had the highest, 0.4841, for the year 2000.

The neighbor variables were calculated for each individual control variable incorporated into the model. The calculation of the neighbor variables thus provides the foundation for the comparison of not only neighboring inequality but each specific control variable as well. A core assumption of this paper assumes that there is a contagion effect across borders; therefore, the formulation and inclusion of these variables will serve to correct for the correlation between the neighbor gini and the error term. This correction will assist in the calculation of our model and allow the neighboring inequality to be unbiased and consistent during regression procedures.

A variety of control variables and channels through which they may influence income inequality were identified via previous literature. Variables representing demographic characteristics include: measures of educational attainment, percentage of female-headed households, ethno-linguistic fractionalization (E.L.F.), occupational characteristics, share of individuals over the age of 65 years, and urban population. The latter two terms, share over 65 years and urban population, were both squared to determine whether a quadratic relation exists. If this relation proves significant one may draw the conclusion that an increasing (decreasing)

[4] The U.S. saw an increase of approximately 13% (12.98%) in the average gini coefficient over the sample period.
[5] Neighboring income inequality increased slightly less over the period by 12.85%.

urban and elderly population may actually cause income inequality to increase (decrease) beyond some designated point.

Educational attainment is characterized through the share of the population 25 years and older who have obtained a high school degree as well as the ratio of individuals with no high school degree to those with a bachelor degree and above. Educational attainment has shown to be a contributing factor in combating income inequality (Bryan and Martinez 2008). Education has a positive correlation with earnings potential; thus, as wages become more equal across the population, income inequality is expected to decrease as educational attainment increases. Also, skill and knowledge diffusion across society allows for greater economic growth across new and expanding industry (Neilson and Alderson, 1995). The number of individuals expected to have received a high school degree is anticipated to exceed those who have acquired a bachelor degree; therefore, a high school degree is likely to encompass a wider throng of individuals considered a part of the labor force within a state and proves to be a better indicator than that of a college education. Additionally, the ratio of those without a high school degree to those individuals 25 years and older with a bachelor degree provides a measure of how unequal the educational distribution within a state has become. A larger ratio indicates a more polarized society with regard to educational attainment.

The ethno-linguistic fractionalization (E.L.F.) index is a measure of the diversity within a state. Calculation of the E.L.F. requires subtracting all of the proportions of each ethnicity squared from 1. The E.L.F. ranges from 0 to 1 with values closer to 0 representing a more homogeneous culture ethnically, while a value of 1 indicates a highly diversified and fractionalized society. A homogeneous environment ethnically may also play a significant role in the operation of the economic system, as Zak and Knack (2001) explain. Trust among economic agents, encouraged through cultural uniformity, is predicted to increase investment and may prove to be a contributing factor to growth and ultimately income inequality. Therefore, diversity (E.L.F.) is hypothesized to have a negative relation to the left hand side variable.

Table 2. Summary Statistics				
Variable	Mean	Std. Dev.	Min	Max
Gini	0.4193667	0.0294081	0.3625	0.5071
Neighbor Gini	0.4196083	0.0254291	0.365	0.4841
High School	0.748991	0.0839076	0.531	0.8795
E.L.F.	0.2976234	0.1566722	0.0293807	0.661324
Share over 65	0.1217521	0.0187597	0.0746	0.183
Female Headed Households	0.1178934	0.0245263	0.073	0.1835509
Urban Pop.	0.5223125	0.2605668	0.1528	0.9371
Log of Income	9.737182	0.4757674	8.8544	10.6435
Log of Transfers	15.71809	1.176421	12.7976	18.5594
Agricultural	0.0370882	0.0292174	0.0022	0.1531
Manufacturing	0.1414799	0.0568948	0.0374	0.2746

Previous literature notes that female-headed households experience greater difficulties with regard to earnings. The increasing burden placed upon single mothers as they tend to household commitments causes a decrease in labor force participation and earnings potential (Lee 2007).

