

A HEDONIC ANALYSIS OF STATE AND LOCAL FISCAL POLICY ON
NONMETROPOLITAN ECONOMIC DEVELOPMENT

By

YIHUA YU

Bachelor of Arts in Economics
Nanchang University
Jiangxi, China
1999

Master of Arts in Economics
University of Missouri – Kansas City
Kansas City, MO
2002

Submitted to the Faculty of the
Graduate College of the
Oklahoma State University
in partial fulfillment of
the requirements for
the Degree of
DOCTOR OF PHILOSOPHY
December, 2008

A HEDONIC ANALYSIS OF STATE AND LOCAL FISCAL POLICY ON
NONMETROPOLITAN ECONOMIC DEVELOPMENT

Dissertation Approved:

Dr. Dan S. Rickman

Dissertation Adviser

Dr. Jonathan C. Comer

Dr. Ronald L. Moomaw

Dr. Abdul Munasib

Dr. A. Gordon Emslie

Dean of the Graduate College

ACKNOWLEDGEMENTS

Many people contributed to the writing of this dissertation, and a few lines below cannot fully express my gratefulness towards them.

I wish to dedicate my dissertation to my dissertation committee members, Dr. Dan S. Rickman, Dr. Ronald L. Moomaw, and Dr. Abdul Munasib, Dr. Jonathan C. Comer, for their guidance and constructive criticism throughout the dissertation stage. I am especially grateful and indebted to my dissertation chair, Dr. Dan S. Rickman for helping me every step of the way to make this dissertation a reality. Without his guidance, it would have been an impossible task.

I cannot express enough gratitude to Dr. Dan S. Rickman, who supported me financially for the last two summers of my Ph.D. study. I acknowledge gratitude to the Department of Economics and Legal Studies for providing generous funding for my graduate study at Oklahoma State University.

I would also like to extend a thank you to other faculty members, my friends, doctoral students, and university staff at Oklahoma State University for their friendship and assistance.

And finally, I wish to thank my parents, my siblings and their families for their love, encouragement and support.

TABLE OF CONTENTS

Chapter	Page
1. INTRODUCTION.....	1
1.1 Overview of U.S. Fiscal Structure	1
1.2 Motivation.....	5
1.3 Purpose of the Study	6
1.4 Contribution	8
2. REVIEW OF THE LITERATURE	11
2.1 Taxes and Economic Development	12
2.2 Public Services and Economic Development	13
2.3 Amenities/Quality of Life and Economic Growth/Development	14
2.4 Hedonic Approach and Economic Development.....	15
3. MODEL AND METHODOLOGY.....	17
3.1 Spatial Equilibrium Wage-Rent Model	18
3.1.1 Theoretical Model.....	18
3.1.2 Illustration of Site Characteristics Effects on Equilibrium Wages and Rents.....	20
3.1.3 Decomposition of Wage Differential and Rent Differential.....	22
3.1.4 Empirical Model Specification	25
3.1.4.1 Empirical Model Specification – Level Equation Model	25
<i>Endogeneity Issue</i>	29
<i>Sensitivity Analysis</i>	31
<i>Fixed Effects Regression</i>	32
3.1.4.2 Empirical Model Specification – Difference Equation Model	33
<i>Endogeneity Issue</i>	34
<i>Sensitivity Analysis</i>	35
<i>Spatial Correlation Issue</i>	35
3.2 Dynamic Growth Model	36
3.2.1 Three Hypotheses of Sources of Economic Growth.....	36
3.2.2 Framework and Decomposition of the Sources of Economic Growth	37
3.2.3 Empirical Model Specification – Growth Equation Model	41
<i>Sensitivity Analysis</i>	43

Chapter	Page
4. DATA SOURCE.....	44
4.1 Wage and Rent.....	44
4.2 State and Local Fiscal Variables.....	45
4.3 Small Business Survival Index Variables.....	46
4.4 Amenity Variables.....	47
4.5 Demographic Variables.....	47
4.6 Business Cycle Variable.....	48
4.7 Housing Structural Variables.....	49
5. EMPIRICAL RESULTS.....	50
5.1 Level Equation Model Results.....	52
5.2 Differenced Model Results.....	69
5.3 Growth Model Results.....	83
6. CONCLUSIONS.....	109
6.1 Summary.....	110
6.2 Policy Implications.....	114
6.3 Limitations and Future Studies.....	115
REFERENCES.....	118
APPENDICES.....	124
Appendix A. Detailed Calculations for Section 3.1.....	124
Appendix B. Detailed Calculations for Section 3.2.....	128
Appendix C. Appendix Tables 1-20.....	135

LIST OF TABLES

Table	Page
Table 1. State and Local Government Expenditures Structures (Year 2002).....	2
Table 2. State and Local Tax Structures (Year 2002).....	3
Table 3. State Tax Distributions in Selected States (Year 2002).....	4
Table 4. Location Decision Factors of Rural Manufacturing Firms	7
Table 5 Rural-Urban Continuum Codes (Beale Codes).....	26
Table 6. Fiscal Impacts on Equilibrium Wage and Rent	51
Table 7A. Level Equation Model Results for Sample Nall, Dependent variables: ln(wage2002)	55
Table 7B. Level Equation Model Results for Sample Nall, Dependent variables: ln(rent2002).....	56
Table 8A. Level Equation Model Results for Sample Nall, Dependent variables: ln(earning2000).....	58
Table 8B. Level Equation Model Results for Sample Nall, Dependent variables: ln(housing2000)	59
Table 9. Level Equation Model Results for Sample Nall Considering SBSI Variables, Dependent variables: ln(wage2002) and ln(rent2002)	62
Table 10. Level Equation Model Results for Sample Nall, Fixed Effects Regression, Dependent Variable: Fixed Effects from Estimating the Wage and Rent Equations, Respectively	64
Table 11. Level Equation Model Results for Sample Nall, Fixed Effects Regression Considering SBSI Variables, Dependent Variables: Fixed Effects from Estimating the Wage and Rent Equations, Respectively	65

Table	Page
Table 12.	Difference Equation Model Results for Sample Nall, Dependent Variables: Δ wage and Δ rent.....71
Table 13.	Difference Equation Model Results for Sample Nall, Instrumental Variables Estimation, Dependent variable: Δ wage and Δ rent73
Table 14.	Difference Equation Model Results for Sample Nall, Instrumental Variables Estimation with Clustering Method, Dependent variable: Δ wage and Δ rent76
Table 15.	Difference Equation Model Results for Sample Nall, Dependent Variables: Δ earning and Δ housing.....79
Table 16.	Difference Equation Model Results for Sample Nall, Instrumental Variables Estimation, Dependent variable: Δ earning and Δ housing80
Table 17.	Difference Equation Model Results for Sample Nall, Instrumental Variables Estimation with Clustering Method, Dependent variable: Δ earning and Δ housing81
Table 18A.	Growth Equation Model Results for Sample Nall, N468, and N579 Respectively, Dependent variable: Δ wage/ \ln (wage1992)86
Table 18B.	Growth Equation Model Results for Sample Nall, N468, and N579 Respectively, Dependent variable: Δ rent/ \ln (rent1992).....87
Table 19A.	Growth Equation Model Results with Clustering Method for Sample Nall, N468, and N579 Respectively, Dependent variable: Δ wage/ \ln (wage1992)88
Table 19B.	Growth Equation Model Results with Clustering Method for Sample Nall, N468, and N579 Respectively, Dependent variable: Δ rent/ \ln (rent1992).....89
Table 20A.	Growth Equation Model Results for Sample Nall, N468, and N579 Respectively, Dependent variable: Δ earning/ \ln (earning1990)90
Table 20B.	Growth Equation Model Results for Sample Nall, N468, and N579 Respectively, Dependent variable: Δ housing/ \ln (housing1990).....91
Table 21A.	Growth Equation Model Results with Clustering Method for Sample Nall, N468 and N579 Respectively, Dependent variable: Δ earning/ \ln (earning1990)93

Table	Page
Table 21B. Growth Equation Model Results with Clustering Method for Sample Nall, N468 and N579 Respectively, Dependent variable: $\Delta\text{housing}/\ln(\text{housing}1990)$	94
Table 22. Growth Equation Model Results for Sample Nall, N468, and N579 respectively Considering SBSI Variables, Dependent variable: $\Delta\text{wage}/\ln(\text{wage}1992)$ and $\Delta\text{rent}/\ln(\text{rent}1992)$	95
Table 23. Growth Equation Model Results for Sample Nall, N468, and N579 respectively Considering SBSI plus ERS Variables, Dependent variable: $\Delta\text{wage}/\ln(\text{wage}1992)$ and $\Delta\text{rent}/\ln(\text{rent}1992)$	96
Table 24. Growth Equation Model Results for Sample Nall, N468, and N579 respectively Considering SBSI Variables and Clustering Method, Dependent variable: $\Delta\text{wage}/\ln(\text{wage}1992)$ and $\Delta\text{rent}/\ln(\text{rent}1992)$	97
Table 25. Growth Equation Model Results for Sample Nall, N468, and N579 respectively Considering SBSI plus ERS Variables and Clustering Method, Dependent variable: $\Delta\text{wage}/\ln(\text{wage}1992)$ and $\Delta\text{rent}/\ln(\text{rent}1992)$	98
Table 26. Growth Equation Model Results for Sample Nall, N468, and N579 respectively Considering SBSI Variables, Dependent variable: $\Delta\text{earning}/\ln(\text{earning}1990)$ and $\Delta\text{housing}/\ln(\text{housing}1990)$	99
Table 27. Growth Equation Model Results for Sample Nall, N468, and N579 respectively Considering SBSI plus ERS Variables, Dependent Variable: $\Delta\text{earning}/\ln(\text{earning}1990)$ and $\Delta\text{housing}/\ln(\text{housing}1990)$	100
Table 28. Growth Equation Model Results for Sample Nall, N468, and N579 respectively Considering SBSI Variables and Clustering Method, Dependent Variable: $\Delta\text{earning}/\ln(\text{earning}1990)$ and $\Delta\text{housing}/\ln(\text{housing}1990)$	101
Table 29. Growth Equation Model Results for Sample Nall, N468, and N579 respectively Considering SBSI plus ERS Variables and Clustering Method, Dependent Variable: $\Delta\text{earning}/\ln(\text{earning}1990)$ and $\Delta\text{housing}/\ln(\text{housing}1990)$	102
Table 30A. Growth Equation Model Results for 9 Subsamples Considering SBSI and ERS Variables, Dependent Variable: $\Delta\text{wage}/\ln(\text{wage}1992)$	104

Table	Page
Table 30B. Growth Equation Model Results for 9 Subsamples Considering SBSI and ERS Variables, Dependent Variable: $\Delta \text{rent}/\ln(\text{rent}1992)$	105
Table 31A. Growth Equation Model Results for 9 Subsamples Considering SBSI and ERS Variables, Dependent Variable: $\text{earning}/\ln(\text{earning}1990)$	106
Table 31B. Growth Equation Model Results for 9 Subsamples Considering SBSI and ERS Variables, Dependent Variables: $\Delta \text{housing}/\ln(\text{housing}1990)$...	107

APPENDICES

Appendix Table 1. Variable Definitions and Descriptive Statistics	135
Appendix Table 2A. Level Equation Model Results for Sample N468, Dependent variables: $\ln(\text{wage}2002)$	138
Appendix Table 2B. Level Equation Model Results for Sample N468, Dependent variables: $\ln(\text{rent}2002)$	139
Appendix Table 3A. Level Equation Model Results for Sample N579, Dependent variables: $\ln(\text{wage}2002)$	140
Appendix Table 3B. Level Equation Model Results for Sample N579, Dependent variables: $\ln(\text{rent}2002)$	141
Appendix Table 4. Level Equation Model Results for Sample N468 Considering SBSI Variables, Dependent variables: $\ln(\text{wage}2002)$ and $\ln(\text{rent}2002)$	142
Appendix Table 5. Level Equation Model Results for Sample N579 Considering SBSI Variables, Dependent variables: $\ln(\text{wage}2002)$ and $\ln(\text{rent}2002)$	143
Appendix Table 6. Level Equation Model Results for Sample N468 and N579, Fixed Effects Regression	144
Appendix Table 7. Level Equation Model Results for Sample N468 and N579, Fixed Effects Regression Considering SBSI Variables	145
Appendix Table 8A. Level Equation Model Results, Fixed Effects Regression by Nine Census Divisions, Dependent variable: Fixed effects from Wage Equation	146

Table	Page
Appendix Table 8B. Level Equation Model Results, Fixed Effects Regression by Nine Census Divisions, Dependent variable: Fixed effects from Rent Equation.....	147
Appendix Table 9A. Level Equation Model Results, Fixed Effects Regression by Nine Census Divisions Considering SBSI Variables, Dependent Variable: Fixed Effects from Wage Equation	148
Appendix Table 9B. Level Equation Model Results, Fixed Effects Regression by Nine Census Divisions Considering SBSI Variables, Dependent Variable: Fixed Effects from Rent Equation.....	149
Appendix Table 10. Level Equation Model Results for Sample Nall, N468, and N579, Instrumental Variable Estimation, Dependent Variables: ln(wage2002) and ln(rent2002)	150
Appendix Table 11. Level Equation Model Results for Sample Nall, N468, and N579, Instrumental Variable Estimation with Clustering Method, Dependent Variables: ln(wage2002) and ln(rent2002).....	151
Appendix Table 12. Level Equation Model Results for Sample Nall, N468, and N579, Instrumental Variable Estimation, Dependent Variables: ln(earning2000) and ln(housing2000).....	152
Appendix Table 13. Level Equation Model Results for Sample Nall, N468, and N579, Instrumental Variable Estimation with Clustering Method, Dependent Variables: ln(earning2000) and ln(housing2000)	153
Appendix Table 14. Difference Equation Model Results for Sample N468 and N579, Dependent Variables: Δ wage and Δ rent.....	154
Appendix Table 15. Difference Equation Model Results for Sample N468 and N579, Instrumental Variables Estimation, Dependent variable: Δ wage and Δ rent	155
Appendix Table 16. Difference Equation Model Results for Sample N468 and N579, Instrumental Variables Estimation with Clustering Method, Dependent variable: Δ wage and Δ rent	156
Appendix Table 17. Difference Equation Model Results for Sample N468 and N579, Dependent Variables: Δ earning and Δ housing.....	157

Table	Page
Appendix Table 18. Difference Equation Model Results for Sample N468 and N579, Instrumental Variables Estimation, Dependent variable: Δ earning and Δ housing	158
Appendix Table 19. Difference Equation Model Results for Sample N468 and N579, Instrumental Variables Estimation with Clustering Method, Dependent variable: Δ earning and Δ housing	159
Appendix Table 20. Sample-Split Chow Test Results for Wage and Rent (or, Earning and Housing) Equations in Tables 18-27, Respectively.....	160

LIST OF FIGURES

Figure	Page
Figure 1. Diagram Analysis of Amenity (access to harbor) Effect on Equilibrium Wages and Rents.....	21

CHAPTER 1

INTRODUCTION

1.1 Overview of U.S. Fiscal Structure

Fiscal policy is carried out by the governments in a country to affect its economy through increasing or decreasing taxes and public spending. The United States has one central government, 50 state governments and thousands of local governments. These governments hence have to decide whom to tax, how much tax revenue to collect from them, and what to spend it on.

Almost nobody likes to pay taxes, but as Supreme Court Justice Oliver Wendell Holmes put it in 1927, “Taxes are what we pay for a civilized society.” In other words, taxes have to be endured in order to fund governmental services such as police, fire, water, sewerage, roads, education, and health care. Table 1 depicts some major expenditures of state, local, and combined state and local governments in 2002. When looking at local governments, total expenditures amounted to over one trillion dollars, or about \$4000 per person. Education is the single largest expenditure function, which accounts for 37.9% of the total expenditure. 3.9% was spent on highway maintenance and construction, 7.0% on hospital and health care, 4.8% on police, 2.3% on fire protection, and 2.6% on sewerage. There are numerous other expenditure categories that took up

Table 1. State and Local Government Expenditures Structures (Year 2002)

Function of Expenditure	State and Local Government (% of combined expenditure)	State Government (% of total expenditure)	Local Government (% of total expenditure)
Education	29.0%	12.6%	37.9%
Highway	5.6%	5.5%	3.9%
hospital and health	7.2%	5.2%	7.0%
Police protection	3.1%	0.7%	4.8%
Fire protection	1.3%	0.0%	2.3%
Natural resources	1.1%	1.3%	0.5%
Sewerage	1.5%	0.1%	2.6%
Total	\$2052 billion*	\$1283 billion	\$1140 billion*

*Duplicative intergovernmental transactions are excluded.

Source: Author's calculation using Table 2 from *Compendium of Government Finances: 2002* (U.S. Census Bureau, *2002 Census of Governments*, Volume 4, Number 5, U.S. Government Printing Office, Washington D.C.).

smaller shares of the budget such as judicial and legal provisions, public buildings, and solid waste management.

There are also various taxes that are used to finance the various expenditures mentioned above. Table 2 presents different sources of tax revenue for state, local, and combined state and local governments. As shown, the relative importance of these taxes differs greatly among different types of governments. At the state level, the largest share of tax revenue is obtained from personal income taxes, and general sales and excise taxes together account for almost half of total tax revenue. By contrast, at the local level, the property tax is the major revenue source, which produces nearly three-fourth of local tax revenue.

Not all states follow the same distribution of taxes, For instance, seven states (Alaska, Florida, Nevada, South Dakota, Texas, Washington, and Wyoming) do not levy personal income taxes, five of these states except Alaska and Florida do not levy

Table 2. State and Local Tax Structures (Year 2002)

Type of Tax	State and Local Government (% of combined revenue)	State Government (% of own-source revenue)	Local Government (% of own-source revenue)
General Sales	24.6%	33.6%	11.7%
Selective Sales (excise)	11.2%	15.5%	5.0%
Property	30.8%	1.8%	72.9%
Personal Income	22.4%	34.7%	4.6%
Corporate Income	3.1%	4.7%	0.8%
Licenses	4.1%	6.6%	0.4%
Other taxes	3.8%	3.2%	4.6%
Total own-source tax	\$905 million	\$535 million	\$370 million

Source: Author's calculation using Table 2 from *Compendium of Government Finances: 2002* (U.S. Census Bureau, 2002 *Census of Governments*, Volume 4, Number 5, U.S. Government Printing Office, Washington D.C.).

a corporate income tax, and five states (Alaska, Delaware, Montana, New Hampshire, and Oregon) do not have a general sales tax. Not only do state and local tax structures differ between states, but tax structures differ dramatically within states as well. As shown in Table 3, Florida and Tennessee respectively obtain most of their tax revenue from a general sales tax, while Oregon relies substantially on personal income taxes, over 70% of revenue is from personal income taxes. Nevada and New Hampshire respectively collect much of their revenue from license taxes.

While Tables 1-3 reveal much about the size and composition of fiscal structure, they are not able to tell us the consequences of these governmental activities. In other words, they can not tell us whether and how these tax and expenditures affect decisions made by households or firms. Neither economists nor policy makers will disagree on the importance of fiscal policies on the economy, but they do not agree on how to carry out fiscal policies. On the one hand, taxation may discourage people to work, invest, and

Table 3. State Tax Distributions in Selected States (Year 2002)

State	General Sales	Selective Sales	Property Income	Personal Income	Corporate Income	Licenses	Other Taxes
All	24.6%	11.2%	30.8%	22.4%	3.1%	4.1%	3.8%
AZ	51%	13%	4%	25%	4%	3%	1%
DE	0%	15%	0%	33%	12%	36%	5%
FL	57%	20%	2%	0%	5%	6%	11%
MA	25%	10%	0%	53%	5%	3%	3%
NV	52%	32%	3%	0%	0%	11%	1%
NH	0%	32%	26%	4%	20%	10%	8%
NY	20%	10%	0%	59%	5%	2%	3%
OR	0%	13%	0%	71%	4%	10%	2%
SD	54%	26%	0%	0%	4%	14%	3%
TN	60%	18%	0%	2%	6%	11%	3%
TX	51%	31%	0%	0%	0%	13%	5%
WA	63%	16%	12%	0%	0%	5%	5%
WY	41%	9%	13%	0%	0%	9%	28%

Source: Author's calculation using Table 45 from *Compendium of Government Finances: 2002* (U.S. Census Bureau, 2002 *Census of Governments*, Volume 4, Number 5, U.S. Government Printing Office, Washington D.C.).

consume, preventing the economy from reaching its full potential. On the other hand, taxation is necessary to finance public expenditures, which can be effective in boosting economic growth. In this regard, managing fiscal policy is always a difficult task for governments. In addition, there are a myriad of other factors that should be considered other than government taxes and expenditures that could affect economic development. These factors include population size or growth, savings rate, education level, ethnicity, housing prices, prices of oil and other natural resources, natural amenities, environmental regulations, minimum wage laws, tax policies of its neighbors, just to name a few. Hence, examining the impact of fiscal policy on local economic development is the focus of this dissertation.

1.2 Motivation

We want to examine the impact of fiscal policy on economic development, specifically, rural development. In other words, we want to look at nonmetropolitan fiscal variables and see how they affect location decisions of households and firms by affecting the nonmetropolitan county wages and rents. Some scholars may question why we do not use state level data to examine the effects of state fiscal variables on state wage and state rent. We argue that the states are difficult to compare. It is rather difficult to compare a state like New York that has New York City using state level data with the state of Oklahoma that has more rural areas. We want to take rural counties of similar size in one state and compare them with rural counties in other states. We want to see how differences in policy across counties matters for the outcomes, which can not be done using state level data. Some scholars may also suggest that we could use metropolitan data. We could do that but we argue that the metro counties function very differently from each other. For instance, a tax in the central county of New York City could function quite differently from that in the central city of Denver, due to the difference of geography, the structure of local neighborhoods and local governments.

We are primarily interested in rural areas and we think the data generating process for the rural areas is different from that for the metropolitan areas. Particularly since studies at the metropolitan level or state level have been done over and over again (Hoehn, et al., 1987; Izraeli, 1987; Blomquist, et al. 1988; Beeson and Eberts, 1989; Gyourko and Tracy, 1989, 1991; Stover and Leven, 1992; Herzog, et al., 1993; Gabriel et al., 2003, just name a few), this study could fill the gap in the literature by addressing local fiscal policy effects on nonmetropolitan development.

1.3 Purpose of the Study

The U.S. nonmetropolitan area is composed of hundreds of independent government jurisdictions (county governments, local municipal governments, school districts, and other special districts). Each jurisdiction supplies various public goods and services, such as primary and secondary education, and raises revenues from property and other taxes to fund these goods and services. As the renowned Tiebout (1956) model of local government indicates, households vote with their feet for the best combination of local taxes and expenditures, which gives them the highest utility through migration. Similarly, firms sort themselves into jurisdictions in response to changes in the local fiscal policies. Not only are location decisions of households and business affected by the local fiscal conditions, they are also affected by natural amenities such as lakes, coastlines, or mild temperatures as well.

In this respect, nonmetropolitan areas differ in their desirability, specifically, in the local fiscal environment and natural amenities. Households or firms prefer to reside in a region with higher levels of quality of life (more favorable fiscal environment, low crime rates, a mild climate, etc.) to those with low levels of quality of life as the former provides the households higher utility and offers the firms higher productivity. The importance of local amenities and fiscal conditions to the households and firms can be inferred from the survey (Table 4) undertaken by Halstead and Deller (1997) of two thousand small rural manufacturing firms in upper New England (Maine, New Hampshire, and Vermont) and Wisconsin. The firms were asked to rank sixteen factors

Table 4. Location Decision Factors of Rural Manufacturing Firms

	Unimportant				Very important	Average	
Item	1	2	3	4	5	Rating	Rank
	----- percent responding -----						
<u>Traditional Factors</u>							
Local business services	12	10	26	20	31	3.44	(2)
Loabor costs	14	7	31	23	24	3.35	(3)
Property taxes	10	14	34	20	22	3.24	(4)
Closeness to output markets	27	18	21	12	22	2.8	(7)
Closeness to inut markets	26	22	24	11	17	2.7	(8)
Being near similar firms	70	13	8	4	5	1.59	(16)
<u>Infrastructure Factors</u>							
Telecommunication infrastrucutr	20	13	23	21	23	3.11	(5)
Interstate highway access	26	15	22	20	17	2.83	(6)
Sewer/water capacity	42	19	20	8	10	2.2	(11)
Waster disposal facilities	45	18	22	7	8	2.12	(12)
Air freight service	53	19	16	7	5	1.91	(14)
<u>Alternative Factors</u>							
Quality of life/amenities	7	6	18	26	43	3.9	(1)
Primary and secondary education	28	13	31	16	12	2.68	(9)
Land for construction/expansion	30	16	27	14	13	2.61	(10)
Technical training programs	43	21	21	10	5	2.1	(13)
Government inducements	67	12	11	5	5	1.64	(15)

Source: Table 2 from Halstead and Deller (1997), p. 162.

which were thought to influence their ability to effectively operate their business.

Amenities and quality of life received the highest rating.¹

The main purpose of this study thus is to examine how regional fiscal conditions (government taxes and expenditures) along with amenities affect the location decisions of

¹ Recent surveys of firms on how state and local fiscal policies affect business location decision include Schmenner (1982), Premus (1982), Walker and Greenstreet (1989), and Rubin (1991). Schmenner's survey of Fortune 500 companies found that 35% listed low taxes as 'desirable if available and helped to tip scales in favor of a particular broad region and state for a new branch plant.' Premus's survey of high-tech companies found that 67% listed taxes as "significant" or "very significant" in affecting state growth decisions. Walker and Greenstreet's survey of new Appalachian manufacturing plants found that 37% stated that the tax and other financial incentives offered to these plants were decisive in their final location decision. Rubin's survey of New Jersey firms receiving enterprise zone tax incentives found that 32% reported that these incentives were their primary or only reason to locate and expand their business in the zone.

households and firms by affecting household earnings and land prices in the U.S. nonmetropolitan counties using a hedonic pricing approach (Roback 1982; Beeson and Eberts, 1989; Gyourko and Tracy, 1989, 1991). The hedonic pricing approach predicts that, in equilibrium of land and labor markets where no individuals or firms have a desire to relocate, by relocating to a more desirable place, the firms are able to pay higher wage and higher land rent and households are willing to accept a lower wage and pay higher rent. Overall the equilibrium land rent will be unambiguously pushed up and the equilibrium wage is indeterminate depending on whether firms' labor demand effects or households' labor supply effects dominate. Therefore in equilibrium, local specific characteristics such as local fiscal characteristics and amenities are fully capitalized into the labor market (or wage) and land market (or rent).

These fiscal effects, as examined in a locational equilibrium of the land and labor markets, then allow us not only to examine which fiscal variables matter most on local wages and rents, but also to decompose wage and rent differentials across nonmetropolitan counties into two components: an amenity component and a productivity component. Consequently, the relative importance of productivity effects and amenity effect can be evaluated for each fiscal variable.

1.4 Contribution

This study contributes to the regional development literature in the following ways. First, a large literature on economic development/growth has focused on the state, regional, MSA, or national level. No hedonic fiscal policy studies have been done at the nonmetropolitan level. This study could fill the gap in the literature by focusing on

nonmetropolitan economic development. Specifically, this study examines how household earnings and land costs of nonmetropolitan counties are affected by the state and county governmental taxation and expenditures in a hedonic framework. A focus on local government is important. Local government fiscal policies vary greatly; in addition, counties differ dramatically in their natural resources, demographic characteristics, location, and histories. The large number of counties in the U.S. represents a reservoir to examine the effects of various policies. Local governments may respond not only to local conditions and to the preferences of local voters, but also to the policy choices of neighboring local governments. If so, a focus only on higher levels of geography would yield biased results in estimating the effects of local policies. By the same token, data aggregated over counties can mislead the true nature of a state's characteristics. For instance, Nevada is considered as a rural state, while almost 86% of its population lives in the two counties (Clark County and Washoe County) containing Las Vegas and Reno. In addition, almost 99% of population in the Clark County lives in the Las Vegas MSA (Census 2000). Similarly, MSA level data are not used, as MSAs by definition include one urbanized area of 50,000 or more population, and an adjacent area that has a high degree of social and economic integration with the core.² In this respect, MSAs include dozens of cities and several counties and do not provide much insight as to local effects. Also counties cover the entire surface area of the states and have relatively stable borders

2 OMB Bulletin No. 07-01, "Updates to Statistical Area Definitions and Guidance on Their Uses," December 18, 2006.

across time compared with those of MSAs, which enables researchers to explore spatial interactions between each jurisdiction.³

Second, county governments are believed to be economically interdependent although politically independent. The fiscal policies of one county may have effects reaching beyond its political boundary. We account for the spatial effects in the cross-sectional study which allows for arbitrary spatial correlation and arbitrary heteroscedasticity within the BEA defined clusters. Statistically if one expects that error terms are correlated within clusters, the OLS estimators are still unbiased but not efficient (Wooldridge, 2001). The standard procedure in the empirical work is to use clustering methods to correct estimated standard errors. Another concern of this cross-sectional study is that some of the explanatory variables such as tax or expenditure variables, depend to some extent on the dependent variable (wage or rent), thus introducing simultaneity bias. Instrumental variable estimation is used in attempt to reduce this bias.

Third, the hedonic approach has been often used in regional/urban economics, but it has received little attention from planners and policy makers. The findings of this study provide some, though limited, insights into wages and rents differentials across counties. It has implications for economists, economic planners, and policy makers in enhancing their understanding of whether and how fiscal policies matters for economic performance. Consequently, proper tax policies can be conducted and public resources can be efficiently allocated to improve the local economy.

The remainder of this paper is organized as follows. Chapter 2 reviews literature that relates state and local government policy, amenities, and the hedonic approach to

³ We do make one adjustment to the county definition. That's, following the U.S. Bureau of Economic Analysis, we combined "independent cities" with the counties that completely surround them to form a more functional region (mostly in Virginia).

economic development. Chapter 3 presents the theoretical models and econometric specifications. Chapter 4 describes the data sources. Chapter 5 reports the empirical results. The final chapter summarizes the key findings, policy implications, and limitations of the study, and presents some suggestions for future research.

CHAPTER 2

REVIEW OF THE LITERATURE

A large literature has examined the impacts of state and local fiscal policies (usually in the form of taxation, and public services) and amenities on economic development, as measured in terms of population, employment, income, or plant location (see Bartik, 1991; Fisher; 1997; Wasylenko, 1997 and Malpezzi 2001 for surveys).

2.1 Taxes and Economic Development

Bartik (1991) reviews a list of 48 studies on the relationship between taxes and growth in different MSAs and states. Based on his review, he concludes that, on average, if a state or a MSA reduces state and local taxes by 10 percent, *ceteris paribus*, economy activity in that jurisdiction would increase in the long run by somewhere between 1 and 6 percent (Bartik, 1992). The conclusion is drawn under the premise that other factors such as public services or fiscal policies in another jurisdiction will not change, which is problematic in that other factors could change in the face of significant tax cuts.

The wide range of the estimates in these findings, as Wasylenko (1997) argues, are owing to variations in data, time periods, and other variables used in the empirical analyses. In addition, he contends that the results are fragile and the magnitude of change

depends on which variables are included in the analysis and which time frame is analyzed.

There seems to be a consensus among researchers or policy makers that tax policy affects economic behavior; however, researchers disagree on the magnitude of the tax policy effect. In his review of at least 75 studies that relate state and local taxes to employment growth, investment growth, or firm location at the state, city, or regional level, Wasylenko (1997) argues that researchers have struggled mightily over the past 20 years to understand the extent to which state and local tax policies influence business activity.

2.2 Public Services and Economic Development

To some extent public services can be treated as either productive amenities which lower firms' costs, or consumer amenities. Fisher (1997) summarizes the burgeoning literature examining the relationship between public services and economic development in the jurisdiction providing those services. In his review of the literature he states, "In many studies, government spending, public capital, or public services are estimated to exert a positive and statistically significant effect on economic development... But the results vary greatly. Perhaps the most that can be concluded is that some public services clearly have a positive effect on some measures of economic development in some cases" (Fisher, 1997, p. 54).

Of all the public services, transportation services and highway facilities show the most considerable evidence on affecting economic development. Among the fifteen

studies Fisher (1997) reviewed, ten studies reported a positive effect (eight of which are statistically significant) of highway facilities or spending on economic development.

Fisher also reviewed nine studies of the role of public safety services on development. He found that the results are less consistent than those from the transportation studies. The lack of consistent results is partly due to measurement problems. He argues, "...public safety services...measured by government spending on public safety and not all by measures of public facilities or activity" (Fisher, 1997, p. 56).

Education spending is one of the three major public service categories that are essential for economic development and growth. However, nineteen studies reviewed by Fisher (1997) show that the evidence about the relationship between economic development and spending on education is the least convincing. The empirical evidence about whether and how education influences economic activity, according to Fisher, is very cloudy.

2.3 Amenities/Quality of Life and Economic Growth/Development

A growing number of studies have explored the economic importance of site specific amenities such as a clean environment, a desirable climate, and topography. A search of the *Econlit* database, which covers mainly economic literature using the key words "amenity" and "economics", generated a result of 34 articles from 1981 to 1990. The number increased to 84 from 1991 to 2000, and 165 in 2001-2007.

Dissart and Deller (2000) conducted a review of the planning literature related to quality of life. Specifically they reviewed the notion of quality of life (QOL) and how it affects human migration, firm location, and growth/development. To assess the role of

QOL on industrial location, Blair and Premus (1987) found that because of advances in technology and growing environmental awareness, industrial location choices are influenced to a lesser extent than in the past by traditional factors such as access to markets and raw materials. Nontraditional factors such as quality-of-life factors are gaining importance, and these factors are most important for smaller firms because they are usually located where their owner lives (Halstead and Deller, 1997). More recently, Gottlieb (1994) reviewed specifically the literature on amenity-oriented firm location and noted that “pools of technical professionals can only be maintained in an area that has a high quality-of-life and amenities that appeal to a managerial elite” (Gottlieb, 1994; p. 272). The role of amenities/quality-of-life in affecting business locations can be directly seen from the survey (Halstead and Deller; 1997) evidence of two thousand small rural manufacturing firms in upper New England and Wisconsin. Amenities and quality of life received the highest rating among the sixteen factors that were considered to affect the firm’s operation (as shown in Table 4).

On the other hand, Biagi et al. (2006) presented a detailed review of economic effects of QOL in the economic literature and, particularly, in the urban economics literature. Among the literature that examined economic activities (namely, population or employment growth or location choices) in counties, the most well-known studies include Carlino and Mills (1987), Stover and Leven (1992), Clark and Murphy (1996), and Beeson et al. (2001), among others.

2.4 Hedonic Approach and Economic Development

Although a large amount of literature has examined the effects of local fiscal policies and/or amenities on economic activities at the state, MSA, county or city level, studies on the local amenity and fiscal policy effects using a hedonic approach are relatively few. This hedonic approach argues that the fiscal and amenity attributes do not have a market price; however, these attributes have an implicit price and hence affect the location decisions of households and firms.

According to the hedonic approach, if a location is equipped with a higher level of natural amenities and/or with more favorable fiscal conditions (called man-built amenities, to some extent) than elsewhere, households would like to reside in that place by accepting a lower wage and a higher cost of housing. In addition, if the desirability reduces business cost or is productive, firms would like to locate in that place by paying higher wages and higher land costs.

Therefore, the hedonic approach allows us to examine both the amenity component and productivity component of a site specific attribute and further to evaluate the relative importance of amenity and productivity differences in explaining wage and rental differentials across jurisdictions.

The QOL literature in the hedonic framework can be grouped into those studies that consider only wage differentials (Nordhaus and Tobin, 1972; Getz and Huang, 1978; Rosen, 1979; Cropper, 1981; Gerking and Weirick, 1983; Clark and Kahn, 1989; Clark and Cosgrove, 1991), those that consider only rent differentials (Ridker and Henning, 1967; Ozanne and Thibodeau, 1983; Cheshire and Sheppard, 1995; Shultz and King, 2001), and those that consider both wages and land rents (Haurin, 1980; Roback, 1982; Hoehn, et al., 1987; Izraeli, 1987; Blomquist, et al. 1988; Beeson and Eberts, 1989;

Gyourko and Tracy, 1989, 1991; Voith, 1991; Stover and Leven, 1992; Herzog, et al., 1993; Kahn, 1995; Gabriel et al., 2003).

In the hedonic literature, Gyourko and Tracy (1991) is the only study that prices local fiscal policy out of local land rent and wage by applying hedonic analysis to metropolitan areas. Their study finds that overall influences of fiscal differentials on intercity quality-of-life comparisons are almost equally important as amenities. Specifically they find that: 1) a higher property tax rate reduced housing prices, and because of omission from the wage equation, it implies that property taxes are capitalized solely in the land market; 2) state and local income taxes reduced housing prices but had insignificant effects on wages, which is at odds with expected higher wages and/or lower housing prices; 3) a higher corporate income tax positively and significantly increased housing prices and reduced wages, in which the authors suggest that housing prices may have spuriously picked up agglomeration effects; 4) a measure of hospital services was negatively and significantly related to wages but not to housing prices, suggesting hospital services served as a household amenity; 5) a measure of fire services positively and significantly affected housing prices and wages, suggestive of a strong firm amenity effect; 6) education was insignificant for both variables.

This dissertation focuses on fiscal policy effects in the nonmetropolitan areas. We not only account for the household quality-of-life effects which are considered by Gyourko and Tracy (1989; 1991), but also extend the work by Gyourko and Tracy by considering firm effects.

CHAPTER 3

MODEL AND METHODOLOGY

3.1 Spatial Equilibrium Wage-Rent Model

3.1.1 Theoretical Model

The first basic model in this paper applies the canonical interregional equilibrium model of household and firm location (Roback, 1982; Gyourko and Tracy, 1989, 1991). Under this model, interregional wages and land rents differ in site-specific characteristics. On the firm side, these site-specific characteristics can be productive (harbor facilities, for example, as they lower transportation costs for firms located nearby) or unproductive (for example, clean air, as it costs firms to use a nonpolluting technology). On the household side, these site-specific characteristics can be amenity or disamenity to households through affecting the households' utility directly or indirectly through their effects on wages and land rents.

The model assumes a world comprised of two groups of agents, workers and firms, who are assumed to be able to migrate freely across regions. Workers are assumed to have identical preferences and to be able to migrate without cost across regions. A representative worker earns income from selling one unit of labor. Workers produce and consume a numeraire composite good (X). Firms employ local residents and land to

produce the composite good (X) with identical constant-returns-to-scale production technologies. The rental rate for a unit of land, either demanded by households for residential purpose or by firms for production purpose, is assumed to be same. The goal of a representative worker is to choose a consumption bundle (the composite good X and residential land L_h), and location (s) to maximize his/her utility subject to a budget constraint,

$$\max U(X, L_h; s) \quad \text{subject to } w + I = X + rL_h \quad (1)$$

where w and r stands for wage and rent, respectively; I denotes nonlabor income which is assumed to be independent of location (s).

Solving equation (1) to get the utility maximizing levels of X and L^h , and substituting them back into the utility function we obtain the indirect utility function of wage (w), land rent (r), and site-specific characteristics (s). In equilibrium, there is no incentive for workers to migrate, implying that utility is equalized at all locations, or,

$$\text{Isoutility curve:} \quad V(w, r; s) = \bar{V} \quad (2)$$

where $V_w > 0$; $V_r < 0$; $V_s < > 0$ (depending on whether s is amenity or disamenity). The goal facing a representative firm is to minimize production costs by choosing the optimal inputs of land and labor. In equilibrium, there is no incentive for firms to locate elsewhere, implying that unit costs for the composite good (X) are equal to one (the price of X), or,

$$\text{Isocost curve:} \quad C(w, r; s) = 1 \quad (3).$$

Defining L^p and N^p as the land and labor used in production, the unit cost is increasing in factor prices so that $C_w = N_p/X > 0$, $C_r = L_p/X > 0$ and $C_s < > 0$ (depending on whether s is pro-productive or anti-productive).

Equilibrium wages and rents are determined by the interaction of households and firms. The effects of site-specific attribute (s) on wages and rental rates can then be identified by totally differentiating equations (2) and (3). Solving for dw/ds and dr/ds , the procedure yields,

$$\begin{aligned}\frac{dw}{ds} &= \frac{1}{DET} (C_s V_r - V_s C_r) \geq 0 \\ \frac{dr}{ds} &= \frac{1}{DET} (C_w V_s - V_w C_s) \geq 0\end{aligned}\tag{4}$$

where $DET = C_r V_w - V_r C_w > 0$. As shown in equation (4), the indeterminate signs for dw/ds and dr/ds depend on signs for V_s (household marginal valuation of site characteristics) and C_s (firm marginal valuation of site characteristics).

3.1.2 Illustration of Site Characteristics Effects on Equilibrium Wages and Rents

The unique equilibrium wage and rent in a region given the regional level of s in equation (4) can be illustrated on a graph (Figure 1).⁴ The y -axis is wage and the x -axis is rent. The isoutility curves are upward sloping because higher rents must be compensated by higher wages to leave the household equally well-off. The isocost curves are downward sloping because higher rents must be offset by lower nominal wages to keep costs unchanged. Hence, the equilibrium wages and rents are determined by the intersection of the isoutility curve and the isocost curve. An amenity variable (for example, close to a harbor) which is desirable to both firms and households will shift the isoutility curve and

⁴ To illustrate the effects of different site-specific characteristics on wages and rents, I borrowed heavily from works of Roback (1982), Beeson and Eberts (1989), and Partridge et al. (2007).

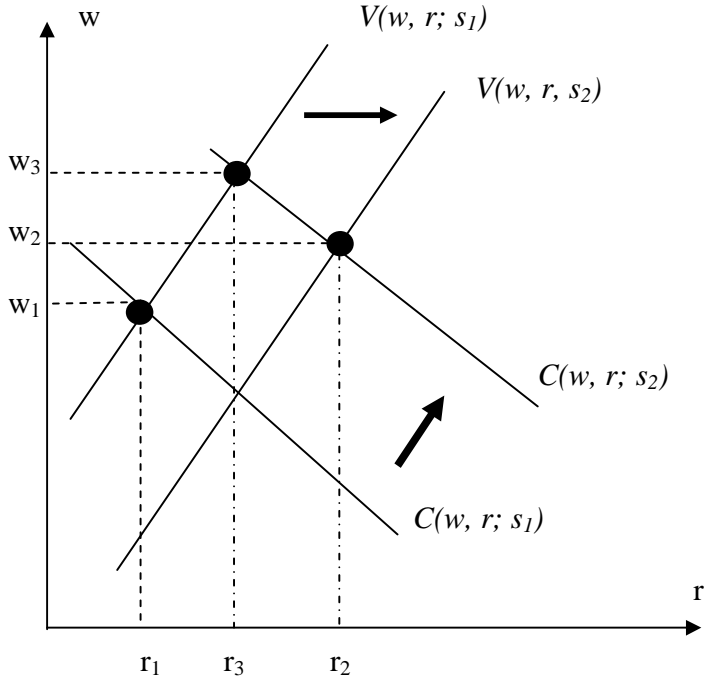


Figure 1. Diagram Analysis of Amenity (access to harbor) Effect on Equilibrium Wages and Rents

the isocost curve rightward. The accessibility to a harbor unambiguously increases the equilibrium rental rate from r_1 to r_2 as firms and households are more likely to locate in the area, implying more demand for land (equation (4)). However, as more firms raise the wage rate via increased labor demand and more households reduce the wage rate via increased labor supply, the overall effect on the equilibrium wage is ambiguous, depending on the size of relative shifts. Figure 1 shows a case that the isocost curve shifts more than the isoutility curve, leading to a rise in the equilibrium wage from w_1 to w_2 .

In brief, the above illustration shows an example that a site-specific variable that has both amenity value (i.e. $V_s(w, r; s) > 0$) and productive value (i.e. $C_s(w, r; s) < 0$) increases rents but has an ambiguous effect on wages.

3.1.3 Decomposition of Wage Differential and Rent Differential

Following Beeson and Eberts (1989), the wage and rental differential (dw/ds or $w_1 - w_2$; dr/ds or $r_1 - r_2$) between two regions can be decomposed into two components: the productivity component ($[dw/ds]^C$ or $w_1 - w_3$; $[dr/ds]^C$ or $r_1 - r_3$) related to the shift in the isocost curve and amenity component ($[dw/ds]^V$ or $w_3 - w_2$; $[dr/ds]^V$ or $r_3 - r_2$) related to the shift in the isoutility curve. Algebraically,

$$w_1 - w_2 = (w_1 - w_3) + (w_3 - w_2)$$

$$r_1 - r_2 = (r_1 - r_3) + (r_3 - r_2)$$

$$\frac{dw}{ds} = \left(\frac{dw}{ds}\right)^C + \left(\frac{dw}{ds}\right)^V \quad (5)$$

$$\frac{dr}{ds} = \left(\frac{dr}{ds}\right)^C + \left(\frac{dr}{ds}\right)^V \quad (6).$$

To identify the sign on dw/ds or dr/ds , we have to know the relative size of shifts of the isoutility and isocost curve, implying we have to know the slope of the two curves. The slope of the isoutility curve is identified by the shift in the isocost curve,

$$\left(\frac{dw}{ds}\right)^C / \left(\frac{dr}{ds}\right)^C = L_h \quad (7).$$

Correspondingly, the slope of the isocost curve is identified by the shift in the isoutility curve,

$$\left(\frac{dw}{ds}\right)^V / \left(\frac{dr}{ds}\right)^V = -L_p / N_p \quad (8).$$

Solving equations (5)-(8), we can derive the site specific characteristics effect on wages attributable to the household amenity effect,

$$\left(\frac{dw}{ds}\right)^V = \frac{L_p / N_p}{L_p / N_p + L_h} \left(\frac{dw}{ds} - L_h \frac{dr}{ds}\right) \quad (9a)$$

or in logarithms,

$$\left(\frac{d \ln w}{ds}\right)^v = \frac{L_p / N_p}{L_p / N_p + L_h} \left(\frac{d \ln w}{ds} - k_l \frac{d \ln r}{ds}\right) \quad (9b)$$

where $k_l (= rL_h/w)$ is the share of land in a household's budget. Details on calculations can be found in Appendix A.

Equation (9b) is not directly estimable as we only observe data on housing costs instead of land costs. Hence, we will have to relate the unit cost of land (rl_h/h) to the unit housing rents (p_h) as the unit housing rents are equal to the unit cost of land plus the unit price of the structure (p_h'), namely,

$$p_h = rl_h / h + p_h' \quad (10)$$

where h is the quantity of housing. By assuming that variations in unit housing price reflect variations in land rents, differentiating both sides with regards to s yields,

$$\frac{d \ln p_h}{ds} = \frac{1}{p_h} \frac{dp_h}{ds} = \frac{1}{p_h} \frac{d(rl_h / h)}{ds} = \frac{1}{p_h} \frac{l_h}{h} \frac{dr}{ds} = \frac{rl_h}{p_h h} \frac{d \ln r}{ds} \quad (11).$$

The equilibrium conditions of full employment of labor ($N_p = N$) and land ($L = NL_h + L_p$) are imposed, where labor is used only in production of the good and land is used for residential and production purpose. Rearranging equation (11) to obtain $d \ln r / ds$ and substituting it back to equation (9b), which, under the equilibrium conditions, becomes,

$$\text{Amenity component: } \left(\frac{d \ln w}{ds}\right)^v = \frac{rL_p / wN_p}{rL / wN} \left(\frac{d \ln w}{ds} - k_h \frac{d \ln p_h}{ds}\right) \quad (12)$$

where $k_h = p_h h / w$, which is the share of a household's budget spent on housing and assumes a value of 0.27 in this study based on the calculation from the Census data by

Beeson and Eberts (1989). The value on $\frac{rL_p / wN_p}{rL / wN}$ is calculated to be 0.399 using their

estimation results on rL/wN (0.088) and k_l (0.05). Therefore, equation (12) becomes,

$$\text{Amenity component: } \left(\frac{d \ln w}{ds}\right)^v = 0.399\left(\frac{d \ln w}{ds}\right) - 0.108\left(\frac{d \ln p_h}{ds}\right) \quad (12b).$$

The productivity components can be obtained by substituting equation (12) into equation (5), rearranging it we have,

$$\text{Productivity component: } \left(\frac{d \ln w}{ds}\right)^c = \frac{d \ln w}{ds} - \left(\frac{d \ln w}{ds}\right)^v \quad (13)$$

$$= 0.601\left(\frac{d \ln w}{ds}\right) + 0.108\left(\frac{d \ln p_h}{ds}\right) \quad (13b).$$

A similar procedure is used to derive the amenity component and productivity component for land rent,

$$\text{Amenity component: } \left(\frac{d \ln r}{ds}\right)^v = \frac{k_l}{rL / wN} \left(\frac{k_h}{k_l} \frac{d \ln p_h}{ds} - \frac{1}{k_l} \frac{d \ln w}{ds} \right) \quad (14)$$

$$= 3.068\left(\frac{d \ln p_h}{ds}\right) - 11.364\left(\frac{d \ln w}{ds}\right) \quad (14b)$$

$$\text{Productivity component: } \left(\frac{d \ln r}{ds}\right)^c = \frac{k_h}{k_l} \frac{d \ln p_h}{ds} - \left(\frac{d \ln r}{ds}\right)^v \quad (15)$$

$$= 2.036\left(\frac{d \ln p_h}{ds}\right) + 11.364\left(\frac{d \ln w}{ds}\right) \quad (15b)$$

where $rL/wN = 0.088$, $k_l = 0.05$ and $k_h = 0.27$ following Beeson and Eberts (1989).

