Is Income Inequality Endogenous in Regional Growth?

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Abstract

This study focuses on testing the relationship between income inequality and growth within U.S. counties, and the channels through which such effects are observed. The study tests three hypotheses: (1) income inequality has an inverse relationship with growth; (2) regional growth adjustments are the channels through which the inequality and growth are equilibrated; and (3) income inequality is endogenous to regional growth and its adjustment. Results, based on a system of equations estimation, confirm the hypotheses that income inequality has a growth dampening effect; income inequality is endogenous to regional growth and growth adjustment; and the channels through which income inequality determines growth are regional growth adjustments, such as migration and regional adjustment in job and income growth. Results have numerous policy implications: (1) to the extent that income inequality is endogenous, its equilibrium level can be internally determined within a regional growth process; (2) to the extent that traditional income inequality mitigating policies have indirect effect on overall regional growth, they may have unintended indirect effects on income inequality; and (3) to the extent that regional growth adjustment also equilibrates income inequality, such forces can be utilized as policy instruments to mitigate income inequality, and its growth dampening effects hence forth.

Key Words: Income inequality, economic growth, Gini coefficient, growth modeling, population change, per capita income.

JEL Classification codes: I32, J15, O18, P25, R11, R23, R25, R51, R53, R58

Introduction

Income distribution and its impact on the trend and pattern of economic growth has been a topic of contention in the literature. While numerous cross-country analyses revealed negative effects of inequality on growth, numerous studies emerged and provided evidence on a positive relationship. From an economic policy perspective, closer and better understanding of the links between income inequality and economic growth provides valuable policy insights. For instance, while evidence suggesting a negative relationship may encourage an economic development policy and strategy that targets ameliorating inequality, evidence of a positive relationship may suggest a non-aggressive distributional policy to maintain economic growth within an existing inequitable income distribution. Therefore, better understanding of the income inequality-economic growth linkage and the channels through which such links are equilibrated remains crucial in informing economic development and distributional policies.

Income inequality is determined by many factors, including functioning of market systems, public policy, household choices, labor market conditions, human capital, growth rate of job and other opportunities, etc (Rubin, et al 2000; Burtless, 1990; Levy and Murnane, 1992; Becker 1991). Numerous studies that utilized cross-country time series data analysis suggest that greater income inequality could have negative impacts on the trend of economic growth (Alesina and Rodrik 1994, Persson and Tabellini 1994, Alesina and Perotti 1996, Dadkhah 2003, Davis 2007). In an intra-country regional analysis, Hailu, et al. (2008) also found a negative relationship.

Equally as important is explanation of the channels through which income inequality lowers growth performance. Some insights for the inverse relationship between inequality and growth in these studies are summarized by Aghion, et al. (1999). The study discusses that income inequality reduces investment opportunities, worsens borrowers' incentives, fuels political instability, and creates macroeconomic volatility and as a result, through appropriate channels, impacts economic growth.

Based on earlier works of Lewis (1954) and Kaldor (1957), numerous other studies, based on cross-country panel data analysis, established a positive relationship between income inequality and economic growth (Pasinetti 1962, Bourguignon 1981, Li and Zou 1998, Forbes 2000). In an intra-country Southern U.S. regional analysis, Ngarambe et al., (1998) also found a positive relationship between income growth and income inequality.

The channel through which a positive inequality-growth relationship could be observed is often argued from the perspective that the marginal propensity to save between higher and lower income groups is different. Given that investment is a positive function of saving, income inequality will be associated with growth. For instance, an unequal initial income distribution, with convex saving functions, can lead to growth in aggregate output (Bourguignon 1981).

A growing list of literature provides another insight into the inequality-growth debate by forwarding an alternative hypothesis that the relationship is non-linear over time. These studies suggest that growth rate is a non-linear function of inequality, specifically an inverted *U* function of income inequality (Gupta and Singh 1984, Aghion and Bolton 1997, Banerjee and Duflo 2003). Thus inequality initially leads to fast growth, but gradually constraints it.