The anticipated link to the dependent variable is expected to be positively associated. Additionally, a higher cost of living within urban areas increases the burden upon low-income individuals, reducing the amount of disposable income and savings potential among this segment of the population. As the share of the population over the age of 65 increases income inequality is also expected to increase. The logic behind a positive expectation lies in understanding that a majority of the population over 65 is retired, meaning incomes then become fixed (Devaney ET. Al 2007). A large portion of the population receiving a fixed income allows for widening income gaps between themselves and the rest of the population.

Occupational characteristics include the share of employment within the manufacturing and agricultural sectors. Manufacturing has historically been associated with higher skilled labor requiring longer amounts of specialized training (Mouw and Kalleberg 2010); thus, hourly wages and income related to this sector typically exceed those of a homogeneous wage industry, such as agriculture. As Levernier et al (1995) point out, "with a nationally declining share in the goods producing sector, its role in reducing income inequality in all states has diminished" (Levernier et al, p. 371). Thus, as more jobs become available in manufacturing, abatement in income inequality is to be expected. An industry such as agriculture, where the volatility in wages occurs to a much lesser degree, carries with it the expectation of a positive sign.

Per-Capita income will be used as an economic indicator and is expected to contribute positively to income inequality; therefore, log of real per-capita income is expected to show a positive effect upon the dependent variable. Increasing income levels accompanying growth, distributed unevenly among different groups, constitutes the foundation for income inequality.

Policy initiatives are represented through transfer payments made to individuals. Transfer payments include programs such as: retirement and disability insurance benefits, medical payments, unemployment insurance payments, and veteran's benefits, among others (U.S. Census Bureau). Transfer payments directly impact those in need at the lower end of the income spectrum; therefore, including a measure of funds allocated directly to this segment of the population enable analysis with regard to the effectiveness of aid on income inequality. Redistributive efforts, in an attempt to achieve a more equal income distribution, aim to accomplish the goal of eliminating the need for aid entirely so that funds may be allocated to sectors such as education (Perotti 1993). The assumption that welfare payments reduce inequality thus leads to a predicted negative relation with the dependent variable.

IV. Empirical Model

The empirical literature relative to income inequality has thus far utilized ordinary least squares (OLS) to examine the statistical significance of determinants upon the null hypothesis that a given control has no effect upon income inequality. This technique has been widely used throughout previous literature and results coincide with prior research. *Table 4*, which may be found in the appendix, summarizes initial regression results based upon pooled ordinary least squares with the variable of interest showing 5% significance. The proposed model, based upon the growth transmission literature, differs in that it takes into account neighboring spillover effects, avoiding the omitted variables problem present in previous studies, resulting in robust estimation of the control variables. A two-stage least squares technique (2SLS) with instrumental variables (IV) showed that these same results hold. Estimations prove more efficient than normal OLS, providing unbiased and consistent beta coefficients. The goodness of fit displayed by the 2SLS technique, provided support that this model was more appropriate.

Introduced into the two-stage model are control variables associated with neighboring demographic, economic, and policy initiatives explained previously, testing the significance of previous income inequality studies. *Equation 1*, shown below, represents the mathematical formula used for OLS regression analysis.

$$\text{Equation 1: } Y_{it} = \beta_0 + \beta_1 X_{it} + u_{it}$$

The above equation represents income inequality for an individual state (i) at time (t) where X represents a vector of control variables plus an error term. As mentioned previously, the inclusion of state data as well as neighbor variables, representing spatial effects excluded from previous studies, will be included. The neighbor gini variable poses the only significant problems with regard to obtaining unbiased estimates due to the correlation with the error term. Since the correlation between the right hand side variable and the error term is not equal to zero, *Corr*

$(NGini,U) \neq 0$, the elimination of the correlation must occur to eliminate bias and inconsistent results. The estimation of the model, without taking this factor into account performs poorly. To eliminate endogeneity, the neighbor gini coefficient is transformed by the use of instrumental variables. The neighbor gini is now introduced as a function of demographic, economic, and policy neighbor variables as shown in equation 2.