The four equations (12b, 13b, 14b, 15b) form the basis for empirically decomposing the interregional wage differential and rent differential presented in the results section.

3.1.4 Empirical Model Specification

In order to examine the effects of state and local fiscal characteristics on local economic development, two types of empirical models, i.e., the level equation model and the differenced equation model, are specified given that they are conceptually the same, but address statistical considerations, which are elaborated below.

3.1.4.1 Empirical Model Specification – Level Equation Model

To examine how state and local fiscal conditions affect local economic development, the whole sample of 1998 U.S. nonmetropolitan counties (excluding counties in Alaska and Hawaii) is used to investigate the importance of local expenditure and tax characteristics in the local labor and land market. The same analysis is applied for two disaggregated subsamples, namely, the one consisting of 1040 nonmetropolitan counties that are adjacent to a metropolitan area (which corresponds to the Beale codes 4, 6, 8 in Table 5), and the one consisting of 958 nonmetropolitan counties that are not adjacent to a metropolitan area (which corresponds to the Beale codes 5, 7, 9 in Table 5). Comparisons are made between each subsample and the full sample, and also among the different subsamples. Throughout the study, we term the whole sample as Nall and two subsamples as N468 and N579, respectively.

Table 5 provides an overview on the Beale codes or rural-urban Continuum codes defined by the Economic Research Service, U. S. Department of Agriculture (ERS, USDA). The Census Bureau classifies the U.S. territory into either metropolitan (metro) statistical areas or nonmetropolitan (nonmetro) statistical areas. Further, nonmetro is divided into micropolitan statistical areas and pure rural areas. The Census defines a

Table 5 Rural-Urban Continuum Codes (Beale Codes)

Code	Description	Number of counties
Metro counties:		
1	Counties in metro areas of 1 million population or more	413
2	Counties in metro areas of 250,000 to 1 million population	325
3	Counties in metro areas of fewer than 250,000 population	351
Non-metro counties:		
4	Urban population of 20,000 or more, adjacent to a metro area	218
5	Urban population of 20,000 or more, not adjacent to a metro area	105
6	Urban population of 2,500 to 19,999, adjacent to a metro area	609
7	Urban population of 2,500 to 19,999, not adjacent to a metro area	450
8	Completely rural or less than 2,500 urban population, adjacent to a metro area	235
9	Completely rural or less than 2,500 urban population, not adjacent to a metro area	435
Total:		3141

Source: ERS, USDA, 2003.

metropolitan area for the 2000 Census as containing a core urban area of 50,000 or more population and including counties which include the core urban area, as well as any adjacent counties that have 25% residents commuting to the urban core. Micropolitan areas are defined in a similar way except that the Census uses 10,000 population (but less than 50,000) for defining the urban center. The ERS takes the Census definition of metro and nonmetro statistical areas, creates the Rural-Urban Continuum codes (or Beales codes) by classifying counties into nonmetro and nonmetro type, and furthermore refines each county type by adding more classifications to examine the size of its urban population and its proximity to a metro area.

In specifying the hedonic wage and rent models, the first implementation of our analysis begins with the most parsimonious model which includes only state and local fiscal variables as explanatory variables for the full sample and each subsample,

$$\begin{aligned}
WAGE_i &= \beta_0^W + \beta_1^W SFISCAL_i + \beta_2^W CFISCAL_i + \varepsilon_i^W \\
RENT_i &= \beta_0^R + \beta_1^R SFISCAL_i + \beta_2^R CFISCAL_i + \varepsilon_i^R
\end{aligned} \tag{16}$$

where **WAGE** and **RENT** are average wage per job and fair market rent respectively, both of which are expressed in natural logarithms. **SFISCAL_i** is a vector of state fiscal attributes which includes five categories of tax revenues and seven categories of expenditure variables. Specifically the tax variables include such major items as revenue from property tax, sales tax, individual income tax, corporate income tax, respectively. The expenditure variables include those, respectively, on education, highways, hospitals, public safety, and so on (See Table 4). **CFISCAL_i** is a vector of county fiscal attributes which includes property tax, sales tax, and five variables of expenditures on highways, safety, natural recreation, sewerage and education, respectively.

Next, the empirical implementation adds to the most parsimonious model the right to work (**RTW**) dummy variable, the Census dummies and the rural-urban continuum dummies (Table 5) as additional explanatory variables to account for state or region specific fixed effects. Therefore, for the full sample and two subsamples of nonmetropolitan counties, there are eight Census dummies. There are five rural-urban continuum dummies for the full sample (*Nall*) and two rural-urban continuum dummies for each subsample (*N468*, *N579*).

Further, we introduce the first key set of control variables (**AMENITY**) that may affect wages and rents by influencing labor supply and firm profitability,

$$\begin{aligned}
WAGE_i &= \beta_0^W + \beta_1^W SFISCAL_i + \beta_2^W CFISCAL_i + \beta_3^W RTW_i + \beta_4^W REG_i \\
&+ \beta_5^W AMENITY_i + \varepsilon_i^W \\
RENT_i &= \beta_0^R + \beta_1^R SFISCAL_i + \beta_2^R CFISCAL_i + \beta_3^R RTW_i + \beta_4^R REG_i \\
&+ \beta_5^R AMENITY_i + \varepsilon_i^R
\end{aligned} \tag{17}$$

where **AMENITY** is a vector of amenity variables that include the following weather and topography variables: climate, topography, the average temperature for January and July respectively, the average hours of sunlight for January and the average humidity for July, the percentage of county area that is covered by water; the topography score index. **REG** is a vector of Census dummies (Pacific is the omitted division) and rural-urban continuum dummies, which are used to capture unobserved differences common to given Census division or Beale region.

The second set of control variables we focus on are the demographic variables (**DEMOG**) which can affect household's earnings. The **DEMOG** vector includes six age and five racial composition variables, four education variables, the percentage of population that is female, married, and that has a linguistic isolation problem, respectively. As the introduction of the demographic variables into the wage model could incur possible endogeneity bias, we try to mitigate this problem by including the 1990 values of these labor quality variables in the empirical regression model. Consequently equation (17) is respecified as,

$$\begin{aligned} WAGE_i &= \beta_0^W + \beta_1^W SFISCAL_i + \beta_2^W CFISCAL_i + \beta_3^W RTW_i + \beta_4^W REG_i \\ &+ \beta_5^W AMENITY_i + \beta_6^W DEMOG_i + \varepsilon_i^W \\ RENT_i &= \beta_0^R + \beta_1^R SFISCAL_i + \beta_2^R CFISCAL_i + \beta_3^R RTW_i + \beta_4^R REG_i \\ &+ \beta_5^R AMENITY_i + \varepsilon_i^R \end{aligned} \quad (18).$$

Next we respecify a model which replaces state fiscal variables, including the RTW dummy and Census division dummies, with 47 state dummy variables in equation (18). That is, we want to estimate the following equation,

$$\begin{aligned} WAGE_i &= \beta_0^W + \beta_1 CFISCAL + \beta_2^W AMENITY_i + \beta_3^W DEMOG_i + \beta_4 State_i + \varepsilon_i^W \\ RENT_i &= \beta_0^R + \beta_1^R CFISCAL + \beta_2^R AMENITY_i + \beta_4 State_i + \varepsilon_i^R \end{aligned} \quad (19).$$

In doing so we are able to examine not only the different way that the county fiscal variables might behave but also the effects of state fiscal variables in another perspective through the fixed effects regressions as elaborated below.

Endogeneity Issue

One of our empirical concerns is that local labor and land markets could influence fiscal variables. One could make a good argument that tax or expenditure variables depend to some extent on the dependent variables, housing values for instance. Given the level of public spending, the higher home values in a county, the lower are the tax rates needed to generate revenues to finance governmental programs. If this is the case, the OLS estimates could be spurious and not reliable.

In order to overcome the potential endogeneity of the OLS variables, the Instrumental Variable (IV) method or two stage least squares (2SLS) estimation method is implemented. In the first stage, we regress the year 2002 fiscal variables on instrumental variables and exogenous variables using OLS and then compute the predicted value for the fiscal variables. In the second stage, we then regress the outcome variables (*WAGE*, *RENT*) on exogenous variables and the predicted values of the fiscal variables. However, there is a practical difficulty in the 2SLS estimation in that it is difficult to identify one or more appropriate instruments. What variables can explain the changes of fiscal variables and not be determinants of the change of wage or rent? We will have to seek instruments which can affect the outcome variables only through the mechanism of the changes of fiscal variables. In other words, taking a look at equation

(18), we will have to find at least one instrumental variable such that the instrument is strongly correlated with *SFISCAL* and *CFISCAL* but uncorrelated with the error term.

The choice of suitable instruments is a difficult task. Since there are no obvious instrumental variables from economic theory, we follow the standard way of correcting simultaneity bias by identifying the earlier values (i.e., one-period lag) of the endogenous fiscal variables as instruments.

There are three general tests associated with the 2SLS regression – the endogeneity test, the test of the validity of instruments and the overidentification test. To diagnose the possible endogeneity of *SFISCAL* and *CFISCAL* in this study, the Durbin-Wu-Hausman test (Durbin, 1954; Hausman, 1978; Wu, 1973) is employed. The Durbin-Wu-Hausman (thereafter, DWH) test involves two steps. The first step is to regress each individual endogenous variable on the instrumental variables (in this case are year 1992 fiscal variables, or *SFISCAL*₁₉₉₂ and *CFISCAL*₁₉₉₂) and all exogenous variables (i.e., demographic and amenity variables) to obtain their predicted residuals. The second step is to estimate OLS models with *WAGE* and *RENT* as dependent variables and the *SFISCAL* and *CFISCAL* variables, all exogenous variables, and the predicted residuals as independent variables. Then a joint *F*-test is performed to test the statistical significance of the estimated coefficients on the predicted residuals under the null hypothesis that the *SFISCAL* and *CFISCAL* variables are exogenous variables. If the estimated coefficients on the predicted residuals are statistically significant, one can reject the null hypothesis and conclude at least one suspected variable is endogenous. To verify the validity of instruments (i.e., *SFISCAL*₁₉₉₂ and *CFISCAL*₁₉₉₂), we will use the *F*-test of the joint significance of the instruments in the first stage regression to check

whether they are highly correlated with $SFISCAL_{2002}$ and $CFISCAL_{2002}$ (Bound et al., 1995; Staiger and Stock, 1997). The general rule of thumb is for a single endogenous regressor, an F -statistic less than 10 is cause for concern (Staiger and Stock (1997), p. 557). In addition, we also check the identification conditions for our instruments. As in the sensitivity analysis discussed below, the set of instruments is overidentified since the number of exogenous instruments exceeds the number of endogenous variables.

Sensitivity Analysis

In our sensitivity analysis, alternative state policy variables are included in the model outlined above. The top marginal personal income tax rate and marginal corporate income tax replaces the effective tax rate such as the state corporate income tax and the state personal income tax, and further additional state fiscal variables are added in equations (16)-(19). In addition to the top marginal personal income tax rate and top corporate income tax, additional variables will include the following variables such as capital gains tax, death tax, unemployment tax rate, utility costs, workers' compensation cost, gas tax, and state minimum wage. These variables are components of the Small Business Survival Index (**SBSI**) compiled and updated annually by the Small Business and Entrepreneurship Council to evaluate the business climate for the start-up companies or existing ones in an individual state. Hence the model similar to equation (18) is specified as,

$$\begin{aligned}
 WAGE_i &= \beta_0^W + \beta_1^W SFISCAL_i + \beta_2^W CFISCAL_i + \beta_3^W RTW_i + \beta_4^W REG_i \\
 &+ \beta_5^W AMENITY_i + \beta_6^W DEMOG_i + \beta_7^W SBSI + \varepsilon_i^W \\
 RENT_i &= \beta_0^R + \beta_1^R SFISCAL_i + \beta_2^R CFISCAL_i + \beta_3^R RTW_i + \beta_4^R REG_i \\
 &+ \beta_5^R AMENITY_i + \beta_7^R SBSI + \varepsilon_i^R
 \end{aligned} \tag{20}$$

In addition, equation (20) can be further experimented with by including four additional ERS typology variables; namely, we include four additional dummy variables (*fm*, *mi*, *fl*, *rec*) to identify whether a county is farming dependent or mining dependent, whether the county has 30% of the federally-owned lands, and whether the county belongs to a recreational county.⁵

Fixed Effects Regression

Instead of examining directly the state fiscal effects from the wage and rent equations, we conduct the fixed effects regression to examine these effects in an alternative way. The regression involves two steps. First, we obtain state fixed effects from estimating wage and rent equations in equation (19), where the fixed effects are obtained by removing county fiscal variables and demographic variables from the right-hand side explanatory variables, as we expect the explanatory variables to be purely exogenous, and then we regress the fixed effects from the wage and rent equation respectively on the state fiscal variables. In doing so we are attempting to obtain state fixed effects from running both wage and rent regressions, of which the right-hand side includes only the exogenous amenity variables. In sensitivity analysis, we conduct additional regressions by replacing some of the state fiscal variables from the Census with the **SBSI** variables.

With respect to the state fiscal effects, next we conduct the sensitivity analysis to the fixed effects regressions. We regress these fixed effects obtained from the wage and rent model on these state fiscal variables but dropping out the fixed effects that correspond to each of the nine Census divisions, which means that we will have nine

⁵ The county classification and definition can be found at <http://srdc.msstate.edu/measuring/overview.pdf>

groups of regressions. For instance, the first Census division (New England region) has six states, therefore the first group regression will drop 6 observations of fixed effects. By the same token, for the second Census division (Mid Atlantic region) which contains three states, we will drop three fixed effects. Further, we check the robustness of the state fiscal effects by including SBSI variables as additional explanatory variables.

3.1.4.2 Empirical Model Specification – Difference Equation Model

Theoretically, when we specify a levels equation model of wage and rent we are assuming an equilibrium model of local labor and land markets. For instance, in equilibrium the difference in wages between two locations will reflect the workers' marginal valuation of the difference in local conditions. However, in specifying the difference equation model we are implicitly not assuming that. As a matter of fact we are examining the contemporaneous effects of the changes in government tax and expenditure variables on the changes of local wages and rents.

Econometrically, the first difference equation model provides certain superiorities over the levels equation models in circumstances when there are powerful unobservable and unchanging variables that bias the cross-sectional estimates (Liker, Augustyniak, and Duncan; 1985). Therefore by taking differences of the level equation we implicitly control for county fixed effects or omitted variables at the county level that bias our coefficients. The first difference equation model has an additional advantage as it often reduces the severity of multicollinearity (Gujarati, 2004; p. 367), because even though the levels of fiscal attributes may be correlated with other explanatory variables, there is no prior reason to believe that their differences will also be highly correlated.

Similar to the procedures done in the levels equation regression, we will conduct a first difference regression on the full sample and each individual subsample, respectively.

Therefore, we specify the following regression model for each sample,

$$\begin{aligned}
\Delta WAGE_i &= \beta_0^W + \beta_1^W \Delta SFISCAL_i + \beta_2^W \Delta CFISCAL_i + \beta_3^W REG_i \\
&+ \beta_4^W AMENITY_i + \beta_6^W \Delta DEMOG_i + \varepsilon_i^W \\
\Delta RENT_i &= \beta_0^R + \beta_1^R \Delta SFISCAL_i + \beta_2^R \Delta CFISCAL_i + \beta_3^R REG_i \\
&+ \beta_4^R AMENITY_i + \varepsilon_i^R
\end{aligned} \tag{21}$$

where the Δ before the wage, rent, and each fiscal variable indicates the value of the year 2002 minus its corresponding year 1992 value, and the $\Delta DEMOG$ is a vector of change of the value for the demographic variable in year 2000 minus its corresponding value in year 1990. For comparison purposes, we can rerun the above model by including additional four ERS typology dummy variables (*fm, mi, fl, rec*).

Endogeneity Issue

Even though the first difference model has its advantages over the levels equation model, the first difference model equation (21) is not without problems. It could incur the same problem as found in the levels form regression. Namely, there is the possibility of endogeneity between the change of local fiscal variables and the change of local outcome variables. The change of local fiscal variables (taxes or expenditures) may be simultaneously determined with the contemporaneous change of wages or rents. In order to correct for the problems of the OLS biased estimates, the 2SLS estimation technique is also employed in the differenced models.

Sensitivity Analysis

The political system could affect the outcome of local fiscal policies. For instance, Republican governments tend to favor low taxes and low spending while Democratic governments tend to have higher levels of expenditures being financed by higher taxes. In the sensitivity analysis, we hence consider whether the 2SLS results are robust to the inclusion of two additional political voting behavior instruments, i.e., the percentage of votes cast for the Republican candidate in the 1972 presidential election (*PRES_REP72*) and the percentage of presidential election turnout in 1972 (*PRES_TO72*). In such case, we are able to compute the Sargan (1958) Chi-Square statistics to test the general validity of the instrument sets.

Spatial Correlation Issue

The U.S. nonmetropolitan area is composed of hundreds of independent government jurisdictions. Although politically independent, the county governments are believed to be economically interdependent. The fiscal policies of one county may have effects reaching beyond its political boundaries. An understanding of such spatial effects could have strong empirical implications.

One way to account for the spatial effects in our cross-sectional study is to use a clustering method, which is included in most statistical software packages such as STATA to allow for computations of standard errors that are robust to arbitrary correlation within clusters and arbitrary heteroskedasticity. The BEA has developed an exhaustive set of BEA Economic Areas based on similar traits and characteristics. It

classified all U.S. counties into 179 clusters, which are used in our study for robustness check purposes.

Econometrically, when the residuals are correlated within a cluster, not only are the OLS standard errors biased but the slope coefficients are not efficient. For estimating the coefficients and standard errors in the presence of within cluster correlation, we use a commonly used method. Namely we apply OLS to estimate the coefficients but reported clustered standard errors which are standard errors adjusted to account for possible correlation within a cluster (BEA Economic Area).

3.2 Dynamic Growth Model

3.2.1 Three Hypotheses of Sources of Economic Growth

This section follows the pioneering work of Glaeser and Tobio (2008) which adapts the original static Roback (1982) equilibrium framework explicated in Section 3.1 into a growth model context. Specifically, this growth model uses changes in population, income, and housing prices to evaluate the potential sources for the U.S. nonmetropolitan economic growth. Three hypotheses are proposed to identify nonmetropolitan economic growth. First, economic growth could be due to rising productivity in a nonmetropolitan county. Second, the county may have become a more attractive place to live for households (say, mild winter) or to locate for firms (say, favorable business environment-related fiscal policy). The final hypothesis is that flexible housing supply drives the regional growth.

The growth framework of Glaeser and Tobio (2008) differs from previous static approach of Roback (1982) in a number of perspectives. First, these two models conceptually are based on two different assumptions of local labor or land markets. In the growth context, instead of assuming an equilibrium of labor and land markets, we assume by some means that there are disequilibrium forces in the current period, and there are some disequilibrium innovations going on that affect current levels and subsequent changes. Second, the housing sectors are treated differently in these two frameworks. In the Roback (1982) model, there are only firm and household sectors in the model; there are no innovations from housing. Housing price changes in a place because households or firms move there and the differences in housing prices or land prices just reflect the productivity (dis)advantage or amenity (dis)advantage of a place. In Glaeser and Tobio (2008) model however, there are household, firm and housing sectors, and innovations to all these three sectors. There are various innovations to the housing sector such as changes of regulations and zonings which can affect households and firms' locations. In brief, the explicit treatment of the housing sector gives housing a more active role in the Glaeser and Tobio (2008) model.

3.2.2 Framework and Decomposition of the Sources of Economic Growth

The formal framework following Glaeser and Tobio (2008) allows for evaluating the relative contribution of productivity growth, site specific factor growth such as amenity growth or change in fiscal policy, and housing supply growth to the nonmetropolitan regions.

Assuming a Roback (1982) spatial equilibrium model where firms and households are indifferent across space in one time. Each firm in a region is assumed to have the following production function,

$$Y = AN^{\beta} K^{\gamma} Z^{1-\beta-\gamma} \quad (21)$$

where A indicates regional specific productivity level, N is the number of workers, K is traded capital, and Z is non-traded capital. Traded capital can be purchased anywhere with a price equal to one. Non-traded capital in region is fixed which is equal to \bar{Z} . Firms in a perfectly competitive market hence have the following labor demand equation based on firms' first order conditions of output maximization subject to a cost constraint (Details on equation derivation can be found in Appendix B),

$$\beta A^{\frac{1}{1-\gamma}} \gamma^{\frac{\gamma}{1-\gamma}} N^{\frac{\beta+\gamma-1}{1-\gamma}} \bar{Z}^{\frac{1-\beta-\gamma}{1-\gamma}} = W \quad (22).$$

Households in a given region, who consume a non-traded housing (H , with price P_H) and numeraire traded goods (C), have the following Cobb-Douglas utility function,

$$U = \theta H^{\alpha} C^{1-\alpha} \quad (23).$$

Optimizing the utility function in equation (23) subject to budget constraint gives us the following indirect utility function,

$$\alpha^{\alpha} (1-\alpha)^{1-\alpha} \theta W P_H^{-\alpha} = \bar{V} \quad (24).$$

Regional housing supply is produced competitively with certain height (h) and land (L). Total quantity of housing supply for a developer thus is,

$$Q_H = hL \quad (25).$$

Meanwhile, the developer faces two types of costs: the cost of using land L in housing production and the cost of producing Q_H units of structure on top of L units of

land, which is assumed to be equal to $c_0 h^\delta L$. The developer's first order profit maximization, under these assumptions, yields a demand for h , which is,

$$h = \left(\frac{P_H}{\delta c_0} \right)^{\frac{1}{\delta-1}} \quad (26a).$$

This implies a total housing supply equation of,

$$h \bar{L} = \left(\frac{P_H}{\delta c_0} \right)^{\frac{1}{\delta-1}} \bar{L} \quad (26b).$$

This total housing supply must be equal to total housing demand, i.e., the total number of households in the region times housing consumption for each household, which is $\left(\frac{1}{P_H} \right) \alpha W$ derived from the first order condition of utility maximization in equation (23). Eventually, the equilibrium of housing supply and housing demand yields the following housing price equation, which is a function of population and income,

$$P_H = \delta^{\frac{1}{\delta}} c_0^{\frac{1}{\delta}} \left(\frac{\alpha N W}{\bar{L}} \right)^{\frac{\delta-1}{\delta}} \quad (27).$$

Given the firms' labor demand function (equation (22)), the households' indirect utility function (equation (24)), and the housing price equation (equation (27)), solving these three equations with three unknowns (population N , income W , and housing price P_H) we have,

$$\ln N = C_N + \frac{(\delta + \alpha - \alpha\delta) \ln A + (1 - \gamma)[\delta \ln \theta + \alpha(\delta - 1) \ln \bar{L}]}{\delta(1 - \beta - \gamma) + \alpha\beta(\delta - 1)} \quad (28a)$$

$$\ln W = C_W + \frac{(\delta - 1)\alpha \ln A - (1 - \beta - \gamma)[\delta \ln \theta + \alpha(\delta - 1) \ln \bar{L}]}{\delta(1 - \beta - \gamma) + \alpha\beta(\delta - 1)} \quad (28b)$$

$$\ln P_H = C_P + \frac{(\delta - 1)[\ln A + \beta \ln \theta - (1 - \beta - \gamma) \ln \bar{L}]}{\delta(1 - \beta - \gamma) + \alpha\beta(\delta - 1)} \quad (28c)$$

where C_N , C_W , and C_P are constant terms that differ across regions but not within a region. Assuming innovations to productivity, region specific characteristics (amenity or fiscal policies), and housing supply are characterized by the following growth equations, $\ln(\frac{A_{t+1}}{A_t}) = C_A + \phi_A S + \varepsilon_A$, $\ln(\frac{\theta_{t+1}}{\theta_t}) = C_\theta + \phi_\theta S + \varepsilon_\theta$, $\ln(\frac{\bar{L}_{t+1}}{\bar{L}_t}) = C_L + \phi_L S + \varepsilon_L$, where C_A , C_θ , and C_L are constants, ϕ_A, ϕ_θ and ϕ_L are coefficients, $\varepsilon_A, \varepsilon_\theta$ and ε_L are error terms, and S is a region specific variable.

Consequently, equations (28a)-(28c) imply that:

$$\ln(\frac{N_{t+1}}{N_t}) = C_{\Delta N} + \tau\{(\delta + \alpha - \alpha\delta)\phi_A + (1 - \gamma)[\delta\phi_\theta + \alpha(\delta - 1)\phi_L]\}S + \varepsilon_N \quad (29a)$$

$$\ln(\frac{W_{t+1}}{W_t}) = C_{\Delta W} + \tau\{(\delta - 1)\alpha\phi_A - (1 - \beta - \gamma)[\delta\phi_\theta + \alpha(\delta - 1)\phi_L]\}S + \varepsilon_W \quad (29b)$$

$$\ln(\frac{P_{t+1}}{P_t}) = C_{\Delta P} + \tau\{(\delta - 1)[\phi_A + \beta\phi_\theta - (1 - \beta - \gamma)\phi_L]\}S + \varepsilon_P \quad (29c)$$

where $\tau = [\delta(1 - \beta - \gamma) + \alpha\beta(\delta - 1)]^{-1}$. Hence if letting $\hat{B}_N, \hat{B}_W, \hat{B}_P$ represent the estimated coefficients on S variable from estimating the population, wage and housing price change equations (29a-29c), then,

$$\phi_A = (1 - \beta - \gamma)\hat{B}_N + (1 - \gamma)\hat{B}_W \quad (30a)$$

$$\phi_\theta = \alpha\hat{B}_P - \hat{B}_W \quad (30b)$$

$$\phi_P = \hat{B}_N + \hat{B}_W - \frac{\delta\hat{B}_P}{\delta - 1} \quad (30c).$$

In the empirical analysis section the coefficient estimates for \hat{B}_N, \hat{B}_W and \hat{B}_P are obtained from regressing equations (29a-c) first, and then these estimates are used to

estimate ϕ_A, ϕ_θ and ϕ_L using equations (30a-30c) assuming that parameters α, β, γ , and δ are known. Following Glaeser and Tobio (2008), the expenditure share on housing α takes the value 0.3, labor share of input costs β takes the value 0.6, the share of mobile capital γ is 0.2, and the elasticity of housing supply, $\delta = 1.5$ or $\delta = 3$.

As a result, this framework allows us to decompose regional growth into three potential sources: 1) rising productivity; 2) rising amenities or favorable policy; and 3) flexible housing supply, which is ignored in the standard Roback (1982) model of previous section. It allows us to estimate the relative shocks to productivity, region specific characteristics, and housing supply in a region and to assess the relative contribution of each type of shock to regional growth.

3.2.3 Empirical Model Specification – Growth Equation Model

In order to examine the impact of current local fiscal conditions on the nonmetropolitan wage and rent growth, we estimate the following growth model for the entire sample and each subsample of the nonmetropolitan counties,

$$\begin{aligned} \% \Delta WAGE_{i,2002-1992} &= \beta_0^W + \beta_1^W SFISCAL_{i,1992} + \beta_2^W CFISCAL_{i,1992} \\ &+ \beta_3^W RTW_i + \beta_4^W REG_i + \beta_5^W AMENITY_i + \beta_6^W DEMOG_{i,1990} + \varepsilon_i^W \\ \% \Delta RENT_{i,2002-1992} &= \beta_0^R + \beta_1^R SFISCAL_{i,1992} + \beta_2^R CFISCAL_{i,1992} \\ &+ \beta_3^R RTW_i + \beta_4^R REG_i + \beta_5^R AMENITY_i + \varepsilon_i^R \end{aligned} \quad (31)$$

where the dependent variables are the ensuing period's percentage change in wage and rent using data from BEA and HUD, respectively. The explanatory variables, except the dummy variables (RTW state dummy, Census and ERS typology dummies) and Amenity variables, are measured at their initial 1992 or 1990 values.

To test whether the coefficients are constant across samples or to test whether we should run a full-sample regression (pooled regression) or subsample regressions, we perform an F test known as the Chow test (Chow, 1960), which uses the F statistic,

$$F(k, n - 2k) = \frac{(RSS_p - RSS_1 - RSS_2) / k}{(RSS_1 + RSS_2) / 2k} \quad (32)$$

where RSS_p is the total sum of the squares of the residuals in the full sample. RSS_1 and RSS_2 are the sum of the squares of the residuals in two-subsample regression respectively. The parameter k is the regression coefficients and n is the total observations in the full sample ($Nall$). Rejection of the null hypothesis implies that the pooled sample regression is inadequate and we should run separate regressions for the two subsamples ($N468$ and $N579$) in this study.

The growth equation model of wage and rent theoretically implies a different assumption of local labor or land market from the two types of models as mentioned above. In other words, when specifying a growth equation model, and running regressions of the growth variables on initial fiscal policy variables, we assume by some means there are disequilibrium forces in the current period. There are some disequilibrium innovations going on that affect current levels and subsequent changes.

Econometrically the growth model specification has the advantage over the level form or first difference form specification. By regressing the wage and rent growth from 1992-2002 on the initial values of the explanatory variables, the growth model overcomes the problem of direct endogeneity, which is analogous to a simple IV estimator (Partridge, 2005).

Sensitivity Analysis

We next consider a set of sensitivity checks in the growth model similar to what we implemented in the differenced model.

First, we check the sensitivity of regression results to standard errors which are clustered by BEA defined economic areas and examine whether the significance of the coefficient estimates varies.

Second, we consider whether our results are robust to inclusion of the SBSI variables.

Third, we examine how the results of the governmental tax and expenditure variables are robust to using alternative measures of dependent variables using the Census earning and housing cost data.

Our last specification is to disaggregate the entire sample into several sub-samples by nine Rural-urban Continuum Codes (Beale codes) to study the effects of tax and expenditure variables on local wages and rents. Through addressing the issue of sample heterogeneity, we hope to obtain consistent results from estimating coefficients of every subsample.

CHAPTER 4

DATA SOURCE

4.1 Wage and Rent

The average wage per job variable is used in this empirical analysis as one of the dependent variables. It is defined as total wage and salary disbursements divided by total wage and salary employment. There are three major sources to acquire data for labor employment and wages – Bureau of Labor Statistics (BLS), Bureau of Economic Analysis (BEA) or U.S. Census Bureau. The BEA employment and wage estimates are more comprehensive than BLS data as the BEA adjusts the BLS estimates by accounting for employment and wages not covered in the categories such as farms, private households, private elementary and secondary schools and other omitted categories. The data for average wage per job, therefore, are taken from the Regional Economic Information System (REIS) of the BEA.

As another dependent variable, the cost of housing is measured using county level fair market rents (FMR) compiled by the U.S. Department of Housing and Urban Development (HUD). FMR are gross rent estimates that include rent plus the cost of all utilities derived from annual estimates for 530 metropolitan areas and 2045 nonmetropolitan county FMR areas. The FMR figures, reflecting the 45th percentile (50th percentile after fiscal year 1995) rent for a standard quality two-bedroom housing

unit, have the advantage that they provide rent for a standardized housing unit, thus allowing comparisons across counties.

In sensitivity analysis this study uses an alternative measurement for wage using Census median household earnings for year 2000. In the rent equation, following Partridge et al. (2007), the alternative measurement for rent, calculated based on data from the U.S. Census of Bureau, is defined as the weighted average median gross rent of owner and renter occupied housing units for 2000 (Blomquist et al., 1988; Gabriel et al., 2003). For the owner occupied units, median housing prices are converted into imputed annual rent using a discount rate of 7.85% (Peiser and Smith, 1985). The imputed annual rent for the owner occupied units along with the median monthly rent for the renter occupied units are then used to calculate the weighted average median rent, using the shares of owner and renter occupied houses as the weights.

4.2 State and Local Fiscal Variables

Variables of government taxes and expenditures are obtained from the Census of Governments (COG) 2002 and 1992 SF3 files. COG provides detailed budgetary information for all levels of government (state, local, county, municipal, school district and so on) in the United States. This study considers fiscal variables at the state level and county level, respectively.

For the state fiscal variables, we derive the proxy variables for effective tax rates by dividing state and local government tax revenues from individual income, sales, property, corporate income and other taxes by state personal income. The structure of government services is also adjusted by state personal income and includes expenditures

on highway, education (higher education, elementary and secondary education), public safety (police protection, fire protection, and correction), public health and hospitals, environment (natural resources, parks and recreation), housing (housing and community development, sewerage, and solid waste management), and government administration (financial administration, judicial and legal).

For the county level fiscal variables, similar variables are used as those at the state level and all divided by county personal income. Tax structure variables include property taxes, sales taxes, while government spending includes expenditures on highway, education, environment and housing (natural recreation, and sewerage). All government expenditures at the state and county level are measured as net values (namely, expenditures minus their corresponding charges).

4.3 Small Business Survival Index Variables

Business climate affects companies' decision about plant location, job creation and retention. To appraise how business-friendly a state is, the Small Business and Entrepreneurship Council created and updated annually the Small Business Survival Index (SBSI), which ranks U.S. states according to the governmental burdens placed on the start-up companies or existing ones in individual state. The SBSI consists of such major state fiscal variables as top personal income tax, capital gains tax, top corporate income tax, death tax, unemployment tax rate, utility costs, workers' compensation cost, gas tax, and state minimum wage. The lower is the index number, the lighter are the governmental burdens, or the better is the business environment. According to the 2002

SBSI in our sample, the most business friendly states are South Dakota and Nevada. In contrast the most anti-business states are Maine and Minnesota.

4.4 Amenity Variables

The amenity variables are taken from the Economic Research Service of United States Department of Agriculture (ERS, USDA) and are available from the ERS for counties in the 48 contiguous states. The amenity variables measure the physical conditions of a county that facilitates people to live or firm to locate and include measurements such as climate, topography, and water area. Specifically, these variables used in this study are the mean temperature (from 1941-1971) for January and July respectively, mean hours of sunlight (from 1941-1971) for January and mean humidity (from 1941-1971) for July; the percentage of county area that is covered by water; and the topography score variable, which have a value range of 1 to 21, where 1 represents flat plains and 21 represents the most mountainous land.

4.5 Demographic Variables

The demographic variables are taken from the 1990 and 2000 Census (U.S. Bureau of the Census, *Characteristics of the Population*) and include variables on age structure, gender composition, education level, marital status, and ethnicity. Details on these variables are described in Appendix Table 1.

4.6 Business Cycle Variable

Local conditions, except conditions of fiscal policies, local amenities, and demographic compositions, can also include state regulation that influences local wage and rents. We include a dummy variable to indicate whether the local area is in a state with a right-to-work law (RTW). A right-to-work law disallows the union shop where all employees are required to join the union. Most of the 22 states that have a RTW law adopted them since the 1940s. The states with RTW laws and their adoption dates, according to Newman (1984), are (in ascending order): Florida (1944), Nebraska (1946), South Dakota (1946), Virginia (1947), Texas (1947), Tennessee (1947), North Dakota (1947), North Carolina (1947), Iowa (1947), Georgia (1947), Arkansas (1947), Arizona (1947), Nevada (1951), Alabama (1953), South Carolina (1954), Mississippi (1954), Utah (1955), Kansas (1958), Wyoming (1963), Louisiana (1976), Idaho (1986), and Oklahoma (2001).

What effects the RTW laws have on wages is a hot topic. On the one hand, proponents of right to work laws claimed that these laws create jobs by creating a “pro-business” environment (Holmes, 1998) and lead to higher wages, on the other hand, opponents argued that a right-to-work law leads to lowered wages and weakened unions. Among the empirical studies on RTW laws, Carroll (1983), and Garofalo & Malhotra (1992) report RTW laws have a large, significant, negative effect on average wages, Moore et al. (1986) and Hundley (1993) find that RTW laws have no significant effect on union or nonunion wages in the private sector and in the public sector, respectively. In general, there is a great controversy on the effects of RTW laws on wage levels (Moore; 1998).

4.7 Housing Structural Variables

Unlike the fair market rent data from the HUD that are constructed from the standardized two bedroom housing unit, the Census housing cost used as an alternative dependent variable in the rent equation is constructed from rents of houses and apartments that are not standardized and directly comparable between them. Therefore, we include several housing quality control variables in the rent equation to account for differences across the housing structures. These control variables are drawn from the U.S. Census Bureau SF3 file and include the median number of rooms in the structure, the age of housing units, the shares of 1-5 bedrooms out of total rooms, the share housing units that are mobile homes, and the shares with complete plumbing and kitchen. The median number of rooms indicates the size of rental units. The age differences in the housing units reflect the differences in construction technology, type and efficiency of mechanical systems (for example, heating and wiring) and the time over which the structure has been subject to normal wear and tear (Galster, 1987). Thus, smaller and older rental units are expected to have lower rents.

CHAPTER 5

EMPIRICAL RESULTS

The empirical results of the local fiscal effects on nonmetropolitan wage and land rent are presented in this chapter.

The chapter is divided into three sections. The first section reports the results of the wage and rent model in level form. The second section reports the results of a first differenced wage and rent model. The third section reports the growth model results. Comparisons are made among these three models. In addition, the results are compared between each subsample and the full sample, and also between alternative specifications within each sample.

Recalling from equation (4), the coefficient sign of a specific fiscal variable in either wage or rent equation depends on households' and/or firms' marginal valuation of that variable (V_s and/or C_s). Theoretically V_s and C_s can be positive, negative or zero. In other words, the variable can be an amenity, disamenity, or has no amenity value. On the other hand, it can be productive, counterproductive, or does not affect production. Therefore theoretically the possible attributes of a variable generates nine combinations of outcomes for the wage and rent model as shown in Table 6. In this study however, we expect that tax variables are considered as disamenities and counterproductive and that expenditure variables are amenities and productive. Consequently, we expect that in

Table 6. Fiscal Impacts on Equilibrium Wage and Rent

	Productive ($C_s < 0$)	Counterproductive ($C_s > 0$)	No Productivity ($C_s = 0$)
Amenity ($V_s > 0$)	Wage +/-; Rent +	Wage -; Rent +/-	Wage -; Rent +
Disamenity ($V_s < 0$)	Wage +; Rent +/-	Wage +/-; Rent -	Wage +; Rent -
No Amenity Value ($V_s = 0$)	Wage +; Rent +	Wage -; Rent -	Wage 0; Rent 0

the rent equation, the sign on tax variables is negative and the sign on expenditure variables is positive.

We assume that tax and expenditure variables considered in this study affect each subsample in the same manner regardless of the group to which they belong. As a result, the predicted signs for the subsample are the same as those for the sample as a whole. Besides we expect the sign of a coefficient estimate for a given fiscal variable in the level regression to be the same as in the difference equation and growth equation as well. Put differently, we expect that higher taxation levels leads to a lower rental rate when running a levels form regression, which implies that we expect changes of taxes to generate negative effects on the change of rental rate if we run a difference form regression. If we regress changes of rents on initial levels of fiscal variables, we expect higher level of taxes to have a negative effect on subsequent growth.

Before reporting and interpreting the coefficients of fiscal variables, we should always keep in mind that government taxes and expenditures variables enter the regressions with a balanced budget constraint, where by definition the sum of revenues is restricted to equal the sum of expenditures. Government revenues are the sum of intergovernmental revenue (i.e., grants), tax revenue, charges and user fees, and non-

general revenue (liquor store, utility, or insurance trust revenue), and government bond revenues. Government expenditures are the sum of expenditures on education, highways, public safety, transportation, health and hospitals, environment and housing, government services and three non-general expenditures (liquor store, utility, or insurance trust expenditure).⁶ However, in order for the models to be estimated, one of the revenue or expenditure variables has to be excluded to avoid perfect multicollinearity. Thus, the omitted variable becomes important to interpret the coefficients of the fiscal variables included in the model because all the tax variables or expenditure variable are evaluated against the change of the omitted variable.

In this study, the omitted variables are intergovernmental revenues, non-general revenues, bond revenues, and non-general expenditures. Therefore, the sales tax coefficient in the model specifications should be interpreted as the effect of faster growth of the sales tax at the expense of slower growth in intergovernmental revenues, non-general revenues and bond revenues, and/or the faster growth in the non-general expenditures. Similarly, the education coefficient should be interpreted as the effect of a one unit increase in education financed by the increase of intergovernmental revenues and non-general revenues, and/or bond revenue. In addition, the net impact of increasing sales tax revenue to fund an equivalent increase in the education can be found by adding their respective coefficients together.

5.1 Level Equation Model Results

⁶ Detailed definition and classification of the tax and expenditure categories are available at <http://www.Census.gov/govs/www/class.html>.

This section presents the empirical results of the levels equation (Tables 7-11). The analysis in this section proceeds in five major steps. First, Tables 7A-7B report the state and local fiscal effects from the wage and rent equation for the whole sample of nonmetropolitan counties using data from the BEA and HUD. Second, these fiscal effects are evaluated using alternative Census earning and housing cost data. The results are presented in Tables 8A-8B. Third, Table 9 reports the results of sensitivity analysis by adding the SBSI variables into the models in Tables 7A-7B. The same analysis conducted for the whole sample (Nall) in Tables 7-9 is applied to the two subsamples (N468 and N579). The results are reported in the Appendix Tables. Fourth, state fiscal policy variables are further examined in the fixed effects regression. The results are presented in Tables 10-11. The last step is to apply the 2SLS technique to address the endogeneity issue arising from this cross-sectional analysis. The results are shown in the appendix tables.

Table 7A shows labor market effects and Table 7B shows housing market effects. Both tables report the OLS estimates with *t* statistics based on robust Huber-White (Huber, 1967; White, 1980) standard errors and adjusted *R*-squared values from a full sample of 1998 nonmetropolitan counties. Various forms of empirical specifications are presented in both Tables 7A and 7B. Model 1 reports the results of our most parsimonious model which includes only the state and local fiscal variables (corresponding to equation (16)). Model 2 adds the RTW state dummy variable, Census dummies, and rural-urban continuum dummies to the first model. Next, Model 3 includes additional amenity variables to the second model. Model 4 includes further demographic variables into Model 3 to control for labor force quality in the wage equation. Model 5

removes the state fiscal variables together with Census dummies and the RTW state dummy variable from Model 4 while adding 47 state dummies to the model. Model 6 evaluates some major state and county fiscal variables based on Model 4.

Generally speaking, Model 1 in Table 7A shows that almost all the coefficients on the state and county tax variables are positive and statistically significant. The education and highway variables (*stl02_firstsecond*, *stl02_higheredu*, *cty02education*, *stl02_highway*, *cty02highway*) at the state level or county level are found to be negative and most of them are statistically significant. The expenditure variables on environmental housing (*stl02_envirohousing*), government administration (*stl02_govtadmin*), and natural recreation (*cty02naturalrec*) are found to be positive. The sewerage variable (*cty02sewerage*) is negative and statistically significant. These fiscal variables explain only 21% of the wage equation. According to the compensation differential theory, we should expect a higher wage in an unfavorable, higher tax location, and lower wage in a favorable, better public services provided location, other things being equal. Therefore we expect tax and expenditure variables to have opposite signs in the wage equation. As a result, the estimates in Model 1 do not meet our expectations very well. We find somewhat mixed coefficient signs between these two fiscal variable groups.

With respect to the size and statistical significance, the estimates of Model 1 are sensitive to the subsequent model specifications in Models 2-6. In contrast to Model 1, Models 2-6 show that *stl02_property*, *stl02_individual*, *stl02_corporate*, *cty02sales* are found to be negative but only *cty02sales* is statistically significant. The variables on first-secondary education and higher education at state level, public safety, natural recreation,

**Table 7A. Level Equation Model Results for Sample Nall, Dependent variables:
ln(wage2002)**

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
stl02_property	3.211** (4.55)	-1.020 (1.04)	-1.083 (1.10)	-1.274 (1.38)		
stl02_sales	1.990** (3.23)	2.020** (3.54)	2.126** (3.67)	1.371* (2.54)		
stl02_individual	1.384** (2.93)	0.600 (1.06)	1.080 (1.57)	-0.710 (1.05)		-1.707** (4.33)
stl02_corporate	12.492** (5.53)	-6.186* (2.16)	-5.440 (1.91)	-3.670 (1.34)		-0.873 (0.39)
stl02_rest	2.534** (2.90)	4.132** (4.29)	4.863** (4.01)	2.992* (2.52)		
stl02_firstsecond	-2.006* (2.17)	0.860 (0.92)	1.020 (1.08)	0.720 (0.80)		-0.615 (0.76)
stl02_higheredu	-1.050 (0.68)	-1.310 (0.82)	-2.320 (1.14)	1.690 (0.86)		2.989 (1.84)
stl02_hospitalhealth	-6.039** (3.44)	-5.133** (2.95)	-4.841** (2.84)	-2.890 (1.88)		
stl02_highway	-10.194** (9.18)	-8.360** (6.69)	-8.167** (6.55)	-8.511** (7.38)		-5.005** (5.54)
stl02_publicsafety	1.280 (0.62)	-1.720 (0.65)	-2.040 (0.80)	1.680 (0.65)		5.545* (2.20)
stl02_envirohousing	9.367** (4.01)	2.670 (1.08)	1.640 (0.62)	3.260 (1.25)		
stl02_govtadmin	9.642** (4.65)	2.190 (1.04)	1.090 (0.46)	0.590 (0.26)		
cty02property	0.788** (4.50)	0.965** (5.35)	0.944** (5.31)	0.370 (1.94)	0.480* (2.56)	0.245 (1.33)
cty02sales	-0.170 (0.17)	0.210 (0.22)	0.250 (0.26)	-2.315** (2.59)	-1.320 (1.08)	-1.943** (2.60)
cty02education	-1.171** (7.39)	-0.757** (4.94)	-0.739** (4.81)	-0.735** (4.43)	-0.834** (5.18)	-0.676** (4.16)
cty02highway	-3.533** (6.91)	-1.866** (4.09)	-1.828** (3.99)	-1.383** (3.24)	-1.485** (3.54)	-1.165** (2.84)
cty02safety	3.490* (2.33)	1.070 (1.15)	1.000 (1.09)	0.720 (0.89)	0.090 (0.12)	0.994 (1.14)
cty02naturalrec	0.600 (1.31)	0.650 (1.69)	0.660 (1.71)	0.400 (1.36)	0.510 (1.78)	
cty02sewerage	-2.131* (2.02)	-0.170 (0.18)	-0.150 (0.16)	0.290 (0.35)	-0.450 (0.55)	
Constant	10.013** (211.96)	10.228** (103.12)	10.225** (103.49)	9.073** (23.40)	9.165** (23.49)	9.064** (23.32)
Observations	1998	1998	1998	1998	1998	
Adj. R-squared	0.21	0.36	0.36	0.48	0.52	0.47

Notes: Robust *t* statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level; Nall stands for all nonmetropolitan counties; Model 2 adds to Model 1 additional RTW state dummy variable, Census dummies, and rural-urban continuum dummies as explanatory variables; Model 3 includes additional amenity variables; Model 4 includes demographic variables; Model 5 replaces state fiscal variables with 47 state dummies; Model 6 is similar to Model 4 except including only some major fiscal variables. Wage data are from the BEA and Rent data are from the HUD.

Table 7B. Level Equation Model Results for Sample Nall, Dependent variables: ln(rent2002)

	Model 1	Model 2	Model 3	Model 5	Model 6
stl02_property	7.170** (13.76)	3.706** (4.85)	3.676** (4.78)		
stl02_sales	-2.795** (4.24)	0.360 (0.67)	0.410 (0.75)		
stl02_individual	-0.640 (1.54)	-0.010 (0.01)	0.220 (0.37)		0.082 (0.27)
stl02_corporate	8.426** (3.41)	2.670 (1.04)	3.030 (1.16)		-2.403 (1.06)
stl02_rest	-3.359** (5.25)	-2.041** (2.75)	-1.690 (1.73)		
stl02_firstsecond	-6.927** (8.86)	-5.537** (8.43)	-5.460** (8.16)		-3.598** (6.01)
stl02_higheredu	-6.304** (5.28)	-4.392** (3.80)	-4.873** (3.11)		-5.187** (4.28)
stl02_hospitalhealth	-5.470** (3.47)	-0.420 (0.30)	-0.280 (0.20)		
stl02_highway	1.670 (1.70)	0.580 (0.64)	0.670 (0.74)		-1.532* (2.25)
stl02_publicsafety	17.541** (9.61)	7.121** (3.67)	6.966** (3.69)		6.384** (3.79)
stl02_envirohousing	-0.670 (0.35)	-2.490 (1.44)	-2.980 (1.53)		
stl02_govtadmin	14.411** (8.25)	2.650 (1.57)	2.130 (1.15)		
cty02property	0.440** (3.82)	0.258** (3.14)	0.249** (3.00)	0.363** (5.41)	0.426** (4.93)
cty02sales	4.060** (3.57)	0.690 (0.67)	0.700 (0.70)	3.192* (2.43)	0.074 (0.09)
cty02education	-0.579** (4.63)	-0.327** (3.35)	-0.318** (3.18)	-0.468** (5.24)	-0.387** (3.60)
cty02highway	-1.196** (3.42)	-0.150 (0.47)	-0.130 (0.41)	-0.679* (2.46)	-0.097 (0.30)
cty02safety	4.046** (2.91)	1.615* (2.06)	1.581* (2.01)	0.360 (0.68)	1.453 (1.88)
cty02naturalrec	0.210 (0.51)	0.240 (0.96)	0.250 (1.00)	0.260 (1.07)	
cty02sewerage	0.960 (0.75)	0.720 (0.81)	0.730 (0.82)	0.280 (0.40)	
Constant	5.985** (139.68)	6.677** (77.74)	6.675** (77.30)	6.293** (85.13)	6.726** (78.83)
Observations	1998	1998	1998	1998	
Adj. R-squared	0.40	0.65	0.65	0.77	0.63

Notes: Robust *t* statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level; Nall stands for all nonmetropolitan counties; Model 2 adds to Model 1 additional RTW state dummy variable, Census dummies, and rural-urban continuum dummies as explanatory variables; Model 3 includes additional amenity variables; Model 4 includes demographic variables; Model 5 replaces state fiscal variables with 47 state dummies; Model 6 is similar to Model 4 except including only some major fiscal variables. Wage data are from the BEA and Rent data are from the HUD.

government administration, environmental housing, and sewerage appear to have positive signs but statistically all are insignificant. However, we do find consistent signs and significance for *stl02_sales*, *stl02_rest*, *stl02_highway*, *cty02education*, *cty02highway* across different model specifications.