A number of studies also found no relationship between income inequality and growth performance (Lozier 1993, Baro 2000). Moreover, based on extensive literature review, Benabou (2000) noted that OLS based estimation to identify the effect of inequality on economic growth found negative relationships. Banerjee and Duflo (2003) also noted that fixed-effects panel regression based studies found positive relationships; while 3SLS based estimations have insignificant results. Given the wide array of divergent findings, numerous hypotheses on the channels through which inequality influences growth, and the divergence in findings based on modeling and estimation framework, re-examining the nature of relationship between income inequality and growth from alternative frameworks and estimation approaches adds value to the discussion and the policy implications thereof.

The main goal of this paper is to examine the relationship between inequality and economic growth performance, and the channels through which such relationships can be affected. To accomplish these goals, the study: (1) focuses on U.S. county level data for 1990 and 2000 to explain the intra-country relationship between inequality and growth within similar legal, institutional, and market conditions; (2) utilizes an augmented regional growth model that relates income inequality to patterns in income, employment and population growth hence identifying mobility of people and changes in job and income growth across regions as equilibrating forces between inequality and growth; (3) endogenizes income inequality within a regional growth framework, so that not only does income inequality determines growth, but regional growth patterns endogenously determine subsequent income inequality; and (4) following a systems of equations approach with a two-stage-least-squares estimation procedure, provides robust estimation of the inequality and growth relationship. The central hypotheses to be tested in this study are:

1. Income inequality negatively impacts regional growth.
2. The channel through which income inequality influences growth performance is regional adjustment in migration, job opportunities and income growth.
3. Income inequality is not exogenous, and hence is determined simultaneously within a region growth adjustment process.

Methodology

Departing from most of earlier modeling work used to test the effect of income inequality on economic growth, we focus on regional economic framework. Modeling the relationship between economic growth and income inequality from a regional economic perspective requires the proper understanding of the factors that affect differences in regional economic growth. Investigating the relationship between income inequality and growth using a regional growth framework has a number of advantages. First, a regional approach adds value by explicitly establishing links between regional migration patterns, differences in regional job creation, and their impact on income growth, along with consideration of income inequality. Second, apart from many studies that focus on cross-country comparisons, cross-regional assessment of the impact of income inequality on growth provides additional explanations on the pathway through which income inequality can impact economic growth. Part of the explanation on how inequality results in slower economic growth can be found in cross-regional migration choices and employment creation differences that might be indirectly affected by income inequality. Third, a regional approach can provide policy relevant parameters that can be targeted at the regional and sub-regional levels to mitigate the effect of income inequality on economic growth, or to target minimization of income inequality itself.

Fundamentally, population, employment and income growth over time can determine the nature of regional economic growth. Regional science literature establishes endogeneity in population, employment, and income growth in a region (Roback 1982, Carlino and Mills 1987, Duffy-Deno 1998, Deller et al., 2001). Growth equilibrium modeling enables to simultaneously estimate these endogenous growth variables and allow examination of the relationship of income inequality and growth within the broader regional framework. Following the early work of

Carlino and Mills (1987) and further developments by Deller et al. (2001), a simultaneous growth equilibrium model can be specified as:

(1) $$PCI_i^* = f(POP_i^*, E_i^*, G_i^* \mid \Omega^{PCI})$$

(2) $$POP_i^* = f(E_i^*, PCI_i^*, G_i^* \mid \Omega^{POP})$$

(3) $$E_i^* = f(POP_i^*, PCI_i^*, G_i^* \mid \Omega^{E})$$

(4) $$G_i^* = f(POP_i^*, PCI_i^*, E^* \mid \Omega^{G})$$

where PCI_i^*, POP_i^*, E_i^* and G^* refer to equilibrium levels of per capita income, population, employment, and income inequality, respectively; Ω^{PCI}, Ω^{POP}, Ω^{E} and Ω^{G} refer to vectors of other exogenous variables having a direct or indirect relationship with per capita income, population, employment, and income inequality, respectively. Table 1 provides definitions and descriptions of these exogenous variables and their summary statistics.