Equation 2: Neighbor Gini= F {Neighboring: Demographic, Economic, Policy}

This instrument will now be included within the vector of control variables in equation 1 in the place of the neighbor gini. State specific variables hold the expectation of $Corr(X_{i-1},U)=0$; thus, the use of all state variables acting as their own instruments is acceptable in this framework. *Equation 3* displays the new regression that has thus eliminated the endogeneity, allowing for the assumption of a normal distribution within the error term.

$$\text{Equation 3: } Y_{it} = \beta_0 + \beta_1 NGini + \beta_2 X_{it} + u_{it} \qquad u_{it} \approx (0,\sigma^2)$$

Using this model and incorporating the instrumented variable allows for a more efficient approach to estimation than that of OLS.

V. Results

Regression results were acquired through two-stage least squares estimation using instrumental variables. The first stage regressions included all neighboring variables as instruments for the endogenous neighboring gini coefficient[6]. An F-statistic of 11.02 for the first stage with a Shea Partial R^2 of 0.547 and a partial R^2 equaling 0.547 provide a justification for the significance of the instrumented variable. Fitted values from the first stage regression were then included within second stage procedures in place of the neighbor gini. A Hansen test was performed,

Table 3. **Dependent Variable Gini**

Variable	Coefficient	Robust St. Error	Z	P > |z|
Neighbor Gini	0.4044	0.1676	2.41	0.016**
High School	0.0744	0.0508	1.46	0.143
Educational ratio	0.0076	0.0039	1.96	0.05**
E.L.F.	0.0215	0.0129	1.67	0.095*
Over 65	1.798	.5459	3.29	0.001***
Over 65^2	-7.2465	2.0241	-3.58	0.000***
Female Heads of Household	0.1438	0.1021	1.41	-0.0564*
Urban Pop.	0.139	0.0542	2.57	0.010***
Urban $Pop.^2$	-0.0859	0.0409	-2.10	0.036**
Log of Income	-0.1771	0.0433	-4.09	0.000***
Log of Transfers	-0.0836	0.0256	-3.26	0.001***
LN(Income)*LN(Transfers)	0.0092	0.0026	3.55	0.000***
Agricultural Employment	0.0823	0.0686	1.20	0.230
Manufacturing Employment	-0.1206	0.028	-4.30	0.000***
South	-0.0073	0.005	-1.47	0.141
Midwest	-0.0122	0.005	-2.49	0.013**
West	-0.0168	0.0061	-2.77	0.006***
1990	0.0291	0.0094	3.09	0.002***
2000	0.0808	0.0224	3.61	0.000***
Constant	1.6231	0.4331	3.75	0.000***
Observations		144		
F Statistic (19, 124)		41.19		
Centered R^2		0.8116		
Uncentered R^2		0.9991		

Standard errors were corrected using White's general correction for heteroskedasticity.
*** 10% significance, ** 5% significance, ***1% significance respectively.**

[6] Instrumental variables included neighboring: share of population with a high school degree, educational distribution ratio, ethno-linguistic fractionalization index, share of the population 65 years over, 65 and over squared, the share of single female heads of households, urban population, urban population squared, log of real per-capita income, log of transfer payments to individuals, an interaction term between income and transfer payments, and shares of agricultural and manufacturing employment.

testing for the over identification of instrumental variables resulting in 10% significance; therefore, the possibility of instrument over-identification is eliminated, verifying the robustness of the instruments in use. Final regression results may be viewed in *table 3*.

Resulting robust standard errors, corrected for heteroskedasticity using White's method, are shown in column three of *table 3*. A second stage F statistic of 41.19 and an R^2 equaling 0.8116 shows a significant level of explanatory power contained among right hand side variables. *Table 3* shows a positive 5% significant two-tailed test for the independent variable of interest (ngini). This finding is significant because it rejects the null hypothesis that there is no spillover effect from neighboring states. In other words, the associated beta coefficient (.404) shows that with a 10% increase in income inequality for state A, neighboring state B should expect an increase in their own income inequality of approximately four (4) percentage points. Therefore, the magnitude and significance of the contagion effect relative to income inequality implies meaningful consideration is warranted.