Next turning to the rent equation with the same model structure as in the wage equation, in general property tax variables (*stl02_property*, *cty02property*) are found to be positive and statistically significant while general sales tax variables (*stl02_sales*, *cty02sales*) are found to be positive and insignificant. The education variables (*stl02_firstsecond*, *stl02_higheredu*, *cty02education*) are found to be negative and significant and the highway variables (*stl02_highway*, *cty02highway*) generally are found to be negative. The public safety variables (*stl02_publicsafety*, *cty02safety*) appear to be positive and significant. Briefly, the coefficient signs from the rent equation are counter to the ones predicted by the compensation differential theory.

Next we re-estimate Models 1-7 in both wage and rent equations using Census earnings and housing cost data instead of BEA wage and HUD rent data. The results are reported in Tables 8A-8B. In general models in Table 8A (8B) have better goodness of fit with higher adjusted R-squares than those in Tables 7A (7B). However, in terms of the direction of the coefficients, the estimates of these fiscal variables in Tables 7A and 8A (or Tables 7B and 8B), generally speaking, are in the same direction (the obvious exception is that we find *stl02_corporate* is significantly negative in the rent equation using Census data).

Furthermore, to address the issue of possible sample heterogeneity, the same models for the entire sample in Tables 7A-7B are analyzed for two subsamples: the

**Table 8A. Level Equation Model Results for Sample Nall, Dependent variables:
ln(earning2000)**

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
stl02_property	3.831** (5.81)	-0.874 (0.96)	-0.977 (1.08)	-1.521* (2.35)		
stl02_sales	2.990** (4.61)	1.030 (1.32)	1.203 (1.54)	1.914** (3.79)		
stl02_individual	2.572** (5.71)	-0.021 (0.04)	0.766 (1.09)	-0.857 (1.56)		-0.322 (1.06)
stl02_corporate	4.932* (2.23)	-14.405** (5.04)	-13.184** (4.58)	-10.724** (4.80)		-6.456** (3.48)
stl02_rest	-0.076 (0.09)	0.415 (0.43)	1.608 (1.36)	-1.160 (1.22)		
stl02_firstsecond	-2.999** (3.66)	-1.559 (1.82)	-1.296 (1.51)	-0.511 (0.76)		-0.762 (1.25)
stl02_higheredu	-1.948 (1.35)	0.909 (0.57)	-0.740 (0.37)	3.843* (2.51)		3.978** (2.98)
stl02_hospitalhealth	-4.338* (2.45)	-4.648* (2.47)	-4.171* (2.26)	-1.205 (0.95)		
stl02_highway	-9.049** (8.25)	-8.305** (6.96)	-7.990** (6.74)	-8.069** (9.29)		-5.795** (8.47)
stl02_publicsafety	-2.394 (1.18)	2.475 (0.98)	1.946 (0.81)	5.092** (2.65)		6.547** (3.46)
stl02_envirohousing	3.580 (1.74)	-2.824 (1.23)	-4.505 (1.80)	1.313 (0.69)		
stl02_govtadmin	8.803** (4.63)	11.763** (5.20)	9.958** (4.19)	7.087** (4.17)		
cty02property	1.124** (5.96)	1.244** (7.07)	1.210** (6.86)	0.090 (0.64)	0.177 (1.38)	-0.046 (0.33)
cty02sales	-1.137 (1.15)	0.807 (0.70)	0.871 (0.77)	-2.251** (2.78)	-1.851 (1.59)	-0.554 (0.77)
cty02education	-1.953** (11.91)	-1.679** (11.19)	-1.649** (10.85)	-0.767** (5.18)	-0.755** (5.83)	-0.768** (5.14)
cty02highway	-1.470** (2.80)	-1.022 (1.63)	-0.960 (1.51)	-1.667** (3.52)	-1.929** (3.85)	-1.276** (2.67)
cty02safety	1.625 (1.76)	0.711 (0.84)	0.595 (0.68)	0.875 (1.29)	0.094 (0.15)	0.814 (1.15)
cty02naturalrec	-0.137 (0.38)	-0.195 (0.55)	-0.173 (0.48)	-0.345 (1.15)	-0.120 (0.48)	
cty02sewerage	-1.048 (0.84)	-0.383 (0.34)	-0.350 (0.31)	0.981 (1.31)	0.411 (0.56)	
Constant	9.932** (217.82)	10.011** (94.95)	10.006** (94.90)	9.493** (29.96)	9.729** (32.57)	9.529** (29.08)
Observations	1998	1998	1998	1998	1998	1998
R-squared	0.25	0.34	0.35	0.68	0.73	0.66

Notes: Robust *t* statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level; Nall stands for all nonmetropolitan counties; Model 2 adds to Model 1 additional RTW state dummy variable, Census dummies, and rural-urban continuum dummies as explanatory variables; Model 3 includes additional amenity variables; Model 4 includes demographic variables; Model 5 replaces state fiscal variables with 47 state dummies; Model 6 is similar to Model 4 except including only some major fiscal variables. The wage data are from the Census.

**Table 8B. Level Equation Model Results for Sample Nall, Dependent variables:
ln(housing2000)**

	Model 1	Model 2	Model 3	Model5	Model 6
stl02_property	3.394** (3.41)	1.550 (1.36)	1.508 (1.33)		
stl02_sales	-5.824** (5.95)	-0.246 (0.30)	-0.186 (0.23)		
stl02_individual	0.189 (0.29)	2.159** (3.03)	2.472** (2.61)		1.935** (4.17)
stl02_corporate	9.919** (3.29)	-8.630** (2.69)	-8.173* (2.41)		-12.819** (4.25)
stl02_rest	-7.065** (6.40)	1.707 (1.41)	2.164 (1.44)		
stl02_firstsecond	-5.636** (4.68)	-1.418 (1.33)	-1.302 (1.18)		-1.413 (1.40)
stl02_higheredu	-1.350 (0.65)	1.133 (0.56)	0.502 (0.20)		3.702 (1.90)
stl02_hospitalhealth	-1.027 (0.42)	-4.010 (1.89)	-3.800 (1.83)		
stl02_highway	-2.848 (1.67)	-6.557** (4.13)	-6.410** (3.96)		-9.482** (7.96)
stl02_publicsafety	26.613** (9.78)	4.066 (1.50)	3.774 (1.34)		1.532 (0.67)
stl02_envirohousing	-1.620 (0.50)	-16.120** (5.66)	-16.766** (5.29)		
stl02_govtadmin	18.692** (6.91)	-0.735 (0.26)	-1.393 (0.45)		
cty02property	1.456** (5.65)	1.333** (7.00)	1.322** (6.95)	1.439** (7.43)	1.433** (7.79)
cty02sales	4.167** (2.65)	5.744** (4.95)	5.777** (4.97)	8.604** (6.49)	3.761** (4.06)
cty02education	-2.650** (8.64)	-2.269** (10.06)	-2.254** (9.91)	-2.351** (10.43)	-2.328** (10.32)
cty02highway	0.102 (0.15)	0.230 (0.40)	0.265 (0.46)	-0.386 (0.64)	0.235 (0.39)
cty02safety	1.725 (1.17)	0.967 (1.01)	0.911 (0.94)	-0.661 (0.67)	0.939 (0.98)
cty02naturalrec	0.050 (0.06)	0.115 (0.19)	0.129 (0.22)	-0.037 (0.06)	
cty02sewerage	0.203 (0.12)	0.125 (0.10)	0.135 (0.10)	-1.113 (0.94)	
Constant	7.005** (10.24)	7.143** (15.40)	7.129** (15.29)	7.050** (15.75)	7.113** (14.98)
Observations	1998	1998	1998	1998	1998
R-squared	0.70	0.81	0.81	0.84	0.80

Notes: Robust *t* statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level; Nall stands for all nonmetropolitan counties; Model 2 adds to Model 1 additional RTW state dummy variable, Census dummies, and rural-urban continuum dummies as explanatory variables; Model 3 includes additional amenity variables; Model 4 includes demographic variables; Model 5 replaces state fiscal variables with 47 state dummies; Model 6 is similar to Model 4 except including only some major fiscal variables. The rent data are from the Census. Certain control variables are added: median number of rooms in the structure, the age of housing units, the shares of 1-5 bedrooms out of total rooms, the share housing units that are mobile homes, and the shares with complete plumbing and kitchen.

nonmetropolitan counties that are adjacent to a metro area (sample N468) and the nonmetropolitan counties that are not adjacent to a metro area (sample N579). The results are reported in the Appendix Tables 2A-2B for sample N468 and Appendix Tables 3A-3B for sample N579. Overall the results in Tables 7A-7B are not sensitive to disaggregation of the whole sample into two subsamples.

To date the results for the tax group variables or expenditure group variables are found to be very inconsistent with each other. The coefficient signs on tax variables in either wage or rent equation do not follow the same direction, either do the signs on the variables, property and sales taxes. expenditure variables. In addition, according to Table 6 the results of two expenditure variables, education and highway (having negative signs in both equations), seem to indicate these two expenditure variables are counterproductive, and these two tax variables are considered either as amenities or productive. These results are counterintuitive in that we expect the expenditure variables to have either an amenity effect or productivity effect, or both.

To attain further insights, next we implement sensitivity analysis by replacing the effective tax measurement variables with the marginal tax variables (*SBSI* variables) to evaluate the sensitivity of the fiscal effects in the wage and rent equations. The results are presented in Table 9. Columns (1)-(3) present the OLS results of three forms of specification for the wage equation based on Model 4 and Model 6 as mentioned above. Specifically, column (1) is based on Model 4 (corresponding to Equation (20)), and column (2) adds four more ERS typology dummy variables (*fm*, *mi*, *fl*, *rec*) to Column (1). Column (3) is based on Model 6. The corresponding results for the rent equation are presented in columns (4)-(6).

As shown from the rent equation in Table 9, in general the property tax variable is found to be positive and statistically significant, and the education and highway variables (*stl02_firstsecond*, *stl02_higheredu*, *cty02education*, *cty02highway*) are found to be negative and statistically significant, which are counter to our expectations and similar to those found in Tables 7A-7B. The expenditures on *cty02safety*, *cty02naturalrec*, and *cty02sewerage* appear to have both amenity and productivity effects, which are consistent with prior findings in Tables 7A-7B. In contrast to the earlier estimates, adding SBSI variables in Table 8 produced expected results for state general sales tax (*stl02_sales*), top marginal personal income tax (*top_pi*), and top marginal corporate income tax (*top_corporate*). For instance, the negative coefficient of *top_pi* in both the wage and rent equations, according to Table 6, implies that high top marginal personal income tax rates are unattractive to both households and firms.⁷

Meanwhile comparisons are made between the subsamples (N468 and N579) and the entire sample. The results are reported in the Appendix Tables 4-5. These results are similar to these obtained from using the whole sample (Table 7) which, except that for the sample N579, the *stl02_highway* and *stl02_publicsafety* variables are found to be larger in size than in sample Nall (or N468) and statistically significant.

The next two tables (Tables 10-11) present further evidence on state fiscal effects in fixed effect regressions where the fixed effects are obtained from the first stage wage and rent regression model (equation (19)) in which the explanatory variables include only the pure exogenous amenity variables. Table 11 reports the results of corresponding

⁷ Theoretically, another explanation to explain the negative sign in both wage and rent equation is that top marginal personal income tax rates (*top_pi*) are household amenities, but the household amenity effect dominated by the firm disamenity effect. However, the argument that *top_pi* is a household amenity is hard to find supports in reality.

**Table 9. Level Equation Model Results for Sample Nall Considering SBSI Variables,
Dependent variables: ln(wage2002) and ln(rent2002)**

	ln(wage2002)			ln(rent2002)		
	Model 4, SBSI	Model 4, SBSI+ERS	Model 6, SBSI	Model13, SBSI	Model13, SBSI+ERS	Model 6, SBSI
stdl02_property	-0.490 (0.46)	-1.580 (1.57)		5.189** (5.63)	5.128** (5.50)	
stdl02_sales	2.080** (3.12)	2.070** (3.25)		-1.060 (1.68)	-0.960 (1.53)	
top_pi	-0.025** (5.52)	-0.023** (5.43)	-0.012** (3.44)	-0.018** (5.35)	-0.019** (5.64)	-0.006* (2.50)
top_capitalgains	0.022** (4.38)	0.019** (4.03)	0.004 (1.27)	0.016** (4.29)	0.017** (4.59)	-0.001 (0.60)
top_corporate	0.000 (0.90)	0.000 (1.37)	0.002 (0.83)	-0.012** (4.06)	-0.012** (3.88)	0.002 (0.94)
deathtax	-0.047** (4.06)	-0.034** (3.16)	-0.022* (2.26)	0.029* (2.57)	0.028* (2.50)	0.037** (4.40)
unemptax	0.019** (4.63)	0.014** (3.63)	0.013** (3.61)	0.008* (2.26)	0.010 (1.96)	-0.001 (0.18)
utilitiescosts	0.050 (1.38)	0.040 (1.17)	0.001 (0.03)	0.272** (6.73)	0.252** (6.31)	0.180** (5.63)
compensation	-0.020 (1.35)	-0.020 (1.26)	0.019 (1.84)	-0.020 (1.73)	-0.020 (1.70)	-0.037** (5.53)
gastax	0.220 (1.83)	0.200 (1.81)	-0.124 (1.33)	0.588** (7.39)	0.591** (7.47)	0.214** (3.12)
miniwage	0.030 (0.81)	0.020 (0.70)	0.035 (1.03)	0.238** (5.74)	0.235** (5.62)	0.183** (5.57)
stdl02_rest	3.305* (2.52)	1.250 (1.05)	-0.684 (0.62)	-4.534** (4.00)	-4.442** (3.91)	-0.876 (1.11)
stdl02_firstsecond	2.100 (1.62)	2.747* (2.27)	3.044 (1.63)	-3.306** (3.24)	-3.348** (3.33)	-4.113** (2.98)
stdl02_higheredu	-2.810 (1.26)	-2.820 (1.36)		-1.890 (1.03)	-2.290 (1.26)	
stdl02_hospitalhealth	-10.026** (3.73)	-8.297** (3.34)		-17.277** (8.30)	-16.911** (8.21)	
stdl02_highway	-3.596* (2.37)	-3.176* (2.26)	-6.085** (5.23)	0.980 (0.81)	1.410 (1.16)	0.806 (0.90)
stdl02_publicsafety	7.015* (2.14)	7.175* (2.37)	8.822** (3.04)	4.950 (1.79)	5.020 (1.83)	2.787 (1.35)
stdl02_environghousing	-12.602** (3.29)	-8.336* (2.39)		-1.450 (0.46)	-1.560 (0.49)	
stdl02_govtadmin	2.110 (0.73)	-0.360 (0.13)		13.113** (6.53)	12.837** (6.45)	
cty02property	0.330 (1.75)	0.220 (1.22)	0.176 (0.93)	0.361** (4.33)	0.351** (4.34)	0.433** (5.13)
cty02sales	-1.000 (1.08)	-2.593* (2.56)	-1.584 (1.84)	2.000 (1.84)	2.000 (1.45)	0.945 (1.07)
cty02education	-0.922** (5.52)	-0.785** (5.00)	-0.851** (5.11)	-0.659** (6.32)	-0.593** (5.99)	-0.646** (5.95)
cty02highway	-1.958** (4.32)	-1.304** (3.00)	-1.763** (4.00)	-1.079** (2.91)	-0.816* (2.28)	-0.785* (2.28)
cty02safety	0.910 (1.08)	0.280 (0.37)	1.437 (1.49)	2.590** (2.73)	2.411** (2.67)	2.616** (2.63)
cty02naturalrec	0.420 (1.46)	0.430 (1.56)		0.290 (0.91)	0.310 (0.94)	
cty02sewerage	-0.360 (0.44)	-0.440 (0.53)		0.810 (0.87)	0.860 (0.93)	
Constant	8.607** (21.71)	9.435** (25.35)	8.553** (21.70)	5.942** (51.27)	5.942** (51.67)	6.257** (62.43)
Observations	1998	1998	1998	1998	1998	1998
Adjusted R-squared	0.48	0.52	0.46	0.66	0.67	0.63

Notes: Robust *t* statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level; Nall stands for all nonmetropolitan counties; Model 2 adds to Model 1 additional RTW state dummy variable, Census dummies, and rural-urban continuum dummies as explanatory variables; Model 3 includes additional amenity variables; Model 4 includes demographic variables; Model 5 replaces state fiscal variables with 47 state dummies; Model 6 is similar to Model 4 except including only some major fiscal variables. The four ERS typology dummy variables are fm, mi, fl, rec (see Appendix Table 1 for details). Wage data are from the BEA and Rent data are from the HUD.

models in Table 10 but instead including additional SBSI variables to the right hand side of the model.

Turning to the results in Table 10, state variables in both equations have a poor goodness of fit with low adjusted R-squares. In the rent equation, *stl02_property* is significantly positive and *stl02_firstsecond* is significantly negative. *stl02_highway*, *stl02_publicsafety*, and *stl02_hospitalhealth* variables appear to be positive but statistically insignificant. Table 11 generally shows similar results for these expenditure group variables from Table 10. But results using SBSI variables in the model specification are more promising. The model has slightly better goodness of fit and the *stl02_sales*, *top_pi*, and *top_corporate* variables are found to have expected negative sign in the rent equation, though statistically insignificant.

Furthermore, we conduct the same regression as in Tables 10-11 except that we are using the two subsamples, N468 and N579. Detailed results are reported in the Appendix Tables 6 and 7, which correspond, respectively, to the Tables 10 and 11. The results generally are not sensitive to those made for the whole sample. In brief, most state tax variables in the rent are negative but statistically insignificant. The coefficient on education variables is negative and the coefficient is positive for the public safety. Overall the tax and expenditure variables are shown to be statistically insignificant, which reflects the poor goodness-of-fit of the model with low adjusted R-squares.

With respect to the state fiscal variables, we next conduct the sensitivity analysis to the fixed effects regressions. Appendix Tables 8A-8B present the results of 9 groups of fixed effects regression. Column (1) contains the subsample where fixed effects corresponding to the first Census division are dropped out. Likewise, Column (9)

Table 10. Level Equation Model Results for Sample Nall, Fixed Effects Regression, Dependent Variable: Fixed Effects from Estimating the Wage and Rent Equations, Respectively

	Fixed effects from the wage equation	Fixed effects from the rent equation
stl02_property	3.792 (1.46)	8.125* (2.68)
stl02_sales	1.348 (0.69)	-1.668 (0.54)
stl02_individual	1.448 (0.99)	1.259 (0.46)
stl02_corporate	-0.506 (0.07)	2.231 (0.21)
stl02_rest	2.190 (0.75)	-0.803 (0.15)
stl02_firstsecond	-4.656 (1.31)	-14.089* (2.54)
stl02_higheredu	-7.955 (1.35)	-12.797 (1.15)
stl02_hospitalhealth	-1.493 (0.23)	2.323 (0.19)
stl02_highway	-2.914 (0.58)	2.380 (0.23)
stl02_publicsafety	4.779 (0.67)	15.889 (1.75)
stl02_envirohousing	-5.138 (0.52)	-12.905 (0.92)
stl02_govtadmin	2.876 (0.43)	14.154 (1.02)
rtw2	-0.014 (0.42)	-0.038 (0.80)
Constant	10.278** (68.09)	6.660** (24.77)
Observations	46	46
Adjusted R-squared	0.13	0.25

Notes: Robust *t* statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level; Nall stands for all nonmetropolitan counties; Column 1 are Fixed effects from the wage equation which is based on Model 4 where county fiscal variables are dropped out from the explanatory variables. Column 2 are Fixed effects from the rent equation which is based on Model 3 where county fiscal variables are dropped out from the explanatory variables. Wage data are from the BEA and Rent data are from the HUD.

Table 11. Level Equation Model Results for Sample Nall, Fixed Effects Regression Considering SBSI Variables, Dependent Variables: Fixed Effects from Estimating the Wage and Rent Equations, Respectively

	fixed effects from wage equation	fixed effects from rent equation
stl02_property	-0.907 (0.30)	0.850 (0.21)
stl02_sales	-0.881 (0.42)	-3.606 (1.02)
top_pi	-0.008 (0.59)	-0.030 (1.55)
top_capitalgains	-0.002 (0.27)	0.021 (1.66)
top_corporate	0.001 (0.12)	-0.001 (0.08)
deathtax	0.020 (0.52)	-0.032 (0.53)
unemptax	0.009 (0.58)	-0.001 (0.05)
utilitiescosts	0.165 (1.93)	0.273* (2.74)
compensation	0.001 (0.04)	-0.048 (0.89)
gastax	-0.250 (0.84)	0.392 (1.06)
miniwage	0.018 (0.38)	0.153* (2.07)
stl02_rest	-1.656 (0.49)	-4.280 (0.82)
stl02_firstsecond	-0.743 (0.19)	-5.402 (1.08)
stl02_higheredu	-6.220 (0.93)	-9.959 (1.03)
stl02_hospitalhealth	-1.655 (0.25)	-12.064 (1.16)
stl02_highway	0.200 (0.03)	8.837 (0.91)
stl02_publicsafety	4.434 (0.53)	9.688 (1.01)
stl02_environhousing	-2.535 (0.21)	-13.951 (0.86)
stl02_govtadmin	2.317 (0.29)	9.790 (0.80)
rtw2	-0.014 (0.44)	-0.014 (0.33)
Constant	10.229** (65.74)	6.520** (26.71)
Observations	46	46
Adjusted R-squared	0.08	0.55

Notes: Robust *t* statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level; Nall stands for all nonmetropolitan counties; Column 1 are Fixed effects from the wage equation which is based on Model 4 where county fiscal variables are dropped out from the explanatory variables. Column 2 are Fixed effects from the rent equation which is based on Model 3 where county fiscal variables are dropped out from the explanatory variables. Wage data are from the BEA and Rent data are from the HUD.

contains the subsample that omits the fixed effects corresponding to the ninth Census division. Further, we check the robustness of the state fiscal effects by including SBSI variables as additional explanatory variables. Appendix Tables 9A-9B consider additional SBSI variables and follow the same structure as Appendix Tables 8A-8B.

Turning to the results, Appendix Table 8B shows that in the rent equation, *stl02_sales* is found to be negative and statistically insignificant in most cases, *stl02_highway*, *stl02_publicsafety* are positive and statistically insignificant. According to Table 6, if combining the results from the wage equation in Appendix Table 8A, we can conclude, as expected, that sales tax is unattractive to both households and firms and highway and public safety are attractive and productive. On the other hand, the positive coefficient on tax variables, *stl02_property*, *stl02_individual*, and *stl02_corporate* and the negative coefficients on education variables, *stl02_firstsecond* and *stl02_higheredu* are counter to our expectation.

Compared to the estimates from the Appendix Tables 8A-8B, models using SBSI variables in the Appendix Tables 9A-9B have better goodness of fit. The coefficient signs and significance in the Appendix Tables 9A-9B, either expected or unexpected, are generally consistent with these found in the Appendix Tables 8A-8B except that we find the negative effects of corporate income tax and personal income tax on rent using the marginal measurement, which are in accordance with our expectation even though they are statistically insignificant.

The final implementation in this cross-sectional analysis attempts to correct for the possible bias that the ordinary least squares suffers using the instrumental variable (IV or 2SLS) estimation method. The 2SLS results are reported in the Appendix Tables

10-13 for the sample Nall, N468, and N579. Appendix Table 10 reports the 2SLS results from using first set of dependent variables (BEA wage and HUD rent) and two sets of instrumental variables. The first set of instruments (IV1) consist of all fiscal variables in 1992 value and the second set of instruments (IV2) adds to the first set two additional political voting variables, **PRES_REP72** and **PRES_TO72**. For the first case we implicitly specify an exactly identified model, while for the second case we specify an overidentified model where the overidentification condition is tested. Appendix Table 11 adjusts the 2SLS results from the previous table by accounting for cluster effects. The next two tables (Appendix Tables 12-13) replicate the analysis in the previous two tables except we use a second set of dependent variables (Earning and Housing) from the Census.

Turning to the 2SLS results presented in Appendix Tables 10-13, in general we find that: 1) the results of the DWH test (Durbin, 1954; Hausman, 1978; Wu, 1973) overall show that the fiscal variables in the level equation are endogenously determined, implying that the OLS estimates are inconsistent and biased and the 2SLS approach is called for. However, the rejection of the null hypothesis in the Sargan test that the instruments and the error terms are uncorrelated in most specifications indicates that the two instrument sets are invalid, casting doubts on the coefficient estimates; 2) the results appear to be consistent from using two sets of instruments and consistent among each subsample. In addition, the results of using the Census earning and housing data are consistent with these of using the first set of dependent variables. 3) The coefficient signs for most fiscal variables of our interest are found to be inconsistent with theory. As theory predicts that rents should be higher in areas with higher investment in public

services and/or lower taxes, the empirical results fail to support such a theory, which may be due to the statistical facts that the instruments chosen are invalid (or the instruments themselves are not exogenous) as shown from the Sargan test (1958), or maybe the level equation model can not reflect the true process of the local labor and land markets.

In conclusion, several remarks could be made from the level form analysis in this section. First, results from the tax or expenditure group variables are found to be inconsistent with each other. Theory predicts that tax variables should have the same negative coefficient sign in the rent equation in that taxes are similar in nature and are unattractive to both households and firms. Likewise, expenditure variables should be positive in the rent equation in that these variables are expected to have either amenity or productivity effects, or both.

Second, the inconsistency among results from either tax or expenditure group variables implies directly that some fiscal variables are consistent with theory and some are not. For instance, overall, property tax, education, and highway variables are found to have the opposite sign to the one predicted by theory, while public safety is consistent with the prediction.

Third, the results are insensitive to alternative measurements of wage and rent and are consistent between the entire sample and two subsamples.

Fourth, the marginal tax variables (*top_pi* and *top_corporate*) from the SBSI are shown to produce a negative effect on the land market. This is expected and implies that marginal tax variables could be better than average effective tax rate variables in truly reflecting the labor and land markets, as the marginal tax rate measures better the

incentives of households' or firms' location choice and have less measurement error than the average tax measures.

Fifth, using the 2SLS technique fails to generate better results than the OLS. Most fiscal variables are shown to have opposite signs to the ones predicted by theory, which we believe is because either the instruments chosen are invalid, or the true process of the local labor and land markets can not be represented by the level equation model as specified.

5.2 Differenced Model Results

This section reports the estimation of the wage and rent model in first-difference form for the whole sample of nonmetropolitan counties (Tables 12-17). The differenced model has some advantages over the levels model. The differenced model has the advantage to reduce the severity of multicollinearity (Gujarati, 2004; p. 367). Most importantly, the differenced model implicitly controls for county fixed effects, or omitted variables at the county level that bias the level model estimated coefficients.

The analysis proceeds in three steps. The first step is to use the OLS approach to estimate the differenced wage and rent model. The results are presented in Table 12. The second step is to apply the instrumental variables (IV or 2SLS) approach to address possible endogeneity problems. The coefficient estimates, along with several test results of the endogeneity of fiscal variables and the validity of the instrumental variables, are reported in Table 13. The third step is to examine whether the results obtained from the instrumental variable approach are sensitive to clustered regional effects. The results are shown in Table 14. Tables 15-17 follow the same estimation procedures and use the same

set of variables as in Tables 12-14, respectively except that we use an alternative set of dependent variables from the Census. Furthermore, to examine the consistency of the results in Tables 12-17, we conduct the same analysis for two subsamples (N468 and N579). The results are presented in corresponding Appendix Tables 14-19.

Table 12 presents the OLS results of the differenced equation (equation (21)). Columns 1-2 are the wage models where the explanatory variables used are based on Model 4 (mentioned in Section 5.1, the base model therein) which, except differenced fiscal variables and demographic variables, includes additional amenity variables, Columns 3-4 are the rent models where the explanatory variables used are based on Model 3 which removes demographic variables from Model 4. As seen from Table 12, the difference results in the rent equation show that the state highway variable ($\Delta st_highway$) is significantly positive as expected. The expenditure variables on safety (Δst_safety), environmental housing ($\Delta st_environhousing$), county highway ($\Delta ct_highway$), and sewerage ($\Delta ct_sewerage$) appear to have the expected positive signs but are statistically insignificant at conventional levels. The coefficient on sales taxes is positive and the coefficients on first and secondary education and county safety are negative, all of which are statistically significant and counter to our expectation. Turning to the results of two subsamples (N468 and N579) which are reported in the Appendix Table 14, the magnitude and significance from the subsample of N579 (nonmetropolitan counties adjacent to a metro area) seem to be more consistent with these from the full sample. More variables from the subsample N579, though most are statistically insignificant, are shown to have the signs compatible with theoretical predictions.

Table 13 shows the results from the instrumental variable regressions where we

Table 12. Difference Equation Model Results for Sample Nall, Dependent Variables: Δ wage and Δ rent

	Δ wage		Δ rent	
	Base	Base+ERS	Base	Base+ERS
Δ st_property	0.320 (0.51)	0.600 (0.97)	-0.788 (0.95)	-0.717 (0.86)
Δ st_sales	1.025 (1.09)	1.084 (1.16)	4.733** (3.54)	4.744** (3.59)
Δ st_individual	-2.369** (3.31)	-2.353** (3.40)	1.262 (1.17)	1.210 (1.13)
Δ st_corporate	3.628 (1.63)	4.458* (2.06)	0.693 (0.18)	1.195 (0.30)
Δ st_rest	0.064 (0.06)	0.472 (0.46)	-2.473 (1.52)	-2.174 (1.34)
Δ st_firstsecond	1.250* (2.03)	0.771 (1.28)	-2.568* (2.54)	-2.852** (2.82)
Δ st_hospital	-1.447 (1.21)	-0.515 (0.45)	-1.635 (1.04)	-1.883 (1.20)
Δ st_highway	0.962 (1.01)	0.383 (0.41)	4.052** (2.81)	3.923** (2.74)
Δ st_safety	2.381 (1.11)	1.197 (0.57)	0.887 (0.27)	0.594 (0.18)
Δ st_envirohousing	-1.138 (0.93)	-0.693 (0.58)	0.919 (0.54)	1.202 (0.70)
Δ st_govtadmin	-6.989** (3.64)	-6.212** (3.35)	-17.241** (6.17)	-16.248** (5.82)
Δ ct_property	0.058 (0.34)	0.079 (0.48)	0.231 (1.20)	0.255 (1.34)
Δ ct_sales	-0.153 (0.24)	-0.013 (0.02)	1.533* (2.15)	1.593* (2.32)
Δ ct_education	-0.351** (2.58)	-0.356** (2.69)	-0.144 (1.06)	-0.145 (1.05)
Δ ct_highway	0.908* (1.96)	0.812 (1.88)	0.268 (0.79)	0.223 (0.66)
Δ ct_safety	-1.213* (2.17)	-1.242* (2.28)	-1.647** (2.62)	-1.672** (2.67)
Δ ct_naturalrec	-0.066 (0.13)	-0.111 (0.22)	0.811 (1.89)	0.857* (2.01)
Δ ct_sewerage	0.036 (0.08)	0.271 (0.57)	0.426 (0.82)	0.500 (0.97)
Constant	0.355** (6.29)	0.371** (5.83)	-0.055 (0.79)	-0.037 (0.52)
Observations	1998	1998	1998	1998
Adjusted R-squared	0.17	0.22	0.28	0.28

Notes: Robust t statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level. Nall stands for all nonmetropolitan counties. Δ wage= $\ln(\text{wage}_{2002}) - \ln(\text{wage}_{1992})$ and Δ rent= $\ln(\text{fmr}_{02_2}) - \ln(\text{fmr}_{92_2})$. Column 1 in the wage equation is based on Model 4 in the level equation models and Column 2 adds to Column 1 four additional ERS dummy variables (fm, mi, fl, rec). Column 3 in the rent equation is based on Model 3 in the level equation models and Column 4 adds to Column 3 four additional ERS variables.

specify and test two sets of instruments. The results of DWH test confirm that there is endogeneity of the differenced fiscal variables in equations for both wages and rents, implying that the OLS estimates in the analysis of outcome variables are inconsistent and biased. In the first stage, we relate the differenced fiscal variables to their instruments, which means we run 18 regressions separately. The first stage results (not shown) indicate that in almost all cases that the identifying instruments are jointly statistically significant (F -statistic highly above 10 and p -value=0.0000) implying that the instruments are not weak. To look forward to the 2SLS results using the second set of instruments, we also consider the Sargan (1958) test of over identifying restrictions to check the validity of the instruments. We fail to reject the null hypothesis that instruments are valid at the 5% level of significance for the rent model. However the instruments only pass the overidentification test at the 1% level for the wage model.

With regard to the slope coefficients, the two models using two slightly different sets of instruments are quite close in magnitude, though we usually find the significance of each individual variable is more obvious for the second case. Turning to the estimates in the differenced rent equation, the coefficients on the tax variables, $\Delta st_property$, $\Delta st_individual$, Δct_sales and are statistically significant and signed as expected ($\Delta st_individual$ is significant only at 10% level). In addition, the highway expenditure variables at both county and state levels are significant with expected positive signs. The positive coefficient on Δst_safety and $\Delta ct_education$, along with negative coefficients on Δct_safety and $\Delta st_firstsecond$ are statistically insignificant. The $\Delta st_corporate$ is statistically significant however with a counterintuitive positive sign.

Table 13. Difference Equation Model Results for Sample Nall, Instrumental Variables Estimation, Dependent variable: Δ wage and Δ rent

	Δ wage		Δ rent	
	IV1	IV2	IV1	IV2
Δ st_property	0.914 (0.22)	-2.556 (1.25)	-12.221** (2.95)	-10.508** (3.12)
Δ st_sales	2.258 (0.40)	0.124 (0.04)	10.164 (1.76)	10.311 (1.90)
Δ st_individual	-32.673* (2.01)	-10.728* (2.22)	-17.495 (0.88)	-19.000 (1.94)
Δ st_corporate	14.413 (0.86)	10.008 (1.05)	44.243* (2.14)	39.216* (2.25)
Δ st_rest	-1.888 (0.33)	-0.546 (0.17)	-7.616 (1.39)	-6.768 (1.30)
Δ st_firstsecond	7.469 (1.80)	3.534 (1.83)	-5.098 (1.29)	-4.113 (1.26)
Δ st_hospital	-39.741* (2.04)	-22.137* (2.41)	-53.855* (2.20)	-51.642** (3.06)
Δ st_highway	6.987 (1.25)	2.361 (0.85)	12.002* (2.22)	12.105** (2.65)
Δ st_safety	20.710 (1.23)	22.880* (2.33)	24.355 (1.45)	20.001 (1.24)
Δ st_envirohousing	-6.370 (0.68)	3.039 (0.73)	16.185 (1.67)	12.345 (1.86)
Δ st_govtadmin	-21.942 (1.79)	-21.490** (2.98)	-23.187 (1.85)	-22.759 (1.92)
Δ ct_property	-6.237 (1.42)	-0.551 (0.38)	2.299 (0.43)	1.295 (0.48)
Δ ct_sales	-18.447 (1.95)	-6.672* (1.99)	-12.938 (1.02)	-14.282* (2.09)
Δ ct_education	2.616 (1.61)	1.119 (1.46)	1.793 (0.62)	1.944 (1.10)
Δ ct_highway	3.895* (2.15)	1.934* (2.51)	2.543 (1.28)	2.632* (2.00)
Δ ct_safety	3.766 (0.77)	-1.510 (0.74)	-5.947 (1.08)	-4.647 (1.31)
Δ ct_naturalrec	-1.098 (0.63)	-0.423 (0.43)	-3.678 (1.87)	-3.787* (2.22)
Δ ct_sewerage	0.078 (0.06)	0.008 (0.01)	-0.389 (0.26)	-0.352 (0.25)
Constant	0.209 (1.45)	0.344** (5.06)	-0.113 (0.99)	-0.123 (1.14)
F statistics (All endog. vars. =0)	3.94[0.000]	3.72[0.000]	8.77[0.000]	8.33[0.000]
DWH test for endogeneity	56.51[0.000]	46.69[0.000]	125.92[0.000]	124.77[0.000]
Sargan test of exogeneity of the instruments	NA	6.97[0.031]	NA	2.42[0.298]
Observations	1998	1996	1998	1996

Notes: Absolute t statistics are in parenthesis are. P -values are in bracket. * indicates significant at 5% level, ** significant at 1% level. Nall stands for all nonmetropolitan counties. Δ wage= $\ln(\text{wage2002})-\ln(\text{wage1992})$ and Δ rent= $\ln(\text{fmr02_2})-\ln(\text{fmr92_2})$. Column 1 in the wage equation is based on the benchmark Model 4 and Column 2 adds to Column 1 four additional ERS variables (fm, mi, fl, rec). Column 3 in the rent equation is based on the benchmark Model 3 and Column 4 adds to Column 3 four additional ERS variables. IV1 is the 2SLS model using lagged fiscal variables as instruments. IV2 is same as IV1 but instead adding two more political voting behavior variables (PRES_REP72, PRES_TO72) as instruments. NA stands for not applicable.

To further assess the role of these fiscal variables, the negative slope coefficients of property tax ($\Delta st_property$) for the both rent (-10.508) and wage (-2.556) models indicates the property tax has to fall into the case in Column (2) of Table 6, implying that property tax is unattractive to firms and has adverse effects on firm productivity (negative firm effect). If the property tax is unattractive to households (disamenity effect), this would exert downward pressure on the land price, but would produce ambiguous effects on the wage depending on the relative magnitude of movement of labor supply and labor demand. To be consistent with the negative coefficient found in the wage model, the negative firm effect has to dominate the disamenity effect. Similarly, given the positive coefficients on highway and safety in both wage and rent models we can infer that these two expenditure variables are productive and the productivity effect has to dominate the positive amenity effect. In contrast to the earlier findings from the OLS estimates, these effects are stronger in magnitude from the 2SLS estimates though some variables have the wrong signs.

Next we apply the same analysis for the two subsamples of nonmetropolitan counties. The results are reported in Appendix Table 15. In contrast to the full sample, the coefficients of the fiscal variables in Table 13 do not hold for the two subsamples in that most of them either fail to retain signs or statistical significance. The inconsistent results could be explained by the following two possible reasons: either the instruments are invalid as reflected by their failure to pass the overidentification test in the rent equation when using second set of instrument lists (Column (8) in Appendix Table 15), or the instruments are weak as reflected in first stage regressions, the F -statistic (not shown in table) for each single endogenous regressor is quite low, lower than 10 for most cases.

Table 14 reports the 2SLS results while taking intra-cluster correlation into account, which can directly be compared to the results in Table 13. Similarly the results of Appendix Table 16 can be directly compared to these from the Appendix Table 15. Surprisingly we find almost all variables in 2SLS within cluster correlation model are statistically insignificant, which implies the variance of the clustered estimator is found to be larger than previous one. We propose two possible explanations for this puzzling result. First, the weak aspect of the clustering method is that it takes an arbitrary form of correlation. In other words, we do not know the exact form of correlation. The estimation of the standard errors could be wrong if the modeling of the correlation caused by clustering is not correct. Second, it is because of the high correlation between the residuals and the regressors (Sribney, 2007), which leads to larger variance estimates and causes most of the coefficient estimates in Table 13 to be insignificant.

The next three tables (Tables 15-17) respectively repeat the structure and methodology as Tables 12-14 using a second set of dependent variables from the Census. In other words, the median county households earnings for employed residents from the Census is used to replace the average wage per job from the BEA. Meanwhile, the imputed housing cost data from the Census is used to replace the fair rent of standardized two-bedroom housing unit from the HUD.⁸

Table 15 reports the OLS estimates of the differenced wage and rent equation for the whole sample (Nall). In contrast to the results from Table12, Table 15 has higher adjusted R-squares, indicating a better model fit. In the rent model, the coefficients on $\Delta st_individual$ and $\Delta st_corporate$ become negative and statistically significant.

⁸ More details on how to calculate the *housing* variable can be found in Section 4.1 in the data source.

Table 14. Difference Equation Model Results for Sample Nall, Instrumental Variables Estimation with Clustering Method, Dependent variable: Δ wage and Δ rent

	Δ wage		Δ rent	
	IV1,cluster	IV2,cluster	IV1,cluster	IV2,cluster
Δ st_property	0.914 (0.11)	-2.556 (0.80)	-12.221 (1.30)	-10.508 (1.26)
Δ st_sales	2.258 (0.20)	0.124 (0.02)	10.164 (0.76)	10.311 (0.86)
Δ st_individual	-32.673 (1.14)	-10.728 (1.44)	-17.495 (0.36)	-19.000 (0.77)
Δ st_corporate	14.413 (0.38)	10.008 (0.57)	44.243 (0.88)	39.216 (0.93)
Δ st_rest	-1.888 (0.17)	-0.546 (0.10)	-7.616 (0.65)	-6.768 (0.63)
Δ st_firstsecond	7.469 (1.02)	3.534 (1.08)	-5.098 (0.60)	-4.113 (0.58)
Δ st_hospital	-39.741 (0.98)	-22.137 (1.41)	-53.855 (0.80)	-51.642 (1.15)
Δ st_highway	6.987 (0.68)	2.361 (0.54)	12.002 (0.90)	12.105 (1.19)
Δ st_safety	20.710 (0.55)	22.880 (1.24)	24.355 (0.55)	20.001 (0.50)
Δ st_environhousing	-6.370 (0.37)	3.039 (0.48)	16.185 (0.90)	12.345 (0.95)
Δ st_govtadmin	-21.942 (0.74)	-21.490 (1.62)	-23.187 (0.68)	-22.759 (0.71)
Δ ct_property	-6.237 (0.89)	-0.551 (0.25)	2.299 (0.26)	1.295 (0.32)
Δ ct_sales	-18.447 (1.08)	-6.672 (1.30)	-12.938 (0.47)	-14.282 (0.97)
Δ ct_education	2.616 (0.91)	1.119 (0.98)	1.793 (0.32)	1.944 (0.58)
Δ ct_highway	3.895 (1.34)	1.934 (1.91)	2.543 (0.66)	2.632 (1.26)
Δ ct_safety	3.766 (0.47)	-1.510 (0.56)	-5.947 (0.72)	-4.647 (1.05)
Δ ct_naturalrec	-1.098 (0.47)	-0.423 (0.33)	-3.678 (0.76)	-3.787 (0.87)
Δ ct_sewerage	0.078 (0.05)	0.008 (0.01)	-0.389 (0.19)	-0.352 (0.19)
Constant	0.209 (0.90)	0.344** (3.62)	-0.113 (0.48)	-0.123 (0.53)
F statistics (All endog. vars. =0)	3.87[0.000]	2.30[0.002]	3.94[0.000]	3.77[0.000]
DWH test for endogeneity	33.08[0.016]	25.49[0.112]	32.86[0.017]	32.38[0.020]
Sargan test of exogeneity of the instruments	NA	3.91[0.142]	NA	1.27[0.530]
Observations	1998	1996	1998	1996

Notes: Absolute t statistics are in parenthesis are. P -values are in bracket. * indicates significant at 5% level, ** significant at 1% level. Nall stands for all nonmetropolitan counties. Δ wage= $\ln(\text{wage2002})-\ln(\text{wage1992})$ and Δ rent= $\ln(\text{fmr02_2})-\ln(\text{fmr92_2})$. Column 1 in the wage equation is based on the benchmark Model 4 and Column 2 adds to Column 1 four additional ERS variables (fm, mi, fl, rec). Column 3 in the rent equation is based on the benchmark Model 3 and Column 4 adds to Column 3 four additional ERS variables. IV1 is the 2SLS model using lagged fiscal variables as instruments. IV2 is same as IV1 but instead adding two more political voting behavior variables (PRES_REP72, PRES_TO72) as instruments. Standard errors are clustered by BEA defined economic areas. NA stands for not applicable. Number of Clusters is 174.

Meanwhile the Δst_safety variable becomes statistically significant while retaining the expected positive sign. The $\Delta st_highway$ variable is no longer statistically significant. The significance of the unexpected signs on $\Delta st_firstsecond$ and Δct_sales in Table 12 vanishes in Table 15. The coefficient on Δst_sales remains statistically significant with unexpected positive sign. In addition, the coefficient on $\Delta st_property$ appears to be positive and statistically significant, which is contrary to our expectations.

Table 16 presents the 2SLS results of the differenced wage and rent equation. The F -statistic on testing the joint significance of the excluded instruments in the first stage IV regression is high (above 10), indicating that these instruments are strong. However, the second set of instruments which includes two political voting variables can not pass the overidentification test ($p < 0.000$) in using the Census earning and housing cost data, casting doubts on the validity of this set of instruments. Turning to the fiscal variables of our interest, $\Delta st_highway$ and Δst_safety are positive in both wage and rent equations and statistically significant in the rent equation, which is consistent with the predictions of theory that public investment highway and safety are enjoyed by households and contributes positively to firm productivity. The property tax, general sales tax, highway, and safety variables at the county level all are found to have the expected sign, but statistically insignificant.

Compared to the OLS estimates in Table 15, the 2SLS approach in Table 16 produces relatively larger coefficient estimates. Among the major variables of interest, in Table 16 the $\Delta st_highway$ variable becomes positive and significant and Δst_safety retains its positive sign and is statistically significant. The tax variables, $\Delta st_individual$ and $\Delta st_corporate$ are no longer statistically significant. In addition, the unexpected

positive and statistically significant coefficients on $\Delta st_property$ and Δst_sales no longer exist.

Table 17 is the same as Table 16 except that we reported standard errors of the coefficient estimates clustered by 174 BEA economic areas. Almost all variables are found to be statistically insignificant, the same pattern as we can see in Table 14 when using the first set of dependent variables.

Next we replicate our analysis in Tables 15-17 using data from the two subsamples, N468 and N579. The corresponding results are presented in Appendix Tables 17-19. In brief, the OLS results from using the subsample of the nonmetropolitan counties nonadjacent to a metro area (N579) are generally more consistent than with these for the full sample (Nall) than the subsample of the nonmetropolitan counties adjacent to a metro area (N468). Similarly the 2SLS results from using the subsample of N579 are more consistent with these from the full sample than subsample N468. As a matter of fact, the 2SLS results from using sample N579 might be better as more fiscal variables such as $\Delta st_property$ and $\Delta st_individual$ reflect better of our expectations, though the model using sample N579 faces the same difficulty as that using the full sample in satisfying the instrument validity condition.

In conclusion, the findings from estimating the differenced equation models in this section can be summarized as follows. First, the tax variables, $\Delta st_individual$ and Δst_rest (selective, license, and other taxes) are found to be consistently significant at 5% or 10% with expected negative coefficients by applying the 2SLS techniques to both different sets of dependent variables (one from BEA wage and HUD rent and the other from Census earning and Census housing cost).

Table 15. Difference Equation Model Results for Sample Nall, Dependent Variables: Δ earning and Δ housing

	Δ earning		Δ housing	
	Base	Base+ERS	Base	Base+ERS
Δ st_property	0.353 (0.36)	0.870 (0.93)	2.160* (2.00)	2.492* (2.42)
Δ st_sales	1.530 (1.09)	3.636** (2.62)	4.001* (2.56)	4.234** (2.78)
Δ st_individual	-3.423** (3.24)	-3.480** (3.42)	-6.244** (5.40)	-6.238** (5.39)
Δ st_corporate	6.250 (1.67)	5.130 (1.43)	-29.373** (6.92)	-27.118** (6.50)
Δ st_rest	-6.217** (3.75)	-4.687** (2.91)	-8.621** (5.58)	-7.549** (5.01)
Δ st_firstsecond	-0.380 (0.38)	-0.190 (0.19)	1.724 (1.62)	0.666 (0.63)
Δ st_hospital	0.460 (0.26)	-0.310 (0.18)	2.786 (1.37)	3.394 (1.72)
Δ st_highway	1.940 (1.30)	2.260 (1.59)	-0.348 (0.23)	-0.946 (0.65)
Δ st_safety	15.274** (4.57)	11.283** (3.43)	11.233** (3.22)	8.465* (2.47)
Δ st_environhousing	1.480 (0.79)	0.130 (0.07)	9.635** (5.25)	9.553** (5.25)
Δ st_govtadmin	-3.400 (1.24)	-2.520 (0.96)	-18.905** (6.30)	-17.064** (5.71)
Δ ct_property	0.330 (0.96)	0.330 (1.24)	0.297 (1.04)	0.338 (1.13)
Δ ct_sales	-2.124* (2.01)	-2.084* (2.17)	-0.678 (0.57)	-0.421 (0.30)
Δ ct_education	-0.170 (0.75)	-0.100 (0.45)	-0.170 (0.74)	-0.130 (0.56)
Δ ct_highway	0.630 (0.91)	0.000 (0.01)	0.120 (0.19)	-0.143 (0.24)
Δ ct_safety	0.650 (0.95)	0.450 (0.64)	-0.124 (0.12)	-0.072 (0.07)
Δ ct_naturalrec	0.000 0.00	0.050 (0.14)	-0.177 (0.34)	-0.182 (0.37)
Δ ct_sewerage	0.120 (0.16)	0.220 (0.33)	-0.114 (0.17)	0.317 (0.50)
Constant	0.292** (3.27)	-0.010 (0.13)	0.750** (7.62)	0.713** (7.20)
Observations	1998	1998	1998	1998
Adjusted R-squared	0.49	0.54	0.50	0.53

Notes: Robust t statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level. Nall stands for all nonmetropolitan counties. Data for wage and rent are from the Census. Δ earning= $\ln(\text{earning00})-\ln(\text{earning90})$ and Δ housing= $\ln(\text{housing00})-\ln(\text{housing90})$. Column 1 in the wage equation is based on the benchmark Model 4 and Column 2 adds to Column 1 four additional ERS variables (fm, mi, fl, rec). Column 3 in the rent equation is based on the benchmark Model 3 and Column 4 adds to Column 3 four additional ERS variables.