Population and employment are likely to adjust to their equilibrium values with substantial lags (Mills and Price 1984). Similarly, per capita income also adjusts to its equilibrium value with lags. Therefore, the distributed lag equations may be specified as:

(5) $$PCI_i = PCI_{(t-1)i} + \lambda_{PCI}(PCI_i^* - PCI_{(t-1)i})$$

(6) $$POP_i = POP_{(t-1)i} + \lambda_{POP}(POP_i^* - POP_{(t-1)i})$$

(7) $$E_i = E_{(t-1)i} + \lambda_{E}(E_i^* - E_{(t-1)i})$$

(8) $$G_i = G_{(t-1)i} + \lambda_{G}(G_i^* - G_{(t-1)i})$$

Where λ_{PCI}, λ_{POP}, λ_E and λ_G are speed-of-adjustment coefficients with $0 \leq \lambda_{PCI}, \lambda_{POP}, \lambda_{E}, \lambda_G \leq 1$, and t-1 is a one period lag. This indicates that current per capita income, population, employment, and income inequality are dependent on their one period lags and on the change between equilibrium values and one lag period values adjusted at speed-of-adjustment values of λ_{PCI}, λ_{P}, λ_{E} and λ_{G}. Rearranging terms:

(9) $$\Delta PCI_i = \lambda_{PCI}(PCI_i * - PCI_{(t-1)i})$$

(10) $$\Delta POP_i = \lambda_{POP}(POP_i * - POP_{(t-1)i})$$

(11) $$\Delta E_i = \lambda_E(E_i * - E_{(t-1)i})$$

(12) $$\Delta G_i = \lambda_G(G_i * - G_{(t-1)i})$$

where ΔPCI, ΔPOP, ΔE and ΔG are changes in per capita income, population, employment, and income inequality, respectively. With substitution and rearranging of terms, the equations of the model in linear form can be specified as:

(13) $$\Delta PCI_i = \alpha_1 + \beta_{1PCI}PCI_{(t-1)i} + \beta_{2PCI}\Delta POP_i + \beta_{3PCI}\Delta E_i + \beta_{4PCI}\Delta G_i + \sum_i \delta_{iPCI}\Omega^{PCI} + \varepsilon_i$$

(14) $$\Delta POP_i = \alpha_2 + \beta_{1POP}POP_{(t-1)i} + \beta_{2POP}\Delta E_i + \beta_{3POP}\Delta PCI_i + \beta_{4POP}\Delta G_i + \sum_i \delta_{iPOP}\Omega^{POP} + \upsilon_i$$

(15) $$\Delta E_i = \alpha_3 + \beta_{1E}E_{(t-1)i} + \beta_{2E}\Delta POP_i + \beta_{3E}\Delta PCI_i + \beta_{4E}\Delta G_i + \sum_i \delta_{iE}\Omega^{E} + \vartheta_i$$

(16) $$\Delta G_i = \alpha_4 + \beta_{1G}G_{(t-1)i} + \beta_{2G}\Delta POP_i + \beta_{3G}\Delta E_i + \beta_{4G}\Delta PCI_i + \sum_i \delta_{iG}\Omega^{G} + \varpi_i$$

Equations (13) through (16) indicate that per capita income, population, employment and income inequality changes are dependent on their initial levels and changes of the other two endogenous variables, and vectors of other variables that affect the endogenous variables in the system. In such a system, the simultaneous interaction of changes in per capita income, population, employment and income inequality can be identified. More importantly, the effect of income inequality on changes in per capita income and other growth indicators can be identified.

In estimating the system in equations (13) through (16), the identification condition needs to be satisfied. Following the *order condition* of identification, if $M \leq EX$, where M is the number of right hand side endogenous variables in a given equation, and *EX* is the number of excluded exogenous variables from a given equation when compared to other equations in the system, then the order condition of identification is satisfied. Following the empirical estimation indicated in Table 2, one can easily determine that all equations in the system are identifiable using the order condition, i.e., $3 \leq 3$ for the population change equation, $3 \leq 3$ for the employment change equations, $3 \leq 3$ for the per capita income change equation, and $3 \leq 6$. The *rank condition* gives a more stringent condition on identification. In this case, if $EMX \geq \#M\text{-}1$, where *EMX* is the number of excluded endogenous and exogenous variables in a given equation compared to other equations in the system, and #*M*-1 is the total number of endogenous variables in the system minus one, then the rank condition is satisfied. Again following the empirical specification indicated in Table 2, one can determine that all equations in the system are identifiable using the rank condition, i.e., $4 \geq (4\text{-}1)$ for the population change equation, $4 \geq (4\text{-}1)$ for the employment change equations, $4 \geq (4\text{-}1)$ for the per capita income change equation, and $7 \geq (4\text{-}1)$ for the income inequality change equation.