Regression results show that signs for a majority of the control variables agree with previously literature. An elderly population shows a positive but diminishing relation with income inequality through the quadratic term, indicating the effect that the share of the population over 65 will contribute to rising inequality until the proportion of the population reaches 12.4%. The urban population exhibits similar patterns showing that income inequality will increase at a decreasing rate until the percentage of the population residing in an urban setting reaches 80.9% respectively. Increasing per-capita income and transfer payments to individuals each predict a negative partial effect upon the gini coefficient independently. Agricultural employment is positive but without significance, while manufacturing employment confirms previous findings that inequality will be negatively influenced as this job sector expands, providing more blue-collar jobs. An increase in the share of female-headed households confirms the anticipated direction, with 10% significance.

Contrary to previous literature, analysis of the data provides some interesting results with regard to the remaining control variables. Demographics representing educational attainment show positive signs, indicating an effect opposing a majority of prior research. The share of the population with a high school degree shows no significance, however, the ratio of those with no high school to degree to those with at least bachelor degree or greater is significant at 5%. The expansion of an industry or occupation that may be more applicable to those with a high school degree, such as manufacturing employment, discussed previously, is one example where the expansion of a particular sector may assist those with high school degrees.

The ethno-linguistic fractionalization index (E.L.F.) showed a positive and significant relationship at the 5% level with the dependent variable. However, the sign associated with the variable is not as predicted in the literature, leading one to conclude that diversity may actually contribute to the levels of investment, rather than decrease it. The increases in investment would then spur growth followed by per-capita income and eventually income inequality. This finding contradicts the hypothesis put forth by Zak and Knack (2001), that diversity decreases trust and investment, leading to a conclusion that their hypothesis may be better explained by a polarization index rather than by ethnicity.

Finally, an interaction term between log of per-capita income and log of transfer payments allows an analysis of the partial effect that transfer payments are expected to show on the gini coefficient, given an increase in per-capita income. The interaction term indicates a positive sign with 1% statistical significance. The level of significance not is surprising given both log of per-capita income and log of transfers share this same quality. The fascinating aspect of the interaction lies in the fact that the relation displays a positive effect upon the dependent variable, indicating that as per-capita income increases, transfer payments contribute to income inequality, rather than decrease it. Tomljavovich (2004) provides support for this finding by pointing out that as transfer payments increase, a rising disposable income fosters spending and consumption from the transfer recipients, encouraging businesses to expand in an effort to meet increased demand. The cyclical effect associated with transfer payments may ultimately result in the growth of income inequality rather than a reduction. However, as this may be one plausible explanation for the findings, it must be remembered that it is not the only one, and since this paper is not intending to determine causality between transfers and income inequality, the reasons for this relation are beyond the scope of this paper.

V. ***Conclusion***

The existence of a transmission effect with regard to growth has been discussed at length in previous literature, determining there is a significant spillover effect occurring among neighbors. The magnitude of this relationship varies according to numerous demographic, economic, and policy factors identified as significant contributors to economic activity. A stable society, both socially and politically, allows for increased involvement by investors, which influences the potential for rising per-capita income.

This relationship implies the presence of a contagion effect for not only economic growth but for income inequality as well. This paper was the first to incorporate a spatial relation into regression analysis for income inequality. Findings indicate the presence of an omitted variable bias among previous research resulting in biased and inconsistent estimation. Neighboring income inequality, as measured by the average of gini coefficients for all bordering states, showed positive and statistically significant results that imply a 10% increase in a neighbor's gini coefficient will cause an adjacent state's to rise by approximately four (4) percentage points.