Table 16. Difference Equation Model Results for Sample Nall, Instrumental Variables Estimation, Dependent variable: Δ earning and Δ housing

	Δ earning		Δ housing	
	IV1	IV2	IV1	IV2
Δ st_property	6.434 (1.25)	0.108 (0.04)	9.566 (0.46)	-7.346 (1.74)
Δ st_sales	9.543 (1.35)	6.526 (1.51)	15.246 (0.57)	6.350 (0.95)
Δ st_individual	-37.014 (1.83)	-5.209 (0.81)	-158.842 (1.56)	-27.354 (1.92)
Δ st_corporate	18.393 (0.88)	17.364 (1.38)	81.357 (0.79)	6.694 (0.30)
Δ st_rest	-2.598 (0.37)	-1.753 (0.40)	-36.256 (1.35)	-26.485** (3.99)
Δ st_firstsecond	4.810 (0.93)	-1.796 (0.70)	15.680 (0.74)	-4.277 (1.02)
Δ st_hospital	-28.992 (1.20)	-6.703 (0.55)	-217.869 (1.52)	-66.048* (2.50)
Δ st_highway	6.274 (0.91)	0.023 (0.01)	37.339 (1.58)	26.440** (4.59)
Δ st_safety	11.216 (0.54)	17.719 (1.36)	107.282 (1.06)	54.322* (2.27)
Δ st_envirohousing	-11.622 (1.00)	4.726 (0.86)	1.855 (0.05)	28.691** (3.28)
Δ st_govtadmin	-4.870 (0.32)	-3.784 (0.40)	-72.578 (1.11)	-45.631** (2.81)
Δ ct_property	-8.692 (1.59)	0.103 (0.05)	-35.833 (1.31)	-0.389 (0.10)
Δ ct_sales	-19.466 (1.66)	-2.018 (0.46)	-94.509 (1.42)	-12.761 (1.25)
Δ ct_education	4.170* (2.07)	2.090* (2.06)	19.438 (1.44)	4.158 (1.78)
Δ ct_highway	-1.189 (0.53)	-3.963** (3.88)	12.271 (1.21)	0.709 (0.40)
Δ ct_safety	13.126* (2.15)	4.632 (1.70)	36.111 (1.22)	1.334 (0.28)
Δ ct_naturalrec	-0.361 (0.17)	0.594 (0.45)	-10.456 (1.09)	-3.607 (1.66)
Δ ct_sewerage	1.275 (0.73)	1.171 (1.07)	-0.120 (0.02)	-0.827 (0.47)
Constant	0.108 (0.60)	0.319** (3.54)	0.300 (0.51)	0.606** (4.30)
F statistics (All endog. vars. =0)	5.34[0.000]	5.62[0.000]	22.98[0.000]	21.68[0.000]
DWH test for endogeneity	115.28[0.000]	123.75[0.000]	329.77[0.000]	227.01[0.000]
Sargan test of exogeneity of the instruments	NA	13.23[0.000]	NA	35.88[0.000]
Observations	1998	1996	1998	1996

Notes: Absolute t statistics are in parenthesis. P -values are in bracket. * indicates significant at 5% level, ** significant at 1% level. Nall stands for all nonmetropolitan counties. Data for wage and rent are from the Census.

Δ earning= $\ln(\text{earning00})-\ln(\text{earning90})$ and Δ housing= $\ln(\text{housing00})-\ln(\text{housing90})$. Column 1 in the wage equation is based on the benchmark Model 4 and Column 2 adds to Column 1 four additional ERS variables (fm, mi, fl, rec).

Column 3 in the rent equation is based on the benchmark Model 3 and Column 4 adds to Column 3 four additional ERS variables. IV1 is the 2SLS model using lagged fiscal variables as instruments. IV2 is same as IV1 but instead adding two more political voting behavior variables (PRES_REP72, PRES_TO72) as instruments. NA stands for not applicable.

Table 17. Difference Equation Model Results for Sample Nall, Instrumental Variables Estimation with Clustering Method, Dependent variable: Δ earning and Δ housing

	Δ earning		Δ housing	
	IV1,cluster	IV2,cluster	IV1,cluster	IV2,cluster
Δ st_property	6.434 (0.77)	0.108 (0.03)	9.566 (0.27)	-7.346 (0.86)
Δ st_sales	9.543 (0.82)	6.526 (1.02)	15.246 (0.30)	6.350 (0.39)
Δ st_individual	-37.014 (1.13)	-5.209 (0.46)	-158.842 (0.81)	-27.354 (0.78)
Δ st_corporate	18.393 (0.48)	17.364 (0.93)	81.357 (0.36)	6.694 (0.13)
Δ st_rest	-2.598 (0.22)	-1.753 (0.28)	-36.256 (0.69)	-26.485 (1.70)
Δ st_firstsecond	4.810 (0.58)	-1.796 (0.41)	15.680 (0.41)	-4.277 (0.47)
Δ st_hospital	-28.992 (0.66)	-6.703 (0.33)	-217.869 (0.70)	-66.048 (0.94)
Δ st_highway	6.274 (0.56)	0.023 0.00	37.339 (0.82)	26.440* (2.26)
Δ st_safety	11.216 (0.27)	17.719 (1.03)	107.282 (0.44)	54.322 (0.83)
Δ st_envirohousing	-11.622 (0.67)	4.726 (0.64)	1.855 (0.02)	28.691 (1.30)
Δ st_govtadmin	-4.870 (0.15)	-3.784 (0.26)	-72.578 (0.40)	-45.631 (0.89)
Δ ct_property	-8.692 (0.94)	0.103 (0.04)	-35.833 (0.79)	-0.389 (0.05)
Δ ct_sales	-19.466 (1.07)	-2.018 (0.24)	-94.509 (0.80)	-12.761 (0.57)
Δ ct_education	4.170 (1.27)	2.090 (1.26)	19.438 (0.82)	4.158 (0.78)
Δ ct_highway	-1.189 (0.28)	-3.963* (2.12)	12.271 (0.66)	0.709 (0.22)
Δ ct_safety	13.126 (1.22)	4.632 (1.15)	36.111 (0.76)	1.334 (0.17)
Δ ct_naturalrec	-0.361 (0.13)	0.594 (0.34)	-10.456 (0.64)	-3.607 (0.79)
Δ ct_sewerage	1.275 (0.65)	1.171 (0.94)	-0.120 (0.02)	-0.827 (0.37)
Constant	0.108 (0.39)	0.319* (2.54)	0.300 (0.30)	0.606** (2.67)
F statistics (All endog. vars. =0)	3.33[0.000]	3.35[0.000]	7.09[0.000]	6.71[0.000]
DWH test for endogeneity	30.51[0.03]	26.79[0.083]	34.91[0.010]	17.34[0.500]
Sargan test of exogeneity of the instruments	NA	7.41[0.025]	NA	8.11[0.017]
Observations	1998	1996	1998	1996

Notes: Absolute t statistics are in parenthesis. P -values are in bracket. * indicates significant at 5% level, ** significant at 1% level. Nall stands for all nonmetropolitan counties. Data for wage and rent are from the Census.

Δ earning= $\ln(\text{earning00})-\ln(\text{earning90})$ and Δ housing= $\ln(\text{housing00})-\ln(\text{housing90})$. Column 1 in the wage equation is based on the benchmark Model 4 and Column 2 adds to Column 1 four additional ERS variables (fm, mi, fl, rec).

Column 3 in the rent equation is based on the benchmark Model 3 and Column 4 adds to Column 3 four additional ERS variables. IV1 is the 2SLS model using lagged fiscal variables as instruments. IV2 is same as IV1 but instead adding two more political voting behavior variables (PRES_REP72, PRES_TO72) as instruments. Standard errors are clustered by BEA defined economic areas. NA stands for not applicable. Number of Clusters is 174.

Second, the 2SLS coefficient magnitudes are generally larger than those from OLS. In addition, the 2SLS estimates appear to be better than the OLS estimates in both cases as mentioned, not only because more variables meet our expectation, but also because the 2SLS approach in this study accounts for possible endogeneity bias arising from the OLS approach.

Third, when taking into account of intra-cluster correlation, the significance of almost all coefficient estimates vanishes, which could be due to the two reasons as mentioned before. The first is that we do not know the exact form of correlation, as a result, the estimation of the standard errors could be wrong if the modeling of the correlation caused by clustering is not correct. The second reason is that there exists a high correlation between the residuals and the regressors.⁹

Fourth, the differenced equation estimates in this section are found to be better than the level estimates in Section 5.2, not only because it takes the endogeneity issue into consideration, but also because, as mentioned earlier, there are several advantages in using the differenced equation approach: (1) it eliminates possible county fixed effects that bias our coefficients, (2) it reduces severity of multicollinearity among explanatory variables.

Fifth, turning to the differenced equation model in this section, using the measurement of wage and rent from the Census seems to provide us better results. This is possible and reasonable if we recognize the nature of the labor and land markets in the nonmetropolitan areas. Our focus is on nonmetropolitan counties and noticing that in

⁹ Error spatial dependence is often interpreted as a nuisance (Anselin, 1988), which reflects spatial autocorrelation in measurement errors. Correlations in residuals can arise because of we treat the counties with arbitrary boundaries into separate jurisdiction units, however, these counties may share common cultural, social, or economic process.

nonmetropolitan areas, we observe that household usually has earnings from more than one job, the Census measures the wage (or earning) of each household by adding together the earnings of each job, while the BEA measures the wage on a per job basis. Therefore, Census earning data could be better in reflecting the nonmetropolitan labor market. Similarly the Census rent data (based on housing value) could be better than the HUD rent data (based on apartment rent) in reflecting nonmetropolitan land market, as nonmetropolitan households generally have a higher homeownership rate and there are relatively few rental activities going on in the nonmetropolitan areas.

5.3 Growth Model Results

This section reports the regression results of a regional growth model of wages and rents using mainly equation (31), where the dependent variable is defined as growth from 1992-2002 and the explanatory variables are mainly initial period fiscal policy variables.

We conduct the regression analysis in four major steps and the coefficient estimates are reported in Tables 18A-31B: 1) Tables 18A-B are the results for the wage and rent equations, respectively, which are followed by Tables 19A-B that present how the previous results are robust to the cluster method. 2) Tables 20A-21B replicate the processes in the first step by using alternative measurements of wages and rent from the Census earning and housing value data. 3) Tables 22-29 follow the same processes in step 1 and 2 while considering SBSI variables as additional explanatory variables. 4) Tables 30A-31B present the corresponding results done in step 3 by breaking up the entire sample into nine sub-samples by rural-urban continuum codes.

As the results of Chow test (Appendix Table 20) from Tables 18-29 all uniformly indicate that the calculated F statistic is greater than the critical value at the 5% significance level, which justifies our implementations of running subsample regressions as well as the full sample regression.

Table 18A presents the OLS results of the wage growth model for the entire sample (Nall) and two subsamples (N468 and N579), respectively. Columns 1 (3, or 5) uses the explanatory variables based on Model 4 (mentioned in Section 5.1, the base model therein) which, except initial fiscal variables, includes additional amenity variables, Census dummies and initial demographic variables. Similarly, Column 2 (4, or 6) includes additional four additional ERS variables (*fm*, *mi*, *fl*, *rec*) to the base model. The same structures are followed in the rent equation specification in Table 18B, except the base model used is based on Model 3 (i.e., removing the demographic variables from Model 4 in the rent equation).

Turning to the results in both Tables 18A-18B, the models for wages and rent are found to have low adjusted R -squares, indicating low goodness of fit. The state tax variables are generally found to be negative and statistically significant as expected in the rent equation (Table 18B) and consistent within samples. In addition, state expenditures on education, highway, and public safety (*stl92_firstsecond*, *stl92_highway*, *stl92_publicsafety*) appear to have the expected positive sign but statistically insignificant. With respect to county fiscal variables, the coefficient on education is generally statistically significant signed as positive and expected. However the negative and statistically significant coefficient on *cty92highway* contradicts our expectation, which can not be explained simply as that households or firms do not prefer highway

investment by county government. In contrast to the estimates from the rent model, the coefficient estimates in the wage model (Table 18A) are less convincing. The major fiscal variables of interest are found to be statistically insignificant, even though the state tax variables are generally found to be consistently negative and state expenditure variables are consistently positive. The above results generally hold when taking into consideration intra-cluster correlation as shown in Tables 19A-19B, implying that the clustered and unclustered variance estimators are approximately the same, which also implies that it is appropriate to apply the OLS method to the growth equation.

Next we conduct the above analysis using Census earning and housing data to examine the sensitivity of the results to different outcome variable measurements. The corresponding results are presented in Tables 20A and 20B for wage and rent respectively. In contrast to the earlier results in Tables 18A-18B, models in Tables 20A-20B using the Census earning and housing data as dependent variables consistently have better model fit as reflected by the higher *R*-squares.

Compared to the rent model in Table 18B, state tax variables retain their expected negative sign and significance in Table 20B. In addition, state expenditure variables such as *stl92_firstsecond*, *stl92_highway*, and *stl92_publicsafety* become statistically significant positive. The statistically significant positive *cty92sales* becomes negative and no longer significant. However, the coefficient on *cty92safety* is found to be negative and statistically significant, which is not accordance with our prediction.

Compared to the wage model in Table 18A, state tax variables retain their negative sign in Table 20A. In addition, state general sales tax and individual income tax

**Table 18A. Growth Equation Model Results for Sample Nall, N468, and N579
Respectively, Dependent variable: $\Delta \ln(\text{wage1992})$**

	Nall		N468		N579	
	Base	Base+ERS	Base	Base+ERS	Base	Base+ERS
stl92_property	0.019 (0.34)	0.033 (0.63)	0.040 (0.52)	0.058 (0.80)	-0.046 (0.55)	-0.025 (0.30)
stl92_general_sales	-0.065 (0.99)	-0.021 (0.33)	-0.128 (1.38)	-0.105 (1.17)	-0.060 (0.58)	0.007 (0.07)
stl92_individual_income	-0.070 (1.64)	-0.050 (1.20)	-0.148* (2.13)	-0.144* (2.18)	-0.030 (0.47)	0.010 (0.10)
stl92_corporate_income	-0.179 (1.13)	-0.233 (1.51)	-0.111 (0.55)	-0.123 (0.64)	-0.268 (0.95)	-0.376 (1.33)
stl92_rest	-0.341** (3.98)	-0.215* (2.56)	-0.429** (3.14)	-0.317* (2.51)	-0.215 (1.71)	-0.066 (0.54)
stl92_firstsecond	0.140 (1.85)	0.100 (1.32)	0.170 (1.45)	0.140 (1.28)	0.090 (0.77)	0.010 (0.11)
stl92_hospitalhealth	0.175 (1.19)	0.091 (0.63)	0.056 (0.28)	0.022 (0.11)	0.630* (2.53)	0.463 (1.89)
stl92_highway	0.182 (1.75)	0.116 (1.10)	0.199 (1.24)	0.211 (1.33)	0.215 (1.48)	0.077 (0.55)
stl92_publicsafety	0.150 (0.93)	0.050 (0.30)	-0.090 (0.39)	-0.190 (0.92)	0.530 (1.95)	0.460 (1.76)
stl92_envirohousing	0.087 (0.71)	0.140 (1.19)	0.160 (0.91)	0.215 (1.27)	0.117 (0.58)	0.231 (1.21)
stl92_govtadmin	-0.957** (3.42)	-0.731** (2.67)	-0.767* (2.08)	-0.687 (1.91)	-1.661** (3.64)	-1.246** (2.85)
cty92property	-0.030 (1.80)	-0.010 (0.67)	-0.058* (2.15)	-0.050 (1.61)	0.000 (0.09)	0.020 (0.79)
cty92sales	-0.001 (0.01)	0.009 (0.17)	-0.041 (0.54)	-0.031 (0.38)	-0.011 (0.11)	0.015 (0.17)
cty92education	0.008 (0.58)	-0.001 (0.09)	-0.007 (0.33)	-0.011 (0.49)	0.024 (1.20)	0.011 (0.54)
cty92highway	-0.060 (1.07)	-0.060 (1.21)	0.060 (1.16)	0.060 (1.18)	-0.040 (0.60)	-0.050 (0.85)
cty92safety	0.016 (0.20)	0.047 (0.59)	0.018 (0.19)	0.034 (0.38)	-0.233 (1.71)	-0.152 (1.13)
cty92naturalrec	0.080 (0.60)	0.077 (0.57)	0.019 (0.20)	0.022 (0.21)	0.156 (0.69)	0.144 (0.64)
cty92sewerage	0.010 (0.14)	0.000 (0.02)	-0.030 (0.38)	-0.030 (0.41)	0.130 (1.30)	0.130 (1.36)
Constant	0.110** (4.12)	0.083** (3.09)	0.076* (2.08)	0.039 (1.03)	0.167** (4.47)	0.136** (3.63)
Observations	1998	1998	1040	1040	958	958
Adjusted R-squared	0.18	0.22	0.16	0.20	0.19	0.25

Notes: Robust *t* statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level. Nall stands for all nonmetropolitan counties. N468 (N579) stands for nonmetropolitan counties adjacent (nonadjacent) to a metro area. Column 1 (3, or 5) in the wage equation is based on the benchmark Model 4. Column 2 (4, or 6) adds to Column 1 four additional ERS variables (fm, mi, fl, rec). Wage data are from the BEA.

**Table 18B. Growth Equation Model Results for Sample Nall, N468, and N579
Respectively, Dependent variable: $\Delta \text{rent}/\ln(\text{rent}1992)$**

	Nall		N468		N579	
	Base	Base+ERS	Base	Base+ERS	Base	Base+ERS
stl92_property	-0.040 (0.39)	-0.044 (0.42)	-0.381* (2.44)	-0.396* (2.53)	0.251 (1.75)	0.268 (1.87)
stl92_general_sales	-0.305* (2.25)	-0.268* (1.97)	-0.340 (1.59)	-0.324 (1.52)	-0.328 (1.66)	-0.273 (1.40)
stl92_individual_income	-0.414** (4.73)	-0.387** (4.43)	-0.532** (3.41)	-0.516** (3.32)	-0.410** (3.69)	-0.379** (3.44)
stl92_corporate_income	-1.116** (3.28)	-1.157** (3.40)	-1.339** (2.73)	-1.312** (2.69)	-1.049* (2.20)	-1.129* (2.39)
stl92_rest	-1.097** (6.44)	-1.027** (6.04)	-1.273** (4.67)	-1.260** (4.63)	-1.024** (4.43)	-0.911** (3.94)
stl92_firstsecond	0.290 (1.72)	0.250 (1.51)	0.547* (2.11)	0.515* (1.99)	-0.050 (0.22)	-0.120 (0.55)
stl92_hospitalhealth	0.366 (1.09)	0.316 (0.94)	0.076 (0.17)	0.050 (0.11)	0.606 (1.11)	0.484 (0.88)
stl92_highway	0.135 (0.58)	0.088 (0.38)	-0.232 (0.63)	-0.255 (0.70)	0.658* (2.04)	0.588 (1.83)
stl92_publicsafety	0.560 (1.52)	0.490 (1.33)	0.900 (1.69)	0.840 (1.58)	0.330 (0.61)	0.270 (0.51)
stl92_envirohousing	-0.141 (0.57)	-0.123 (0.50)	0.695 (1.73)	0.736 (1.86)	-0.831** (2.58)	-0.813* (2.53)
stl92_govtadmin	2.033** (3.57)	2.211** (3.89)	2.855** (3.58)	2.995** (3.75)	1.239 (1.40)	1.529 (1.73)
cty92property	-0.020 (0.67)	-0.010 (0.32)	0.030 (0.74)	0.030 (0.85)	-0.020 (0.69)	-0.010 (0.46)
cty92sales	0.311 (1.73)	0.298 (1.70)	0.172 (0.84)	0.143 (0.71)	0.392 (1.44)	0.392 (1.49)
cty92education	0.064** (3.03)	0.066** (3.15)	0.062 (1.82)	0.062 (1.84)	0.070** (2.67)	0.073** (2.81)
cty92highway	-0.117* (2.32)	-0.112* (2.21)	-0.306** (2.87)	-0.309** (2.88)	-0.030 (0.57)	-0.040 (0.68)
cty92safety	0.129 (0.76)	0.140 (0.81)	0.027 (0.11)	0.047 (0.20)	0.361 (1.64)	0.386 (1.65)
cty92naturalrec	-0.020 (0.11)	-0.021 (0.11)	0.084 (0.40)	0.093 (0.45)	-0.233 (0.94)	-0.244 (0.96)
cty92sewerage	0.180 (1.24)	0.170 (1.17)	0.040 (0.22)	0.040 (0.22)	0.380 (1.88)	0.360 (1.81)
Constant	-0.024 (1.71)	-0.024 (1.67)	-0.039 (1.89)	-0.033 (1.56)	-0.007 (0.41)	-0.014 (0.78)
Observations	1998	1998	1040	1040	958	958
Adjusted R-squared	0.28	0.28	0.29	0.29	0.29	0.29

Notes: Robust t statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level. Nall stands for all nonmetropolitan counties. N468 (N579) stands for nonmetropolitan counties adjacent (nonadjacent) to a metro area. Column 1 (3, or 5) in the wage equation is based on the benchmark Model 3. Column 2 (4, or 6) 1 adds to Column 1 four additional ERS variables (fm, mi, fl, rec). Rent data are from the HUD.

Table 19A. Growth Equation Model Results with Clustering Method for Sample Nall, N468, and N579 Respectively, Dependent variable: $\Delta \ln(\text{wage1992})$

	Nall		N468		N579	
	Base	Base+ERS	Base	Base+ERS	Base	Base+ERS
stl92_property	0.019 (0.30)	0.033 (0.57)	0.040 (0.44)	0.058 (0.75)	-0.046 (0.53)	-0.025 (0.29)
stl92_general_sales	-0.065 (0.80)	-0.021 (0.28)	-0.128 (1.17)	-0.105 (1.10)	-0.060 (0.55)	0.007 (0.06)
stl92_individual_income	-0.071 (1.41)	-0.050 (1.10)	-0.148 (1.95)	-0.144* (2.18)	-0.030 (0.45)	0.006 (0.11)
stl92_corporate_income	-0.179 (1.09)	-0.233 (1.50)	-0.111 (0.53)	-0.123 (0.62)	-0.268 (1.04)	-0.376 (1.49)
stl92_rest	-0.341** (3.59)	-0.215* (2.31)	-0.429** (2.87)	-0.317* (2.40)	-0.215 (1.73)	-0.066 (0.52)
stl92_firstsecond	0.144 (1.70)	0.098 (1.32)	0.171 (1.16)	0.142 (1.13)	0.091 (0.84)	0.012 (0.13)
stl92_hospitalhealth	0.175 (1.17)	0.091 (0.60)	0.056 (0.28)	0.022 (0.11)	0.630** (2.72)	0.463 (1.97)
stl92_highway	0.182 (1.38)	0.116 (0.85)	0.199 (1.07)	0.211 (1.17)	0.215 (1.57)	0.077 (0.59)
stl92_publicsafety	0.151 (0.79)	0.046 (0.26)	-0.088 (0.35)	-0.193 (0.87)	0.531 (1.80)	0.460 (1.66)
stl92_envirohousing	0.087 (0.73)	0.140 (1.13)	0.160 (1.02)	0.215 (1.39)	0.117 (0.64)	0.231 (1.28)
stl92_govtadmin	-0.957** (2.77)	-0.731* (2.21)	-0.767 (1.97)	-0.687 (1.86)	-1.661** (3.57)	-1.246** (2.87)
cty92property	-0.029 (1.95)	-0.011 (0.73)	-0.058 (1.97)	-0.047 (1.46)	0.002 (0.11)	0.017 (1.01)
cty92sales	-0.001 (0.01)	0.009 (0.16)	-0.041 (0.50)	-0.031 (0.35)	-0.011 (0.13)	0.015 (0.18)
cty92education	0.008 (0.55)	-0.001 (0.09)	-0.007 (0.35)	-0.011 (0.53)	0.024 (1.15)	0.011 (0.52)
cty92highway	-0.057 (1.83)	-0.057* (2.20)	0.059 (1.03)	0.059 (1.03)	-0.042 (0.97)	-0.051 (1.54)
cty92safety	0.016 (0.19)	0.047 (0.59)	0.018 (0.20)	0.034 (0.40)	-0.233 (1.59)	-0.152 (1.07)
cty92naturalrec	0.080 (0.61)	0.077 (0.59)	0.019 (0.20)	0.022 (0.21)	0.156 (0.71)	0.144 (0.66)
cty92sewerage	0.008 (0.14)	0.001 (0.02)	-0.030 (0.39)	-0.034 (0.42)	0.129 (1.27)	0.131 (1.38)
Constant	0.110** (4.06)	0.083** (2.96)	0.076* (2.19)	0.039 (1.06)	0.167** (4.20)	0.136** (3.23)
Observations	1998	1998	1040	1040	958	958
Adjusted R-squared	0.18	0.22	0.16	0.20	0.19	0.25

Notes: Robust t statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level. Nall stands for all nonmetropolitan counties. N468 (N579) stands for nonmetropolitan counties adjacent (nonadjacent) to a metro area. Column 1 (3, or 5) in the wage equation is based on the benchmark Model 4. Column 2 (4, or 6) adds to Column 1 four additional ERS variables (fm, mi, fl, rec). Wage data are from the BEA. Number of Clusters = 174.

Table 19B. Growth Equation Model Results with Clustering Method for Sample Nall, N468, and N579 Respectively, Dependent variable: $\Delta \text{rent}/\ln(\text{rent}1992)$

	Nall		N468		N579	
	Base	Base+ERS	Base	Base+ERS	Base	Base+ERS
stl92_property	-0.040 (0.27)	-0.044 (0.28)	-0.381* (2.01)	-0.396* (2.08)	0.251 (1.34)	0.268 (1.46)
stl92_general_sales	-0.305 (1.30)	-0.268 (1.14)	-0.340 (1.30)	-0.324 (1.24)	-0.328 (1.24)	-0.273 (1.06)
stl92_individual_income	-0.414** (2.71)	-0.387* (2.52)	-0.532** (2.90)	-0.516** (2.81)	-0.410* (2.19)	-0.379* (2.05)
stl92_corporate_income	-1.116* (2.10)	-1.157* (2.20)	-1.339* (2.36)	-1.312* (2.33)	-1.049 (1.44)	-1.129 (1.57)
stl92_rest	-1.097** (3.66)	-1.027** (3.38)	-1.273** (4.05)	-1.260** (3.97)	-1.024** (2.84)	-0.911* (2.44)
stl92_firstsecond	0.285 (1.11)	0.249 (0.99)	0.547 (1.64)	0.515 (1.56)	-0.047 (0.16)	-0.117 (0.42)
stl92_hospitalhealth	0.366 (0.71)	0.316 (0.60)	0.076 (0.13)	0.050 (0.09)	0.606 (0.73)	0.484 (0.57)
stl92_highway	0.135 (0.29)	0.088 (0.20)	-0.232 (0.49)	-0.255 (0.54)	0.658 (1.14)	0.588 (1.03)
stl92_publicsafety	0.556 (0.80)	0.485 (0.70)	0.902 (1.27)	0.844 (1.20)	0.334 (0.36)	0.269 (0.29)
stl92_envirohousing	-0.141 (0.34)	-0.123 (0.30)	0.695 (1.56)	0.736 (1.68)	-0.831 (1.61)	-0.813 (1.58)
stl92_govtadmin	2.033 (1.91)	2.211* (2.10)	2.855* (2.59)	2.995** (2.73)	1.239 (0.88)	1.529 (1.09)
cty92property	-0.016 (0.60)	-0.008 (0.29)	0.027 (0.60)	0.032 (0.68)	-0.022 (0.83)	-0.014 (0.57)
cty92sales	0.311* (2.24)	0.298* (2.15)	0.172 (0.74)	0.143 (0.63)	0.392* (2.56)	0.392* (2.52)
cty92education	0.064* (2.48)	0.066* (2.50)	0.062 (1.69)	0.062 (1.69)	0.070* (2.46)	0.073* (2.48)
cty92highway	-0.117* (2.09)	-0.112* (1.99)	-0.306** (2.70)	-0.309** (2.67)	-0.029 (0.56)	-0.035 (0.68)
cty92safety	0.129 (0.69)	0.140 (0.74)	0.027 (0.11)	0.047 (0.19)	0.361 (1.64)	0.386 (1.62)
cty92naturalrec	-0.020 (0.10)	-0.021 (0.11)	0.084 (0.42)	0.093 (0.47)	-0.233 (0.95)	-0.244 (0.98)
cty92sewerage	0.183 (1.33)	0.173 (1.25)	0.039 (0.23)	0.040 (0.23)	0.383 (1.68)	0.358 (1.65)
Constant	-0.024 (1.09)	-0.024 (1.11)	-0.039 (1.57)	-0.033 (1.35)	-0.007 (0.28)	-0.014 (0.54)
Observations	1998	1998	1040	1040	958	958
Adjusted R-squared	0.28	0.28	0.29	0.29	0.29	0.29

Notes: Robust *t* statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level. Nall stands for all nonmetropolitan counties. N468 (N579) stands for nonmetropolitan counties adjacent (nonadjacent) to a metro area. Column 1 (3, or 5) in the wage equation is based on the benchmark Model 3. Column 2 (4, or 6) 1 adds to Column 1 four additional ERS variables (fm, mi, fl, rec). Rent data are from the HUD. Number of Clusters = 174.

**Table 20A. Growth Equation Model Results for Sample Nall, N468, and N579
Respectively, Dependent variable: $\Delta \ln(\text{earning}_{1990})$**

	Nall		N468		N579	
	Base	Base+ERS	Base	Base+ERS	Base	Base+ERS
stl92_property	-0.097 (1.39)	-0.084 (1.24)	-0.080 (0.84)	-0.058 (0.62)	-0.073 (0.67)	-0.050 (0.47)
stl92_general_sales	-0.310** (3.57)	-0.247** (2.93)	-0.497** (4.18)	-0.420** (3.75)	-0.210 (1.54)	-0.132 (0.98)
stl92_individual_income	-0.138* (2.30)	-0.106 (1.83)	-0.209* (2.26)	-0.158 (1.80)	-0.141 (1.60)	-0.106 (1.28)
stl92_corporate_income	-0.229 (1.11)	-0.319 (1.61)	-0.256 (1.02)	-0.282 (1.15)	0.048 (0.12)	-0.173 (0.47)
stl92_rest	-0.602** (5.05)	-0.437** (3.66)	-0.588** (3.72)	-0.424** (2.76)	-0.602** (3.13)	-0.421* (2.18)
stl92_firstsecond	0.159 (1.53)	0.138 (1.38)	0.492** (3.82)	0.451** (3.70)	-0.334 (1.82)	-0.347 (1.94)
stl92_hospitalhealth	0.018 (0.09)	-0.096 (0.47)	0.191 (0.75)	0.007 (0.03)	-0.080 (0.20)	-0.269 (0.70)
stl92_highway	0.460** (3.05)	0.261 (1.75)	0.478* (2.06)	0.319 (1.43)	0.549* (2.19)	0.294 (1.22)
stl92_publicsafety	0.252 (1.15)	0.166 (0.80)	0.652* (2.31)	0.547* (2.01)	0.060 (0.15)	0.019 (0.05)
stl92_envirohousing	0.034 (0.20)	0.184 (1.09)	-0.034 (0.13)	0.110 (0.45)	0.418 (1.46)	0.606* (2.12)
stl92_govtadmin	-0.873* (2.28)	-0.444 (1.20)	-1.833** (3.91)	-1.458** (3.26)	-0.317 (0.48)	0.280 (0.45)
cty92property	-0.043 (1.91)	-0.014 (0.64)	-0.097** (3.94)	-0.065* (2.31)	0.006 (0.19)	0.025 (0.79)
cty92sales	0.049 (0.68)	0.092 (1.26)	0.122 (1.22)	0.187 (1.85)	-0.060 (0.51)	-0.005 (0.04)
cty92education	0.008 (0.36)	-0.012 (0.59)	0.045 (1.64)	0.032 (1.15)	0.008 (0.26)	-0.016 (0.53)
cty92highway	0.147** (3.00)	0.134* (2.40)	0.133* (2.15)	0.066 (1.08)	0.199** (3.46)	0.185** (2.90)
cty92safety	-0.193 (1.88)	-0.123 (1.23)	-0.263* (2.57)	-0.217* (2.21)	-0.329 (1.79)	-0.181 (1.00)
cty92naturalrec	0.017 (0.23)	0.000 (0.00)	0.060 (0.91)	0.068 (0.91)	-0.130 (0.89)	-0.152 (0.97)
cty92sewerage	-0.120 (1.37)	-0.107 (1.27)	-0.128 (1.44)	-0.115 (1.37)	-0.034 (0.21)	-0.026 (0.16)
Constant	0.189** (4.87)	0.135** (3.49)	0.161** (3.36)	0.106* (2.14)	0.231** (4.01)	0.161** (2.82)
Observations	1998	1998	1040	1040	958	958
Adjusted R-squared	0.58	0.61	0.56	0.59	0.58	0.61

Notes: Robust *t* statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level. Nall stands for all nonmetropolitan counties. N468 (N579) stands for nonmetropolitan counties adjacent (nonadjacent) to a metro area. Column 1 (3, or 5) in the wage equation is based on the benchmark Model 4. Column 2 (4, or 6) adds to Column 1 four additional ERS variables (fm, mi, fl, rec). Wage data are from the Census.

**Table 20B. Growth Equation Model Results for Sample Nall, N468, and N579
Respectively, Dependent variable: $\Delta \ln(\text{housing1990})$**

	Nall		N468		N579	
	Base	Base+ERS	Base	Base+ERS	Base	Base+ERS
stl92_property	-0.384** (2.87)	-0.324* (2.44)	-0.309 (1.72)	-0.266 (1.53)	-0.745** (3.45)	-0.631** (2.93)
stl92_general_sales	-0.619** (3.81)	-0.510** (3.13)	-0.809** (3.73)	-0.718** (3.35)	-0.752** (2.86)	-0.611* (2.32)
stl92_individual_income	-0.262* (2.32)	-0.222* (1.97)	-0.452** (2.74)	-0.405* (2.50)	-0.117 (0.68)	-0.068 (0.41)
stl92_corporate_income	-1.851** (4.93)	-2.005** (5.36)	-1.238** (2.86)	-1.318** (3.02)	-3.718** (5.31)	-3.944** (5.69)
stl92_rest	-1.525** (7.86)	-1.313** (6.85)	-1.070** (4.12)	-0.866** (3.36)	-2.523** (8.33)	-2.254** (7.50)
stl92_firstsecond	1.044** (5.33)	0.980** (5.06)	1.115** (4.46)	1.098** (4.50)	1.342** (4.36)	1.152** (3.85)
stl92_hospitalhealth	0.132 (0.34)	0.064 (0.17)	-0.521 (1.21)	-0.547 (1.28)	2.738** (4.01)	2.430** (3.60)
stl92_highway	0.754** (2.76)	0.715** (2.67)	0.580 (1.44)	0.593 (1.49)	1.466** (3.40)	1.335** (3.14)
stl92_publicsafety	1.724** (4.11)	1.473** (3.58)	1.118* (2.04)	0.855 (1.59)	2.312** (3.14)	2.003** (2.82)
stl92_envirohousing	-2.435** (8.00)	-2.403** (8.05)	-2.424** (5.51)	-2.348** (5.47)	-2.450** (5.18)	-2.405** (5.29)
stl92_govtadmin	-1.512* (2.15)	-1.387* (1.98)	-2.305* (2.58)	-2.322** (2.62)	-3.419** (2.95)	-2.795* (2.46)
cty92property	-0.083 (1.96)	-0.060 (1.33)	-0.173** (3.71)	-0.146** (3.29)	0.035 (0.58)	0.040 (0.62)
cty92sales	-0.004 (0.03)	0.034 (0.19)	0.242 (1.29)	0.312 (1.63)	-0.391 (1.59)	-0.333 (1.34)
cty92education	-0.021 (0.65)	-0.012 (0.36)	0.105* (2.46)	0.120** (2.86)	-0.127** (2.96)	-0.113* (2.58)
cty92highway	0.191 (1.66)	0.171 (1.58)	0.679** (5.46)	0.627** (5.18)	0.093 (0.72)	0.038 (0.31)
cty92safety	-0.520* (2.20)	-0.471* (2.03)	-0.799** (3.64)	-0.759** (3.53)	-0.466 (1.16)	-0.324 (0.86)
cty92naturalrec	0.205 (1.19)	0.200 (1.22)	0.168 (0.81)	0.189 (1.00)	0.096 (0.31)	0.075 (0.24)
cty92sewerage	0.288 (1.75)	0.216 (1.40)	0.098 (0.42)	0.055 (0.26)	0.315 (1.47)	0.211 (0.99)
Constant	0.213** (2.94)	0.176* (2.30)	0.207* (2.22)	0.175 (1.72)	0.284** (2.63)	0.219* (2.01)
Observations	1998	1998	1040	1040	958	958
Adjusted R-squared	0.56	0.58	0.61	0.63	0.53	0.54

Notes: Robust t statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level. Nall stands for all nonmetropolitan counties. N468 (N579) stands for nonmetropolitan counties adjacent (nonadjacent) to a metro area. Column 1 (3, or 5) in the wage equation is based on the benchmark Model 3. Column 2 (4, or 6) 1 adds to Column 1 four additional ERS variables (fm, mi, fl, rec). Rent data are from the Census.

(*stl92_general_sales*, *stl92_individual_income*) appear to be statistically significant. On the other hand, state expenditures on education, highway, and public safety (*stl92_firstsecond*, *stl92_highway*, *stl92_publicsafety*) retain their positive signs. In addition, state level and county level highway expenditures are shown to have positive and statistical effects on wage growth.

The next two tables (Tables 21A-21B) replicate the analysis done in Tables 20A-20B by accounting for spatial cluster effects. The results from both wage and rent models using the second set of measurement of dependent variables is found to be more sensitive to specification of intra-cluster correlation than the first one. For instance, the statistical significance of the fiscal variables such as *stl92_property*, *stl92_general_sales*, *stl92_individual_income*, *stl92_highway* vanishes when the cluster method is applied.

Furthermore, we conduct additional analyses to check whether the corresponding results from the above Tables 18A-21B are robust to including additional SBSI and ERS variables. These results are reported in Tables 22-29. Briefly, we find that: 1) including additional SBSI and ERS variables does not produce better results. 2) The coefficient estimates from the models using Census earning and housing data are generally better than using the set of BEA wage and HUD rent data being consistent with the theoretical predictions. For instance, the negative coefficients in the rent model and positive coefficients in the wage model for the two tax variables, *stl92_property*, *stl92_general_sales* and *top_pi* are consistent with the prediction that neither firms nor households prefer higher taxes and in equilibrium, households should be compensated by locating in an area with higher taxes, *ceteris paribus*. 3) The variance estimators using the clustered method overall are larger than these using the unclustered one. This implies that

Table 21A. Growth Equation Model Results with Clustering Method for Sample Nall, N468 and N579 Respectively, Dependent variable: $\Delta \ln(\text{earning1990})$

	Nall		N468		N579	
	Base	Base+ERS	Base	Base+ERS	Base	Base+ERS
stl92_property	-0.097 (0.96)	-0.084 (0.85)	-0.080 (0.72)	-0.058 (0.57)	-0.073 (0.54)	-0.050 (0.39)
stl92_general_sales	-0.310* (2.52)	-0.247* (2.03)	-0.497** (3.39)	-0.420** (3.06)	-0.210 (1.19)	-0.132 (0.81)
stl92_individual_income	-0.138 (1.45)	-0.106 (1.15)	-0.209 (1.79)	-0.158 (1.48)	-0.141 (1.06)	-0.106 (0.90)
stl92_corporate_income	-0.229 (0.82)	-0.319 (1.24)	-0.256 (0.85)	-0.282 (0.99)	0.048 (0.10)	-0.173 (0.38)
stl92_rest	-0.602** (3.07)	-0.437* (2.20)	-0.588** (2.80)	-0.424* (2.11)	-0.602* (2.54)	-0.421 (1.77)
stl92_firstsecond	0.159 (1.14)	0.138 (1.06)	0.492** (3.23)	0.451** (3.31)	-0.334 (1.59)	-0.347 (1.74)
stl92_hospitalhealth	0.018 (0.05)	-0.096 (0.28)	0.191 (0.56)	0.007 (0.02)	-0.080 (0.14)	-0.269 (0.50)
stl92_highway	0.460 (1.63)	0.261 (0.95)	0.478 (1.53)	0.319 (1.07)	0.549 (1.38)	0.294 (0.83)
stl92_publicsafety	0.252 (0.72)	0.166 (0.51)	0.652 (1.77)	0.547 (1.59)	0.060 (0.10)	0.019 (0.04)
stl92_envirohousing	0.034 (0.13)	0.184 (0.69)	-0.034 (0.12)	0.110 (0.38)	0.418 (1.05)	0.606 (1.56)
stl92_govtadmin	-0.873 (1.35)	-0.444 (0.73)	-1.833** (2.91)	-1.458* (2.49)	-0.317 (0.35)	0.280 (0.34)
cty92property	-0.043 (1.71)	-0.014 (0.58)	-0.097** (3.64)	-0.065* (2.34)	0.006 (0.21)	0.025 (0.81)
cty92sales	0.049 (0.46)	0.092 (0.87)	0.122 (1.09)	0.187 (1.68)	-0.060 (0.33)	-0.005 (0.03)
cty92education	0.008 (0.35)	-0.012 (0.61)	0.045 (1.64)	0.032 (1.18)	0.008 (0.28)	-0.016 (0.57)
cty92highway	0.147* (2.18)	0.134 (1.65)	0.133* (2.37)	0.066 (1.13)	0.199** (3.06)	0.185* (2.15)
cty92safety	-0.193 (1.91)	-0.123 (1.27)	-0.263* (2.53)	-0.217* (2.19)	-0.329* (2.06)	-0.181 (1.19)
cty92naturalrec	0.017 (0.26)	0.000 (0.00)	0.060 (0.85)	0.068 (0.87)	-0.130 (1.14)	-0.152 (1.35)
cty92sewerage	-0.120 (1.36)	-0.107 (1.26)	-0.128 (1.43)	-0.115 (1.40)	-0.034 (0.23)	-0.026 (0.18)
Constant	0.189** (4.74)	0.135** (3.58)	0.161** (2.84)	0.106 (1.90)	0.231** (4.36)	0.161** (3.00)
Observations	1998	1998	1040	1040	958	958
Adjusted R-squared	0.58	0.61	0.56	0.59	0.58	0.61

Notes: Robust t statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level. Nall stands for all nonmetropolitan counties. N468 (N579) stands for nonmetropolitan counties adjacent (nonadjacent) to a metro area. Column 1 (3, or 5) in the wage equation is based on the benchmark Model 4. Column 2 (4, or 6) adds to Column 1 four additional ERS variables (fm, mi, fl, rec). Wage data are from the Census. Number of Clusters = 174.

Table 21B. Growth Equation Model Results with Clustering Method for Sample Nall, N468 and N579 Respectively, Dependent variable: $\Delta \ln(\text{housing}_{1990})$

	Nall		N468		N579	
	Base	Base+ERS	Base	Base+ERS	Base	Base+ERS
stl92_property	-0.384 (1.48)	-0.324 (1.29)	-0.309 (1.20)	-0.266 (1.07)	-0.745* (2.20)	-0.631 (1.90)
stl92_general_sales	-0.619 (1.79)	-0.510 (1.50)	-0.809* (2.52)	-0.718* (2.29)	-0.752 (1.71)	-0.611 (1.40)
stl92_individual_income	-0.262 (1.07)	-0.222 (0.93)	-0.452 (1.96)	-0.405 (1.80)	-0.117 (0.37)	-0.068 (0.22)
stl92_corporate_income	-1.851** (2.65)	-2.005** (2.91)	-1.238 (1.81)	-1.318 (1.95)	-3.718** (3.74)	-3.944** (4.02)
stl92_rest	-1.525** (4.55)	-1.313** (3.93)	-1.070** (2.77)	-0.866* (2.23)	-2.523** (5.90)	-2.254** (5.37)
stl92_firstsecond	1.044** (2.78)	0.980** (2.70)	1.115** (2.85)	1.098** (2.97)	1.342** (2.70)	1.152* (2.36)
stl92_hospitalhealth	0.132 (0.22)	0.064 (0.11)	-0.521 (0.90)	-0.547 (0.96)	2.738** (3.12)	2.430** (2.81)
stl92_highway	0.754 (1.56)	0.715 (1.48)	0.580 (1.02)	0.593 (1.02)	1.466* (2.48)	1.335* (2.37)
stl92_publicsafety	1.724* (2.29)	1.473* (2.00)	1.118 (1.37)	0.855 (1.09)	2.312* (2.49)	2.003* (2.25)
stl92_envirohousing	-2.435** (4.10)	-2.403** (4.10)	-2.424** (3.69)	-2.348** (3.68)	-2.450** (3.18)	-2.405** (3.28)
stl92_govtadmin	-1.512 (0.95)	-1.387 (0.89)	-2.305 (1.74)	-2.322 (1.77)	-3.419 (1.63)	-2.795 (1.37)
cty92property	-0.083 (1.94)	-0.060 (1.28)	-0.173** (3.95)	-0.146** (3.14)	0.035 (0.64)	0.040 (0.64)
cty92sales	-0.004 (0.02)	0.034 (0.18)	0.242 (0.97)	0.312 (1.22)	-0.391 (1.83)	-0.333 (1.69)
cty92education	-0.021 (0.53)	-0.012 (0.30)	0.105* (2.56)	0.120** (2.93)	-0.127** (2.63)	-0.113* (2.32)
cty92highway	0.191 (1.54)	0.171 (1.48)	0.679** (4.88)	0.627** (4.94)	0.093 (0.66)	0.038 (0.29)
cty92safety	-0.520* (2.07)	-0.471 (1.90)	-0.799** (3.58)	-0.759** (3.56)	-0.466 (1.23)	-0.324 (0.90)
cty92naturalrec	0.205 (1.18)	0.200 (1.25)	0.168 (0.82)	0.189 (1.01)	0.096 (0.36)	0.075 (0.29)
cty92sewerage	0.288 (1.77)	0.216 (1.43)	0.098 (0.43)	0.055 (0.27)	0.315 (1.61)	0.211 (1.07)
Constant	0.213** (3.52)	0.176** (2.78)	0.207** (3.78)	0.175** (3.03)	0.284* (2.55)	0.219 (1.79)
Observations	1998	1998	1040	1040	958	958
Adjusted R-squared	0.56	0.58	0.61	0.63	0.53	0.54

Notes: Robust t statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level. Nall stands for all nonmetropolitan counties. N468 (N579) stands for nonmetropolitan counties adjacent (nonadjacent) to a metro area. Column 1 (3, or 5) in the wage equation is based on the benchmark Model 3. Column 2 (4, or 6) 1 adds to Column 1 four additional ERS variables (fm, mi, fl, rec). Rent data are from the Census. Number of Clusters = 174.