Table 1.

TYPES AND SOURCES OF DATA

The study uses data of 3038 U.S. counties drawn from several sources. The study will construct and use county level data of change in population, employment, per capita income, and Gini coefficient from 1990 to 2000 as endogenous variables. The control variables reflect the fiscal, social, and economic factors that affect regional growth and income inequality. All these variables are from BEA-REIS, Census Bureau, and the Economic Research Service (ERS) of USDA. Table 1 summarizes the descriptive statistics of all the variables used in the study.

Model Results and Analysis

The estimated coefficients of the simultaneous system of equations and the statistical properties are given in Table 2. Based on adjusted R^2 statistics, the estimated model explains 23 percent, 82 percent, 51 percent and 66 percent of the variations in income inequality, population change, per capita income change, and employment change, respectively. Model results are presented based on the three stated hypotheses.

Table 2.

Does Income Inequality Negatively Affect Growth?

One central hypothesis in this study is whether income inequality negatively affects growth or not. The results from this study provide the following evidence: (1) when it comes to per capita income change, income inequality change is significantly and negatively related to income inequality. Counties becoming more inequitable had lower income growth; (2) income inequality is also negatively and significantly related to population growth. Counties with high income inequality change have lower population change, i.e., growingly more inequitable counties have lower population retention; (3) income inequality change is positively related to employment change. Counties that are growingly income inequitable have more job growth. Therefore, we conclude that while growing income inequality lowers regional growth performance through lower growth in income and population, that effect can be mitigated by employment growth. If the focus is purely the inequality-income growth relationship, the results is conclusively inverse. If the focus is the broader regional growth as defined by population, income and employment growth, then the overall conclusion is conditional. If the population out-migration and negative income effects of growing income inequality are more than the positive job growth effect, then overall regional growth impact of income inequality is negative.

However, if the job growth effect is substantially higher than the population and income decline effects, then the negative effect on the overall regional growth can be mitigated, and at times compensated. Therefore, our finding demonstrates that the impact of inequality on growth could be different across regions, and could also be inconclusive depending on which impact dominates.

Is Income Inequality Endogenous in Regional Growth?

Numerous studies tackled the impact of income inequality on growth, while regarding income inequality exogenous. This study modeled income inequality within the regional growth framework. Results suggest that indeed income inequality is endogenous to regional adjustment process, and regional growth in population, per capita income and employment have significant influences on the level of income inequality. Results suggest (1) counties with higher population growth have lower change in income inequality, that is places with growing population have a decline in inequality; (2) counties with higher per capita income growth have lower change in income inequality, that is counties with income growth have declining inequality; and (3) counties with higher employment growth have higher income inequality, that is counties with growing job opportunities also experienced a rise in inequality. The fact that population, employment and income growth have significant relationship with changes in income inequality provided us the basis to argue that income inequality is endogenous to regional growth adjustments, and therefore regional growth adjustment impacts the nature and pace of income inequality.

Is Regional Growth Adjustment the Channel through which Income Inequality Influences Growth Performance?

Understanding the channels through which income inequality affects growth performance is crucial beyond the debate of whether any such relationship exists in the first place. Cross-country studies have often focused on political instability, saving rates among the rich and the poor, patterns of investment, government policies, etc as the possible explanations for observed inequality-growth relationships. Within a country, the fact that institutions, markets, political system, and saving behavior are likely to be more homogeneous, such explanations are not sufficient to explain observed relationships between income inequality and growth within a country. We offer an alternative explanation. Results from this study suggest that there is a simultaneous relationship between regional growth in population, income and employment and changes in income inequality. Income inequality has a negative relationship with population and income growth (i.e., high inequality leads to out-migration and declining incomes) but a positive relationship with job growth. On the other hand, change in income inequality is negatively related to growth in population and income, but positively with growth in employment. These significant and simultaneous relationships suggest that regional growth adjustment have significant implications to changes in income inequality. Therefore, since income inequality is endogenous to regional growth adjustment, the channel of relationship between growth and inequality is established. The observed negative relationship between inequality and income growth can be explained as follows: high income inequality puts a downward pressure on population growth and income growth, which in turn result in an indirect negative job growth impact. Declining population and income further exacerbates income inequality, that then affect growth negatively further. This process continues until, across regions, migration, income growth and job growth are equilibrated, which determines an equilibrium level of income inequality. Any further disequilibrium on growth or in income inequality itself (for instance, through government policy) will lead to new regional growth and inequality adjustment process that will be equilibrated through migration and job creation (investment) across regions.