Controlling for demographic characteristics showed income inequality was significant and positively associated with the educational ratio , but insignificantly related to the shares of the population with a high school diploma, contradicting previous works. Also, findings confirming prior literature indicate single female-headed households, the level of ethnic diversity, agricultural employment, and the shares of the population over the age of 65 and urban population contribute to inequality levels. The latter two show quadratic relations indicating positive but decreasing effects upon the dependent variable respectively.

Negatively associated control variables included the share of those employed in the manufacturing sector, rising per-capita income, and transfer payments made to individuals, representing governmental policy initiatives. These findings mirror previous literature, and confirm the theoretical relationships discussed previously between those and the dependent variable.

Lastly, the effect of government transfer payments with respect to an increase in per-capita income levels was shown to have a statistically significant effect on *increasing* income inequality. In other words, as per-capita income increases, transfer payments would be expected to cause a widening gap between upper and lower income groups. It must be understood that this relationship does not imply causality; therefore, they should be interpreted with caution.

The contagion effect among neighboring states emphasizes the importance of cooperation among states. The impact of a policy initiative may be argued to carry with it implications not only for the initiating state, but also for all those with propinquity geographically, socially, and economically. The homogeneous nature of U.S. states proves to encourage the transmission of both positive as well as negative externalities. The knowledge of this relationship is hoped to encourage policy makers to more carefully examine the residual effects for their neighbors as well.

The intent of this research is to provide a springboard for the examination of the contagion effect of income inequality among the U.S. states. The decomposition of various demographic characteristics including, but not limited to, occupational structure and policy initiatives may prove to shed further light on additional determinants of income inequality. Breaking these categories down into smaller segments may assist in understanding the causality behind the relationships presented within this paper.

Bibliography

Andrews, Dan, Christopher Jencks, and Andrew Leigh. "Do Rising Top Incomes Lift All Boats?." 11.1 (2011): 1-43.

Ashby, N., and R. Sobel. "Income inequality and economic freedom in the US states." Public choice 134.3-4 (2008):329-346.

Berggren, N. "Economic freedom and equality: Friends or foes?." Public choice 100.3-4 (1999):203-223.

Bryan, Kevin A., and Leonardo Martinez. "On the Evolution of Income Inequality in the United States." *Federal Reserve Bank of Richmond Economic Quarterly* 94.2 (2008): 97-120.

Carter, J. "An empirical note on economic freedom and income inequality." Public choice 130.1-2 (2007):163-177.

Devaney, Sharon A., Sophia T. Anong, and Stacy E. Whirl. "Household Savings Motives." *Journal of Consumer Affairs* 41.1 (2007): 174-186.

Easterly, William, and Ross Levine. "Troubles with the Neighbours: Africa's Problem, Africa's Opportunity." *Journal of African Economies* 7.1 (1998): 120-142.

Ezcurra, Roberto, and Pedro Pascual. "Convergence in Income Inequality in the United States: A Nonparametric Analysis." *Applied Economics Letters* 16.13-15 (2009): 1365-1368.

Frank, Mark W. "Inequality and Growth in the United States: Evidence from a New State-Level Panel of Income Inequality Measures." *Economic Inquiry* 47.1 (2009): 55-68.

Garrett, Thomas A., Gary A. Wagner, and David C. Wheelock. "Regional Disparities in the Spatial Correlation of State Income Growth, 1977-2002." *Annals of Regional Science* 41.3 (2007): 601-618.

Gordon, Robert J. "Has the Rise in American Inequality Been Exaggerated?." *Challenge* 52.3 (2009): 92-120.

Kuznets, S. "Economic growth and income inequality." *American Economic Review* 45.(1955): 1-28.

Lee, Chulhee. "Rising Family Income Inequality in the United States, 1968-2000: Impacts of Changing Labor Supply, Wages, and Family Structure." *International Economic Journal* 22.2 (2008): 253-272.