Table 22. Growth Equation Model Results for Sample Nall, N468, and N579 respectively Considering SBSI Variables, Dependent variable: $\Delta \text{wage}/\ln(\text{wage1992})$ and $\Delta \text{rent}/\ln(\text{rent1992})$

	Nall		N468		N579	
	wage	rent	wage	rent	wage	rent
stl92_property	-0.044 (0.70)	0.203 (1.41)	0.015 (0.17)	-0.084 (0.42)	-0.155 (1.51)	0.471 (1.85)
stl92_general_sales	-0.070 (1.09)	0.084 (0.51)	-0.062 (0.69)	0.148 (0.68)	-0.114 (1.04)	0.041 (0.14)
top_pi	0.000 (0.99)	0.000 (0.35)	0.000 (0.92)	0.000 (0.47)	0.000 (0.37)	0.000 (0.02)
top_capitalgains	0.000 (1.47)	0.000 (0.69)	0.000 (0.33)	0.000 (0.19)	-0.001 (1.46)	-0.001 (0.67)
top_corporate	0.000 (1.07)	-0.001** (3.75)	0.000 (0.94)	-0.002** (3.48)	0.000 (1.47)	-0.001* (2.19)
deathtax	0.001* (1.97)	0.005** (3.55)	0.001 (1.36)	0.006** (2.80)	0.003* (2.26)	0.006* (2.11)
unemptax	0.000 (0.41)	-0.002** (3.64)	0.000 (0.22)	-0.002 (1.78)	0.000 (0.71)	-0.002** (2.94)
utilitiescosts	0.001 (0.23)	-0.004 (0.63)	0.002 (0.61)	-0.002 (0.20)	0.003 (0.71)	-0.001 (0.14)
compensation	-0.002** (3.18)	-0.005** (3.57)	-0.003** (2.79)	-0.007** (3.32)	-0.002 (1.61)	-0.004 (1.77)
gastax	-0.008 (1.07)	0.020 (1.40)	-0.010 (1.00)	-0.004 (0.20)	-0.007 (0.56)	0.024 (0.92)
miniwage	0.000 (0.26)	0.010* (2.14)	0.002 (0.77)	0.005 (1.18)	-0.003 (1.20)	0.018* (2.12)
stl92_rest	-0.279** (2.74)	-0.540* (2.42)	-0.264 (1.83)	-0.509 (1.67)	-0.221 (1.33)	-0.439 (1.19)
stl92_firstsecond	0.257* (2.52)	-0.151 (0.67)	0.247 (1.71)	0.196 (0.58)	0.207 (1.25)	-0.491 (1.42)
stl92_hospitalhealth	0.327 (1.65)	0.268 (0.64)	0.038 (0.13)	-0.343 (0.62)	0.865* (2.42)	0.619 (0.92)
stl92_highway	0.053 (0.47)	-0.142 (0.59)	0.087 (0.47)	-0.535 (1.40)	0.084 (0.50)	0.360 (1.02)
stl92_publicsafety	-0.155 (0.73)	-0.695 (1.45)	-0.447 (1.57)	-0.493 (0.76)	0.136 (0.36)	-0.705 (0.80)
stl92_envirohousing	0.228 (1.50)	0.912** (2.87)	0.362 (1.71)	1.646** (3.37)	0.426 (1.71)	0.378 (0.73)
stl92_govtadmin	-0.850** (2.88)	2.542** (4.41)	-0.572 (1.39)	3.516** (3.96)	-1.536** (3.39)	1.536 (1.77)
cty92property	-0.021 (1.32)	-0.014 (0.62)	-0.047 (1.73)	0.038 (1.04)	0.006 (0.27)	-0.027 (0.98)
cty92sales	0.006 (0.09)	0.005 (0.03)	-0.065 (0.73)	-0.176 (0.80)	-0.020 (0.20)	0.182 (0.68)
cty92education	0.002 (0.16)	0.059** (2.98)	-0.016 (0.74)	0.062 (1.86)	0.023 (1.13)	0.062** (2.61)
cty92highway	-0.053 (0.99)	-0.094* (1.99)	0.063 (1.21)	-0.240* (2.25)	-0.040 (0.57)	-0.029 (0.61)
cty92safety	0.006 (0.08)	0.210 (1.30)	0.019 (0.21)	0.085 (0.38)	-0.251 (1.83)	0.471* (2.22)
cty92naturalrec	0.069 (0.52)	-0.047 (0.24)	-0.001 (0.01)	0.071 (0.31)	0.149 (0.66)	-0.252 (1.01)
cty92sewerage	-0.015 (0.26)	0.157 (1.12)	-0.052 (0.62)	-0.014 (0.08)	0.111 (1.12)	0.347 (1.77)
Constant	0.119** (4.35)	-0.018 (1.01)	0.074 (1.94)	-0.034 (1.43)	0.179** (4.58)	-0.020 (0.77)
Observations	1998	1998	1040	1040	958	958
Adjusted R-squared	0.20	0.32	0.18	0.32	0.20	0.34

Notes: Robust t statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level. Nall stands for all nonmetropolitan counties. N468 (N579) stands for nonmetropolitan counties adjacent (nonadjacent) to a metro area. Column 1 (3, or 5) in the wage equation is based on the benchmark Model 4. Column 2 (4, or 6) in the wage equation is based on the benchmark Model 3. Wage and Rent data are from the BEA and HUD, respectively.

**Table 23. Growth Equation Model Results for Sample Nall, N468, and N579 respectively
Considering SBSI plus ERS Variables, Dependent variable: $\Delta \text{wage}/\ln(\text{wage1992})$ and
 $\Delta \text{rent}/\ln(\text{rent1992})$**

	Nall		N468		N579	
	wage	rent	wage	rent	wage	rent
stl92_property	-0.051 (0.84)	0.188 (1.30)	0.033 (0.37)	-0.109 (0.54)	-0.169 (1.68)	0.466 (1.82)
stl92_general_sales	-0.052 (0.84)	0.101 (0.61)	-0.048 (0.55)	0.150 (0.68)	-0.093 (0.87)	0.075 (0.25)
top_pi	0.000 (1.42)	0.000 (0.41)	0.000 (1.07)	0.000 (0.43)	0.000 (0.88)	0.000 (0.22)
top_capitalgains	0.000 (0.98)	0.000 (0.54)	0.000 (0.02)	0.000 (0.19)	0.000 (1.10)	0.000 (0.28)
top_corporate	0.000 (1.07)	-0.001** (3.74)	0.000 (0.95)	-0.002** (3.56)	0.000 (1.69)	-0.001* (2.19)
deathtax	0.001 (1.59)	0.005** (3.51)	0.001 (1.32)	0.006** (2.78)	0.002* (1.98)	0.005 (1.96)
unemptax	0.000 (0.51)	-0.002** (3.72)	0.000 (0.24)	-0.002 (1.70)	0.000 (0.15)	-0.002** (3.05)
utilitiescosts	0.001 (0.20)	-0.005 (0.81)	0.001 (0.28)	-0.002 (0.25)	0.005 (0.98)	-0.003 (0.24)
compensation	-0.002** (3.22)	-0.005** (3.51)	-0.002* (2.44)	-0.007** (3.24)	-0.002 (1.90)	-0.004 (1.73)
gastax	-0.009 (1.34)	0.017 (1.18)	-0.011 (1.14)	-0.006 (0.29)	-0.008 (0.64)	0.024 (0.91)
miniwage	0.001 (0.36)	0.010* (1.96)	0.002 (0.77)	0.004 (0.92)	-0.002 (0.86)	0.018* (2.04)
stl92_rest	-0.181 (1.82)	-0.497* (2.24)	-0.166 (1.19)	-0.522 (1.76)	-0.136 (0.85)	-0.386 (1.05)
stl92_firstsecond	0.247* (2.54)	-0.168 (0.74)	0.214 (1.57)	0.162 (0.48)	0.211 (1.32)	-0.539 (1.54)
stl92_hospitalhealth	0.169 (0.88)	0.207 (0.49)	-0.027 (0.10)	-0.366 (0.67)	0.502 (1.47)	0.386 (0.56)
stl92_highway	-0.007 (0.06)	-0.175 (0.74)	0.112 (0.61)	-0.550 (1.45)	-0.035 (0.21)	0.336 (0.95)
stl92_publicsafety	-0.168 (0.83)	-0.705 (1.48)	-0.460 (1.64)	-0.520 (0.80)	0.205 (0.55)	-0.656 (0.74)
stl92_environhousing	0.291* (1.99)	0.957** (3.01)	0.453* (2.18)	1.703** (3.51)	0.522* (2.18)	0.450 (0.87)
stl92_govtadmin	-0.681* (2.35)	2.601** (4.53)	-0.626 (1.53)	3.635** (4.04)	-1.134** (2.58)	1.740* (2.01)
cty92property	-0.004 (0.24)	-0.005 (0.23)	-0.036 (1.24)	0.044 (1.19)	0.020 (0.89)	-0.017 (0.61)
cty92sales	0.016 (0.26)	-0.021 (0.11)	-0.072 (0.76)	-0.211 (0.99)	0.014 (0.16)	0.150 (0.57)
cty92education	-0.007 (0.49)	0.062** (3.16)	-0.018 (0.81)	0.063 (1.91)	0.011 (0.52)	0.066** (2.85)
cty92highway	-0.053 (1.11)	-0.084 (1.76)	0.066 (1.28)	-0.235* (2.19)	-0.048 (0.80)	-0.024 (0.50)
cty92safety	0.041 (0.53)	0.219 (1.33)	0.037 (0.41)	0.097 (0.44)	-0.176 (1.30)	0.458* (2.07)
cty92naturalrec	0.066 (0.49)	-0.046 (0.24)	0.008 (0.08)	0.078 (0.35)	0.141 (0.62)	-0.261 (1.04)
cty92sewerage	-0.021 (0.35)	0.147 (1.04)	-0.054 (0.62)	-0.006 (0.03)	0.115 (1.20)	0.323 (1.70)
Constant	0.091** (3.34)	-0.014 (0.75)	0.042 (1.10)	-0.024 (0.98)	0.146** (3.71)	-0.023 (0.90)
Observations	1998	1998	1040	1040	958	958
Adjusted R-squared	0.24	0.32	0.22	0.33	0.25	0.34

Notes: Robust t statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level. Nall stands for all nonmetropolitan counties. N468 (N579) stands for nonmetropolitan counties adjacent (nonadjacent) to a metro area. Column 1 (3, or 5) in the wage equation is based on the benchmark Model 4 plus four additional ERS variables (fm, mi, fl, rec). Column 2 (4, or 6) in the wage equation is based on the benchmark Model 3 plus corresponding ERS variables. Wage and Rent data are from the BEA and HUD, respectively.

Table 24. Growth Equation Model Results for Sample Nall, N468, and N579 respectively Considering SBSI Variables and Clustering Method, Dependent variable: $\Delta \text{wage}/\ln(\text{wage1992})$ and $\Delta \text{rent}/\ln(\text{rent1992})$

	Nall		N468		N579	
	wage	rent	wage	rent	wage	rent
stl92_property	-0.044 (0.72)	0.203 (0.98)	0.015 (0.17)	-0.084 (0.35)	-0.155 (1.58)	0.471 (1.86)
stl92_general_sales	-0.070 (0.98)	0.084 (0.38)	-0.062 (0.69)	0.148 (0.60)	-0.114 (1.07)	0.041 (0.16)
top_pi	0.000 (1.03)	0.000 (0.22)	0.000 (1.02)	0.000 (0.41)	0.000 (0.36)	0.000 (0.02)
top_capitalgains	0.000 (1.40)	0.000 (0.42)	0.000 (0.33)	0.000 (0.16)	-0.001 (1.36)	-0.001 (0.55)
top_corporate	0.000 (0.91)	-0.001** (2.88)	0.000 (0.82)	-0.002** (3.90)	0.000 (1.41)	-0.001 (1.80)
deathtax	0.001* (2.00)	0.005* (2.20)	0.001 (1.45)	0.006* (2.22)	0.003* (2.45)	0.006 (1.47)
unemptax	0.000 (0.37)	-0.002* (2.00)	0.000 (0.21)	-0.002 (1.46)	0.000 (0.69)	-0.002* (2.13)
utilitiescosts	0.001 (0.24)	-0.004 (0.44)	0.002 (0.55)	-0.002 (0.17)	0.003 (0.77)	-0.001 (0.11)
compensation	-0.002** (2.96)	-0.005* (2.50)	-0.003** (2.84)	-0.007** (3.19)	-0.002 (1.51)	-0.004 (1.43)
gastax	-0.008 (1.14)	0.020 (1.00)	-0.010 (1.10)	-0.004 (0.17)	-0.007 (0.60)	0.024 (0.87)
miniwage	0.000 (0.29)	0.010* (2.49)	0.002 (0.75)	0.005 (1.17)	-0.003 (1.19)	0.018** (3.87)
stl92_rest	-0.279* (2.60)	-0.540 (1.81)	-0.264 (1.77)	-0.509 (1.53)	-0.221 (1.40)	-0.439 (1.31)
stl92_firstsecond	0.257* (2.57)	-0.151 (0.38)	0.247 (1.68)	0.196 (0.46)	0.207 (1.32)	-0.491 (1.05)
stl92_hospitalhealth	0.327 (1.42)	0.268 (0.40)	0.038 (0.13)	-0.343 (0.49)	0.865* (2.27)	0.619 (0.67)
stl92_highway	0.053 (0.41)	-0.142 (0.34)	0.087 (0.44)	-0.535 (1.15)	0.084 (0.58)	0.360 (0.76)
stl92_publicsafety	-0.155 (0.73)	-0.695 (0.95)	-0.447 (1.95)	-0.493 (0.68)	0.136 (0.37)	-0.705 (0.68)
stl92_environhousing	0.228 (1.66)	0.912 (1.78)	0.362 (1.89)	1.646** (2.83)	0.426 (1.85)	0.378 (0.58)
stl92_govtadmin	-0.850* (2.60)	2.542* (2.38)	-0.572 (1.48)	3.516** (3.05)	-1.536** (3.25)	1.536 (1.26)
cty92property	-0.021 (1.41)	-0.014 (0.56)	-0.047 (1.57)	0.038 (0.86)	0.006 (0.33)	-0.027 (1.25)
cty92sales	0.006 (0.09)	0.005 (0.03)	-0.065 (0.68)	-0.176 (0.76)	-0.020 (0.24)	0.182 (0.90)
cty92education	0.002 (0.15)	0.059** (2.62)	-0.016 (0.78)	0.062 (1.72)	0.023 (1.08)	0.062* (2.49)
cty92highway	-0.053 (1.66)	-0.094 (1.89)	0.063 (1.08)	-0.240* (2.03)	-0.040 (0.94)	-0.029 (0.63)
cty92safety	0.006 (0.08)	0.210 (1.15)	0.019 (0.22)	0.085 (0.35)	-0.251 (1.66)	0.471* (2.10)
cty92naturalrec	0.069 (0.53)	-0.047 (0.24)	-0.001 (0.01)	0.071 (0.33)	0.149 (0.66)	-0.252 (1.00)
cty92sewerage	-0.015 (0.25)	0.157 (1.20)	-0.052 (0.64)	-0.014 (0.08)	0.111 (1.09)	0.347 (1.61)
Constant	0.119** (4.31)	-0.018 (0.64)	0.074* (2.12)	-0.034 (1.28)	0.179** (4.19)	-0.020 (0.54)
Observations	1998	1998	1040	1040	958	958
Adjusted R-squared	0.20	0.32	0.18	0.32	0.20	0.34

Notes: Robust t statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level. Nall stands for all nonmetropolitan counties. N468 (N579) stands for nonmetropolitan counties adjacent (nonadjacent) to a metro area. Column 1 (3, or 5) in the wage equation is based on the benchmark Model 4. Column 2 (4, or 6) in the wage equation is based on the benchmark Model 3. Wage and Rent data are from the BEA and HUD, respectively. Numbers of Clusters for Nall, N468, and N579 are 174, 167, and 129, respectively.

Table 25. Growth Equation Model Results for Sample Nall, N468, and N579 respectively Considering SBSI plus ERS Variables and Clustering Method, Dependent variable: $\Delta \text{wage}/\ln(\text{wage}1992)$ and $\Delta \text{rent}/\ln(\text{rent}1992)$

	Nall		N468		N579	
	wage	rent	wage	rent	wage	rent
stl92_property	-0.051 (0.87)	0.188 (0.91)	0.033 (0.40)	-0.109 (0.47)	-0.169 (1.74)	0.466 (1.83)
stl92_general_sales	-0.052 (0.78)	0.101 (0.45)	-0.048 (0.57)	0.150 (0.60)	-0.093 (0.90)	0.075 (0.29)
top_pi	0.000 (1.47)	0.000 (0.26)	0.000 (1.18)	0.000 (0.38)	0.000 (0.84)	0.000 (0.20)
top_capitalgains	0.000 (0.97)	0.000 (0.33)	0.000 (0.02)	0.000 (0.16)	0.000 (1.04)	0.000 (0.22)
top_corporate	0.000 (0.88)	-0.001** (2.84)	0.000 (0.82)	-0.002** (4.03)	0.000 (1.64)	-0.001 (1.77)
deathtax	0.001 (1.65)	0.005* (2.18)	0.001 (1.42)	0.006* (2.27)	0.002* (2.07)	0.005 (1.36)
unemptax	0.000 (0.49)	-0.002* (2.07)	0.000 (0.23)	-0.002 (1.40)	0.000 (0.14)	-0.002* (2.15)
utilitiescosts	0.001 (0.22)	-0.005 (0.56)	0.001 (0.27)	-0.002 (0.22)	0.005 (1.08)	-0.003 (0.19)
compensation	-0.002** (3.01)	-0.005* (2.53)	-0.002* (2.43)	-0.007** (3.24)	-0.002 (1.68)	-0.004 (1.41)
gastax	-0.009 (1.40)	0.017 (0.83)	-0.011 (1.26)	-0.006 (0.26)	-0.008 (0.67)	0.024 (0.87)
miniwage	0.001 (0.43)	0.010* (2.29)	0.002 (0.76)	0.004 (0.93)	-0.002 (0.88)	0.018** (3.65)
stl92_rest	-0.181 (1.65)	-0.497 (1.65)	-0.166 (1.16)	-0.522 (1.60)	-0.136 (0.82)	-0.386 (1.15)
stl92_firstsecond	0.247** (2.66)	-0.168 (0.43)	0.214 (1.58)	0.162 (0.38)	0.211 (1.42)	-0.539 (1.15)
stl92_hospitalhealth	0.169 (0.71)	0.207 (0.30)	-0.027 (0.09)	-0.366 (0.52)	0.502 (1.35)	0.386 (0.40)
stl92_highway	-0.007 (0.05)	-0.175 (0.42)	0.112 (0.54)	-0.550 (1.20)	-0.035 (0.25)	0.336 (0.70)
stl92_publicsafety	-0.168 (0.82)	-0.705 (0.98)	-0.460* (2.00)	-0.520 (0.71)	0.205 (0.55)	-0.656 (0.64)
stl92_envirohousing	0.291* (1.99)	0.957 (1.89)	0.453* (2.42)	1.703** (3.03)	0.522* (2.24)	0.450 (0.69)
stl92_govtadmin	-0.681* (2.21)	2.601* (2.45)	-0.626 (1.66)	3.635** (3.14)	-1.134* (2.52)	1.740 (1.42)
cty92property	-0.004 (0.25)	-0.005 (0.21)	-0.036 (1.11)	0.044 (0.98)	0.020 (1.13)	-0.017 (0.81)
cty92sales	0.016 (0.26)	-0.021 (0.11)	-0.072 (0.73)	-0.211 (0.94)	0.014 (0.17)	0.150 (0.69)
cty92education	-0.007 (0.46)	0.062** (2.72)	-0.018 (0.87)	0.063 (1.74)	0.011 (0.50)	0.066** (2.62)
cty92highway	-0.053 (1.96)	-0.084 (1.67)	0.066 (1.12)	-0.235 (1.95)	-0.048 (1.43)	-0.024 (0.53)
cty92safety	0.041 (0.52)	0.219 (1.19)	0.037 (0.43)	0.097 (0.41)	-0.176 (1.20)	0.458 (1.87)
cty92naturalrec	0.066 (0.52)	-0.046 (0.24)	0.008 (0.08)	0.078 (0.38)	0.141 (0.64)	-0.261 (1.05)
cty92sewerage	-0.021 (0.34)	0.147 (1.12)	-0.054 (0.65)	-0.006 (0.03)	0.115 (1.23)	0.323 (1.58)
Constant	0.091** (3.14)	-0.014 (0.49)	0.042 (1.17)	-0.024 (0.90)	0.146** (3.19)	-0.023 (0.64)
Observations	1998	1998	1040	1040	958	958
Adjusted R-squared	0.24	0.32	0.22	0.33	0.25	0.34

Notes: Robust t statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level. Nall stands for all nonmetropolitan counties. N468 (N579) stands for nonmetropolitan counties adjacent (nonadjacent) to a metro area. Column 1 (3, or 5) in the wage equation is based on the benchmark Model 4 plus four additional ERS variables (fm, mi, fl, rec). Column 2 (4, or 6) in the wage equation is based on the benchmark Model 3 plus corresponding ERS variables. Wage and Rent data are from the BEA and HUD, respectively. Numbers of Clusters for Nall, N468, and N579 are 174, 167, and 129, respectively.

Table 26. Growth Equation Model Results for Sample Nall, N468, and N579 respectively Considering SBSI Variables, Dependent variable: $\Delta \text{earning}/\ln(\text{earning1990})$ and $\Delta \text{housing}/\ln(\text{housing1990})$

	Nall		N468		N579	
	earning	housing	earning	housing	earning	housing
stl92_property	0.162 (1.84)	-0.681** (4.03)	0.254* (2.44)	-0.279 (1.16)	0.028 (0.19)	-1.257** (4.70)
stl92_general_sales	0.011 (0.12)	-0.860** (4.35)	-0.075 (0.68)	-0.621* (2.49)	-0.036 (0.21)	-1.292** (4.21)
top_pi	0.001** (3.22)	-0.003** (3.64)	0.001** (2.91)	-0.003* (2.44)	0.002 (1.92)	-0.002 (1.81)
top_capitalgains	-0.001** (3.06)	-0.001 (1.55)	-0.001 (1.84)	0.001 (0.94)	-0.002* (2.46)	-0.003** (3.00)
top_corporate	-0.001** (3.03)	0.001** (3.00)	-0.001** (3.96)	-0.001 (1.26)	0.000 (0.78)	0.003** (3.94)
deathtax	0.003** (3.77)	0.001 (0.57)	0.004** (3.59)	0.003 (1.53)	0.004* (2.41)	0.002 (0.82)
unemptax	0.000 (0.28)	0.001 (1.47)	0.001 (1.08)	0.001 (1.00)	-0.001 (0.97)	-0.001 (0.74)
utilitiescosts	0.003 (0.71)	-0.028** (3.92)	0.007 (1.45)	-0.019 (1.96)	0.009 (1.36)	-0.034** (2.79)
compensation	-0.003** (3.48)	-0.005** (2.85)	-0.003** (2.93)	-0.005* (2.13)	-0.003 (1.76)	-0.005 (1.92)
gastax	0.011 (1.01)	0.095** (4.54)	-0.008 (0.58)	0.044 (1.50)	-0.004 (0.21)	0.116** (3.68)
miniwage	0.002 (0.69)	0.009 (1.15)	0.000 (0.13)	0.005 (0.47)	0.003 (0.62)	0.006 (0.76)
stl92_rest	-0.187 (1.28)	-2.039** (6.58)	-0.055 (0.33)	-1.103* (2.58)	-0.163 (0.67)	-2.896** (7.46)
stl92_firstsecond	-0.232 (1.79)	1.187** (4.87)	0.089 (0.57)	1.011** (3.06)	-0.517* (2.11)	1.552** (3.88)
stl92_hospitalhealth	0.207 (0.70)	1.103* (2.29)	-0.007 (0.02)	-0.613 (1.01)	0.464 (0.81)	4.116** (4.43)
stl92_highway	0.143 (0.83)	0.946** (2.92)	0.002 (0.01)	0.512 (1.04)	0.259 (0.96)	1.615** (3.40)
stl92_publicsafety	-0.934** (3.22)	2.187** (3.60)	-0.714* (2.05)	1.036 (1.37)	-1.158* (2.22)	3.176** (3.34)
stl92_envirohousing	0.246 (1.13)	-2.323** (5.98)	0.328 (1.01)	-1.703** (2.99)	0.587 (1.60)	-1.856** (2.99)
stl92_govtadmin	0.020 (0.05)	-0.632 (0.80)	-0.637 (1.17)	-1.471 (1.33)	0.035 (0.05)	-3.175** (2.60)
cty92property	-0.037 (1.63)	-0.065 (1.56)	-0.087** (3.56)	-0.146** (3.13)	0.009 (0.28)	0.032 (0.54)
cty92sales	0.022 (0.28)	-0.097 (0.51)	0.100 (0.92)	-0.064 (0.28)	-0.063 (0.49)	-0.396 (1.58)
cty92education	0.003 (0.13)	-0.050 (1.58)	0.032 (1.19)	0.085* (2.03)	0.008 (0.25)	-0.143** (3.35)
cty92highway	0.147** (2.93)	0.145 (1.34)	0.135* (2.20)	0.717** (5.64)	0.212** (3.54)	0.066 (0.54)
cty92safety	-0.201* (2.05)	-0.461 (1.85)	-0.257* (2.58)	-0.757** (3.39)	-0.355 (1.92)	-0.554 (1.33)
cty92naturalrec	0.007 (0.09)	0.102 (0.53)	0.032 (0.56)	0.096 (0.43)	-0.110 (0.75)	0.007 (0.02)
cty92sewerage	-0.108 (1.23)	0.173 (1.15)	-0.093 (1.08)	-0.007 (0.04)	-0.062 (0.38)	0.222 (1.03)
Constant	0.188** (4.74)	0.203** (2.72)	0.161** (3.29)	0.213* (2.36)	0.230** (3.81)	0.288* (2.57)
Observations	1998	1998	1040	1040	958	958
Adjusted R-squared	0.59	0.58	0.58	0.63	0.58	0.55

Notes: Robust t statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level. Nall stands for all nonmetropolitan counties. N468 (N579) stands for nonmetropolitan counties adjacent (nonadjacent) to a metro area. Column 1 (3, or 5) in the wage equation is based on the benchmark Model 4. Column 2 (4, or 6) in the wage equation is based on the benchmark Model 3. Wage and Rent data are from the Census.

Table 27. Growth Equation Model Results for Sample Nall, N468, and N579 respectively Considering SBSI plus ERS Variables, Dependent Variable: $\Delta \text{earning}/\ln(\text{earning1990})$ and $\Delta \text{housing}/\ln(\text{housing1990})$

	Nall		N468		N579	
	earning	housing	earning	housing	earning	housing
stl92_property	0.122 (1.42)	-0.658** (3.91)	0.217* (2.14)	-0.222 (0.93)	0.006 (0.04)	-1.233** (4.72)
stl92_general_sales	0.017 (0.17)	-0.813** (4.15)	-0.063 (0.60)	-0.557* (2.28)	-0.037 (0.21)	-1.276** (4.26)
top_pi	0.001** (2.96)	-0.003** (3.93)	0.001** (2.70)	-0.002* (2.36)	0.001 (1.41)	-0.003** (2.63)
top_capitalgains	-0.001** (2.91)	-0.001 (1.18)	-0.001 (1.75)	0.001 (1.04)	-0.001* (2.20)	-0.002* (2.32)
top_corporate	-0.001** (2.95)	0.001** (3.01)	-0.001** (3.48)	-0.001 (1.23)	0.000 (0.76)	0.003** (3.93)
deathtax	0.003** (3.17)	0.000 (0.23)	0.003** (3.02)	0.003 (1.47)	0.003 (1.96)	0.001 (0.43)
unemptax	0.000 (1.11)	0.001 (1.47)	0.001 (1.22)	0.001 (0.82)	0.000 (0.17)	0.000 (0.48)
utilitiescosts	0.004 (1.17)	-0.030** (4.30)	0.005 (1.13)	-0.024* (2.49)	0.012 (1.84)	-0.033** (2.86)
compensation	-0.003** (3.87)	-0.004* (2.56)	-0.003** (3.00)	-0.004 (1.83)	-0.003* (2.04)	-0.004 (1.61)
gastax	0.005 (0.51)	0.089** (4.31)	-0.005 (0.40)	0.036 (1.26)	-0.007 (0.44)	0.115** (3.70)
miniwage	0.003 (1.16)	0.009 (1.18)	0.000 (0.20)	0.004 (0.39)	0.007 (1.30)	0.007 (0.88)
stl92_rest	-0.062 (0.43)	-1.883** (6.17)	0.013 (0.08)	-0.886* (2.11)	-0.068 (0.28)	-2.858** (7.50)
stl92_firstsecond	-0.138 (1.11)	1.171** (4.88)	0.104 (0.69)	0.978** (3.05)	-0.354 (1.48)	1.517** (3.84)
stl92_hospitalhealth	-0.050 (0.18)	0.924* (1.97)	-0.140 (0.42)	-0.619 (1.05)	-0.179 (0.33)	3.309** (3.73)
stl92_highway	-0.067 (0.40)	0.929** (2.92)	-0.100 (0.40)	0.508 (1.05)	0.011 (0.04)	1.604** (3.44)
stl92_publicsafety	-0.909** (3.26)	2.173** (3.66)	-0.653* (1.96)	0.959 (1.30)	-0.947 (1.86)	3.457** (3.83)
stl92_envirnhousing	0.335 (1.58)	-2.250** (5.89)	0.394 (1.29)	-1.585** (2.86)	0.668 (1.83)	-1.676** (2.79)
stl92_govtadmin	0.394 (0.97)	-0.737 (0.95)	-0.333 (0.64)	-1.770 (1.63)	0.634 (0.96)	-2.800* (2.34)
cty92property	-0.009 (0.38)	-0.042 (0.95)	-0.054 (1.96)	-0.120** (2.72)	0.025 (0.79)	0.040 (0.63)
cty92sales	0.098 (1.26)	-0.068 (0.35)	0.167 (1.51)	-0.006 (0.03)	0.038 (0.31)	-0.354 (1.36)
cty92education	-0.017 (0.82)	-0.041 (1.27)	0.021 (0.76)	0.101* (2.48)	-0.016 (0.52)	-0.131** (3.01)
cty92highway	0.135* (2.36)	0.130 (1.26)	0.069 (1.11)	0.667** (5.39)	0.198** (3.05)	0.018 (0.16)
cty92safety	-0.135 (1.42)	-0.407 (1.65)	-0.213* (2.18)	-0.718** (3.28)	-0.225 (1.24)	-0.427 (1.08)
cty92naturalrec	-0.008 (0.11)	0.101 (0.56)	0.039 (0.62)	0.126 (0.63)	-0.125 (0.80)	-0.004 (0.01)
cty92sewerage	-0.096 (1.14)	0.105 (0.74)	-0.081 (0.99)	-0.045 (0.25)	-0.048 (0.30)	0.130 (0.60)
Constant	0.130** (3.28)	0.173* (2.22)	0.112* (2.23)	0.190 (1.96)	0.145* (2.39)	0.221 (1.94)
Observations	1998	1998	1040	1040	958	958
Adjusted R-squared	0.62	0.60	0.61	0.65	0.62	0.56

Notes: Robust t statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level. Nall stands for all nonmetropolitan counties. N468 (N579) stands for nonmetropolitan counties adjacent (nonadjacent) to a metro area. Column 1 (3, or 5) in the wage equation is based on the benchmark Model 4 plus four additional ERS variables (fm, mi, fl, rec). Column 2 (4, or 6) in the wage equation is based on the benchmark Model 3 plus corresponding ERS variables. Wage and Rent data are from the Census.

Table 28. Growth Equation Model Results for Sample Nall, N468, and N579 respectively Considering SBSI Variables and Clustering Method, Dependent Variable: $\Delta \text{earning}/\ln(\text{earning1990})$ and $\Delta \text{housing}/\ln(\text{housing1990})$

	Nall		N468		N579	
	earning	housing	earning	housing	earning	housing
stl92_property	0.162 (1.45)	-0.681* (2.33)	0.254* (2.10)	-0.279 (0.88)	0.028 (0.16)	-1.257** (3.40)
stl92_general_sales	0.011 (0.09)	-0.860* (2.51)	-0.075 (0.64)	-0.621 (1.74)	-0.036 (0.18)	-1.292** (3.25)
top_pi	0.001* (2.49)	-0.003* (2.08)	0.001** (2.80)	-0.003 (1.76)	0.002 (1.71)	-0.002 (1.29)
top_capitalgains	-0.001* (2.18)	-0.001 (0.85)	-0.001 (1.86)	0.001 (0.64)	-0.002* (2.07)	-0.003* (2.45)
top_corporate	-0.001 (1.97)	0.001 (1.81)	-0.001** (2.99)	-0.001 (0.92)	0.000 (0.64)	0.003** (2.86)
deathtax	0.003** (3.02)	0.001 (0.33)	0.004** (3.49)	0.003 (1.14)	0.004* (2.28)	0.002 (0.66)
unemptax	0.000 (0.20)	0.001 (0.97)	0.001 (0.94)	0.001 (0.75)	-0.001 (0.85)	-0.001 (0.55)
utilitiescosts	0.003 (0.59)	-0.028** (2.61)	0.007 (1.29)	-0.019 (1.59)	0.009 (1.15)	-0.034* (2.27)
compensation	-0.003* (2.52)	-0.005 (1.76)	-0.003* (2.56)	-0.005 (1.61)	-0.003 (1.31)	-0.005 (1.41)
gastax	0.011 (0.69)	0.095* (2.55)	-0.008 (0.51)	0.044 (0.95)	-0.004 (0.18)	0.116** (2.73)
miniwage	0.002 (0.75)	0.009 (0.79)	0.000 (0.12)	0.005 (0.41)	0.003 (0.67)	0.006 (0.60)
stl92_rest	-0.187 (0.93)	-2.039** (4.14)	-0.055 (0.27)	-1.103 (1.71)	-0.163 (0.70)	-2.896** (5.87)
stl92_firstsecond	-0.232 (1.54)	1.187** (2.85)	0.089 (0.52)	1.011* (2.28)	-0.517 (1.89)	1.552** (2.73)
stl92_hospitalhealth	0.207 (0.41)	1.103 (1.51)	-0.007 (0.02)	-0.613 (0.74)	0.464 (0.58)	4.116** (3.51)
stl92_highway	0.143 (0.49)	0.946 (1.82)	0.002 (0.01)	0.512 (0.71)	0.259 (0.72)	1.615** (2.67)
stl92_publicsafety	-0.934* (2.41)	2.187* (1.99)	-0.714 (1.78)	1.036 (0.90)	-1.158 (1.79)	3.176* (2.52)
stl92_envirnhousing	0.246 (0.83)	-2.323** (3.42)	0.328 (0.93)	-1.703* (2.03)	0.587 (1.35)	-1.856* (2.36)
stl92_govtadmin	0.020 (0.03)	-0.632 (0.38)	-0.637 (1.00)	-1.471 (0.90)	0.035 (0.04)	-3.175 (1.58)
cty92property	-0.037 (1.44)	-0.065 (1.58)	-0.087** (3.27)	-0.146** (3.38)	0.009 (0.31)	0.032 (0.61)
cty92sales	0.022 (0.18)	-0.097 (0.53)	0.100 (0.89)	-0.064 (0.21)	-0.063 (0.32)	-0.396* (2.16)
cty92education	0.003 (0.13)	-0.050 (1.30)	0.032 (1.20)	0.085* (2.10)	0.008 (0.28)	-0.143** (3.03)
cty92highway	0.147* (2.17)	0.145 (1.24)	0.135* (2.50)	0.717** (5.06)	0.212** (3.16)	0.066 (0.48)
cty92safety	-0.201* (2.07)	-0.461 (1.80)	-0.257* (2.56)	-0.757** (3.46)	-0.355* (2.15)	-0.554 (1.42)
cty92naturalrec	0.007 (0.11)	0.102 (0.57)	0.032 (0.49)	0.096 (0.43)	-0.110 (0.99)	0.007 (0.03)
cty92sewerage	-0.108 (1.24)	0.173 (1.17)	-0.093 (1.07)	-0.007 (0.03)	-0.062 (0.40)	0.222 (1.17)
Constant	0.188** (4.80)	0.203** (3.42)	0.161** (2.87)	0.213** (3.68)	0.230** (4.07)	0.288** (2.65)
Observations	1998	1998	1040	1040	958	958
Adjusted R-squared	0.59	0.58	0.58	0.63	0.58	0.55

Notes: Robust t statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level. Nall stands for all nonmetropolitan counties. N468 (N579) stands for nonmetropolitan counties adjacent (nonadjacent) to a metro area. Column 1 (3, or 5) in the wage equation is based on the benchmark Model 4. Column 2 (4, or 6) in the wage equation is based on the benchmark Model 3. Wage and Rent data are from the Census. Numbers of Clusters for Nall, N468, and N579 are 174, 167, and 129, respectively.

Table 29. Growth Equation Model Results for Sample Nall, N468, and N579 respectively Considering SBSI plus ERS Variables and Clustering Method, Dependent Variable: $\Delta \text{earning}/\ln(\text{earning1990})$ and $\Delta \text{housing}/\ln(\text{housing1990})$

	Nall		N468		N579	
	earning	housing	earning	housing	earning	housing
stl92_property	0.122 (1.12)	-0.658* (2.24)	0.217 (1.91)	-0.222 (0.70)	0.006 (0.03)	-1.233** (3.25)
stl92_general_sales	0.017 (0.14)	-0.813* (2.39)	-0.063 (0.56)	-0.557 (1.59)	-0.037 (0.18)	-1.276** (3.20)
top_pi	0.001* (2.34)	-0.003* (2.21)	0.001** (2.61)	-0.002 (1.71)	0.001 (1.28)	-0.003 (1.84)
top_capitalgains	-0.001* (2.13)	-0.001 (0.65)	-0.001 (1.73)	0.001 (0.72)	-0.001* (2.04)	-0.002 (1.93)
top_corporate	-0.001 (1.84)	0.001 (1.82)	-0.001* (2.57)	-0.001 (0.89)	0.000 (0.62)	0.003** (2.88)
deathtax	0.003* (2.57)	0.000 (0.13)	0.003** (2.92)	0.003 (1.07)	0.003 (1.87)	0.001 (0.37)
unemptax	0.000 (0.84)	0.001 (0.99)	0.001 (1.07)	0.001 (0.62)	0.000 (0.15)	0.000 (0.35)
utilitiescosts	0.004 (0.94)	-0.030** (2.82)	0.005 (1.11)	-0.024* (2.01)	0.012 (1.52)	-0.033* (2.34)
compensation	-0.003** (2.84)	-0.004 (1.58)	-0.003** (2.64)	-0.004 (1.36)	-0.003 (1.52)	-0.004 (1.17)
gastax	0.005 (0.34)	0.089* (2.44)	-0.005 (0.35)	0.036 (0.82)	-0.007 (0.36)	0.115** (2.72)
miniwage	0.003 (1.18)	0.009 (0.78)	0.000 (0.19)	0.004 (0.34)	0.007 (1.45)	0.007 (0.66)
stl92_rest	-0.062 (0.30)	-1.883** (3.83)	0.013 (0.06)	-0.886 (1.40)	-0.068 (0.27)	-2.858** (5.73)
stl92_firstsecond	-0.138 (0.99)	1.171** (2.81)	0.104 (0.66)	0.978* (2.28)	-0.354 (1.38)	1.517* (2.61)
stl92_hospitalhealth	-0.050 (0.10)	0.924 (1.35)	-0.140 (0.35)	-0.619 (0.77)	-0.179 (0.25)	3.309** (3.10)
stl92_highway	-0.067 (0.23)	0.929 (1.78)	-0.100 (0.31)	0.508 (0.69)	0.011 (0.03)	1.604** (2.73)
stl92_publicsafety	-0.909* (2.47)	2.173* (2.03)	-0.653 (1.67)	0.959 (0.86)	-0.947 (1.48)	3.457** (2.88)
stl92_envirohousing	0.335 (1.08)	-2.250** (3.36)	0.394 (1.13)	-1.585 (1.96)	0.668 (1.54)	-1.676* (2.19)
stl92_govtadmin	0.394 (0.62)	-0.737 (0.45)	-0.333 (0.55)	-1.770 (1.09)	0.634 (0.74)	-2.800 (1.41)
cty92property	-0.009 (0.35)	-0.042 (0.95)	-0.054 (1.97)	-0.120** (2.77)	0.025 (0.82)	0.040 (0.67)
cty92sales	0.098 (0.86)	-0.068 (0.37)	0.167 (1.49)	-0.006 (0.02)	0.038 (0.21)	-0.354* (2.14)
cty92education	-0.017 (0.85)	-0.041 (1.06)	0.021 (0.79)	0.101* (2.60)	-0.016 (0.55)	-0.131** (2.72)
cty92highway	0.135 (1.67)	0.130 (1.18)	0.069 (1.20)	0.667** (5.23)	0.198* (2.31)	0.018 (0.14)
cty92safety	-0.135 (1.42)	-0.407 (1.60)	-0.213* (2.17)	-0.718** (3.41)	-0.225 (1.45)	-0.427 (1.12)
cty92naturalrec	-0.008 (0.13)	0.101 (0.62)	0.039 (0.56)	0.126 (0.63)	-0.125 (1.14)	-0.004 (0.01)
cty92sewerage	-0.096 (1.16)	0.105 (0.77)	-0.081 (1.03)	-0.045 (0.25)	-0.048 (0.32)	0.130 (0.66)
Constant	0.130** (3.41)	0.173** (2.76)	0.112* (2.00)	0.190** (3.13)	0.145* (2.51)	0.221 (1.90)
Observations	1998	1998	1040	1040	958	958
Adjusted R-squared	0.62	0.6	0.61	0.65	0.62	0.56

Notes: Robust t statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level. Nall stands for all nonmetropolitan counties. N468 (N579) stands for nonmetropolitan counties adjacent (nonadjacent) to a metro area. Column 1 (3, or 5) in the wage equation is based on the benchmark Model 4 plus four additional ERS variables (fm, mi, fl, rec). Column 2 (4, or 6) in the wage equation is based on the benchmark Model 3 plus corresponding ERS variables. Wage and Rent data are from the Census. Numbers of Clusters for Nall, N468, and N579 are 174, 167, and 129, respectively.

t -statistics without accounting for spatial effect are smaller. The difference of the t -statistics between the clustered method and unclustered one could also imply that spatial correlation simply exists for the data in analysis.

The last empirical implementation is to break up the full sample into nine subsamples and examine how the effects of local fiscal variables are robust to sample heterogeneity and whether results are consistent with every subsample and the sample as a whole. The results are reported in Tables 30A-31B. In brevity, compared to the full sample models with SBSI variables included (Tables 23 and 27), the coefficient signs of the fiscal variables of interest in the subsamples generally are consistent with those in the full sample. Compared to the full sample which uses the first set of dependent variables from the BEA wage and HUD rent (Table 23), the sub-region which has urban population of 2500 to 20000 that is adjacent to a metro area (corresponding to Beale code 6) tends to produce results better in accordance with our expectation (see for example, the *stl92_property* and *top_pi* tax variables are found negative and statistically significant at the 10% level in the rent equation). However, the sub-region which has urban population of at least 20000 that is not adjacent to a metro area (corresponding to Beale code 5) tends to produce counterintuitive and negative coefficient signs for expenditure variables, *stl92_publicsafety* and *stl92_highway*, in the rent equation. In addition, compared to the full sample which uses the second set of dependent variables from the Census earning and housing cost data (Table 27), the nine subsamples generally do not produce better results than the full sample. For example, the statistically significant negative *stl92_property* loses its statistical significance in all the nonmetropolitan subsamples in the rent equation. The negative sign on *stl92_general_sales* and positive sign on

**Table 30A. Growth Equation Model Results for 9 Subsamples Considering SBSI and ERS Variables,
Dependent Variable: $\Delta \text{wage}/\ln(\text{wage1992})$**

	UR=1	UR=2	UR=3	UR=4	UR=5	UR=6	UR=7	UR=8	UR=9
stl92_property	-0.042 (0.22)	-0.151 (0.81)	0.085 (0.71)	-0.011 (0.06)	-0.027 (0.03)	0.033 (0.32)	-0.156 (1.36)	-0.524 (1.35)	0.604 (1.40)
stl92_general_sales	-0.173 (0.88)	-0.150 (0.89)	0.091 (0.76)	-0.156 (1.04)	0.454 (0.76)	-0.088 (0.83)	-0.079 (0.60)	-1.021* (2.14)	0.831* (2.17)
top_pi	0.000 (0.54)	-0.002* (2.21)	0.000 (0.66)	0.000 (0.32)	0.000 (0.02)	-0.001 (1.89)	0.000 (0.61)	-0.002 (1.41)	0.002 (1.34)
top_capitalgains	0.000 (0.18)	0.001 (1.48)	-0.001 (1.56)	-0.001* (2.12)	0.002 (0.56)	0.000 (0.66)	-0.001 (1.35)	0.000 (0.28)	-0.001 (0.91)
top_corporate	0.001 (0.98)	0.000 (0.16)	0.000 (0.39)	0.000 (0.37)	-0.001 (0.41)	0.000 (0.41)	0.000 (1.34)	-0.001 (0.96)	-0.001 (0.68)
deathtax	0.000 (0.10)	-0.002 (0.98)	0.000 (0.16)	0.001 (0.68)	-0.005 (0.79)	0.001 (0.56)	0.001 (0.86)	0.005 (1.35)	0.004 (0.90)
unemptax	0.000 (0.43)	0.000 (0.11)	0.000 (0.19)	0.000 (0.03)	0.000 (0.11)	0.000 (0.42)	0.000 (0.32)	0.002* (2.13)	0.001 (1.02)
utilitiescosts	0.006 (0.90)	0.011 (1.60)	-0.001 (0.15)	0.010 (1.88)	-0.005 (0.18)	-0.004 (0.85)	0.005 (0.83)	0.003 (0.23)	-0.013 (0.69)
compensation	0.000 (0.08)	-0.002 (1.09)	-0.003* (2.41)	0.000 (0.27)	-0.003 (0.48)	-0.003* (2.25)	-0.001 (0.80)	0.002 (0.48)	-0.003 (0.71)
gastax	-0.032 (1.90)	0.012 (0.57)	0.012 (0.82)	0.018 (0.74)	-0.090 (1.02)	-0.006 (0.41)	-0.015 (1.04)	0.019 (0.58)	0.006 (0.12)
miniwage	0.000 (0.05)	0.006 (1.54)	-0.003 (1.09)	-0.004 (1.35)	-0.003 (0.32)	0.002 (0.81)	-0.001 (0.38)	0.030** (3.55)	-0.124** (2.75)
stl92_rest	0.166 (0.94)	-0.153 (0.55)	-0.133 (0.78)	0.039 (0.16)	1.148 (1.16)	-0.429* (2.30)	-0.169 (0.92)	-1.333* (2.18)	0.714 (1.57)
stl92_firstsecond	0.607* (2.57)	0.679 (1.77)	-0.225 (1.09)	0.100 (0.41)	-0.360 (0.56)	0.189 (1.37)	0.260 (1.34)	1.439 (1.76)	-0.676 (1.07)
stl92_hospitalhealth	0.327 (0.54)	-0.357 (0.83)	0.411 (1.03)	0.970* (2.51)	0.772 (0.31)	0.279 (0.71)	0.623 (1.54)	-0.979 (1.03)	0.568 (0.70)
stl92_highway	-0.440 (0.57)	0.532 (1.55)	0.122 (0.43)	-0.285 (0.89)	-2.010 (1.54)	0.426 (1.67)	-0.174 (0.85)	-0.864 (1.54)	-0.072 (0.10)
stl92_publicsafety	-0.403 (0.46)	-0.271 (0.44)	-0.470 (1.18)	-1.261* (2.29)	-4.283 (1.64)	0.109 (0.32)	0.113 (0.25)	0.585 (0.52)	-0.494 (0.28)
stl92_envirohousing	0.891 (1.46)	-0.259 (0.58)	-0.346 (1.01)	0.719 (1.47)	-0.183 (0.12)	0.033 (0.11)	0.360 (1.07)	0.828 (0.96)	0.053 (0.09)
stl92_govtadmin	-1.479 (1.33)	-1.146 (1.22)	1.355 (1.92)	-0.948 (1.22)	2.254 (0.89)	-0.523 (1.07)	-1.172* (2.25)	0.054 (0.04)	-1.644 (1.00)
cty92property	-0.100 (1.31)	-0.130* (2.59)	-0.083 (1.58)	-0.084 (1.32)	-0.008 (0.07)	-0.006 (0.20)	-0.023 (0.72)	-0.082 (1.36)	0.060* (2.13)
cty92sales	-0.109 (0.70)	-0.163 (1.25)	-0.180 (1.46)	0.025 (0.16)	0.574 (1.48)	-0.219* (2.07)	-0.054 (0.65)	-0.137 (0.42)	0.067 (0.31)
cty92education	-0.016 (0.23)	0.062 (1.54)	0.063 (1.32)	0.024 (0.45)	0.197 (1.85)	-0.028 (0.98)	0.051 (1.84)	-0.078 (1.76)	-0.038 (1.36)
cty92highway	0.329 (1.88)	0.790** (3.09)	-0.064 (0.42)	0.118 (0.67)	0.142 (0.41)	0.045 (0.69)	-0.027 (0.32)	-0.034 (0.29)	-0.041 (0.58)
cty92safety	-0.106 (0.58)	-0.002 (0.01)	-0.108 (0.92)	0.105 (0.44)	-1.028 (1.88)	0.106 (0.74)	-0.049 (0.29)	0.197 (1.11)	-0.226 (0.89)
cty92naturalrec	0.069 (0.63)	-0.709 (1.67)	0.158 (0.56)	-0.373 (1.16)	0.602 (1.02)	0.019 (0.21)	0.078 (0.47)	0.014 (0.04)	0.124 (0.44)
cty92sewerage	-0.369* (2.32)	-0.018 (0.08)	0.017 (0.11)	-0.040 (0.47)	0.022 (0.07)	-0.302* (2.57)	0.135 (1.10)	0.531** (2.80)	0.157 (0.94)
Constant	0.072 (0.59)	0.030 (0.27)	-0.005 (0.08)	0.195* (2.18)	0.016 (0.07)	-0.024 (0.52)	0.122* (2.49)	-0.074 (0.72)	0.331** (3.59)
Observations	387	318	340	214	101	598	439	228	418
Adjusted R-squared	0.23	0.26	0.19	0.23	0.13	0.29	0.30	0.24	0.21

Notes: Robust *t* statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level. UR stands for rural-urban continuum code or Beale code. Wage data are from the BEA.