To demonstrate the direct and indirect channels through which inequality and growth are related in a regional growth framework, we provide four policy factors as external shocks and how the equilibrating process may occur: (1) education, (2) government expenditure, (3) unemployment rate, and (4) minority population.

Education: from the estimated results, education has a positive and significant direct effect on income inequality. The result suggests that education can increase income inequality. But education has a positive effect on per capita income change, and per capita income itself has a negative relationship with inequality. Thus, education has an indirect inequality dampening effect through its effect on income. Therefore, the net effect of education on income inequality depends on the magnitude of the direct and indirect effects. Education is thus one disequilibriating factor through which a direct and indirect effect of inequality can be observed and regional growth adjustment through income change plays an equilibrating role.

Government Expenditure: based on the regression results, government expenditure has a direct income inequality mitigating effect. However, government expenditure also has a negative relationship with population and per capita income change, and a positive relationship with employment change, all of which have an income inequality increasing indirect effects. Thus, the final effect of government expenditure on income inequality depends on the relative strength of the direct mitigating effect and the indirect increasing effects. Once again, regional growth adjustment through population, income and employment changes play an equilibrating role.

Unemployment Rate*:* the relationship between unemployment rate and income inequality is positive, i.e., a rise in unemployment exacerbates income inequality. Thus, unemployment has a direct inequality exacerbation effect. Unemployment also has a significant and negative relationship with population change. A fall in population change has an indirect effect of increasing income inequality. Therefore, a rise in unemployment rate has a direct and indirect effect of increasing income inequality, partially equilibrated through migration adjustments.

Minority Population: the role of immigrants and diversity on growth performance has been extensively discussed in the literature. Evidence from this study suggests that concentration of minorities has a direct income inequality exacerbation effect, but no significant indirect effects. Since most immigrants and other minorities have lower wages and occupy low paying jobs, larger concentration may affect existing income inequality.

Conclusion

This study focused on better understanding the links between income inequality and economic growth in the U.S. and the channels through which income inequality may influence growth performance. Departing from much of earlier works, the study (1) focuses on U.S. county level data to explain the inequality-growth relationship within similar legal, institutional, and market conditions; (2) utilizes an augmented regional growth model that relates income inequality to patterns in income, employment and population growth, where the latter growth factors are also equilibrating forces between inequality and growth; (3) endogenizes income inequality within a regional growth framework; and (4) following a systems of equations approach with a two-stage-least-squares estimation procedure, provides robust estimates of the inequality and growth relationship.

The study tests three hypothesis: (1) income inequality negatively impacts regional growth; (2) the channel through which income inequality influences growth performance is regional adjustment in migration, job opportunities and income growth; and (3) income inequality is not exogenous, and hence is determined simultaneously within a region growth adjustment process. Results from this study confirm the first hypothesis, that income inequality indeed has a growth dampening effect. Counties with higher inequality have slower growth. This finding provides additional credence to past studies that established an inverse relationship between income inequality and growth.

The study confirms that regional growth adjustment has a direct and indirect effect on income inequality, and regional growth adjustments could have an equilibrating effect on income inequality across regions. Places that have high income inequality, for instance, would have growth limiting outcomes, which results to regional migration, job growth and income growth adjustment effects. These forces in turn influence subsequent income inequality, until growth and inequality are equilibrated through regional growth adjustment.

The study also confirms the third hypothesis, i.e., income inequality is endogenous to regional growth. The implication of this finding is that to the extent that income inequality is endogenously determined in regional growth, patterns in regional growth could be both determinants and equilibrating forces for the endogenously determined income inequality.