Levernier, W., M. Partridge and D. Rickman. "Differences in metropolitan and nonmetropolitan US family income inequality: A cross-county comparison." Journal of urban economics 44.2 (1998):272-290.

Levernier, W., D. Rickman and M. Partridge. "Variation in US state income inequality: 1960-1990." International regional science review 18.3 (1995):355-378.

Lopez-Bazo, Enrique, Esther Vaya, and Manuel Artis. "Regional Externalities and Growth: Evidence from European Regions." *Journal of Regional Science* 44.1 (2004): 43-73.

Moller, Stephanie, Arthur S. Alderson, and Francois Nielsen. "Changing Patterns of Income Inequality in U.S. Counties, 1970-2000." *American Journal of Sociology* 114.4 (2009): 1037-101. Print.

Moore, William S. "Income Inequality and Industrial Composition." *Public Administration Quarterly* 33.4 (2008): 552-81. Print.

Mouw, Ted, and Arne L. Kalleberg. "Occupations and the Structure of Wage Inequality in the United States, 1980s to 2000s." *American Sociological Association* 75.3 (2010): 402-31. Print.

Nielsen, François, and Arthur S. Alderson. "INCOME INEQUALITY, DEVELOPMENT, AND DUALISM: RESULTS FROM AN UNBALANCED CROSS-NATIONAL PANEL." *American Sociological Review* 60.5 (1995): 674-701.

Panizza, Ugo. "Convergence in Income Inequality." *Journal of Income Distribution* 10.1-2 (2001): 5-12. Print.

Robert J Barro. "Inequality and growth in a panel of countries. " *Journal of Economic Growth* 5.1 (2000): 5. ABI/INFORM Global, ProQuest. Web. 22 Feb. 2011.

Ram, Rati. "Level of Economic Development and Income Inequality: Evidence from the Postwar Developed World." *Southern Economic Journal* 64.2 (1997): 576-583.

Tomljanovich, Marc. "The Role of State Fiscal Policy in State Economic Growth." *Contemporary Economic Policy* 22.3 (2004): 318-330.

Wu,X, Perloff,J, Golan,A. "Effects of government policies on urban and rural income inequality." Rev.Income Wealth (2006): 2, 213-235.

Zak, Paul J., and Stephen Knack. "Trust and Growth." *Economic Journal* 111.470 (2001): 295-321.

Appendix

Table 4. OLS Regression				
	Dependent Variable Gini			
Variable	Coefficient	Robust St. Error	T	P> |z|
Neighbor Gini	0.3086	0.1469	2.10	0.038**
High School	0.0825	0.0633	1.30	0.195
Educational Ratio	0.0089	0.0049	1.82	0.071*
E.L.F.	0.0233	0.0137	1.70	0.092*
Over 65	2.0143	0.6579	3.06	0.003***
Over 65^2	-8.074	2.4364	-3.31	0.001***
Female Head of Household	0.135	0.1096	1.23	0.220
Urban Pop.	0.2019	0.0683	2.96	0.004***
Urban $Pop.^2$	-.1266	0.0494	-2.56	0.012**
Log of Income	-0.1875	0.04972	-3.77	0.000***
Log of Transfers	-0.0899	0.0301	-2.99	0.003***
LN(Income)*LN(Transfers)	0.0099	0.0031	3.21	0.002***
Agricultural Employment	0.1206	0.0768	1.57	0.119
Manufacturing Employment	-0.1141	0.0313	-3.65	0.000***
South	-0.0068	0.0064	-1.06	0.292
Midwest	-0.0145	0.0061	-2.39	0.018**
West	-0.0179	0.0079	-2.28	0.025**
1990	0.031	0.0108	2.87	0.005***
2000	0.1004	0.0263	3.82	0.000***
Constant	1.7132	.4979	3.44	0.001***
Observations		144		
F statistic		38.53		
R^2		0.8145		

Standard errors were corrected using White's general correction for heteroskedasticity.
*** 10% significance, ** 5% significance, ***1% significance respectively.**