Table 30B. Growth Equation Model Results for 9 Subsamples Considering SBSI and ERS Variables, Dependent Variable: $\Delta \text{rent}/\ln(\text{rent}1992)$

	UR=1	UR=2	UR=3	UR=4	UR=5	UR=6	UR=7	UR=8	UR=9
stl92_property	-0.888 (1.54)	-0.411 (0.81)	0.413 (1.31)	0.511 (0.88)	-0.614 (0.40)	-0.771** (2.77)	-0.491 (1.66)	-0.098 (0.18)	0.838 (1.85)
stl92_general_sales	-1.478* (2.18)	-0.259 (0.52)	0.682 (1.62)	0.553 (0.93)	2.237 (1.86)	-0.150 (0.57)	-0.783* (2.29)	-0.642 (0.99)	-0.371 (0.88)
top_pi	0.000 (0.01)	-0.002 (0.84)	0.002 (1.60)	0.003 (1.14)	-0.005 (0.68)	-0.003 (1.96)	-0.003 (1.66)	-0.002 (0.73)	-0.002 (1.57)
top_capitalgains	-0.003 (1.21)	0.003 (1.91)	-0.001 (0.69)	0.000 (0.13)	0.015* (2.22)	0.000 (0.14)	0.001 (0.61)	-0.001 (0.54)	0.003 (1.73)
top_corporate	0.003** (2.94)	-0.001 (0.98)	-0.003** (3.60)	-0.003 (1.60)	-0.001 (0.29)	0.000 (0.62)	0.001 (0.65)	-0.003** (2.72)	-0.003** (2.80)
deathtax	-0.013** (3.13)	0.005 (0.93)	0.003 (0.78)	0.015** (2.98)	-0.018 (1.51)	0.000 (0.07)	-0.001 (0.24)	0.005 (0.97)	-0.001 (0.25)
unemptax	0.006* (2.36)	0.000 (0.14)	0.002 (1.09)	0.002 (0.98)	-0.008* (2.27)	-0.003* (2.18)	-0.004** (2.79)	0.000 (0.06)	-0.001 (0.78)
utilitiescosts	0.036 (1.79)	0.005 (0.25)	0.021 (1.31)	-0.023 (1.02)	-0.132* (2.66)	0.003 (0.26)	0.025 (1.85)	-0.039* (2.15)	-0.028 (1.09)
compensation	0.010 (1.43)	-0.007 (1.50)	-0.006 (1.56)	0.004 (0.78)	-0.003 (0.28)	-0.008** (2.89)	-0.005 (1.52)	-0.005 (1.19)	0.005 (1.08)
gastax	-0.078 (1.31)	0.033 (0.45)	-0.009 (0.21)	-0.160* (2.52)	-0.216 (1.14)	-0.001 (0.04)	0.008 (0.23)	0.022 (0.51)	0.121* (2.01)
miniwage	0.004 (0.41)	0.001 (0.05)	0.013 (1.68)	0.014 (1.48)	0.002 (0.10)	0.012 (1.41)	0.013 (1.26)	-0.017 (1.67)	0.137** (2.70)
stl92_rest	-1.568** (2.89)	-0.852 (0.86)	-0.629 (1.38)	0.694 (0.88)	2.244 (1.13)	-0.941* (2.14)	-1.086* (2.11)	-1.370 (1.76)	-1.510** (2.63)
stl92_firstsecond	2.384* (2.58)	1.651* (2.32)	-0.632 (1.05)	0.611 (0.66)	-2.105 (1.58)	0.487 (1.21)	0.337 (0.76)	0.509 (0.49)	-0.764 (1.23)
stl92_hospitalhealth	2.428 (1.26)	-0.162 (0.12)	0.191 (0.18)	-0.334 (0.20)	11.425** (3.01)	-1.125 (1.47)	-0.950 (0.98)	0.472 (0.51)	-0.023 (0.02)
stl92_highway	4.268** (3.01)	-0.239 (0.20)	-0.747 (0.96)	-2.554* (2.44)	-7.646** (5.53)	-0.117 (0.24)	0.800 (1.62)	1.142 (1.75)	1.897** (2.68)
stl92_publicsafety	5.277* (2.34)	0.953 (0.67)	-3.391* (2.54)	0.852 (0.47)	-13.336** (3.55)	0.424 (0.47)	1.167 (0.99)	0.799 (0.46)	3.728* (2.03)
stl92_environghousing	-6.767** (4.27)	0.150 (0.10)	1.288 (1.33)	1.188 (0.75)	1.896 (0.72)	1.785* (2.56)	0.624 (0.87)	1.564 (1.69)	0.745 (0.74)
stl92_govtadmin	-8.725* (2.14)	-2.765 (1.28)	4.351* (2.47)	1.069 (0.39)	13.918** (4.73)	4.021** (3.07)	2.431 (1.90)	0.229 (0.14)	-1.059 (0.63)
cty92property	0.007 (0.04)	-0.130 (0.93)	0.077 (0.49)	0.077 (0.32)	0.270 (1.40)	0.046 (0.63)	0.033 (0.54)	-0.039 (0.92)	-0.033 (0.98)
cty92sales	0.171 (0.30)	-0.176 (0.41)	-0.344 (0.83)	0.080 (0.19)	0.099 (0.11)	0.019 (0.07)	-0.135 (0.44)	-0.144 (0.33)	0.492 (0.65)
cty92education	-0.258* (2.03)	-0.048 (0.60)	0.123 (1.16)	0.017 (0.18)	0.126 (1.14)	0.115* (2.13)	0.051 (1.00)	0.108* (2.37)	0.081** (2.94)
cty92highway	-0.636 (0.96)	-0.783 (1.55)	-0.078 (0.19)	-0.039 (0.07)	0.437 (0.52)	-0.189 (1.25)	-0.390* (2.24)	-0.052 (0.37)	-0.001 (0.02)
cty92safety	0.406 (1.01)	1.192 (1.58)	-0.136 (0.52)	-0.168 (0.23)	0.556 (0.41)	0.096 (0.23)	0.276 (0.71)	0.173 (0.64)	0.494 (1.47)
cty92naturalrec	-0.150 (0.64)	-2.122 (1.58)	-0.192 (0.21)	-1.622 (1.80)	-0.293 (0.20)	0.164 (1.04)	0.554 (1.11)	0.397 (1.04)	-0.359 (1.09)
cty92sewerage	-0.385 (1.05)	0.237 (0.38)	0.492 (0.81)	-0.195 (0.77)	-0.056 (0.07)	-0.022 (0.07)	0.318 (1.01)	-0.181 (0.29)	0.248 (1.11)
Constant	0.046 (0.79)	-0.041 (0.52)	0.023 (0.44)	-0.013 (0.17)	0.204* (2.08)	-0.029 (0.86)	-0.034 (0.85)	0.007 (0.15)	-0.256** (3.06)
Observations	387	318	340	214	101	598	439	228	418
Adjusted R-squared	0.24	0.29	0.20	0.25	0.39	0.38	0.31	0.52	0.43

Notes: Robust t statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level. UR stands for rural-urban continuum code or Beale code. Rent data are from the HUD.

Table 31A. Growth Equation Model Results for 9 Subsamples Considering SBSI and ERS Variables, Dependent Variable: $\ln(\text{earning1990})$

	UR=1	UR=2	UR=3	UR=4	UR=5	UR=6	UR=7	UR=8	UR=9
stl92_property	0.236 (1.54)	-0.549** (2.85)	0.223 (1.32)	0.295 (1.18)	0.838 (0.69)	0.307* (2.21)	0.047 (0.25)	-0.170 (0.52)	0.604 (1.18)
stl92_general_sales	-0.141 (0.85)	-0.844** (3.65)	0.102 (0.58)	0.023 (0.12)	1.087 (1.35)	0.127 (0.93)	-0.156 (0.67)	-0.849 (1.77)	0.552 (1.09)
top_pi	0.000 (0.72)	-0.001 (0.85)	0.001 (0.71)	0.003** (3.08)	0.000 (0.03)	0.001 (1.84)	0.001 (0.94)	0.000 (0.25)	0.003 (1.50)
top_capitalgains	0.000 (0.55)	0.000 (0.20)	-0.001 (1.50)	-0.002* (2.52)	0.001 (0.19)	0.000 (0.79)	-0.002* (2.15)	-0.001 (0.58)	-0.002 (0.85)
top_corporate	0.001 (1.56)	-0.002** (3.13)	0.000 (0.41)	0.000 (0.46)	0.001 (0.66)	-0.001 (1.54)	0.000 (0.82)	-0.002* (2.39)	-0.002 (1.41)
deathtax	0.002 (1.73)	0.002 (0.88)	-0.001 (0.65)	0.003 (1.33)	-0.017 (2.00)	0.003 (1.84)	0.001 (0.51)	0.007 (1.90)	0.005 (0.98)
unemptax	0.001 (1.55)	0.000 (0.35)	-0.002* (2.43)	0.003* (2.56)	0.004 (1.13)	0.001 (1.04)	0.001 (0.88)	0.001 (0.87)	0.000 (0.02)
utilitiescosts	0.007 (0.94)	0.027** (2.64)	-0.009 (1.18)	-0.002 (0.23)	0.004 (0.10)	-0.005 (0.78)	0.002 (0.26)	0.015 (1.19)	0.009 (0.40)
compensation	0.001 (0.55)	0.001 (0.68)	-0.003 (1.88)	0.001 (0.51)	-0.022* (2.29)	-0.005** (3.12)	0.000 (0.08)	0.002 (0.56)	-0.004 (0.93)
gastax	-0.018 (1.19)	0.010 (0.48)	0.042* (2.08)	-0.012 (0.39)	-0.070 (0.49)	0.012 (0.64)	0.013 (0.61)	-0.049 (1.30)	-0.026 (0.48)
miniwage	0.006* (2.21)	0.003 (0.62)	-0.002 (0.42)	0.000 (0.12)	0.009 (0.73)	0.000 (0.10)	0.008 (1.45)	0.002 (0.20)	-0.084 (1.51)
stl92_rest	0.175 (1.22)	-0.559 (1.81)	0.013 (0.05)	0.465 (1.64)	1.192 (0.77)	0.012 (0.06)	-0.652* (2.31)	-1.029 (1.47)	0.760 (1.28)
stl92_firstsecond	0.120 (0.53)	0.817* (2.36)	-0.184 (0.68)	-0.031 (0.11)	-0.733 (0.69)	0.054 (0.29)	-0.400 (1.44)	0.422 (0.71)	-0.907 (1.27)
stl92_hospitalhealth	0.230 (0.44)	-1.364* (2.49)	0.644 (1.29)	0.311 (0.48)	-2.560 (0.60)	0.083 (0.19)	0.011 (0.02)	-0.766 (0.82)	0.013 (0.01)
stl92_highway	-0.381 (0.70)	0.234 (0.59)	0.595 (1.41)	-1.333** (3.49)	-2.016 (1.06)	-0.101 (0.35)	0.253 (0.72)	0.476 (0.79)	0.401 (0.52)
stl92_publicsafety	-0.920 (1.53)	1.617* (2.19)	-0.081 (0.14)	-0.908 (1.37)	-7.160 (1.83)	-0.552 (1.26)	-0.260 (0.41)	0.819 (0.69)	-1.067 (0.58)
stl92_envirohousing	1.457** (3.04)	0.472 (0.99)	-0.404 (0.85)	1.345* (2.24)	-3.750 (1.45)	-0.136 (0.34)	-0.059 (0.12)	1.184 (1.15)	0.228 (0.32)
stl92_govtadmin	-2.926** (3.05)	-2.503* (2.25)	-1.267 (1.47)	-0.894 (0.80)	6.096 (1.68)	0.011 (0.01)	1.923* (2.43)	-1.473 (0.99)	-1.718 (0.97)
cty92property	0.054 (0.71)	-0.115 (1.95)	0.017 (0.31)	0.017 (0.21)	-0.126 (0.71)	-0.051 (1.29)	-0.069 (1.87)	-0.091 (1.57)	0.037 (0.82)
cty92sales	0.182 (1.32)	-0.293 (1.37)	-0.157 (0.97)	0.396 (1.93)	0.775 (1.14)	-0.076 (0.53)	-0.109 (0.85)	0.214 (0.52)	0.277 (0.86)
cty92education	0.069 (1.21)	0.049 (0.97)	0.035 (0.58)	-0.090 (1.46)	0.341 (1.80)	-0.009 (0.26)	-0.003 (0.09)	0.081 (1.39)	-0.050 (1.20)
cty92highway	-0.030 (0.19)	0.404* (2.05)	0.210 (1.12)	0.132 (0.59)	0.336 (0.65)	0.174* (2.03)	0.233* (2.03)	-0.070 (0.43)	0.167* (2.11)
cty92safety	-0.248 (1.27)	0.210 (0.75)	-0.575** (3.50)	-0.225 (0.76)	-1.219 (1.36)	-0.288 (1.88)	-0.106 (0.49)	-0.185 (0.72)	-0.024 (0.07)
cty92naturalrec	-0.099 (0.95)	0.304 (0.71)	-0.564 (1.44)	-0.348 (0.84)	1.425 (1.55)	0.088 (1.53)	0.110 (0.48)	0.413 (0.96)	-0.236 (1.34)
cty92sewerage	-0.208 (1.80)	0.403 (1.40)	0.115 (0.55)	-0.077 (0.74)	-0.278 (0.43)	-0.182 (1.26)	-0.070 (0.42)	0.500 (1.56)	-0.079 (0.24)
Constant	-0.027 (0.33)	-0.161 (1.74)	0.058 (0.70)	0.072 (0.72)	0.423 (1.31)	0.143* (2.32)	0.292** (4.02)	0.072 (0.60)	0.191 (1.51)
Observations	387	318	340	214	101	598	439	228	418
Adjusted R-squared	0.56	0.67	0.71	0.72	0.68	0.56	0.58	0.53	0.53

Notes: Robust t statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level. UR stands for rural-urban continuum code or Beale code. Earning data are from the Census.

Table 31B. Growth Equation Model Results for 9 Subsamples Considering SBSI and ERS Variables, Dependent Variable: $\Delta \ln(\text{housing1990})$

	UR=1	UR=2	UR=3	UR=4	UR=5	UR=6	UR=7	UR=8	UR=9
stl92_property	-1.204** (3.31)	0.040 (0.14)	-0.076 (0.26)	-0.176 (0.39)	-0.610 (0.53)	-0.097 (0.35)	-0.250 (0.81)	-0.538 (0.79)	-1.410 (1.59)
stl92_general_sales	-2.758** (6.38)	-0.693* (2.05)	-0.657* (2.20)	-0.617 (1.44)	-0.920 (0.86)	-0.622* (2.26)	-0.381 (1.04)	-0.379 (0.50)	-0.906 (0.98)
top_pi	-0.003 (1.61)	-0.003* (2.55)	-0.002 (1.78)	0.000 (0.02)	-0.003 (0.54)	-0.003* (2.51)	-0.002 (1.70)	-0.006* (2.19)	0.000 (0.01)
top_capitalgains	-0.004* (2.07)	0.001 (0.88)	-0.001 (0.67)	-0.001 (0.72)	-0.001 (0.11)	0.001 (1.18)	-0.001 (0.56)	0.002 (1.25)	-0.007* (2.44)
top_corporate	0.004** (4.69)	-0.002** (3.24)	-0.001 (1.66)	-0.003** (2.62)	0.004 (1.45)	0.000 (0.47)	0.001 (1.15)	0.002 (1.86)	0.004* (2.05)
deathtax	0.000 (0.12)	0.001 (0.34)	0.003 (0.86)	0.005 (1.04)	-0.001 (0.10)	0.003 (1.06)	0.003 (0.82)	-0.005 (1.05)	0.009 (1.14)
unemptax	0.008** (4.49)	0.002 (1.58)	-0.001 (1.18)	0.004* (2.04)	-0.001 (0.41)	0.003 (1.95)	0.002 (1.79)	0.002 (1.01)	-0.001 (0.65)
utilitiescosts	-0.026 (1.56)	-0.031* (2.37)	-0.008 (0.69)	-0.009 (0.58)	-0.012 (0.26)	-0.029* (2.49)	-0.057** (4.02)	-0.044 (1.91)	-0.013 (0.31)
compensation	0.002 (0.39)	-0.005 (1.69)	-0.003 (1.16)	-0.002 (0.52)	-0.011 (0.96)	-0.001 (0.57)	0.003 (0.89)	-0.006 (1.23)	-0.013* (2.04)
gastax	-0.127** (3.60)	0.105** (3.10)	0.031 (0.98)	0.024 (0.41)	0.034 (0.19)	0.037 (0.92)	0.131** (3.27)	0.146** (2.63)	0.008 (0.09)
miniwage	-0.002 (0.28)	-0.022** (3.74)	-0.001 (0.18)	-0.011 (1.66)	0.025 (1.34)	0.016* (2.21)	0.019* (2.47)	0.056** (3.94)	-0.135 (1.18)
stl92_rest	-2.142** (5.47)	-1.361** (2.86)	-1.012* (2.36)	-0.505 (0.86)	-0.554 (0.30)	-1.121* (2.37)	-2.581** (5.49)	-2.142* (2.16)	-1.472 (1.46)
stl92_firstsecond	2.607** (5.53)	-0.369 (0.75)	1.044* (2.35)	0.227 (0.34)	1.186 (0.99)	0.950* (2.48)	0.767 (1.74)	1.595 (1.33)	1.872 (1.54)
stl92_hospitalhealth	5.077** (4.42)	-1.264 (1.75)	-1.846* (2.20)	-1.991 (1.89)	-1.785 (0.46)	-0.842 (1.04)	2.233 (1.89)	0.402 (0.37)	5.766** (3.18)
stl92_highway	5.751** (5.10)	2.010** (3.20)	1.060 (1.59)	-0.595 (0.80)	-0.682 (0.37)	0.219 (0.39)	1.352* (2.27)	0.616 (0.69)	0.546 (0.45)
stl92_publicsafety	7.256** (5.37)	0.734 (0.70)	0.486 (0.47)	-1.232 (0.74)	0.494 (0.13)	2.043* (2.50)	3.547** (2.93)	2.032 (1.13)	-0.584 (0.21)
stl92_environghousing	-6.108** (6.07)	-0.450 (0.55)	-1.625* (2.17)	0.007 (0.01)	0.031 (0.01)	-2.439** (3.60)	-1.557* (2.01)	-1.579 (1.19)	-2.684 (1.89)
stl92_govtadmin	-11.042** (5.27)	-2.730 (1.55)	0.206 (0.15)	0.179 (0.07)	1.574 (0.37)	0.099 (0.07)	-2.735 (1.69)	-2.996 (0.99)	-2.990 (1.10)
cty92property	-0.283* (2.11)	-0.292** (3.34)	-0.076 (0.75)	-0.396** (2.64)	0.013 (0.05)	-0.244** (4.01)	-0.050 (0.65)	0.024 (0.34)	0.065 (0.78)
cty92sales	0.160 (0.56)	-0.019 (0.06)	0.182 (0.72)	0.109 (0.28)	0.552 (0.75)	0.059 (0.20)	0.007 (0.02)	-0.380 (0.61)	-0.632 (1.28)
cty92education	0.013 (0.12)	0.089 (1.17)	-0.026 (0.33)	0.309** (3.30)	0.109 (0.43)	0.029 (0.53)	-0.129 (1.94)	-0.037 (0.46)	-0.200** (3.39)
cty92highway	1.444** (4.84)	0.698 (1.95)	0.374 (1.28)	0.941 (1.81)	0.834 (1.13)	0.653** (4.63)	0.480* (2.28)	-0.157 (0.56)	-0.045 (0.33)
cty92safety	-1.512** (3.30)	-0.430 (0.96)	0.015 (0.05)	0.653 (0.96)	-3.504** (3.05)	0.058 (0.20)	-0.329 (0.69)	-0.587 (1.31)	0.004 (0.01)
cty92naturalrec	-0.056 (0.27)	0.891 (1.06)	-0.749 (1.39)	-1.951** (3.39)	1.446 (1.33)	0.411** (2.64)	-0.786 (1.23)	-0.863 (1.26)	-0.005 (0.01)
cty92sewerage	-0.530** (2.67)	0.247 (0.61)	0.358 (1.03)	-0.188 (1.16)	0.242 (0.30)	-0.315 (1.16)	0.044 (0.18)	0.562 (1.21)	0.200 (0.53)
Constant	0.545** (3.12)	0.412* (2.36)	0.172 (1.59)	0.259* (2.27)	0.261 (0.65)	0.278** (4.54)	-0.089 (0.52)	-0.439** (2.94)	0.583* (2.34)
Observations	387	318	340	214	101	598	439	228	418
Adjusted R-squared	0.79	0.84	0.74	0.76	0.70	0.67	0.65	0.68	0.49

Notes: Robust t statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level. UR stands for rural-urban continuum code or Beale code. Housing data are from the Census.

stl92_firstsecond, stl92_highway in the rent equation for the full sample, all of which are expected, are shown to lose significance for almost all of nonmetropolitan cases.

However, we do see a positive and statistically significant coefficient on *cty92highway* in both wage and rent equations for the sub-region (Beale code 6 or 7) that has urban population of 2500-20000, adjacent or nonadjacent to a metro area. Overall, using the Census earning and housing value data as the dependent variables (Tables 31A-31B) generally produces better results than using the BEA wage and HUD rent data (Tables 30A-30B). For instance, the *stl92_general_sales*, *top_pi* and *stl92_property* tax variables and the highway expenditure variables at both state and county levels are generally found to perform better in complying with our expectations.

To conclude, the findings from estimating the growth equation models in this section can be summarized as follows. First, we generally find consistent results for the state tax variables using either set of outcome measurements. In addition, the second measurement using Census earning and housing data turns out to be better for the state expenditure variables in terms of statistical significance, implying using Census earning and housing data could be better in reflecting local labor and land markets as mentioned before.

Second, using either set of measurements of dependent variables we generally find little role of county fiscal variables played on affecting wage and rent growth.

Third, the coefficient estimates are also found to be consistent between the full sample and two subsamples, where the full sample generally produces better expected results.

Fourth, we find models including additional SBSI variables do not produce better results than models without them regardless of which set of dependent variables we use, which could be partially due to the fact that the SBSI variables are not measured in initial 1992 values and their usage is somewhat inconsistent with the specification in the growth model context.

Fifth, the variance coefficient estimates are found to be insensitive to accounting for within-cluster correlation and the coefficient significance is only modestly affected.

CHAPTER 6

CONCLUSIONS

The main findings drawn from this study are summarized below. The policy implications, limitations and opportunities for future research are also discussed.

6.1 Summary

The purpose of this study is to explore how state and local fiscal policies explain wage differentials and rent differentials among the U.S. nonmetropolitan counties. We consider comprehensively the government budget constraint, sample heterogeneity, fixed effects, endogeneity, and spatial correlation in modeling.

Nonmetropolitan counties differ in the local fiscal conditions, i.e., government spending and taxes. Government spending can act as both an unpaid factor of production and household amenity, while taxes can act as both a curb of productivity of certain factors of production and household disamenity. These fiscal conditions are formally evaluated in the equilibrium model of the labor and land markets of the Roback (1982) framework to explain the inter-county wage differences which remained after accounting for human capital differences and other labor attributes, and inter-county rent differences which remained after accounting for housing characteristics. According to the framework, if a county-specific desirable attribute can be reflected in both labor and land

markets, such a county should have higher rents than otherwise similar counties, and lower wages if the households are compensated for fiscal differences.

In addition, we model the wage and rent equations in three different forms: the levels form, the differenced form, and the growth form, each of which is under slightly different assumption of labor and land market processes. Specifically, the levels form model assumes an equilibrium of labor and land markets of the Roback (1982) framework. The differenced form model does not assume the equilibrium condition. Rather it is applied to examine the contemporaneous effects of the changes in government tax and expenditure variables on the changes of local wages and rents. The growth form model, extended from the Roback framework, assumes by some means that there are disequilibrium forces in the current period, and there are some disequilibrium innovations going on that affect current levels and subsequent changes. Theoretically we do not know how the true process of the labor and land markets works until we empirically implement the three forms of models.

Turning to the results of the levels form regressions, generally we find that either the tax group or the expenditure group variables are not consistent with each other, as we expect that each variable in the tax group or in the expenditure group should have the same coefficient sign, in addition, the tax group variables should have opposite signs to these in the expenditure group. Specifically, we find that the property tax, education, and highway variables have the opposite signs to the ones predicted by theory, and the sign on public safety is consistent with the prediction. However, we obtain better results in accordance with the theoretical predictions using the marginal tax variables (top marginal personal income tax and top marginal corporate income tax) than those using average

effective tax measurements. We argue that marginal tax variables could be better than average effective tax rates in truly reflecting the labor and land markets, as the marginal tax rate measures better the incentives of households' or firms' location choice and have less measurement error than the average tax measures. Using the two stage least squares (2SLS) techniques in an attempt to mitigate possible endogeneity bias fails to produce better results than the OLS estimates, which we believe either is due to the instrument sets chosen being invalid, or the true process of the labor and land markets can not be represented by the levels form model as specified.

With regard to the results of differenced model, using the Census earning and housing cost data seems to provide us better results than the first set of data from the BEA and HUD, which we have argued that the Census earnings and housing data may be better in reflecting the nonmetropolitan labor and land markets. In addition, using the 2SLS technique appears to produce better results and larger coefficient estimates than the OLS approach. It is better not only because most fiscal variables are consistent with the theoretical predictions, but also because it accounts for possible endogeneity bias associated with the OLS approach. Using the 2SLS method, we find the tax variables, $\Delta st_individual$ and Δst_rest (selective, license, and other taxes) are statistically significant with expected negative signs, and the expenditure variables, Δst_safety and $\Delta st_environhousing$ are statistically significant with expected positive signs. Taking into consideration the negative coefficient of these two tax variables and the positive coefficient of these two expenditure variables in the wage equation, it appears that the public safety and environment and housing have both productivity and amenity effects, with the productivity effect dominating the amenity effect. On the other hand, individual

income tax and selective, license taxes appear to be household disamenities and inhibit productivity.

Turning next to the growth model results, similarly as found in the differenced equation model, using the Census earnings and housing cost data provides us better results than the first set of data from the BEA and HUD. Briefly, the state tax variables (general sales tax, individual income tax, corporate income tax, selective and license taxes) are generally found to be negative both in the wage and rent equation and statistically significant in the rent equation, reflecting the households' disamenity and firms' counter-productivity effects. This result is expected as greater taxes increase business cost and discourage labor supply. Furthermore, the state expenditures on first-secondary education, highway, and public safety are found to be positive in the both equations and statistically significant in the rent equation. According to the hedonic compensation theory, this indicates that education, highway, and public safety have both amenity and productivity effects. In addition, the productivity effects of these the expenditure variables would have to dominate their amenity effects to be consistent with the positive sign in the wage model. These results indicate the fact both households and firms prefer more investment in education, highway, and public safety, which is expected as more government spending can increase the productivity of certain factors of production. For instance, more government spending on education can reduce business costs through increasing the marginal product of labor.

This study fills the gap in the hedonic literature by addressing the state and local fiscal policy effects at the nonmetropolitan level. The findings of this study should be of interest to economists and policy makers. The policy implications as follows are worth

brief consideration.

6.2 Policy Implications

Do fiscal policies matter in affecting local economic performance? The answer to this question seems an unambiguous “yes!”, but only for the state-wide fiscal policies, county-level fiscal policies generally do not. One possible explanation is that a county is a small economy that cannot affect land and labor markets that may extend beyond county boundaries.

The empirical results indicate that the education, public safety, and highway play the role as a household amenity and the role as a productive amenity while personal income tax and property income tax act as household disamenity and firm disamenity. Thus, policy makers should be aware of the dual role of taxes and public services before conducting any government project.

In addition, the theoretical and empirical analysis show that taxes and spending affect local wage and rent growth in opposite directions. Therefore, examining the effects of fiscal policy requires that both components of fiscal policy, i.e., taxes and expenditures, be considered simultaneously. For instance, as the empirical results from the preferred growth model using Census earning and housing data indicate, when the revenue from state taxes (*stl92_property*, *stl92_general_sales*, *stl92_individual_income*, *stl92_corporate_income*, *stl92_rest*) is used to pay for the non-general expenditures (liquor store, utility, or insurance trust expenditure), they have a negative effect on economic development. When the taxes such as *stl92_property*, *stl92_general_sales*, and *stl92_individual_income* are used to fund the local education, public safety, and highway

valued by firms and households, they seem to increase local economic performance. This is important and implies that taxes should be used with caution.

In brief, a county's ability to attract household in-migration and business is significantly affected by its pattern of both taxation and public services, either one can not be studied alone. Households and firms consider the personal income tax and corporate income tax as negative, hence, in order to further the economic development of nonmetropolitan territories, it is better for the state governments to lower the personal income tax and corporate income tax while still being able to maintain the education, public safety and highway expenditures on a high level.

6.3 Limitations and Future Studies

The findings of this study provide some, though limited, insights into differences in local labor and land markets. However this study is also subject to some limitations which require us to interpret the results with caution. First, the hedonic approach suffers from several analytical problems arising from choices of model specification and selection of explanatory variables (see the review by Malpezzi (2003) and Sheppard (1999)).

Therefore, the employment of classical linear regression models in this study may raise some concerns about the linearity assumption and variable selection. In future study we could specify some more flexible functional forms for the hedonic model using the generalized Box-Cox (1964) transformation. This technique poses no (linear) restrictions on the hedonic relationship and provides statistics to choose among different functional forms.

Second, spatial correlation has not been satisfactorily explored in this study.

Spatial correlation has not been tested in this study, neither does the necessity for a clustering.¹⁰ We simply assume that it exists. In other words, we assume the error terms are correlated within clusters, but not across clusters. In addition, the way of grouping clusters are somewhat arbitrary. The econometric analysis in this study can be compared with alternative clustering routines such as K-means clustering, where we can use the fiscal variables of our interest to group the sample counties in this study with similar characteristics instead of using the way that BEA does. Furthermore, this study may be improved by specifying a spatial econometric model. For instance, we may experiment with a spatial contiguity-based model, or we can define a spatial model which assumes that the spatial weights follow a decay function of the distance between two counties subject to some upper and lower bounds on the distance, beyond the bound the spatial weight or county correlation is assumed to be zero. However, as we might notice that the choice of the bounds is arbitrary and ought to be verified empirically.

Third, the problem of endogeneity may not be addressed and corrected properly. The methodology using instruments in the form of lagged endogenous variables can be inappropriate if the instruments under consideration are autocorrelated (Green, 2000, p.689). However, finding good quality instruments posits a significant challenge in the macroeconomics literature. Ideally, the instruments should correlate strongly with the endogenous variables and not correlate with the dependent variable. Future study may be necessary to search for valid and strong instruments.

¹⁰ Herrin (2002) provides the STATA modules to test for clustering. Also, Kezdi (2005) provides a test for clustering in the spirit of the White (1980) test for heteroscedasticity.

Fourth, the panel data approach is not applied in this study as we do not have a complete dataset for more than two time periods. Future regional study can apply the panel approach because it provides several advantages in correcting for problem of endogeneity or heterogeneity.

REFERENCES

- Anselin, L. 1988. *Spatial Econometrics: Methods and Models*. Dordrecht: Kluwer Academic.
- Bartik, T. J. 1991. *Who Benefits From State and Local Economic Development Policies?* Kalamazoo: W. E. Upjohn Institute.
- _____. 1992. The Effects of State and Local Taxes on Economic Development: A Review of Recent Research. *Economic Development Quarterly* 6(1), 102-110.
- Beeson, P. E., N. D. David, and W. Troesken. 2001. Population Growth in U.S. Counties, 1840-1990. *Urban Economics and Regional Science* 31(6), 669-999.
- Beeson, P. E. and R.W. Eberts. 1989. Identifying Productivity and Amenity Effects in Interurban Wage Differentials. *The Review of Economics and Statistics* 71(3), 443-452.
- Biagi, B., D. Lambiri, and V. Royuela. 2006. Quality of Life in the Economic and Urban Economic Literature. *Working Paper, University of Cagliari and Sassari*.
- Blair, J. P. and R. Premus. 1987. Major Factors in Industrial Location: A Review. *Economic Development Quarterly* 1(1), 72-85.
- Blomquist, G. C, M. C. Berger, and J. P. Hoehn. 1988. New Estimates of Quality of Life in Urban Areas. *American Economic Review* 78(1), 89-107.
- Bound, J., D. A. Jaeger, and R. Baker. 1995. Problems with Instrumental Variables Estimation When the Correlation between the Instruments and the Endogenous Explanatory Variable is Weak. *Journal of the American Statistical Association* 90, 443-450.
- Box, G. E. P. and D. R. Cox. 1964. An Analysis of Transformation. *Journal of the Royal Statistical Society, Series B*, 211-252.
- Carroll, T. M. 1983. Right to Work Laws Do Matter. *Southern Economic Journal* 50(2), 494-509.
- Cheshire, P. and S. Sheppard. 1995. On the Price of Land and the Value of Amenities. *Economica* 62(246), 247-267.

- Chow, G. C. 1960. Tests of Equality between Sets of Coefficients in Two Linear Regressions. *Econometrica* 28(3), 591–605.
- Clark, D. E. and C. A. Murphy. 1996. Countywide Employment and Population Growth: An Analysis of the 1980s. *Journal of Regional Science* 36(2), 235-56.
- Clark, D. E. and J. C. Cosgrove. 1991. Amenities vs. Labor Market. Opportunities: Choosing the Optimal Distance to Move. *Journal of Regional Science* 31(3), 311-328.
- Clark, D. E. and J. R. Kahn. 1989. The Two-Stage Hedonic Wage Approach: A Methodology for the Valuation of Environmental Amenities. *Journal of Environmental Economics and Management* 16(2), 106-120.
- Cropper, M. L. 1981. The Value of Urban Amenities. *Journal of Regional Science* 21(3), 359–374.
- Dissart, J. C., and S. C. Deller. 2000. Quality of Life in the Planning Literature. *Journal of Planning Literature* 15(1), 135-161.
- Durbin, J. 1954. Errors in Variables. *Review of the International Statistical Institute* 22, 23-32.
- Fisher, R. C. 1997. The Effects of State and Local Public Services on Economic Development. *New England Economic Review*, 53-82.
- Gabriel, S. A., J. P. Matthey and L. W. Wascher. 2003. Compensating Differentials and Evolution in the Quality-of-Life among U.S. States. *Regional Science and Urban Economics* 33(5), 619-649.
- Galster, G. C. 1987. *Homeowners and Neighborhood Reinvestment*. Durham, NC: Duke University Press.
- Garofalo, G. A. and D. M. Malhotra. 1992. An Integrated Model of the Economic Effects of Right-to-Work Laws. *Journal of Labor Research* 13(3): 293-305.
- Gerking, S. D. and W. N. Weirick. 1983. Compensating Differences and Interregional Wage Differentials. *Review of Economics and Statistics* 65(3), 483–487.
- Getz, M. and Y. Huang. 1978. Consumer Revealed Preference for Environmental Goods. *The Review of Economics and Statistics* 60(3), 449-58.
- Glaeser, E. L. and K. Tobio. 2008. The Rise of the Sunbelt. *Southern Economic Journal* 74(3), 610-643.

- Gottlieb, P. D. 1994. Amenities as an Economic Development Tool: Is There Enough Evidence? *Economic Development Quarterly* 8 (3), 270-285.
- Green, W. H. 2000. *Econometric Analysis* (4th ed.). London: Prentice-Hall.
- Gujarati, D. N. 2003. *Basic Econometrics* (4th ed.). New York: McGraw-Hill.
- Gyourko, J. and J. Tracy. 1989. On the Political Economy of Land Value Capitalization and Local Public Sector Rent Seeking in a Tiebout Model. *Journal of Urban Economics* 26(2), 152-173.
- . 1991. The Structure of Local Public Finance and the Quality of Life. *Journal of Political Economy* 99(4), 774-806.
- Halstead, J. M. and S. C. Deller. 1997. Public Infrastructure in Economic Development and Growth: Evidence from Rural Manufacturers. *Journal of Community Development Society* 28(2), 149-169.
- Haurin, D. 1980. The Regional Distribution of Population Migration, and Climate. *Quarterly Journal of Economics* 95, 293-308.
- Hausman, J. A. 1978. Specification Tests in Econometrics. *Econometrica* 46(6), 1251-1271.
- Herrin, J. 2002. CLTEST: Stata Modules for Performing Cluster-adjusted Chi-square and T-tests. Statistical Software Components S424901, Boston College Department of Economics.
- Herzog, H. W. and A. M. Schlottmann. 1993. Valuing Amenities and Disamenities of Urban Scale: Can Bigger Be Better? *Journal of Regional Science* 33(2), 145-165.
- Hoehn, J., M. Berger, and G. C. Blomquist. 1987. A Hedonic Model of Interregional Wages, Rents, and Amenity Values. *Journal of Regional Science* 27(4), 605-620.
- Huber, P. J. 1967. The Behavior of Maximum Likelihood Estimates under Non-standard Conditions. *Proceedings of the Fifth Berkeley Symposium on Mathematical Statistics and Probability* 1, 221-233.
- Hundley, G. 1993. Collective Bargaining Coverage of Union Members and Nonmembers in the Public Sector. *Industrial Relations* 32(1), 72-93.
- Izraeli, O. 1987. The Effect of Environmental Attributes on Earnings and Housing Values across SMSAs. *Journal of Urban Economics* 22(3), 361-376.
- Kahn, M. E. 1995. A Revealed Preference Approach to Ranking City Quality of Life. *Journal of Urban Economics* 38(2), 221-235.

- Kezdi, G. 2005. Robust Standard Error Estimation in Fixed-Effects Panel Models. *Econometrics* 0508018, EconWPA.
- Liker, J. K., S. Augustyniak, and G. J. Duncan. 1985. Panel Data and Models of Change: A Comparison of First Difference and Conventional Two-Wave Models. *Social Science Research* 14, 80-101.
- Malpezzi, S. 2001. What Do We Know about Economic Development? *Madison, WI: The Center for Urban Land Economics Research, University of Wisconsin.*
- Malpezzi, S. 2003. Hedonic pricing models: A selective and applied review, in T.O'Sullivan and K. Gibb (eds.), *Housing Economics and Public Policy*, 67–89.ss. MA: Blackwell Science.
- Moore, W. J. 1998. The Determinants and Effects of Right-To-Work Laws: A Review of the Recent Literature. *Journal of Labor Research* 19(3), 449-469.
- Moore, W. J., J. A. Dunlevy, and R. J. Newman. 1986. Do Right-to-Work Laws Matter? Comment. *Southern Economic Journal* 53(2), 515-524.
- Newman, R. J. 1984. *Growth in the American South*. New York: New York University Press.
- Nordhaus, W. D. and J. Tobin. 1971. Is Growth Obsolete? *Cowles Foundation Discussion Papers* 319, Yale University.
- Ozanne, L. and T. Thibodeau. 1983. Explaining Metropolitan Housing Price Differences. *Journal of Urban Economics* 13(1), 51–66.
- Partridge, M. D. 2005. Does Income Distribution Affect U.S. State Economic Growth? *Journal of Regional Science* 45(2), 363-394.
- Partridge, M. D., D. S. Rickman, K. Ali, M. R. Olfert. 2007. Agglomeration Spillovers and Wage and Housing Cost Gradients across the Urban Hierarchy. *SWANK Working Papers, Ohio State University.*
- Peiser, R. B. and B. S. Lawrence. 1985. Homeownership Returns, Tenure Choice and Inflation. *American Real Estate and Urban Economics Association Journal* 13(4), 343-360.
- Premus, R. 1982. Location of High-technology Firms and Regional Economic Development. Joint Economic Committee, Congress of the United States.
- Ridker, R. G. and J. A. Henning. 1967. The Determinants of Residential Property Values with Special Reference to Air Pollution, *The Review of Economics and Statistics* 49(2), 246–257.

- Roback, J. 1982. Wages, Rents, and the Quality of Life. *Journal of Political Economy* 90(6), 1257-1278.
- Rosen, S. 1979. Wage-based Indexes of Urban Quality of Life, in P. Mieszkowski and M. Straszheim (ed.) *Current Issues in Urban Economics*, 74-104. Baltimore, MD: Johns Hopkins University Press.
- Rubin, M. M. 1991. Urban Enterprise Zones in New Jersey: Have They Made a Difference? In R. E. Green (ed.) *Enterprise Zones: New Directions in Economic Development*. Newbury Park, CA: Sage Publications.
- Sargan, J. 1958. The Estimation of Economic Relationships Using Instrumental Variables. *Econometrica* 26(3), 393-415.
- Schmenner, R. 1982. *Making Business Location Decisions*. Englewood Cliffs, NJ: Prentice-Hall.
- Sheppard, S. 1999. Hedonic Analysis of Housing Markets, in P. C. Cheshire and E. S. Mills (eds.), *Handbook of Regional and Urban Economics*, Vol. 3, ch. 41. Amsterdam: Elsevier.
- Shultz, S. D. and D. A. King. 2001. The Use of Census Data for Hedonic Price Estimates of Open-space Amenities and Land Use. *Journal of Real Estate Finance and Economics* 22(2-3), 239-252.
- Small Business & Entrepreneurship Council. 2002. Small Business Survival Index, www.smallbusinessadvocate.com/articles/smugwumppower/state.pdf.
- Sribney, W. 2007. Comparison of Standard Errors for Robust, Cluster, and Standard Estimators. In Stata FAQs. College Station, TX: StataCorp LP.
- Staiger, D. and J. H. Stock. 1997. Instrumental Variables Regression with Weak Instruments. *Econometrica* 65(3): 557-586.
- Stover, M. and C. Leven. 1992. Methodological Issues in the Determination of the Quality of Life in Urban Areas. *Urban Studies* 29(5), 737-754.
- Tiebout, C. M. 1956. A Pure Theory of Local Expenditures. *Journal of Political Economy* 64, 416-424.
- U. S. Bureau of the Census (1990, 2000). Census of Population, Decennial, *Characteristics of the Population*, Washington, DC: US. Government Printing Office.
- U.S. Census Bureau, 2002 *Census of Governments, Volume 4, Number 5*,

Compendium of Government Finances: 2002 GC02(4)-5, Washington, DC: US. Government Printing Office.

- Voith, R. 1991. Capitalization of Local and Regional Attributes into Wages and Rents: Differences across Residential and Mixed-use Communities. *Journal of Regional Science* 31(2), 127–145.
- Wasylenko, M. 1997. Taxation and Economic Development: The State of the Economic Literature. *New England Economic Review*, 37-52.
- Walker, R. and D. Greenstreet. 1989. Public Policy and Job Growth in Manufacturing: An Analysis of Incentive and Assistance Programs. Paper presented at the 36th North American meetings of the Regional Science Association, Santa Barbara, CA, November 10-12.
- White, H. 1980. A Heteroscedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroscedasticity. *Econometrica* 48, 817-838.
- Wooldridge, J. M. 2001. *Econometric Analysis of Cross Section and Panel Data*. MA: MIT press.
- Wu, D. 1973. Alternative Tests of Independence between Stochastic Regressors and Disturbances. *Econometrica* 41, 733-750.

APPENDICES

Appendix A. Detailed Calculations for Section 3.1

This appendix is presenting some detailed steps of calculation to get the equations in Section 3.1.

Total differentiating both sides of equations (2) and (3),

$$V(w, r; s) = \bar{V} \quad (2)$$

$$C(w, r; s) = 1 \quad (3)$$

$dV = V_w dw + V_r dr + V_s ds = 0$
 $dC = C_w dw + C_r dr + C_s ds = 0$, putting in a matrix format, $\begin{bmatrix} V_w & V_r \\ C_w & C_r \end{bmatrix} \begin{bmatrix} dw \\ dr \end{bmatrix} = \begin{bmatrix} -V_s \\ -C_s \end{bmatrix} ds$,
solving for dw/ds and dr/ds , we have equation (4).

$$\frac{dw}{ds} = \frac{\begin{vmatrix} -V_s & V_r \\ -C_s & C_r \end{vmatrix}}{\begin{vmatrix} V_w & C_r \\ C_w & V_r \end{vmatrix}} = \frac{C_s V_r - V_s C_r}{DET} \triangleleft 0 \quad (4).$$

$$\frac{dr}{ds} = \frac{\begin{vmatrix} V_w & -V_s \\ C_w & -C_s \end{vmatrix}}{\begin{vmatrix} V_w & C_r \\ C_w & V_r \end{vmatrix}} = \frac{V_s C_w - C_s V_w}{DET} \triangleleft 0$$

The next calculation involves using equations (5)-(8) to obtain equation (9a). The equations (5)-(8) are taken as:

$$\frac{dw}{ds} = \left(\frac{dw}{ds}\right)^V + \left(\frac{dw}{ds}\right)^C \quad (5)$$

$$\frac{dr}{ds} = \left(\frac{dr}{ds}\right)^v + \left(\frac{dr}{ds}\right)^c \quad (6)$$

$$\left(\frac{dw}{ds}\right)^c / \left(\frac{dr}{ds}\right)^c = L_h \quad (7)$$

$$\left(\frac{dw}{ds}\right)^v / \left(\frac{dr}{ds}\right)^v = -L_p / N_p \quad (8).$$

$$\begin{aligned} \text{Rearranging equation (5), } \left(\frac{dw}{ds}\right)^v &= \frac{dw}{ds} - \left(\frac{dw}{ds}\right)^c \\ &= \frac{dw}{ds} - L_h \left(\frac{dr}{ds}\right)^c \quad (\text{substitution using equation (7)}) \\ &= \frac{dw}{ds} - L_h \left[\left(\frac{dr}{ds} - \left(\frac{dr}{ds}\right)^v \right) \right] \quad (\text{substitution using equation (6)}) \\ &= \frac{dw}{ds} - L_h \left[\left(\frac{dr}{ds} - \frac{\left(\frac{dr}{ds}\right)^v}{-L_p / N_p} \right) \right] \quad (\text{substitution using} \end{aligned}$$

equation (8)), simplifying the above equation we obtain:

$$\left(\frac{dw}{ds}\right)^v = \frac{L_p / N_p}{L_p / N_p + L_h} \left(\frac{dw}{ds} - L_h \frac{dr}{ds} \right) \quad (9a),$$

or in logarithm,

$$\left(\frac{d \ln w}{ds}\right)^v = \frac{L_p / N_p}{L_p / N_p + L_h} \left(\frac{d \ln w}{ds} - k_l \frac{d \ln r}{ds} \right), \quad k_l \equiv \frac{r L_h}{w} \quad (9b)$$

As $d \ln r / ds$ is not directly estimable, first we need related it to $d \ln p_h / ds$ from equation (10)

$$p_h = r L_h / h + p_h' \quad (10).$$

$$\text{Hence, } \frac{d \ln p_h}{ds} = \frac{1}{p_h} \frac{dp_h}{ds} = \frac{1}{p_h} \frac{d(r L_h / h)}{ds} = \frac{1}{p_h} \frac{l_h}{h} \frac{dr}{ds} = \frac{r l_h}{p_h h} \frac{d \ln r}{ds} \quad (11).$$

Rearranging equation (11) to get $\frac{d \ln r}{ds} = \frac{p_h h}{r l_h} \frac{d \ln p_h}{ds}$, substituting it into equation (9b),

we have amenity component of dw/ds , or in equation (12),

$$\begin{aligned} \left(\frac{d \ln w}{ds}\right)^v &= \frac{r L_p / w N_p}{r L / w N} \left[\frac{d \ln w}{ds} - \left(\frac{r L_h}{w}\right) \left(\frac{p_h h}{r L_h} \frac{d \ln p_h}{ds} \right) \right] \\ &= \frac{r L_p / w N_p}{r L / w N} \left[\frac{d \ln w}{ds} - \left(\frac{p_h h}{w}\right) \frac{d \ln p_h}{ds} \right] \end{aligned}$$

$$= \frac{rL_p / wN_p}{rL / wN} \left[\frac{d \ln w}{ds} - k_h \frac{d \ln p_h}{ds} \right] \quad (12).$$

Following Beeson and Eberts (1989), $k_h = p_h h / w \equiv 0.27$ and $\frac{rL_p / wN_p}{rL / wN} = 0.399$, hence,

$$\left(\frac{d \ln w}{ds} \right)^v = 0.399 \left[\frac{d \ln w}{ds} - 0.27 \frac{d \ln p_h}{ds} \right] = 0.399 \left(\frac{d \ln w}{ds} \right) - 0.108 \left(\frac{d \ln p_h}{ds} \right) \quad (12b).$$

The productivity component dw/ds thus is

$$\left(\frac{d \ln w}{ds} \right)^c = \frac{d \ln w}{ds} - \left(\frac{d \ln w}{ds} \right)^v \quad (13)$$

$$= 0.601 \left(\frac{d \ln w}{ds} \right) + 0.108 \left(\frac{d \ln p_h}{ds} \right)^v \quad (13b).$$

The amenity component and productivity component of dr/ds is calculated as follows. First rearranging equation (6) we get

$$\begin{aligned} \left(\frac{dr}{ds} \right)^v &= \frac{dr}{ds} - \left(\frac{dr}{ds} \right)^c \\ &= \frac{dr}{ds} - \frac{1}{L_h} \left(\frac{dw}{ds} \right)^c \quad (\text{substitution using equation (7)}) \\ &= \frac{dr}{ds} - \frac{1}{L_h} \left[\frac{dw}{ds} - \left(\frac{dw}{ds} \right)^v \right] \quad (\text{substitution using equation (5)}) \\ &= \frac{dr}{ds} - \frac{1}{L_h} \left[\frac{dw}{ds} + \frac{L_p}{N_p} \left(\frac{dr}{ds} \right)^v \right] \quad (\text{substitution using equation (8)}). \end{aligned}$$

Then simplifying the last expression we get $(dr/ds)^v$:

$$\left(\frac{dr}{ds} \right)^v = \frac{L_h}{L_h + (L_p / N_p)} \left(\frac{dr}{ds} - \frac{1}{L_h} \frac{dw}{ds} \right), \text{ or in logarithm,}$$

$$\begin{aligned}
\left(\frac{d \ln r}{ds}\right)^v &= \frac{L_h}{L_h + (L_p / N_p)} \left(\frac{d \ln r}{ds} - \frac{w}{rL_h} \frac{d \ln w}{ds} \right) \\
&= \frac{L_h}{L_h + (L_p / N_p)} \left(\frac{p_h h}{rl_h} \frac{d \ln p_h}{ds} - \frac{1}{k_l} \frac{d \ln w}{ds} \right) \text{ (Noticing that } \frac{d \ln r}{ds} = \frac{p_h h}{rl_h} \frac{d \ln p_h}{ds} \\
&\quad \text{from equation (11) and } k_l \equiv \frac{rL_h}{w} \\
&\quad \text{from equation (9b))} \\
&= \frac{L_h}{(NL_h + L_p) / N} \left(\frac{p_h h / w}{rl_h / w} \frac{d \ln p_h}{ds} - \frac{1}{k_l} \frac{d \ln w}{ds} \right) \text{ (Noticing that } k_h = p_h h / w \text{ and} \\
&\quad \text{equilibrium conditions for land} \\
&\quad \text{and labor imply } N_p = N \text{ and} \\
&\quad NL_h + L_p = L) \\
&= \frac{(r/w)L_h}{(r/w)(L/N)} \left(\frac{k_h}{k_l} \frac{d \ln p_h}{ds} - \frac{1}{k_l} \frac{d \ln w}{ds} \right) \\
&= \frac{k_l}{(rL/wN)} \left(\frac{k_h}{k_l} \frac{d \ln p_h}{ds} - \frac{1}{k_l} \frac{d \ln w}{ds} \right) \tag{14} \\
&= \frac{0.053}{0.088} \left(\frac{0.27}{0.053} \frac{d \ln p_h}{ds} - \frac{1}{0.053} \frac{d \ln w}{ds} \right) \\
&= 3.068 \left(\frac{d \ln p_h}{ds} \right) - 11.364 \left(\frac{d \ln w}{ds} \right) \tag{14b}
\end{aligned}$$

($k_l \equiv 0.05 \cdot rL / wN \equiv 0.088$; $k_h \equiv 0.27$ following Beeson and Eberts (1989)).