Finally, by establishing that income inequality has an inverse relationship with growth and that income inequality is endogenous to regional growth factors whose adjustment equilibrate income inequality across regions, and by establishing that regional growth adjustment is the channel through which income inequality influences growth, this study contributed to the literature. Moreover, the study provides additional policy insights about income inequality and how to manage it overtime. This study establishes direct and indirect effects of different policies on income inequality. Effective income inequality management policies can benefit from closer understanding of: (1) the endogeneity of income inequality to regional growth, and hence targeting effective regional growth can help internally mitigate income inequality; (2) traditional inequality mitigating policies, such as investment in education and overall government expenditure on programs could have unintended indirect effects, and the overall direct and indirect effects of government programs need to be considered; and (3) income inequality has a growth dampening effect, and hence tackling income inequality is also a pro-growth policy.

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Table 1. Definition and Descriptive Statistics of Variables, US Counties (N=3038)

Variable	Definition	Mean	Std Dev
Endogenous Variables			
ΔPCI	*Change in Per Capita Income ($PCI_{00} – PCI_{90}$)*	*7753.29*	*2972.28*
ΔPOP	*Change in population ($POP_{00} – POP_{90}$)*	*10421.94*	*38581.97*
ΔE	*Change in employment ($EMP_{00} – EMP_{90}$)*	*4606.49*	*15681.67*
Δ GINI[5]	*Change in Gini Coefficient ($Gini_{00} – Gini_{90}$)*	*0.0545*	*0.0255*
Initial Conditions			
POP_{90}	*Population in 1990*	*77308.34*	*260475.8*
EMP_{90}	*Employment in 1990*	*35973.04*	*124875.2*
PCI_{90}	*Per Capita Income in 1990*	*15239.09*	*3446.40*
$GINI_{90}$	*Gini Coefficient in 1990*	*0.379*	*0.0384*
Fiscal, Social, and Economic Factors			
$UNEMRT_{90}$	*Unemployment rate in 1990*	*6.19*	*2.95*
$PMINRTY_{90}$	*Percent of Minority Population in 1990*	*12.26*	*15.17*
$BACHDG_{90}$	*Per cent of 25 years and older population with Bachelor's Degree +*	*13.35*	*6.40*
$GPERCAP_{92}$	*Government direct expenditure per person in 1992*	*1853.48*	*707.58*
$PCTAX_{90}$	*Per capita local taxes in 1990*	*649.63*	*425.86*
$P65PLUS_{90}$	*Per cent of population with age 65 and above in 1990*	*14.97*	*4.34*
$P25\_34P_{90}$	*Per cent of population with age 25-34 in 1990*	*15.08*	*2.11*
$NTMIG_{90}$	*Net Migration in 1990*	*239.76*	*2846.79*
$PURBN_{90}$	*Percent of Urban Population in 1990*	*35.65*	*29.06*
SCPTL[6] *$_{90}$*	*Social Capital index 1990*	*0.0034*	*0.673*
$MEDHVA_{90}$	*Median housing value in 1990*	*52904.6*	*31417.31*
$PHVCNT_{90}$	*Percent of Vacant Houses in 1990*	*14.86*	*10.53*
$PHSEAS_{90}$	*Percent of Seasonal Houses in 1990*	*5.71*	*9.45*
$HWYDEN_{90}$	*Highway density in 1990*	*608.46*	*529.55*
$ALLRDN_{90}$	*All other Road density 1990*	*3342.93*	*2659.43*
$PTVLT_{90}$	*Percent of Population with Travel Time above 45 Minutes in 1990*	*10.52*	*6.48*

[5] Data of Gini coefficients are from two sources. Gini 1990 is from Francois Nielsen (2002), Department of Sociology, University of North Carolina and Gini 2000 is from Mark L. Burkey (2006) "Gini Coefficients for the 2000 census" NCA&T State University, NC. Even though, there are some differences in the classification of grouping (The differences are – upper limit in 1990 is 150,000 but 175,000 in 2000), both used census data and followed similar methodology to calculate the Gini coefficient (Lorenz curve).