The productivity component of dr/ds thus is:

$$\begin{aligned}
\left(\frac{d \ln r}{ds}\right)^c &= \frac{d \ln r}{ds} - \left(\frac{d \ln r}{ds}\right)^v = \frac{p_h h}{rl_h} \frac{d \ln p_h}{ds} - \left(\frac{d \ln r}{ds}\right)^v = \frac{p_h h / w}{rl_h / w} \frac{d \ln p_h}{ds} - \left(\frac{d \ln r}{ds}\right)^v \\
&= \frac{k_h}{k_l} \frac{d \ln p_h}{ds} - \left(\frac{d \ln r}{ds}\right)^v \tag{15}. \\
&= \frac{0.27}{0.053} \frac{d \ln p_h}{ds} - \left(\frac{d \ln r}{ds}\right)^v \\
&= 5.104 \frac{d \ln p_h}{ds} - [3.068 \left(\frac{d \ln p_h}{ds}\right) - 11.364 \left(\frac{d \ln w}{ds}\right)]
\end{aligned}$$

$$= 2.036\left(\frac{d \ln p_h}{ds}\right) + 11.364\left(\frac{d \ln w}{ds}\right) \quad (15b)$$

The four equations (12b), (13b), (14b), (15b) form the basis on empirically identifying the decomposition of the interregional wage differential and rent differential presented in the results section.

Appendix B. Detailed Calculations for Section 3.2

This appendix is presenting some detailed steps of calculation to get the equations in Section 3.2.

Starting from equation (21)

$$Y = AN^\beta K^\gamma Z^{1-\beta-\gamma} \quad (21),$$

to maximize $Y = AN^\beta K^\gamma \bar{Z}^{1-\beta-\gamma}$ subject to $\bar{C} = WN + 1K + P_Z \bar{Z}$, we set up the Lagrange

Multiplier function: $L = PAN^\beta K^\gamma Z^{1-\beta-\gamma} + \lambda(C - WN - K - P_Z Z)$. The first order

conditions on N and K give us: $\frac{\partial L}{\partial N} = PAN^{\beta-1} K^\gamma Z^{1-\beta-\gamma} - \lambda W$,

$\frac{\partial L}{\partial K} = PAN^\beta K^{\gamma-1} Z^{1-\beta-\gamma} - \lambda$. Setting these two equations respectively to zero and solving

for W we have $W = \left(\frac{P}{\lambda}\right)^{\frac{1}{1-\gamma}} A^{\frac{1}{1-\gamma}} \gamma^{\frac{\gamma}{1-\gamma}} N^{\frac{\beta+\gamma-1}{1-\gamma}} \bar{Z}^{\frac{1-\beta-\gamma}{1-\gamma}}$. In a competitive market $P = MC = \lambda$,

therefore,

$$W = A^{\frac{1}{1-\gamma}} \gamma^{\frac{\gamma}{1-\gamma}} N^{\frac{\beta+\gamma-1}{1-\gamma}} \bar{Z}^{\frac{1-\beta-\gamma}{1-\gamma}} \quad (22).$$

To obtain the indirect utility function in equation (24), we maximize utility in equation (23) $U = \theta H^\alpha C^{1-\alpha}$ subject to a budget constraint $W = P_H H + 1C$. Setting up the

Lagrange Multiplier function gives $L = \theta H^\alpha C^{1-\alpha} + \lambda(W - P_H H - C)$. The first order conditions on H and C give us: $\frac{\partial L}{\partial H} = \theta \alpha H^{\alpha-1} C^{1-\alpha} - \lambda P_H$, $\frac{\partial L}{\partial C} = \theta(1-\alpha) H^\alpha C^{-\alpha}$. Setting these two equations respectively equal to zero we have the demand for H and C :

$$H^* = \frac{1}{P_H} \alpha W, \quad C^* = (1-\alpha)W \quad (22a).$$

Substituting H^* and C^* back into utility function (equation (23)), we have the following indirect utility function:

$$\alpha^\alpha (1-\alpha)^{1-\alpha} \theta W P_H = \bar{V} \quad (24).$$

To derive the housing price equation (equation (27)), starting with a developer's total housing supply function (equation (25), $Q_H = hL$) and his/her cost function (housing structure cost, $c_0 H^\delta L$ plus and land cost, $P_L L$), the profit facing a developer thus is:

$\pi = P_H(hL) - (c_0 h^\delta L + P_L L)$, optimizing this profit function with respect to height h we

have: $\frac{\partial \pi}{\partial h} = P_H h - c_0 \delta h^{\delta-1} L = 0$, i.e.,

$$h = \left(\frac{P_H}{\delta c_0} \right)^{\frac{1}{\delta-1}} \quad (21a),$$

which implies that total housing supply equation is:

$$h\bar{L} = \left(\frac{P_H}{\delta c_0} \right)^{\frac{1}{\delta-1}} \bar{L} \quad (21b).$$

This total housing supply must be equal to total housing demand, i.e., the total number of households (N) in the region times housing consumption for each household, which is

$(\frac{1}{P_H})\alpha W$ in equation (22a). Therefore, equating $(\frac{P_H}{\mathcal{E}_0})^{\frac{1}{\delta-1}}\bar{L} = N[(\frac{1}{P_H})\alpha W]$ and solving

for housing price P_H gives us:

$$P_H = \delta^{\frac{1}{\delta}} c_0^{\frac{1}{\delta}} (\frac{\alpha N W}{\bar{L}})^{\frac{\delta-1}{\delta}} \quad (22).$$

The following calculations are performed to generate results in equations (28a-28c) by linking together equation (22) (labor demand equation), equation (24) (indirect utility equation), and equation (27) (housing price equation). The final goal is to solve these three equations for three unknowns (population N , income W , and housing price P_H). Starting with the three equations and taking logarithm on both sides of the equations gives us:

$$\left. \begin{aligned} W &= \beta A^{\frac{1}{1-\gamma}} \gamma^{\frac{\gamma}{1-\gamma}} N^{\frac{\beta+\gamma-1}{1-\gamma}} \bar{Z}^{\frac{1-\beta-\gamma}{1-\gamma}} \\ \alpha^\alpha (1-\alpha)^{1-\alpha} \theta W P_H^{1-\alpha} &= \bar{V} \\ P_H &= \delta^{\frac{1}{\delta}} c_0^{\frac{1}{\delta}} (\frac{\alpha N W}{\bar{L}})^{\frac{\delta-1}{\delta}} \end{aligned} \right\} \Rightarrow \left. \begin{aligned} \ln W &= C_1 + \frac{\beta+\gamma-1}{1-\gamma} \ln N + \frac{1}{1-\gamma} \ln A \\ \ln \theta + \ln W - \alpha \ln P_H &= C_2 \\ \ln P_H &= C_3 + \frac{\delta-1}{\delta} \ln N + \frac{\delta-1}{\delta} \ln W - \frac{\delta-1}{\delta} \ln \bar{L} \end{aligned} \right\}$$

$$\Rightarrow \begin{bmatrix} \frac{\beta+\gamma-1}{1-\gamma} & -1 & 0 \\ 0 & 1 & -\alpha \\ \frac{\delta-1}{\delta} & \frac{\delta-1}{\delta} & -1 \end{bmatrix} \begin{bmatrix} \ln N \\ \ln W \\ \ln P_H \end{bmatrix} = \begin{bmatrix} -C_1 - \frac{1}{1-\gamma} \ln A \\ C_2 - \ln \theta \\ -C_3 + \frac{\delta-1}{\delta} \ln \bar{L} \end{bmatrix}, \text{ using Cramer's rule, we have}$$

$$\Rightarrow \ln N = \frac{\begin{bmatrix} -C_1 - \frac{1}{1-\gamma} \ln A & -1 & 0 \\ C_2 - \ln \theta & 1 & -\alpha \\ -C_3 + \frac{\delta-1}{\delta} \ln \bar{L} & \frac{\delta-1}{\delta} & -1 \end{bmatrix}}{\begin{bmatrix} \frac{\beta+\gamma-1}{1-\gamma} & -1 & 0 \\ 0 & 1 & -\alpha \\ \frac{\delta-1}{\delta} & \frac{\delta-1}{\delta} & -1 \end{bmatrix}} = C_N + \frac{(\delta + \alpha - \alpha\delta) \ln A + (1-\gamma)[\delta \ln \theta + \alpha(\delta-1) \ln \bar{L}]}{\delta(1-\beta-\gamma) + \alpha\beta(\delta-1)}$$

(28a).

Similarly,

$$\Rightarrow \ln W = \frac{\begin{bmatrix} \frac{\beta+\gamma-1}{1-\gamma} & -C_1 - \frac{1}{1-\gamma} \ln A & 0 \\ 0 & C_2 - \ln \theta & -\alpha \\ \frac{\delta-1}{\delta} & -C_3 + \frac{\delta-1}{\delta} \ln \bar{L} & -1 \end{bmatrix}}{\begin{bmatrix} \frac{\beta+\gamma-1}{1-\gamma} & -1 & 0 \\ 0 & 1 & -\alpha \\ \frac{\delta-1}{\delta} & \frac{\delta-1}{\delta} & -1 \end{bmatrix}} = C_W + \frac{(\delta-1)\alpha \ln A - (1-\beta-\gamma)[\delta \ln \theta + \alpha(\delta-1) \ln \bar{L}]}{\delta(1-\beta-\gamma) + \alpha\beta(\delta-1)}$$

(28b).

$$\begin{aligned}
\Rightarrow \ln P_H &= \frac{\begin{bmatrix} \frac{\beta+\gamma-1}{1-\gamma} & -1 & -C_1 - \frac{1}{1-\gamma} \ln A \\ 0 & 1 & C_2 - \ln \theta \\ \frac{\delta-1}{\delta} & \frac{\delta-1}{\delta} & -C_3 + \frac{\delta-1}{\delta} \ln \bar{L} \end{bmatrix}}{\begin{bmatrix} \frac{\beta+\gamma-1}{1-\gamma} & -1 & 0 \\ 0 & 1 & -\alpha \\ \frac{\delta-1}{\delta} & \frac{\delta-1}{\delta} & -1 \end{bmatrix}} \\
&= C_P + \frac{(\delta-1)[\ln A + \beta \ln \theta - (1-\beta-\gamma) \ln \bar{L}]}{\delta(1-\beta-\gamma) + \alpha\beta(\delta-1)} \quad (28c).
\end{aligned}$$

where C_N , C_W , C_P are constant terms that differ across regions but not within a region. Assuming innovations to productivity, region specific characteristics (amenity or fiscal policies), and housing supply are characterized by the following growth equations:

$$\ln\left(\frac{A_{t+1}}{A_t}\right) = C_A + \phi_A S + \varepsilon_A, \ln\left(\frac{\theta_{t+1}}{\theta_t}\right) = C_\theta + \phi_\theta S + \varepsilon_\theta, \ln\left(\frac{\bar{L}_{t+1}}{\bar{L}_t}\right) = C_L + \phi_L S + \varepsilon_L, \text{ where } C_A,$$

C_θ , and C_L are constants, ϕ_A, ϕ_θ and ϕ_L are coefficients, $\varepsilon_A, \varepsilon_\theta$ and ε_L are error terms, and S is a region specific variable.

Consequently, equations (28a-c) imply that:

$$\ln\left(\frac{N_{t+1}}{N_t}\right) = C_{\Delta N} + \tau\{(\delta + \alpha - \alpha\delta)\phi_A + (1-\gamma)[\delta\phi_\theta + \alpha(\delta-1)\phi_L]\}S + \varepsilon_N \quad (29a)$$

$$\ln\left(\frac{W_{t+1}}{W_t}\right) = C_{\Delta W} + \tau\{(\delta-1)\alpha\phi_A - (1-\beta-\gamma)[\delta\phi_\theta + \alpha(\delta-1)\phi_L]\}S + \varepsilon_W \quad (29b)$$

$$\ln\left(\frac{P_{t+1}}{P_t}\right) = C_{\Delta P} + \tau\{(\delta-1)[\phi_A + \beta\phi_\theta - (1-\beta-\gamma)\phi_L]\}S + \varepsilon_P \quad (29c)$$

where $\tau = [\delta(1 - \beta - \gamma) + \alpha\beta(\delta - 1)]^{-1}$. Hence if letting $\hat{B}_N, \hat{B}_W, \hat{B}_P$ represent the estimated coefficients on S variable from estimating the population, wage and housing price change equations (29a-c), i.e. letting

$$\hat{B}_N = \tau\{(\delta + \alpha - \alpha\delta)\phi_A + (1 - \gamma)[\delta\phi_\theta + \alpha(\delta - 1)\phi_L]\} \quad (29i)$$

$$\hat{B}_W = \tau\{(\delta - 1)\alpha\phi_A - (1 - \beta - \gamma)[\delta\phi_\theta + \alpha(\delta - 1)\phi_L]\} \quad (29ii)$$

$$\hat{B}_P = \tau\{(\delta - 1)[\phi_A + \beta\phi_\theta - (1 - \beta - \gamma)\phi_L]\} \quad (29iii).$$

From the equations (24i-ii) we can obtain ϕ_A by noticing that:

$$\delta\phi_\theta + \alpha(\delta - 1)\phi_L = \frac{\hat{B}_N / \tau - (\delta + \alpha - \alpha\delta)\phi_A}{1 - \gamma} = \frac{\hat{B}_W / \tau - (\delta - 1)\alpha\phi_A}{1 - \beta - \gamma}, \text{ solving for } \phi_A \text{ gives}$$

us:

$$\phi_A = (1 - \beta - \gamma)\hat{B}_N + (1 - \gamma)\hat{B}_W \quad (30a).$$

From the equation (24ii), we notice that,

$$\frac{\hat{B}_W}{\tau\alpha} = (\delta - 1)\phi_A - (1 - \beta - \gamma)\frac{\delta}{\alpha}\phi_\theta + (1 - \beta - \gamma)(\delta - 1)\phi_L, \text{ implying that}$$

$$(\delta - 1)\phi_A - (1 - \beta - \gamma)(\delta - 1)\phi_L = \frac{\hat{B}_W}{\tau\alpha} + (1 - \beta - \gamma)\frac{\delta}{\alpha}\phi_\theta \text{ and from the equation (29iii), we}$$

notice that: $\frac{\hat{B}_P}{\tau} = (\delta - 1)\phi_A + \beta(\delta - 1)\phi_\theta - (1 - \beta - \gamma)(\delta - 1)\phi_L$, implying that

$$(\delta - 1)\phi_A - (1 - \beta - \gamma)(\delta - 1)\phi_L = \frac{\hat{B}_P}{\tau} - \beta(\delta - 1)\phi_\theta. \text{ Therefore } \phi_\theta \text{ can be obtained by}$$

equating

$$\frac{\hat{B}_W}{\tau\alpha} + (1 - \beta - \gamma)\frac{\delta}{\alpha}\phi_\theta = \frac{\hat{B}_P}{\tau} - \beta(\delta - 1)\phi_\theta, \text{ solving for } \phi_\theta \text{ gives us:}$$

$$\phi_\theta = \alpha\hat{B}_P - \hat{B}_W \quad (30b)$$

Substituting equations (30a) and (30b) into the equation (29iii) we have:

$$\phi_P = \hat{B}_N + \hat{B}_W - \frac{\delta \hat{B}_P}{\delta - 1} \quad (30c).$$

Appendix C. Appendix Tables 1-20

Appendix Table 1. Variable Definitions and Descriptive Statistics

Variable	Description	Source	Mean	Std. Dev.
Dependent Variables				
ln(wage2002)	Log of average wage per job in 2002 (in dollars) for the employed over 16	BEA	10.086	0.151
ln(wage92)	Log of average wage per job in 1992 (in dollars) for the employed over 16	BEA	9.755	0.174
ln(rent2002)	Log of rent (in dollars) in 2002 for house with 2 bedroom	HUD	6.070	0.142
ln(rent2002)	Log of rent (in dollars) in 1992 for house with 2 bedroom	HUD	5.946	0.164
ln(earning2000)	Log of annual median earnings (in dollars) in 1999 for the employed over 16	2000 Census	9.819	0.142
ln(housing2000)	Log of weighted average median gross house rent (\$/month) of owner and renter occupied housing units in 2000 using shares of owner and renter occupied houses as weights. For owner occupied units, annual rent is imputed as 7.85% of median house value.	2000 Census	6.156	0.316
ln(earning1990)	Log of annual median earnings (in dollars) in 1989 for the employed over 16	1990 Census	9.647	0.188
ln(housing1990)	Log of weighted average median gross house rent (\$/month) of owner and renter occupied housing units in 1990 using shares of owner and renter occupied houses as weights. For owner occupied units, annual rent is imputed as 7.85% of median house value.	1990 Census	5.731	0.302
County Fiscal Variables (2002)				
cty02property	Revenue from property tax	2002 COG	0.035	0.032
cty02sales	Revenue from sales tax	2002 COG	0.004	0.005
cty02highway	Expenditure on highway - charges on highway	2002 COG	0.011	0.009
cty02safety	Expenditure on public safety (police + fire protection)	2002 COG	0.007	0.004
cty02naturalrec	Expenditure on natural resource and parks recreation - corresponding charges	2002 COG	0.003	0.007
cty02sewerage	Expenditure on sewerage and waste management - corresponding charges	2002 COG	0.001	0.003
cty02education	Expenditure on first and secondary education	2002 COG	0.071	0.029
County Fiscal Variables (1992)				
cty92property	Revenue from property tax	1992 COG	0.035	0.026
cty92sales	Revenue from sales tax	1992 COG	0.003	0.005
cty92highway	Expenditure on highway - charges on highway	1992 COG	0.010	0.009
cty92safety	Expenditure on public safety (police + fire protection)	1992 COG	0.006	0.004
cty92naturalrec	Expenditure on natural resource and parks recreation - corresponding charges	1992 COG	0.002	0.003
cty92sewerage	Expenditure on sewerage and waste management - corresponding charges	1992 COG	0.001	0.003
cty92education	Expenditure on first and secondary education	1992 COG	0.063	0.023
State Fiscal Variables (2002)				
stl02_property	Revenue from property tax	2002 COG	0.030	0.008
stl02_sales	Revenue from sales tax	2002 COG	0.026	0.008
stl02_rest	Revenue from selective, license, and other taxes	2002 COG	0.021	0.006
stl02_individual	Revenue from individual income tax	2002 COG	0.020	0.011
stl02_corporate	Revenue from corporate income tax	2002 COG	0.002	0.002
stl02_firstsecond	Expenditure on elementary & secondary - School lunch sales on elementary & secondary	2002 COG	0.046	0.005
stl02_higheredu	Expenditure on Higher education - corresponding charges	2002 COG	0.013	0.003
stl02_hospitalhealth	Expenditure on hospitals - corresponding charges	2002 COG	0.008	0.002
stl02_highway	Expenditure on highway - corresponding charges	2002 COG	0.016	0.005
stl02_publicsafety	Expenditure on public safety (police, fire, correction, etc) - corresponding charges	2002 COG	0.016	0.003
stl02_environghousing	Expenditure on natural resources, parks recreation., housing and community development, sewerage, solid waste management - corresponding charges	2002 COG	0.009	0.002
stl02_govtadmin	Expenditure on government administration (Financial administration + Judicial and legal + General public buildings + Other governmental administration)	2002 COG	0.010	0.003
State Fiscal Variables (1992)				
stl92_property	Revenue from property tax	1992 COG	0.031	0.010

stl92_general_sales	Revenue from sales tax	1992 COG	0.025	0.008
stl92_rest	Revenue from selective, license, and other taxes	1992 COG	0.022	0.006
stl92_individual_income	Revenue from individual income tax	1992 COG	0.019	0.011
stl92_corporate_income	Revenue from corporate income tax	1992 COG	0.003	0.002
stl92_firstsecond	Expenditure on elementary & secondary - School lunch sales	1992 COG	0.043	0.005
stl92_hospitalhealth	Expenditure on hospitals - corresponding charges	1992 COG	0.008	0.002
stl92_highway	Expenditure on highway - corresponding charges	1992 COG	0.016	0.005
stl92_publicsafety	Expenditure on public safety (police, fire, correction, etc) - corresponding charges	1992 COG	0.013	0.003
stl92_envirohousing	Expenditure on natural resources, parks recreation., housing and community development, sewerage, solid waste management - corresponding charges	1992 COG	0.009	0.003
stl92_govtadmin	Expenditure on government administration (Financial administration + Judicial and legal + General public buildings + Other_governmental administration)	1992 COG	0.009	0.002
Small Business Survival Index (2002)				
top_pi	State's top personal income tax rate	2002 SBEC	4.872	2.753
top_capitalgains	State's top capital gains tax rate on individuals	2002 SBEC	4.588	2.893
top_corporate	State's top corporate income tax rate	2002 SBEC	6.311	2.377
deathtax	State death taxes(states levying death taxes receive a score of "1" and states that do not receive a score of "0")	2002 SBEC	0.344	0.475
unemptax	Unemployment tax rate	2002 SBEC	2.496	1.443
utilitiescosts	State's electricity utility cost index	2002 SBEC	0.879	0.178
compensation	State workers' compensation benefits per \$100 of covered wages	2002 SBEC	0.976	0.497
gastax	State gas tax (dollars per gallon)	2002 SBEC	0.201	0.045
miniwage	State minimum wage minus the federal minimum wage	2002 SBEC	0.063	0.303
Demographic Variables (2000)				
Married00	Percent of 2000 population(15 years over) that are married	2000 Census	0.610	0.050
Female00	Percent of 2000 population that are female	2000 Census	0.503	0.021
Disability00	Percent of 2000 Civilian non-institutionalized population 16 to 64 years with a work disability	2000 Census	0.126	0.035
Lingisolation00	Percent of 2000 households with linguistic isolation prob.	2000 Census	0.078	0.148
African00	Percent of 2000 population African-American	2000 Census	0.019	0.071
Native00	Percent of 2000 population that are Native American	2000 Census	0.078	0.148
Asianpacific00	Percent of 2000 population Asian and Pacific islands origin	2000 Census	0.025	0.050
Other00	Percent of 2000 pop. with other race background	2000 Census	0.060	0.128
Hispanic00	Percent of 2000 population Hispanic	2000 Census	0.359	0.059
Highschool00	Percent of 2000 population 25 years and over that are high school graduates	2000 Census	0.201	0.046
Somecollege00	Percent of 2000 population 25 years and over that have some college degree	2000 Census	0.055	0.021
Associate00	Percent of 2000 population 25 years and over that have an associate degree	2000 Census	0.097	0.039
bachelor00	Percent of 2000 population 25 years and over that are 4-year college graduates	2000 Census	0.166	0.021
Age7_1700	Percent of 2000 population 7-17 years	2000 Census	0.085	0.033
Age18_2400	Percent of 2000 population 18-24 years	2000 Census	0.400	0.032
Age25_5400	Percent of 2000 population 25-54 years	2000 Census	0.053	0.009
Age55_5900	Percent of 2000 population 55-59 years	2000 Census	0.048	0.010
Age60_6400	Percent of 2000 population 60-64 years	2000 Census	0.161	0.039
Age65up00	Percent of 2000 population over 65 years	2000 Census	0.610	0.050
Demographic Variables (1990)				
Female	Percent of 1990 population that are female	1990 Census	0.510	0.017
Married	Percent of 1990 population that are married	1990 Census	0.491	0.043
Disability	Percent of 1990 16-64 pop with a work disability	1990 Census	0.100	0.031
Lingisolation	Percent of 1990 population with linguistic isolation problem	1990 Census	0.014	0.034
African	Percent of 1990 population African-American	1990 Census	0.076	0.147
Native	Percent of 1990 population that are Native American	1990 Census	0.018	0.068
Asian	Percent of 1990 population Asian and Pacific islands origin	1990 Census	0.003	0.004
Other	Percent of 1990 pop. with other race background	1990 Census	0.018	0.049
Hispanic	Percent of 1990 population Hispanic	1990 Census	0.044	0.119

Highschool	Percent of 1990 population 25 years and over that are high school graduates	1990 Census	0.226	0.044
Somecollege	Percent of 1990 population 25 years and over that have some college degree	1990 Census	0.101	0.030
Associate	Percent of 1990 population 25 years and over that have an associate degree	1990 Census	0.033	0.015
Bachelor	Percent of 1990 population 25 years and over that are 4-year college graduates	1990 Census	0.052	0.022
Age7_17	Percent of 1990 population 7-17 years	1990 Census	0.171	0.023
age18_24	Percent of 1990 population 18-24 years	1990 Census	0.086	0.033
Age25_54	Percent of 1990 population 25-54 years	1990 Census	0.385	0.032
Age55_59	Percent of 1990 population 55-59 years	1990 Census	0.047	0.008
Age60_64	Percent of 1990 population 60-64 years	1990 Census	0.049	0.010
Age65up	Percent of 1990 population over 65 years	1990 Census	0.163	0.041
Amenity Variables				
Census_division	1-9	ERS, USDA	5.237	1.886
2003 Rural Urban Continuum Code	1-9	ERS, USDA	6.811	1.543
1993 Rural Urban Continuum Code	0-9	ERS, USDA	6.998	1.587
TempJan_	Mean temperature for January, 1941-71	ERS, USDA	31.476	12.279
SunJan_	Mean hours of sunlight for January, 1941-71	ERS, USDA	153.103	33.639
TempJul_	Mean temperature for July, 1941-70	ERS, USDA	75.560	5.623
HumidJul_	Mean relative humidity for July, 1941-71	ERS, USDA	54.184	14.873
Topography_	Topography score ranging from 1-21, where 1 represents flat plain and 21 represents most mountainous land	ERS, USDA	9.109	6.634
Waterpct	Percent of county area covered by water	ERS, USDA	3.466	9.757
Business Cycle Variable				
RTW2	Right to work law dummy variable	NRTW	0.560	0.497

Notes: BEA=Bureau of Economic Analysis, REIS. SBEC=Small Business & Entrepreneurship Council. COG=Census of Government. ERS, USDA=Economic Research Services, U.S. Department of Agriculture. HUD=U.S. Department of Housing and Urban Development. NRTW=National Right To Work Foundation. Total Nonmetropolitan Counties=1998.

Appendix Table 2A. Level Equation Model Results for Sample N468, Dependent variables: ln(wage2002)

	Model 1	Model 2	Model 3	Model 4	Model 5
std02_property	3.084** (3.30)	-0.900 (0.68)	-0.862 (0.65)	-0.210 (0.17)	
std02_sales	2.774** (3.30)	1.820* (2.32)	2.090** (2.60)	1.937* (2.47)	
std02_individual	2.275** (3.58)	0.160 (0.20)	1.170 (1.12)	0.010 (0.01)	
std02_corporate	12.720** (3.90)	-2.380 (0.67)	-0.430 (0.12)	-0.690 (0.20)	
std02_rest	2.070 (1.84)	4.592** (3.29)	6.222** (3.75)	5.106** (3.06)	
std02_firstsecond	-0.880 (0.67)	2.870* (2.07)	3.168* (2.28)	1.980 (1.50)	
std02_higheredu	0.160 (0.07)	0.270 (0.09)	-1.800 (0.50)	0.790 (0.24)	
std02_hospitalhealth	-3.630 (1.29)	-7.371* (2.50)	-7.225* (2.49)	-5.825* (2.21)	
std02_highway	-9.543** (5.22)	-9.599** (4.97)	-9.233** (4.75)	-8.672** (4.48)	
std02_publicsafety	-4.140 (1.68)	-1.300 (0.40)	-1.650 (0.52)	1.500 (0.44)	
std02_environhousing	7.749* (2.07)	0.520 (0.13)	-1.710 (0.44)	-1.910 (0.53)	
std02_govtadmin	9.113** (3.11)	2.700 (0.88)	0.500 (0.15)	0.210 (0.06)	
cty02property	1.149** (3.96)	1.518** (4.92)	1.495** (4.87)	0.724* (2.23)	0.840** (2.69)
cty02sales	-1.930 (1.50)	0.590 (0.41)	0.570 (0.40)	-1.120 (0.80)	-0.110 (0.05)
cty02education	-1.333** (5.54)	-0.862** (3.59)	-0.824** (3.38)	-0.527* (2.13)	-0.632** (2.64)
cty02highway	-4.236** (6.02)	-3.560** (3.67)	-3.480** (3.61)	-2.120* (2.22)	-2.223* (2.15)
cty02safety	5.089* (2.45)	1.470 (0.80)	1.180 (0.62)	-0.810 (0.43)	-0.280 (0.15)
cty02naturalrec	0.850 (1.52)	0.905* (2.07)	0.961* (2.21)	0.738* (2.39)	0.616* (2.38)
cty02sewerage	-3.631* (2.43)	-1.900 (1.32)	-1.860 (1.30)	-0.770 (0.55)	-1.590 (1.04)
Constant	10.016** (147.32)	10.112** (69.25)	10.087** (70.06)	9.030** (14.46)	9.300** (15.06)
Observations	1040	1040	1040	1040	1040
Adjusted R-squared	0.18	0.30	0.31	0.43	0.47

Notes: Robust *t* statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level. N468 stands for all nonmetropolitan counties adjacent to a metro area. Model 2 adds to Model 1 additional RTW state dummy variable, Census dummies, and rural-urban continuum dummies as explanatory variables. Model3 includes additional amenity variables. Model 4 includes demographic variables. Model 5 replaces state fiscal variables with 47 state dummies. Model 6 is similar to Model 4 except including only some major fiscal variables. Wage data are from the BEA and Rent data are from the HUD.

Appendix Table 2B. Level Equation Model Results for Sample N468, Dependent variables: ln(rent2002)

	Model 1	Model 2	Model 3	Model 5
stl02_property	8.884** (12.78)	4.003** (4.04)	4.010** (4.04)	
stl02_sales	-1.450 (1.64)	0.290 (0.40)	0.340 (0.46)	
stl02_individual	1.160 (1.82)	0.300 (0.44)	0.500 (0.54)	
stl02_corporate	6.860 (1.76)	4.410 (1.28)	4.790 (1.35)	
stl02_rest	-0.050 (0.05)	0.470 (0.40)	0.790 (0.49)	
stl02_firstsecond	-7.651** (6.95)	-4.576** (4.49)	-4.518** (4.38)	
stl02_higheredu	-3.698* (1.98)	-1.640 (0.76)	-2.040 (0.74)	
stl02_hospitalhealth	-5.631** (2.65)	-1.750 (0.81)	-1.720 (0.79)	
stl02_highway	-1.770 (1.02)	-4.155* (2.37)	-4.084* (2.30)	
stl02_publicsafety	13.670** (6.06)	6.010* (2.41)	5.942* (2.41)	
stl02_envirohousing	-0.030 (0.01)	-0.790 (0.31)	-1.220 (0.42)	
stl02_govtadmin	14.422** (6.00)	4.250 (1.79)	3.820 (1.42)	
cty02property	0.310 (1.81)	0.240 (1.86)	0.240 (1.83)	0.505** (3.83)
cty02sales	2.668* (2.17)	0.510 (0.48)	0.500 (0.47)	2.994** (2.96)
cty02education	-0.710** (3.80)	-0.547** (3.64)	-0.539** (3.51)	-0.622** (3.90)
cty02highway	-2.454** (4.10)	-0.710 (1.37)	-0.700 (1.32)	-1.987** (4.31)
cty02safety	7.432** (4.45)	2.180 (1.46)	2.120 (1.38)	1.730 (1.17)
cty02naturalrec	0.000 (0.00)	0.230 (0.78)	0.240 (0.84)	0.160 (0.60)
cty02sewerage	-0.930 (0.57)	-0.850 (0.69)	-0.840 (0.68)	-1.010 (0.98)
Constant	5.923** (100.56)	6.663** (49.53)	6.658** (49.28)	6.413** (60.72)
Observations	1040	1040	1040	1040
Adjusted R-squared	0.40	0.62	0.62	0.74

Notes: Robust *t* statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level. N468 stands for all nonmetropolitan counties adjacent to a metro area. Model 2 adds to Model 1 additional RTW state dummy variable, Census dummies, and rural-urban continuum dummies as explanatory variables. Model3 includes additional amenity variables. Model 4 includes demographic variables. Model 5 replaces state fiscal variables with 47 state dummies. Model 6 is similar to Model 4 except including only some major fiscal variables. Wage data are from the BEA and Rent data are from the HUD.

Appendix Table 3A. Level Equation Model Results for Sample N579, Dependent variables: ln(wage2002)

	Model 1	Model 2	Model 3	Model 4	Model 5
stl02_property	3.084** (3.30)	-0.900 (0.68)	-0.862 (0.65)	-0.210 (0.17)	
stl02_sales	2.774** (3.30)	1.820* (2.32)	2.090** (2.60)	1.937* (2.47)	
stl02_individual	2.275** (3.58)	0.160 (0.20)	1.170 (1.12)	0.010 (0.01)	
stl02_corporate	12.720** (3.90)	-2.380 (0.67)	-0.430 (0.12)	-0.690 (0.20)	
stl02_rest	2.070 (1.84)	4.592** (3.29)	6.222** (3.75)	5.106** (3.06)	
stl02_firstsecond	-0.880 (0.67)	2.870* (2.07)	3.168* (2.28)	1.980 (1.50)	
stl02_higheredu	0.160 (0.07)	0.270 (0.09)	-1.800 (0.50)	0.790 (0.24)	
stl02_hospitalhealth	-3.630 (1.29)	-7.371* (2.50)	-7.225* (2.49)	-5.825* (2.21)	
stl02_highway	-9.543** (5.22)	-9.599** (4.97)	-9.233** (4.75)	-8.672** (4.48)	
stl02_publicsafety	-4.140 (1.68)	-1.300 (0.40)	-1.650 (0.52)	1.500 (0.44)	
stl02_environghousing	7.749* (2.07)	0.520 (0.13)	-1.710 (0.44)	-1.910 (0.53)	
stl02_govtadmin	9.113** (3.11)	2.700 (0.88)	0.500 (0.15)	0.210 (0.06)	
cty02property	1.149** (3.96)	1.518** (4.92)	1.495** (4.87)	0.724* (2.23)	0.840** (2.69)
cty02sales	-1.930 (1.50)	0.590 (0.41)	0.570 (0.40)	-1.120 (0.80)	-0.110 (0.05)
cty02education	-1.333** (5.54)	-0.862** (3.59)	-0.824** (3.38)	-0.527* (2.13)	-0.632** (2.64)
cty02highway	-4.236** (6.02)	-3.560** (3.67)	-3.480** (3.61)	-2.120* (2.22)	-2.223* (2.15)
cty02safety	5.089* (2.45)	1.470 (0.80)	1.180 (0.62)	-0.810 (0.43)	-0.280 (0.15)
cty02naturalrec	0.850 (1.52)	0.905* (2.07)	0.961* (2.21)	0.738* (2.39)	0.616* (2.38)
cty02sewerage	-3.631* (2.43)	-1.900 (1.32)	-1.860 (1.30)	-0.770 (0.55)	-1.590 (1.04)
Constant	10.016** (147.32)	10.112** (69.25)	10.087** (70.06)	9.030** (14.46)	9.300** (15.06)
Observations	1040	1040	1040	1040	1040
Adjusted R-squared	0.18	0.30	0.31	0.43	0.47

Notes: Robust *t* statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level. N579 stands for all nonmetropolitan counties not adjacent to a metro area. Model 2 adds to Model 1 additional RTW state dummy variable, Census dummies, and rural-urban continuum dummies as explanatory variables. Model3 includes additional amenity variables. Model 4 includes demographic variables. Model 5 replaces state fiscal variables with 47 state dummies. Model 6 is similar to Model 4 except including only some major fiscal variables. Wage data are from the BEA and Rent data are from the HUD.

Appendix Table 3B. Level Equation Model Results for Sample N579, Dependent variables: ln(rent2002)

	Model 1	Model 2	Model 3	Model 5
stl02_property	5.757** (6.87)	3.422** (3.01)	2.997** (2.64)	
stl02_sales	-4.538** (4.30)	1.270 (1.12)	1.690 (1.37)	
stl02_individual	-2.334** (3.57)	0.080 (0.08)	1.170 (0.95)	
stl02_corporate	12.334** (3.58)	0.160 (0.04)	0.320 (0.08)	
stl02_rest	-6.620** (7.17)	-3.513** (3.19)	-2.030 (1.45)	
stl02_firstsecond	-5.911** (4.70)	-5.430** (4.96)	-4.629** (4.32)	
stl02_higheredu	-6.991** (4.33)	-5.266** (3.71)	-7.244** (3.52)	
stl02_hospitalhealth	-8.029** (3.15)	1.070 (0.44)	2.240 (0.88)	
stl02_highway	4.934** (3.36)	2.707* (2.40)	2.891* (2.53)	
stl02_publicsafety	21.967** (7.22)	6.070 (1.50)	3.970 (1.01)	
stl02_envirohousing	-1.030 (0.40)	-3.660 (1.55)	-5.436* (2.16)	
stl02_govtadmin	13.785** (5.61)	-1.460 (0.47)	-3.830 (1.11)	
cty02property	0.457** (2.97)	0.210 (1.91)	0.180 (1.65)	0.267** (3.33)
cty02sales	5.110** (2.84)	0.530 (0.33)	0.720 (0.45)	3.490 (1.77)
cty02education	-0.453** (2.95)	-0.210 (1.71)	-0.170 (1.41)	-0.347** (3.35)
cty02highway	-0.760 (1.89)	0.060 (0.16)	0.080 (0.22)	-0.250 (0.95)
cty02safety	2.680 (1.93)	1.610 (1.73)	1.510 (1.70)	-0.150 (0.35)
cty02naturalrec	0.470 (1.07)	0.270 (0.73)	0.250 (0.68)	0.330 (1.09)
cty02sewerage	3.330 (1.69)	2.180 (1.77)	2.230 (1.82)	1.000 (1.06)
Constant	6.015** (96.19)	6.770** (67.35)	6.778** (67.17)	6.275** (63.78)
Observations	958	958	958	958
Adjusted R-squared	0.45	0.69	0.69	0.81

Notes: Robust *t* statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level. N579 stands for all nonmetropolitan counties not adjacent to a metro area. Model 2 adds to Model 1 additional RTW state dummy variable, Census dummies, and rural-urban continuum dummies as explanatory variables. Model3 includes additional amenity variables. Model 4 includes demographic variables. Model 5 replaces state fiscal variables with 47 state dummies. Model 6 is similar to Model 4 except including only some major fiscal variables. Wage data are from the BEA and Rent data are from the HUD.

Appendix Table 4. Level Equation Model Results for Sample N468 Considering SBSI Variables, Dependent variables: ln(wage2002) and ln(rent2002)

	wage		rent	
	Model 4, +SBSI	Model 4, +SBSI+ERS	Model 3, +SBSI	Model 3, +SBSI+ERS
stl02_property	-1.610 (1.00)	-2.080 (1.38)	6.246** (5.15)	6.296** (5.15)
stl02_sales	1.720 (1.75)	1.660 (1.79)	-1.260 (1.44)	-1.130 (1.28)
top_pi	-0.016* (2.22)	-0.010 (1.92)	-0.017** (4.11)	-0.018** (4.20)
top_capitalgains	0.010 (1.46)	0.010 (1.04)	0.020** (4.22)	0.020** (4.36)
top_corporate	0.010 (1.74)	0.010 (1.56)	-0.022** (5.06)	-0.022** (4.95)
deathtax	-0.039* (2.57)	-0.030* (2.05)	0.043** (3.06)	0.042** (3.04)
unemptax	0.010 (1.88)	0.013* (2.07)	0.010 (1.75)	0.010 (1.92)
utilitiescosts	-0.010 (0.17)	0.020 (0.42)	0.270** (5.56)	0.259** (5.32)
compensation	0.010 (0.64)	0.010 (0.52)	-0.020 (1.15)	-0.020 (1.20)
gastax	0.030 (0.17)	0.000 (0.02)	0.516** (3.83)	0.502** (3.68)
miniwage	0.010 (0.16)	0.010 (0.34)	0.208** (6.25)	0.204** (5.76)
stl02_rest	3.220 (1.79)	1.080 (0.66)	-2.080 (1.38)	-1.800 (1.19)
stl02_firstsecond	1.600 (0.79)	1.440 (0.75)	-2.100 (1.31)	-1.870 (1.21)
stl02_higheredu	-0.650 (0.19)	0.120 (0.04)	-0.350 (0.14)	-1.020 (0.39)
stl02_hospitalhealth	-5.240 (1.25)	-5.270 (1.40)	-21.981** (6.83)	-21.806** (6.87)
stl02_highway	-6.433** (2.69)	-6.270** (2.83)	-2.290 (1.24)	-1.860 (1.00)
stl02_publicsafety	8.110 (1.81)	6.130 (1.49)	3.900 (1.23)	3.810 (1.20)
stl02_envirohousing	-11.480* (2.45)	-8.320 (1.94)	0.170 (0.04)	-0.400 (0.10)
stl02_govtadmin	-0.140 (0.03)	0.360 (0.08)	15.403** (5.15)	15.238** (5.09)
cty02property	0.610 (1.89)	0.430 (1.36)	0.335* (2.32)	0.314* (2.28)
cty02sales	0.000 (0.30)	-1.000 (0.62)	2.000 (1.73)	2.000 (1.56)
cty02education	-0.657** (2.67)	-0.511* (2.25)	-0.800** (4.75)	-0.751** (4.56)
cty02highway	-3.017** (3.25)	-2.193* (2.44)	-2.409** (5.02)	-2.267** (4.62)
cty02safety	0.020 (0.01)	-0.210 (0.11)	4.367** (2.91)	4.169** (2.68)
cty02naturalrec	0.707* (2.27)	0.758** (2.65)	0.140 (0.44)	0.170 (0.52)
cty02sewerage	-1.430 (0.99)	-1.070 (0.73)	-0.510 (0.36)	-0.590 (0.41)
Constant	8.709** (13.86)	9.700** (16.40)	5.895** (40.11)	5.881** (39.23)
Observations	1040	1040	1040	1040
Adjusted R-squared	0.42	0.48	0.65	0.65

Notes: Robust *t* statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level; Nall stands for all nonmetropolitan counties; The four ERS typology dummy variables are fm, mi, fl, rec. Wage data are from the BEA and Rent data are from the HUD.

Appendix Table 5. Level Equation Model Results for Sample N579 Considering SBSI Variables, Dependent variables: ln(wage2002) and ln(rent2002)

	wage		rent	
	Model 4, +SBSI	Model 4, +SBSI+ERS	Model 3, +SBSI	Model 3, +SBSI+ERS
stl02_property	2.060 (1.41)	0.460 (0.32)	6.019** (4.18)	5.726** (3.90)
stl02_sales	2.644* (2.18)	2.377* (2.06)	-0.520 (0.46)	-0.500 (0.45)
top_pi	-0.038** (6.21)	-0.035** (5.85)	-0.024** (4.38)	-0.025** (4.56)
top_capitalgains	0.041** (5.27)	0.035** (4.73)	0.022** (3.58)	0.023** (3.72)
top_corporate	0.000 (1.01)	0.000 (0.46)	-0.010 (1.96)	-0.010 (1.77)
deathtax	-0.069** (3.56)	-0.049** (2.66)	0.010 (0.48)	0.010 (0.41)
unemptax	0.025** (4.07)	0.018** (3.00)	0.010 (1.72)	0.010 (1.22)
utilitiescosts	0.050 (0.80)	0.040 (0.65)	0.264** (3.57)	0.242** (3.28)
compensation	-0.030 (1.25)	-0.020 (1.11)	0.000 (0.12)	0.000 (0.24)
gastax	0.473** (2.74)	0.416* (2.50)	0.519** (4.40)	0.521** (4.33)
miniwage	0.070 (1.79)	0.040 (1.13)	0.303** (4.21)	0.295** (4.09)
stl02_rest	3.170 (1.52)	1.170 (0.61)	-6.628** (3.86)	-6.573** (3.78)
stl02_firstsecond	0.310 (0.15)	1.190 (0.61)	-4.054** (2.75)	-4.466** (2.99)
stl02_higheredu	-4.350 (1.26)	-3.790 (1.18)	-3.270 (1.40)	-3.330 (1.44)
stl02_hospitalhealth	-16.620** (4.22)	-13.699** (3.73)	-15.853** (5.29)	-15.098** (4.99)
stl02_highway	-0.680 (0.30)	-0.870 (0.41)	5.462** (4.07)	5.570** (4.05)
stl02_publicsafety	10.890 (1.58)	10.170 (1.57)	12.424* (1.99)	12.705* (2.02)
stl02_envirohousing	-16.739** (2.62)	-10.450 (1.79)	-5.970 (1.48)	-5.160 (1.26)
stl02_govtadmin	1.530 (0.39)	-0.700 (0.18)	4.160 (1.28)	4.070 (1.29)
cty02property	0.250 (1.15)	0.180 (0.85)	0.279** (2.97)	0.260** (2.77)
cty02sales	-2.000 (1.43)	-3.375** (2.99)	2.000 (1.40)	2.000 (1.00)
cty02education	-1.003** (4.59)	-0.897** (4.24)	-0.504** (4.09)	-0.440** (3.81)
cty02highway	-0.987* (2.10)	-0.530 (1.12)	-0.410 (1.15)	-0.210 (0.61)
cty02safety	0.930 (1.20)	0.480 (0.65)	2.018* (2.16)	1.935* (2.22)
cty02naturalrec	0.160 (0.32)	0.150 (0.33)	0.520 (1.32)	0.520 (1.36)
cty02sewerage	0.100 (0.09)	-0.270 (0.24)	1.890 (1.59)	1.960 (1.63)
Constant	8.674** (18.65)	9.363** (20.74)	5.777** (34.71)	5.783** (35.53)
Observations	958	958	958	958
Adjusted R-squared	0.51	0.54	0.72	0.73

Notes: Robust *t* statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level; Nall stands for all nonmetropolitan counties; The four ERS typology dummy variables are fm, mi, fl, rec. Wage data are from the BEA and Rent data are from the HUD.