[6] The social capital index used is developed using principal component analysis by Rupasingha, Goetz, and Freshwater (2006) and is available online at: *http://www.nercrd.psu.edu/Social_Capital/index.html*

Table 2. Empirical Results for System of Equations Model, US Counties (N=3038)

Variable	ΔP Equation		ΔE Equation		ΔPCI Equation		Δ *GINI* Equation	
	Coefficient	t-Value	Coefficient	t-Value	Coefficient	t-Value	Coefficient	t-Value
Endogenous Variables								
ΔP	---	---	**0.5325**	**59.69**	**-0.1787**	**2.21**	**-4.25E-07**	**-6.38**
ΔE	**2.028**	**3.51**	---	---	**0.355**	**2.405**	**7.75E-07**	**6.04**
ΔPCI	**-7.661**	**-3.85**	**2.78**	**5.32**	---	---	**-6.85E-06**	**-9.16**
Δ GINI	**-167407.4**	**-2.02**	**177875.5**	**3.92**	**-36422**	**-4.11**	---	---
Initial Conditions								
POP_{90}	**-0.155**	**-4.06**	**6.02E-02**	**5**	**-0.143**	**-6.78**	**-1.28E-07**	**-5.01**
EMP_{90}	**0.505**	**9.03**	**-0.232**	**-9.16**	9.029	0.32	**3.56E-07**	**6.11**
PCI_{90}	0.163	0.56	0.109	1.06	0.226	0.98	-3.38E-07	-1.4
$GINI_{90}$	-41431.03	-1.40	**66387.43**	**3.82**	**-12751.8**	**-3.64**	**-0.359**	**-25.14**
Fiscal, Social, and Economic Factors								
$UNEMRT_{90}$	**-254.27**	**-1.71**	-8.44	-0.11	---	---	**5.33E-04**	**2.98**
$PMINRTY_{90}$	---	---	-25.33	-1.40	-2.388	-0.57	**2.22E-04**	**5.96**
$BACHDG_{90}$	---	---	-114.62	1.33	**87.115**	**6.20**	**1.18E-03**	**9.97**
$GPERCAP_{92}$	**-2.209**	**-3.33**	**1.107**	**2.96**	**-0.396**	**-5.77**	**-4.64E-06**	**-6.56**
$PCTAX_{90}$	**-3.52**	**-2.87**	**1.331**	**2.006**	**-0.533**	**-3.87**	**-1.65E06**	-1.08
$P65PLUS_{90}$	241.39	1.26	**-253.27**	**-2.87**	**38.89**	**1.98**	**1.29E-03**	**8.12**
$P25\_34P_{90}$	59.65	0.17	116.15	0.81	49.42	1.53	-4.34E-05	-0.13
$NTMIG_{90}$	-0.969	-0.393	---	---	---	---	---	---
$PURBN_{90}$	-61.23	-3.26	45.06	5.04	-3.084	-1.48	-6.61E-05	-3.15
$SCPTL_{90}$	**3279.93**	**2.32**	---	---	**487.31**	**4.91**	---	---
$MEDHVA_{90}$	**0.398**	**4.28**	**-0.169**	**-7.73**	**0.404**	**16.89**	**3.53E-07**	**9.21**
$PHVCNT_{90}$	**-5.35.88**	**-2.11**	**46.70**	**2.17**	**-10.23**	**-2.18**	**-1.04E-04**	**-2.04**
$PHSEAS_{90}$	**488.36**	**2.05**	---	---	---	---	---	---
$HWYDEN_{90}$	**-10.246**	**-9.11**	**4.88**	**6.98**	**0.431**	**2.62**	---	---
$ALLRDN_{90}$	---	---	-0.108	-1.30	4.99E-03	0.26	---	---
$PTVLT_{90}$	**262.78**	**2.63**	**-26.554**	**-1.40**	**36.121**	**4.39**	---	---
Constant	**67100.77**	**3.06**	**-49888.5**	**-4.98**	**9762.818**	**5.34**	**0.201**	**20.25**
$adjR^2$	0.818		0.655		0.513		0.22	
F-Statistics	594.92		275.69		146.47		53.02	
Log-Likelihood	-36393.1567		-33658.068		-28605.383		6831.697	

Note: All statistical significance at the 0.10, 0.05, and 0.01 levels are bold. Model is estimated using two-stage-least-squares method.