Appendix Table 6. Level Equation Model Results for Sample N468 and N579, Fixed Effects Regression

	N468		N579	
	Fixed Effects from Wage Equation	Fixed Effects from Rent Equation	Fixed Effects from Wage Equation	Fixed Effects from Rent Equation
stl02_property	2.390 (1.05)	8.646** (2.98)	4.750 (1.28)	5.350 (1.93)
stl02_sales	0.790 (0.59)	-1.150 (0.51)	2.210 (0.71)	-1.740 (0.63)
stl02_individual	-1.040 (0.82)	-0.900 (0.36)	1.560 (0.84)	-1.640 (0.64)
stl02_corporate	-6.350 (0.95)	-0.480 (0.05)	16.230 (1.67)	-4.700 (0.43)
stl02_rest	1.870 (0.77)	2.100 (0.56)	1.460 (0.32)	-8.850 (1.57)
stl02_firstsecond	-2.440 (0.75)	-10.586* (2.24)	-10.230 (1.74)	-8.750 (1.54)
stl02_higheredu	-0.760 (0.16)	-4.530 (0.67)	-10.910 (1.80)	-16.670 (1.53)
stl02_hospitalhealth	-4.370 (0.92)	-8.610 (1.26)	-2.340 (0.28)	4.810 (0.40)
stl02_highway	-6.780 (1.76)	-5.970 (0.89)	-0.820 (0.13)	7.550 (0.76)
stl02_publicsafety	7.290 (1.18)	13.630 (1.73)	10.850 (1.18)	17.180 (1.89)
stl02_environhousing	-2.600 (0.29)	-6.910 (0.59)	-4.500 (0.33)	-10.810 (0.81)
stl02_govtadmin	8.300 (1.20)	20.700 (1.98)	3.580 (0.35)	13.140 (0.92)
rtw2	-0.030 (1.07)	-0.050 (1.17)	0.030 (0.68)	-0.030 (0.61)
Constant	9.952** (90.43)	6.423** (30.31)	10.560** (52.53)	6.698** (21.63)
Observations	45	45	42	42
Adjusted R-squared	0.19	0.42	0.10	0.17

Notes: Robust *t* statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level; N468 (N479) stands for all nonmetropolitan adjacent (nonadjacent) counties; Columns 1 and 3 are Fixed effects from the wage equation which is based on Model 4 where county fiscal variables are dropped out from the explanatory variables. Column 2 are Fixed effects from the rent equation which is based on Model 3 where county fiscal variables are dropped out from the explanatory variables. Wage data are from the BEA and Rent data are from the HUD.

Appendix Table 7. Level Equation Model Results for Sample N468 and N579, Fixed Effects Regression Considering SBSI Variables

	N468		N579	
	Fixed Effects from Wage Equation	Fixed Effects from Rent Equation	Fixed Effects from Wage Equation	Fixed Effects from Rent Equation
stl02_property	0.387 (0.19)	4.729 (1.89)	1.397 (0.30)	0.406 (0.10)
stl02_sales	-0.465 (0.35)	-2.492 (1.05)	0.132 (0.04)	-0.749 (0.27)
top_pi	0.004 (0.49)	-0.010 (0.86)	-0.022 (1.18)	-0.029 (1.37)
top_capitalgains	-0.008 (1.24)	0.016 (1.75)	0.008 (0.56)	0.017 (1.11)
top_corporate	-0.009 (0.99)	-0.025* (2.38)	0.016 (0.98)	0.007 (0.38)
deathtax	0.039 (1.19)	0.012 (0.27)	-0.054 (0.73)	-0.060 (0.83)
unemptax	0.012 (1.16)	-0.006 (0.37)	-0.010 (0.43)	0.012 (0.72)
utilitiescosts	0.155* (2.32)	0.289** (3.64)	0.139 (1.11)	0.258* (2.19)
compensation	0.034 (1.55)	-0.022 (0.67)	0.012 (0.18)	-0.055 (0.77)
gastax	-0.348 (1.27)	0.453 (1.30)	-0.452 (0.99)	-0.109 (0.24)
miniwage	-0.006 (0.18)	0.061 (1.29)	-0.031 (0.50)	0.168 (2.01)
stl02_rest	-0.039 (0.02)	1.086 (0.34)	-2.157 (0.36)	-7.643 (1.47)
stl02_firstsecond	-2.487 (0.77)	-9.014* (2.08)	-8.491 (1.12)	-2.019 (0.35)
stl02_higheredu	0.868 (0.16)	-0.215 (0.03)	-6.005 (0.74)	-17.022 (1.65)
stl02_hospitalhealth	-2.878 (0.51)	-20.640** (3.09)	-3.628 (0.43)	-0.290 (0.03)
stl02_highway	-4.536 (1.00)	-3.054 (0.57)	0.304 (0.04)	15.193 (1.59)
stl02_publicsafety	8.767 (1.27)	5.670 (0.88)	11.575 (0.82)	9.205 (0.86)
stl02_envirohousing	-0.111 (0.01)	-5.663 (0.50)	1.595 (0.08)	-27.186 (1.47)
stl02_govtadmin	4.709 (0.58)	18.026* (2.16)	3.596 (0.25)	13.041 (0.83)
rtw2	-0.017 (0.55)	-0.042 (1.07)	0.023 (0.44)	0.018 (0.37)
Constant	9.886** (69.05)	6.440** (31.37)	10.619** (45.95)	6.435** (27.00)
Observations	45	45	42	42
Adjusted R-squared	0.19	0.66	0.03	0.51

Notes: Robust *t* statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level; N468 (N479) stands for all nonmetropolitan adjacent (nonadjacent) counties; Columns 1 and 3 are Fixed effects from the wage equation which is based on Model 4 where county fiscal variables are dropped out from the explanatory variables. Columns 2 and 4 are Fixed effects from the rent equation which is based on Model 3 where county fiscal variables are dropped out from the explanatory variables. Wage data are from the BEA and Rent data are from the HUD.

Appendix Table 8A. Level Equation Model Results, Fixed Effects Regression by Nine Census Divisions, Dependent variable: Fixed effects from Wage Equation

	goup1	goup2	goup3	goup4	goup5	goup6	goup7	goup8	goup9
stl02_property	3.396 (1.17)	2.852 (1.05)	3.930 (1.29)	5.114 (2.05)	2.937 (1.10)	6.086* (2.26)	2.815 (0.97)	3.792 (1.46)	3.440 (1.41)
stl02_sales	1.092 (0.53)	1.227 (0.65)	1.991 (0.87)	2.505 (1.41)	0.213 (0.08)	2.259 (1.17)	1.001 (0.51)	1.348 (0.69)	0.681 (0.37)
stl02_individual	1.541 (1.00)	1.419 (0.94)	1.216 (0.68)	3.623 (2.04)	0.528 (0.31)	2.136 (1.34)	1.350 (0.95)	1.448 (0.99)	0.812 (0.55)
stl02_corporate	-2.316 (0.31)	-3.373 (0.47)	7.894 (1.35)	-11.372 (1.41)	-3.371 (0.43)	0.804 (0.13)	0.399 (0.05)	-0.506 (0.07)	-1.076 (0.14)
stl02_rest	2.128 (0.68)	2.879 (1.03)	-0.911 (0.33)	5.738* (2.30)	1.706 (0.49)	2.716 (0.96)	1.078 (0.30)	2.190 (0.75)	2.383 (0.75)
stl02_firstsecond	-3.712 (0.95)	-3.073 (0.84)	-3.280 (0.97)	-7.976* (2.28)	-4.080 (1.19)	-6.189 (1.60)	-5.484 (1.42)	-4.656 (1.31)	-2.575 (0.68)
stl02_higheredu	-8.780 (1.33)	-10.014 (1.18)	-4.774 (0.89)	-8.982* (2.09)	-8.792 (1.34)	-7.743 (1.41)	-8.385 (1.26)	-7.955 (1.35)	-7.192 (1.19)
stl02_hospitalhealth	-2.006 (0.30)	-2.640 (0.33)	4.651 (0.62)	-6.856 (1.26)	3.561 (0.48)	-3.241 (0.50)	-0.826 (0.12)	-1.493 (0.23)	-2.133 (0.32)
stl02_highway	-1.987 (0.38)	-1.945 (0.27)	-2.303 (0.39)	-8.327* (2.69)	-1.431 (0.22)	-1.148 (0.23)	-2.755 (0.48)	-2.914 (0.58)	-3.180 (0.59)
stl02_publicsafety	5.566 (0.77)	6.326 (0.81)	-6.334 (1.29)	2.262 (0.35)	4.400 (0.58)	8.700 (1.18)	4.478 (0.53)	4.779 (0.67)	6.288 (0.92)
stl02_envirohousing	-6.562 (0.63)	-7.869 (0.70)	-0.239 (0.02)	5.847 (0.63)	-2.697 (0.28)	-12.556 (1.14)	-7.301 (0.69)	-5.138 (0.52)	-4.820 (0.52)
stl02_govtadmin	-0.220 (0.03)	-1.139 (0.11)	3.715 (0.51)	4.926 (0.79)	2.750 (0.40)	5.148 (0.62)	2.768 (0.40)	2.876 (0.43)	-0.662 (0.10)
rtw2	-0.018 (0.48)	-0.032 (0.90)	-0.017 (0.55)	0.019 (0.54)	-0.023 (0.60)	-0.025 (0.75)	-0.020 (0.53)	-0.014 (0.42)	-0.008 (0.26)
Constant	10.298** (62.53)	10.305** (67.63)	10.267** (61.60)	10.286** (64.84)	10.282** (69.89)	10.192** (63.91)	10.401** (46.01)	10.278** (68.09)	10.229** (66.74)
Observations	41	43	42	39	42	43	42	46	44
Adjusted R-squared	0.10	0.11	0.17	0.37	0.14	0.20	0.13	0.13	0.07

Notes: Robust *t* statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level. N468 (N479) stands for all nonmetropolitan adjacent (nonadjacent) counties. Fixed effects from the wage equation are based on Model 4 where county fiscal variables are dropped out from the explanatory variables. Wage data are from the BEA and Rent data are from the HUD.

Appendix Table 8B. Level Equation Model Results, Fixed Effects Regression by Nine Census Divisions, Dependent variable: Fixed effects from Rent Equation

	goup1	goup2	goup3	goup4	goup5	goup6	goup7	goup8	goup9
std02_property	6.626 (1.88)	7.332 (1.98)	10.281* (2.70)	8.960** (2.82)	6.883 (1.96)	9.780* (2.59)	7.232 (1.95)	8.125* (2.68)	6.614* (2.66)
std02_sales	-1.713 (0.49)	-1.744 (0.60)	0.236 (0.07)	0.500 (0.19)	-4.587 (0.89)	-1.309 (0.39)	-1.477 (0.46)	-1.668 (0.54)	-2.559 (0.92)
std02_individual	1.290 (0.42)	2.098 (0.72)	2.261 (0.68)	1.951 (0.51)	1.102 (0.37)	1.960 (0.65)	0.300 (0.12)	1.259 (0.46)	0.703 (0.24)
std02_corporate	-2.712 (0.25)	0.637 (0.06)	8.541 (0.74)	-7.659 (0.51)	4.692 (0.39)	3.041 (0.28)	5.448 (0.46)	2.231 (0.21)	6.996 (0.55)
std02_rest	-1.824 (0.30)	2.385 (0.61)	-1.382 (0.22)	4.547 (0.95)	-2.837 (0.47)	-0.370 (0.07)	-1.765 (0.26)	-0.803 (0.15)	-1.953 (0.34)
std02_firstsecond	-12.655* (2.29)	-11.351 (1.88)	-13.926* (2.40)	-13.397* (2.27)	-12.753* (2.33)	-14.392* (2.45)	-15.005* (2.15)	-14.089* (2.54)	-12.425 (1.88)
std02_higheredu	-16.860 (1.34)	-23.645 (1.62)	-8.369 (0.67)	-11.254 (1.61)	-16.264 (1.24)	-12.144 (1.09)	-11.705 (0.94)	-12.797 (1.15)	-13.701 (1.15)
std02_hospitalhealth	3.284 (0.26)	7.944 (0.55)	8.303 (0.58)	-9.144 (1.28)	4.973 (0.31)	0.864 (0.07)	4.031 (0.31)	2.323 (0.19)	0.831 (0.07)
std02_highway	3.246 (0.30)	10.435 (0.79)	0.479 (0.04)	-7.713 (1.11)	7.078 (0.52)	4.268 (0.38)	0.863 (0.07)	2.380 (0.23)	4.580 (0.40)
std02_publicsafety	15.249 (1.61)	23.387* (2.23)	5.991 (0.65)	7.386 (0.98)	17.859 (1.59)	20.214 (1.96)	13.153 (1.36)	15.889 (1.75)	18.625* (2.14)
std02_envirohousing	-15.267 (0.98)	-25.824 (1.61)	-12.848 (0.81)	-4.732 (0.38)	-11.753 (0.77)	-16.512 (0.96)	-15.306 (0.91)	-12.905 (0.92)	-9.551 (0.75)
std02_govtadmin	16.234 (1.07)	-3.275 (0.17)	18.361 (1.26)	25.821* (2.21)	15.036 (0.96)	11.341 (0.71)	15.489 (1.10)	14.154 (1.02)	11.807 (0.88)
rtw2	-0.056 (1.03)	-0.063 (1.00)	-0.039 (0.77)	-0.019 (0.40)	-0.017 (0.26)	-0.049 (0.96)	-0.033 (0.60)	-0.038 (0.80)	-0.031 (0.65)
Constant	6.730** (22.59)	6.633** (25.49)	6.547** (24.26)	6.578** (24.89)	6.636** (23.63)	6.564** (23.44)	6.805** (15.18)	6.660** (24.77)	6.605** (22.75)
Observations	41	43	42	39	42	43	42	46	44
Adjusted R-squared	0.26	0.31	0.23	0.38	0.27	0.22	0.20	0.25	0.20

Notes: Robust *t* statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level. N468 (N479) stands for all nonmetropolitan adjacent (nonadjacent) counties. Fixed effects from the rent equation which is based on Model 3 where county fiscal variables are dropped out from the explanatory variables. Rent data are from the HUD.

Appendix Table 9A. Level Equation Model Results, Fixed Effects Regression by Nine Census Divisions Considering SBSI Variables, Dependent Variable: Fixed Effects from Wage Equation

	goup1	goup2	goup3	goup4	goup5	goup6	goup7	goup8	goup9
stl02_property	-1.049 (0.28)	-1.744 (0.51)	-1.609 (0.57)	2.431 (0.81)	-0.411 (0.13)	0.255 (0.07)	-3.067 (0.94)	-0.907 (0.30)	-0.389 (0.13)
stl02_sales	-0.762 (0.34)	-0.885 (0.40)	-0.826 (0.39)	-0.998 (0.47)	-0.749 (0.25)	-0.444 (0.17)	-0.666 (0.36)	-0.881 (0.42)	-1.047 (0.53)
top_pi	-0.008 (0.57)	-0.005 (0.40)	-0.015 (1.10)	0.019 (1.40)	-0.008 (0.52)	-0.009 (0.59)	-0.003 (0.22)	-0.008 (0.59)	-0.012 (0.86)
top_capitalgains	0.000 (0.03)	-0.003 (0.26)	-0.003 (0.30)	-0.013 (1.44)	-0.002 (0.17)	0.000 (0.00)	-0.008 (0.48)	-0.002 (0.27)	0.000 (0.03)
top_corporate	0.000 (0.04)	0.000 (0.03)	0.012 (1.19)	-0.018 (1.46)	-0.001 (0.08)	0.000 (0.03)	0.004 (0.31)	0.001 (0.12)	0.004 (0.31)
deathtax	0.008 (0.17)	0.047 (1.17)	-0.005 (0.13)	0.094 (2.09)	0.014 (0.37)	0.028 (0.64)	0.005 (0.12)	0.020 (0.52)	-0.001 (0.01)
unemptax	0.009 (0.43)	0.013 (0.82)	-0.010 (1.08)	0.013 (0.91)	0.018 (1.04)	0.010 (0.58)	0.012 (0.73)	0.009 (0.58)	0.008 (0.52)
utilitiescosts	0.161 (1.49)	0.164 (1.74)	0.101 (1.39)	0.238* (2.11)	0.138 (1.55)	0.164 (1.56)	0.220* (2.55)	0.165 (1.93)	0.148 (1.82)
compensation	-0.003 (0.09)	0.003 (0.09)	-0.014 (0.46)	-0.100 (1.78)	0.018 (0.57)	0.001 (0.02)	0.006 (0.18)	0.001 (0.04)	0.002 (0.07)
gastax	-0.315 (0.63)	-0.376 (0.88)	-0.191 (0.90)	-0.262 (0.83)	-0.146 (0.44)	-0.307 (0.98)	-0.074 (0.23)	-0.250 (0.84)	-0.270 (0.91)
miniwage	0.019 (0.34)	0.023 (0.44)	0.054 (1.18)	-0.042 (1.31)	0.032 (0.58)	0.022 (0.44)	-0.008 (0.19)	0.018 (0.38)	0.010 (0.18)
stl02_rest	-1.463 (0.38)	-0.814 (0.23)	-5.070 (1.81)	2.419 (0.93)	-1.191 (0.30)	-1.414 (0.39)	-2.591 (0.72)	-1.656 (0.49)	-0.932 (0.26)
stl02_firstsecond	-0.475 (0.10)	1.424 (0.30)	2.534 (0.59)	-7.722 (1.88)	-1.064 (0.25)	-1.505 (0.37)	-3.419 (0.88)	-0.743 (0.19)	0.577 (0.15)
stl02_higheredu	-7.101 (0.87)	-9.946 (0.87)	-1.830 (0.35)	-3.393 (0.60)	-7.983 (1.18)	-6.881 (0.94)	-5.231 (0.69)	-6.220 (0.93)	-5.010 (0.73)
stl02_hospitalhealth	-2.418 (0.27)	-2.584 (0.25)	3.528 (0.57)	-3.973 (0.68)	3.739 (0.46)	-2.462 (0.36)	2.116 (0.26)	-1.655 (0.25)	-1.689 (0.26)
stl02_highway	0.841 (0.13)	2.092 (0.22)	2.477 (0.41)	-7.554 (1.65)	1.057 (0.14)	0.845 (0.13)	-1.556 (0.27)	0.200 (0.03)	-0.297 (0.05)
stl02_publicsafety	4.762 (0.54)	8.106 (0.72)	-8.665 (1.46)	1.871 (0.26)	5.496 (0.64)	6.342 (0.74)	0.778 (0.08)	4.434 (0.53)	6.082 (0.74)
stl02_environhousing	-4.108 (0.30)	-5.271 (0.38)	7.080 (0.74)	13.489 (1.16)	-4.183 (0.33)	-8.284 (0.57)	-7.037 (0.58)	-2.535 (0.21)	-4.599 (0.37)
stl02_govtadmin	-0.518 (0.05)	-4.012 (0.26)	3.467 (0.40)	-1.070 (0.13)	-1.152 (0.13)	5.626 (0.59)	3.193 (0.37)	2.317 (0.29)	-0.773 (0.09)
rtw2	-0.024 (0.62)	-0.030 (0.87)	-0.012 (0.46)	-0.031 (0.76)	-0.014 (0.36)	-0.016 (0.41)	-0.015 (0.44)	-0.014 (0.44)	-0.005 (0.17)
Constant	10.290** (55.95)	10.208** (57.21)	10.225** (69.65)	10.445** (62.69)	10.195** (58.11)	10.205** (63.42)	10.399** (50.91)	10.229** (65.74)	10.182** (69.58)
Observations	41	43	42	39	42	43	42	46	44
Adjusted R-squared	-0.03	0.05	0.29	0.23	0.08	0.09	0.10	0.08	0.00

Notes: Robust t statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level. N468 (N479) stands for all nonmetropolitan adjacent (nonadjacent) counties. Fixed effects from the wage equation are based on Model 4 where county fiscal variables are dropped out from the explanatory variables. Wage data are from the BEA.

Appendix Table 9B. Level Equation Model Results, Fixed Effects Regression by Nine Census Divisions Considering SBSI Variables, Dependent Variable: Fixed Effects from Rent Equation

	goup1	goup2	goup3	goup4	goup5	goup6	goup7	goup8	goup9
stl02_property	1.935 (0.36)	-0.456 (0.11)	0.455 (0.09)	7.755* (2.64)	1.222 (0.29)	-0.270 (0.05)	-1.826 (0.33)	0.850 (0.21)	1.500 (0.38)
stl02_sales	-3.224 (0.88)	-4.090 (1.30)	-1.367 (0.40)	-1.567 (0.57)	-3.130 (0.68)	-4.520 (1.05)	-3.269 (0.95)	-3.606 (1.02)	-3.627 (1.05)
top_pi	-0.031 (1.52)	-0.022 (1.21)	-0.038 (1.71)	-0.007 (0.33)	-0.030 (1.21)	-0.032 (1.60)	-0.031 (1.49)	-0.030 (1.55)	-0.034 (1.69)
top_capitalgains	0.031 (1.60)	0.011 (0.81)	0.022 (1.85)	0.020 (1.20)	0.021 (1.54)	0.021 (1.48)	0.015 (0.89)	0.021 (1.66)	0.023 (1.92)
top_corporate	-0.006 (0.31)	0.006 (0.28)	0.008 (0.46)	-0.023 (1.34)	-0.003 (0.12)	-0.004 (0.19)	0.005 (0.24)	-0.001 (0.08)	0.001 (0.03)
deathtax	-0.069 (0.94)	0.017 (0.27)	-0.081 (1.37)	-0.011 (0.16)	-0.034 (0.56)	-0.022 (0.32)	-0.025 (0.41)	-0.032 (0.53)	-0.048 (0.73)
unemptax	-0.006 (0.24)	0.006 (0.32)	-0.005 (0.41)	-0.016 (0.76)	0.002 (0.08)	-0.007 (0.34)	0.010 (0.57)	-0.001 (0.05)	-0.002 (0.09)
utilitiescosts	0.222 (1.78)	0.247* (2.12)	0.273* (2.59)	0.126 (0.98)	0.260* (2.31)	0.309* (2.28)	0.329* (2.78)	0.273* (2.74)	0.259* (2.56)
compensation	-0.066 (1.19)	-0.035 (0.72)	-0.092 (1.86)	-0.002 (0.02)	-0.043 (0.77)	-0.040 (0.66)	-0.045 (0.85)	-0.048 (0.89)	-0.047 (0.88)
gastax	0.446 (0.70)	0.071 (0.12)	0.389 (1.03)	0.788 (1.48)	0.417 (1.05)	0.410 (0.96)	0.454 (0.95)	0.392 (1.06)	0.390 (1.11)
miniwage	0.157 (2.03)	0.166* (2.30)	0.168* (2.17)	0.087 (1.87)	0.163 (1.83)	0.154 (2.00)	0.138 (2.06)	0.153* (2.07)	0.150 (1.74)
stl02_rest	-2.783 (0.48)	-2.410 (0.49)	-5.386 (0.92)	2.394 (0.64)	-3.941 (0.65)	-5.027 (0.87)	-4.939 (0.87)	-4.280 (0.82)	-3.542 (0.66)
stl02_firstsecond	-6.027 (1.06)	-1.292 (0.19)	-3.132 (0.51)	-13.116* (2.29)	-5.585 (0.94)	-5.160 (1.00)	-5.154 (1.03)	-5.402 (1.08)	-4.267 (0.82)
stl02_higheredu	-11.951 (1.00)	-21.579 (1.33)	-12.173 (1.30)	-6.329 (0.89)	-10.026 (0.92)	-7.999 (0.75)	-10.647 (1.06)	-9.959 (1.03)	-8.840 (0.92)
stl02_hospitalhealth	-16.020 (1.08)	-4.603 (0.32)	-3.390 (0.38)	-24.638* (2.42)	-11.323 (0.76)	-11.249 (1.07)	-7.270 (0.61)	-12.064 (1.16)	-12.082 (1.13)
stl02_highway	9.351 (0.91)	16.967 (1.28)	14.129 (1.36)	-7.491 (1.02)	8.330 (0.65)	9.143 (0.91)	6.320 (0.70)	8.837 (0.91)	8.251 (0.84)
stl02_publicsafety	9.624 (0.92)	20.528 (1.56)	-1.361 (0.13)	2.334 (0.37)	9.475 (0.86)	8.569 (0.79)	6.147 (0.60)	9.688 (1.01)	10.859 (1.25)
stl02_environhousing	-20.774 (1.15)	-20.614 (1.15)	-20.783 (1.47)	-0.726 (0.05)	-14.508 (0.77)	-10.700 (0.54)	-17.353 (1.02)	-13.951 (0.86)	-16.358 (0.91)
stl02_govtadmin	5.468 (0.32)	-8.490 (0.35)	18.772 (1.50)	19.261 (1.89)	8.649 (0.63)	10.075 (0.74)	10.450 (0.86)	9.790 (0.80)	7.081 (0.59)
rtw2	-0.025 (0.53)	-0.026 (0.50)	-0.009 (0.21)	-0.002 (0.04)	-0.017 (0.31)	0.001 (0.01)	0.001 (0.03)	-0.014 (0.33)	-0.006 (0.14)
Constant	6.716** (27.14)	6.388** (23.27)	6.440** (28.65)	6.732** (23.51)	6.525** (21.47)	6.515** (25.29)	6.566** (19.48)	6.520** (26.71)	6.477** (25.67)
Observations	41	43	42	39	42	43	42	46	44
Adjusted R-squared	0.53	0.57	0.63	0.58	0.51	0.51	0.54	0.55	0.48

Notes: Robust t statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level. N468 (N479) stands for all nonmetropolitan adjacent (nonadjacent) counties. Fixed effects from the rent equation are based on Model 3 where county fiscal variables are dropped out from the explanatory variables. Rent data are from the HUD.

Appendix Table 10. Level Equation Model Results for Sample Nall, N468, and N579, Instrumental Variable Estimation, Dependent Variables: ln(wage2002) and ln(rent2002)

	Nall				N468				N579			
	Wage		Rent		Wage		Rent		Wage		Rent	
	IV1	IV2	IV1	IV2	IV1	IV2	IV1	IV2	IV1	IV2	IV1	IV2
stl02_property	1.268 (0.11)	-2.032 (0.90)	29.942 (0.04)	2.815 (1.17)	0.127 (0.09)	0.085 (0.06)	5.464** (4.62)	5.360** (4.55)	-4.598** (2.59)	-3.524 (1.91)	5.187** (4.15)	5.355** (4.36)
stl02_sales	5.353 (1.06)	5.461** (4.17)	14.308 (0.03)	-1.306 (0.51)	3.082 (1.87)	3.232* (1.96)	0.818 (0.63)	0.828 (0.64)	4.678* (1.96)	7.874** (3.35)	1.369 (0.75)	2.507 (1.46)
stl02_individual	-0.191 (0.04)	1.277 (1.07)	-6.985 (0.04)	-1.430 (0.82)	0.139 (0.09)	0.162 (0.11)	-0.447 (0.38)	-0.472 (0.41)	0.108 (0.06)	2.508 (1.28)	-0.664 (0.47)	-0.034 (0.03)
stl02_corporate	-13.783 (1.06)	-16.090** (4.24)	-41.302 (0.03)	6.173 (0.80)	-2.319 (0.56)	-2.946 (0.70)	2.727 (0.81)	2.738 (0.82)	-25.667** (3.62)	-29.034** (3.92)	6.779 (1.20)	4.118 (0.75)
stl02_rest	-7.068 (0.21)	2.743 (0.43)	-80.322 (0.03)	3.139 (0.59)	3.157 (1.40)	2.652 (1.17)	-0.178 (0.09)	-0.231 (0.12)	4.434 (1.48)	6.956* (2.27)	-1.943 (0.96)	-2.103 (1.09)
stl02_firstsecond	-6.167 (0.49)	-5.052 (1.84)	-38.167 (0.04)	-3.379 (0.79)	-2.560 (0.77)	-3.401 (1.03)	-6.154* (2.52)	-6.210* (2.55)	-0.761 (0.30)	-3.931 (1.56)	-6.708** (3.85)	-8.122** (4.97)
stl02_hospitalhealth	-1.434 (0.04)	14.761* (1.97)	-14.424 (0.04)	-2.652 (0.32)	1.075 (0.14)	3.172 (0.41)	3.220 (0.54)	3.773 (0.64)	10.075 (1.45)	19.826** (2.93)	-1.806 (0.33)	2.727 (0.55)
stl02_highway	-22.874 (0.59)	-9.057 (1.27)	-55.158 (0.04)	-4.338 (1.31)	-9.306** (3.95)	-8.953** (3.75)	-9.794** (5.27)	-9.564** (5.18)	-11.852** (4.27)	-9.615** (3.41)	-5.504** (2.97)	-3.588* (2.13)
stl02_publicsafety	16.561 (0.35)	2.913 (0.32)	100.578 (0.03)	-5.656 (0.72)	2.300 (0.55)	2.151 (0.51)	5.404 (1.57)	5.072 (1.50)	0.782 (0.14)	-1.105 (0.19)	-8.129 (1.80)	-6.888 (1.56)
stl02_envirohousing	25.487 (0.30)	-3.074 (0.19)	185.511 (0.03)	-15.070 (1.33)	-4.316 (0.69)	-5.064 (0.81)	-5.235 (1.12)	-5.654 (1.23)	1.475 (0.23)	-4.197 (0.63)	-4.504 (1.04)	-6.089 (1.48)
stl02_govtadmin	47.941 (0.41)	11.287 (0.51)	245.740 (0.03)	4.414 (0.33)	12.857* (2.55)	13.887** (2.73)	24.968** (6.09)	24.555** (6.07)	6.231 (0.92)	-0.230 (0.03)	12.652** (2.69)	10.054* (2.30)
cty02property	2.277 (0.62)	1.198 (1.74)	6.743 (0.03)	-0.220 (0.46)	1.315** (3.88)	1.343** (3.92)	0.252 (1.00)	0.211 (0.85)	1.038** (3.94)	1.035** (3.73)	0.243 (1.40)	0.241 (1.42)
cty02sales	-2.296 (0.18)	-7.138** (2.67)	19.988 (0.04)	1.711 (0.59)	-3.253 (1.28)	-3.720 (1.45)	-0.132 (0.06)	-0.394 (0.19)	-6.833** (2.62)	-8.122** (3.02)	5.558** (3.01)	4.172* (2.38)
cty02education	-1.796 (1.25)	-1.602** (4.69)	-0.852 (0.06)	-0.391 (1.10)	-0.970 (1.72)	-1.173* (2.12)	-0.478 (1.80)	-0.479 (1.80)	-1.511** (4.84)	-1.671** (5.12)	-0.468** (2.75)	-0.504** (3.02)
cty02highway	-3.378 (0.50)	-1.273 (0.92)	-17.406 (0.03)	0.481 (0.29)	-1.507 (0.91)	-1.089 (0.66)	-1.696 (1.42)	-1.701 (1.43)	-0.797 (0.88)	-0.583 (0.61)	-0.620 (0.89)	-0.526 (0.77)
cty02safety	3.162 (0.37)	4.411 (1.82)	43.381 (0.04)	1.201 (0.26)	2.403 (0.74)	2.438 (0.74)	3.628 (1.48)	3.934 (1.62)	3.909 (1.12)	4.363 (1.19)	7.025** (2.67)	7.750** (3.01)
cty02naturalrec	1.055 (0.42)	0.460 (0.72)	2.955 (0.03)	-0.115 (0.11)	1.036 (1.82)	1.012 (1.75)	0.379 (0.78)	0.340 (0.70)	0.186 (0.17)	0.290 (0.25)	-0.725 (0.81)	-0.650 (0.75)
cty02sewerage	-143.767 (0.34)	-12.909 (0.17)	-955.151 (0.03)	77.284 (1.43)	-11.840 (1.22)	-13.239 (1.36)	-1.748 (0.20)	0.179 (0.02)	3.573 (0.32)	4.572 (0.40)	11.608 (1.36)	10.218 (1.25)
Constant	5.328 (0.52)	8.628** (4.47)	4.511 (0.07)	6.737** (32.79)	8.598** (13.27)	8.648** (13.19)	6.356** (48.66)	6.359** (48.69)	8.787** (12.76)	9.126** (12.66)	6.745** (57.33)	6.745** (58.87)
F statistics (All endog. vars. =0)	10.24 (0.000)	10.69 (0.000)	22.14 (0.000)	21.56 (0.000)	4.57 (0.000)	4.42 (0.000)	11.04 (0.000)	10.49 (0.000)	7.76 (0.000)	8.74 (0.000)	18.02 (0.000)	17.55 (0.000)
DWH test for endogeneity	114.62 (0.000)	114.37 (0.000)	350.51 (0.000)	349.13 (0.000)	29.44 0 (0.000)	29.36 (0.004)	168.66 (0.000)	168.05 (0.000)	113.44 (0.000)	117.05 (0.000)	299.45 (0.000)	284.11 (0.000)
Sargan test of exogeneity of the instruments	NA	11.86 (0.003)	NA	0.173 (0.917)	NA	2.46 (0.292)	NA	1.18 (0.553)	NA	13.85 (0.001)	NA	10.11 (0.006)
Observations	1998	1996	1998	1996	1040	1039	1040	1039	958	957	958	957

Notes: Absolute t statistics are in parenthesis are. P-values are in bracket. * indicates significant at 5% level, ** significant at 1% level. Nall stands for all nonmetropolitan counties, N468 (N579) stands for nonmetropolitan counties adjacent (nonadjacent) to a metro area. IV1 is the 2SLS model using lagged fiscal variables as instruments. IV2 is same as IV1 but instead adding two more political voting behavior variables (PRES_REP72, PRES_TO72) as instruments. The wage model is based on Model 4 and the rent model is based on Model 3. NA stands for not applicable. Wage data are from the BEA, Rent data are from the HUD.

Appendix Table 11. Level Equation Model Results for Sample Nall, N468, and N579, Instrumental Variable Estimation with Clustering Method, Dependent Variables: ln(wage2002) and ln(rent2002)

	Nall				N468				N579			
	Wage		Rent		Wage		Rent		Wage		Rent	
	IV1	IV2	IV1	IV2	IV1	IV2	IV1	IV2	IV1	IV2	IV1	IV2
stl02_property	1.268 (0.02)	-2.032 (0.85)	29.942 (0.01)	2.815 (0.89)	0.127 (0.08)	0.085 (0.05)	5.464** (3.09)	5.360** (3.00)	-4.598* (2.06)	-3.524 (1.37)	5.187* (2.01)	5.355* (2.09)
stl02_sales	5.353 (0.34)	5.461** (2.96)	14.308 (0.01)	-1.306 (0.36)	3.082 (1.63)	3.232 (1.66)	0.818 (0.41)	0.828 (0.42)	4.678 (1.71)	7.874* (2.46)	1.369 (0.47)	2.507 (1.00)
stl02_individual	-0.191 (0.01)	1.277 (0.82)	-6.985 (0.01)	-1.430 (0.60)	0.139 (0.08)	0.162 (0.09)	-0.447 (0.22)	-0.472 (0.23)	0.108 (0.05)	2.508 (1.10)	-0.664 (0.23)	-0.034 (0.01)
stl02_corporate	-13.783 (0.91)	-16.090** (2.71)	-41.302 (0.01)	6.173 (0.61)	-2.319 (0.49)	-2.946 (0.60)	2.727 (0.39)	2.738 (0.39)	-25.667** (2.93)	-29.034** (2.94)	6.779 (0.74)	4.118 (0.49)
stl02_rest	-7.068 (0.04)	2.743 (0.39)	-80.322 (0.01)	3.139 (0.47)	3.157 (1.21)	2.652 (1.00)	-0.178 (0.04)	-0.231 (0.06)	4.434 (1.13)	6.956 (1.65)	-1.943 (0.50)	-2.103 (0.55)
stl02_firstsecond	-6.167 (0.11)	-5.052 (1.57)	-38.167 (0.01)	-3.379 (0.66)	-2.560 (0.71)	-3.401 (0.93)	-6.154 (1.68)	-6.210 (1.71)	-0.761 (0.25)	-3.931 (1.16)	-6.708* (2.17)	-8.122** (2.67)
stl02_hospitalhealth	-1.434 (0.01)	14.761 (1.50)	-14.424 (0.01)	-2.652 (0.27)	1.075 (0.11)	3.172 (0.32)	3.220 (0.37)	3.773 (0.44)	10.075 (1.30)	19.826* (2.48)	-1.806 (0.21)	2.727 (0.38)
stl02_highway	-22.874 (0.12)	-9.057 (1.20)	-55.158 (0.01)	-4.338 (1.04)	-9.306** (3.14)	-8.953** (2.92)	-9.794** (2.81)	-9.564** (2.75)	-11.852** (3.68)	-9.615* (2.48)	-5.504 (1.45)	-3.588 (1.10)
stl02_publicsafety	16.561 (0.07)	2.913 (0.29)	100.578 (0.01)	-5.656 (0.54)	2.300 (0.47)	2.151 (0.42)	5.404 (0.93)	5.072 (0.88)	0.782 (0.10)	-1.105 (0.11)	-8.129 (0.82)	-6.888 (0.78)
stl02_environhousing	25.487 (0.06)	-3.074 (0.17)	185.511 (0.01)	-15.070 (1.15)	-4.316 (0.52)	-5.064 (0.59)	-5.235 (0.67)	-5.654 (0.75)	1.475 (0.16)	-4.197 (0.41)	-4.504 (0.47)	-6.089 (0.65)
stl02_govtadmin	47.941 (0.08)	11.287 (0.48)	245.740 (0.01)	4.414 (0.30)	12.857 (1.88)	13.887 (1.91)	24.968** (3.58)	24.555** (3.62)	6.231 (0.72)	-0.230 (0.02)	12.652 (1.40)	10.054 (1.23)
cty02property	2.277 (0.13)	1.198 (1.58)	6.743 (0.01)	-0.220 (0.41)	1.315** (3.15)	1.343** (3.08)	0.252 (0.89)	0.211 (0.78)	1.038* (2.47)	1.035* (2.40)	0.243 (0.98)	0.241 (0.98)
cty02sales	-2.296 (0.04)	-7.138* (2.35)	19.988 (0.01)	1.711 (0.57)	-3.253 (0.97)	-3.720 (1.04)	-0.132 (0.05)	-0.394 (0.15)	-6.833* (2.08)	-8.122* (2.36)	5.558 (1.18)	4.172 (0.95)
cty02education	-1.796 (0.32)	-1.602** (3.63)	-0.852 (0.01)	-0.391 (0.84)	-0.970 (1.45)	-1.173 (1.85)	-0.478 (1.64)	-0.479 (1.66)	-1.511** (3.15)	-1.671** (3.47)	-0.468 (1.73)	-0.504 (1.87)
cty02highway	-3.378 (0.11)	-1.273 (0.83)	-17.406 (0.01)	0.481 (0.28)	-1.507 (0.72)	-1.089 (0.52)	-1.696 (1.25)	-1.701 (1.24)	-0.797 (0.78)	-0.583 (0.53)	-0.620 (0.73)	-0.526 (0.65)
cty02safety	3.162 (0.16)	4.411 (1.24)	43.381 (0.01)	1.201 (0.19)	2.403 (0.55)	2.438 (0.53)	3.628 (1.37)	3.934 (1.45)	3.909 (0.78)	4.363 (0.84)	7.025* (2.00)	7.750* (2.18)
cty02naturalrec	1.055 (0.12)	0.460 (0.80)	2.955 (0.01)	-0.115 (0.13)	1.036 (1.48)	1.012 (1.45)	0.379 (0.74)	0.340 (0.66)	0.186 (0.18)	0.290 (0.28)	-0.725 (0.61)	-0.650 (0.55)
cty02sewerage	-143.767 (0.07)	-12.909 (0.16)	-955.151 (0.01)	77.284 (1.18)	-11.840 (0.66)	-13.239 (0.67)	-1.748 (0.21)	0.179 (0.02)	3.573 (0.25)	4.572 (0.31)	11.608 (1.29)	10.218 (1.12)
Constant	5.328 (0.11)	8.628** (4.02)	4.511 (0.01)	6.737** (29.37)	8.598** (10.21)	8.648** (10.07)	6.356** (30.34)	6.359** (30.35)	8.787** (10.12)	9.126** (10.30)	6.745** (40.28)	6.745** (41.62)
Number of Clusters	174	174	174	174	167	167	167	167	129	129	129	129
F statistics (All endog. vars. =0)	7.47 (0.000)	7.64 (0.000)	9.10 (0.000)	9.17 (0.000)	5.29 (0.000)	5.22 (0.000)	7.23 (0.000)	6.99 (0.000)	5.96 (0.000)	7.84 (0.000)	11.76 (0.000)	13.27 (0.000)
DWH test for endogeneity	34.52 (0.000)	30.51 (0.000)	36.01 (0.007)	35.86 (0.007)	26.48 (0.089)	25.78 (0.105)	36.36 (0.006)	35.99 (0.007)	35.97 (0.007)	30.81 (0.030)	33.88 (0.013)	33.78 (0.031)
Sargan test of exogeneity of the instruments	NA	7.5 (0.023)	NA	0.02 (0.991)	NA	2.25 (0.324)	NA	1.43 (0.490)	NA	8.31 (0.016)	NA	4.9 (0.086)
Observations	1998	1996	1998	1996	1040	1039	1040	1039	958	957	958	957

Notes: Absolute t statistics are in parenthesis are. P-values are in bracket. * indicates significant at 5% level. ** significant at 1% level. Nall stands for all nonmetropolitan counties, N468 (N579) stands for nonmetropolitan counties adjacent (nonadjacent) to a metro area. IV1 is the 2SLS model using lagged fiscal variables as instruments. IV2 is same as IV1 but instead adding two more political voting behavior variables (PRES_REP72, PRES_TO72) as instruments. The wage model is based on Model 4 and the rent model is based on Model 3. NA stands for not applicable. Wage and Rent data are the Census.

Appendix Table 12. Level Equation Model Results for Sample Nall, N468, and N579, Instrumental Variable Estimation, Dependent Variables: ln(earning2000) and ln(housing2000)

	Nall				N468				N579			
	Earning		Housing		Earning		Housing		Earning		Housing	
	IV1	IV2	IV1	IV2	IV1	IV2	IV1	IV2	IV1	IV2	IV1	IV2
stl02_property	3.185 (0.25)	-1.283 (0.70)	7.260 (0.55)	7.192* (2.17)	1.597 (1.34)	1.327 (1.11)	6.800** (3.02)	6.866** (3.07)	-0.703 (0.47)	-0.226 (0.15)	-0.060 (0.02)	-0.351 (0.13)
stl02_sales	6.494 (1.17)	5.998** (5.69)	8.970 (1.42)	9.023** (2.64)	6.087** (4.54)	5.896** (4.39)	8.580** (3.55)	8.579** (3.57)	5.148** (2.58)	6.483** (3.43)	12.329** (3.17)	9.198** (2.60)
stl02_individual	0.677 (0.13)	2.258* (2.35)	7.430 (0.96)	7.532** (2.84)	3.925** (3.16)	3.575** (2.88)	9.992** (4.51)	10.007** (4.55)	0.629 (0.38)	1.530 (0.97)	13.789** (4.50)	10.530** (3.76)
stl02_corporate	-18.002 (1.26)	-19.398** (6.34)	-25.071 (1.82)	-25.073* (2.52)	-6.069 (1.80)	-6.714* (1.97)	4.309 (0.73)	4.332 (0.74)	-17.490** (2.94)	-18.959** (3.18)	-60.422** (5.20)	-55.423** (5.09)
stl02_rest	-11.147 (0.30)	2.124 (0.42)	-2.633 (0.05)	-2.244 (0.32)	2.455 (1.33)	1.549 (0.84)	7.167* (2.13)	7.225* (2.16)	2.166 (0.86)	2.814 (1.14)	9.870* (2.12)	3.565 (0.84)
stl02_firstsecond	-9.658 (0.70)	-6.788** (3.07)	-12.550 (1.21)	-12.605* (2.35)	-6.720* (2.48)	-7.009** (2.61)	-17.832** (3.63)	-17.790** (3.64)	-6.751** (3.14)	-8.288** (4.08)	1.210 (0.32)	4.087 (1.19)
stl02_hospitalhealth	-0.013 (0.00)	17.927** (2.97)	13.166 (0.58)	13.627 (1.16)	11.402 (1.79)	12.438* (1.97)	27.690* (2.39)	27.329* (2.38)	7.777 (1.34)	12.035* (2.21)	21.326 (1.87)	11.022 (1.09)
stl02_highway	-23.364 (0.54)	-6.039 (1.05)	-14.024 (0.49)	-13.804** (3.05)	-10.992** (5.72)	-10.480** (5.39)	-14.573** (4.39)	-14.709** (4.47)	-7.915** (3.40)	-6.712** (2.96)	-7.170 (1.80)	-10.390** (2.99)
stl02_publicsafety	21.703 (0.41)	3.062 (0.42)	5.808 (0.12)	5.413 (0.57)	1.518 (0.45)	1.795 (0.52)	-3.858 (0.60)	-3.644 (0.57)	8.778 (1.83)	8.787 (1.84)	-30.695** (3.09)	-26.928** (2.86)
stl02_envirohousing	25.399 (0.27)	-11.041 (0.86)	-9.309 (0.07)	-10.482 (0.63)	-13.224** (2.60)	-12.680* (2.49)	-48.164** (5.31)	-47.911** (5.33)	-2.484 (0.46)	-4.511 (0.84)	-30.410** (2.84)	-15.403 (1.60)
stl02_govtadmin	59.955 (0.46)	11.146 (0.63)	31.742 (0.27)	30.780 (1.96)	14.801** (3.59)	15.731** (3.79)	10.924 (1.45)	11.136 (1.49)	14.266* (2.51)	11.815* (2.12)	-13.958 (1.39)	-1.945 (0.22)
cty02property	1.951 (0.48)	0.485 (0.87)	2.517 (0.63)	2.484** (3.80)	0.708* (2.56)	0.698* (2.50)	1.798** (3.90)	1.820** (3.99)	0.573** (2.59)	0.578** (2.59)	1.696** (4.41)	1.939** (5.34)
cty02sales	-0.153 (0.01)	-5.875** (2.73)	5.308 (0.50)	5.183 (1.29)	-5.982** (2.89)	-6.388** (3.06)	-1.607 (0.44)	-1.449 (0.40)	-1.282 (0.59)	-2.053 (0.95)	4.003 (1.02)	4.936 (1.37)
cty02education	-2.129 (1.35)	-1.780** (6.46)	-4.415** (3.86)	-4.412** (8.07)	-1.787** (3.87)	-1.909** (4.23)	-4.966** (9.59)	-4.954** (9.63)	-1.729** (6.61)	-1.797** (6.85)	-4.202** (10.99)	-4.287** (11.78)
cty02highway	-3.658 (0.49)	-0.968 (0.87)	-1.480 (0.13)	-1.398 (0.60)	-0.874 (0.65)	-0.590 (0.44)	-1.510 (0.70)	-1.544 (0.72)	-0.721 (0.95)	-0.667 (0.87)	0.182 (0.11)	-0.575 (0.37)
cty02safety	2.077 (0.22)	3.660 (1.88)	3.528 (0.09)	3.389 (0.44)	2.859 (1.08)	3.019 (1.12)	1.625 (0.36)	1.474 (0.33)	1.117 (0.38)	1.540 (0.52)	-1.106 (0.17)	3.043 (0.50)
cty02naturalrec	0.461 (0.16)	-0.296 (0.57)	0.485 (0.20)	0.470 (0.33)	0.249 (0.54)	0.212 (0.45)	-0.298 (0.35)	-0.276 (0.33)	-0.109 (0.12)	-0.059 (0.06)	0.619 (0.33)	-0.014 (0.01)
cty02sewerage	-161.648 (0.34)	14.002 (0.22)	-99.121 (0.19)	-95.560 (1.51)	-14.042 (1.78)	-14.578 (1.83)	7.694 (0.52)	6.680 (0.46)	12.926 (1.40)	12.222 (1.32)	16.885 (0.90)	-9.665 (0.57)
Constant	5.512 (0.49)	9.832** (6.32)	8.912* (2.53)	8.890** (11.36)	10.219** (19.34)	10.205** (19.10)	7.722** (16.33)	7.715** (16.37)	8.921** (15.46)	9.035** (15.59)	9.324** (12.75)	9.683** (13.96)
F statistics (All endog. vars. =0)	21.34 (0.000)	22.46 (0.000)	31.69 (0.000)	30.25 (0.000)	10.51 (0.000)	10.69 (0.000)	15.22 (0.000)	14.25 (0.000)	13.81 (0.000)	13.62 (0.000)	21.26 (0.000)	20.75 (0.000)
DWH test for endogeneity	232.51 (0.000)	227.5 (0.000)	139.96 (0.000)	152.66 (0.000)	90.8 (0.000)	88.32 (0.000)	95.13 (0.000)	100.64 (0.000)	171.57 (0.000)	179.44 (0.000)	109.59 (0.000)	103.02 (0.000)
Sargan test of exogeneity of the instruments	NA	12 (0.003)	NA	0.07 (0.966)	NA	8.03 (0.018)	NA	0.17 (0.918)	NA	3.43 (0.180)	NA	22.95 (0.000)
Observations	1998	1996	1998	1996	1040	1039	1040	1039	958	957	958	957

Notes: Absolute t statistics are in parenthesis are. P-values are in bracket. * indicates significant at 5% level, ** significant at 1% level. Nall stands for all nonmetropolitan counties, N468 (N579) stands for nonmetropolitan counties adjacent (nonadjacent) to a metro area. IV1 is the 2SLS model using lagged fiscal variables as instruments. IV2 is same as IV1 but instead adding two more political voting behavior variables (PRES_REP72, PRES_TO72) as instruments. The wage model is based on Model 4 and the rent model is based on Model 3. NA stands for not applicable. Wage data are from the BEA, Rent data are from the HUD.

Appendix Table 13. Level Equation Model Results for Sample Nall, N468, and N579, Instrumental Variable Estimation with Clustering Method, Dependent Variables: ln(earning2000) and ln(housing2000)

	Nall				N468				N579			
	Earning		Housing		Earning		Housing		Earning		Housing	
	IV1	IV2	IV1	IV2	IV1	IV2	IV1	IV2	IV1	IV2	IV1	IV2
stl02_property	3.185 (0.05)	-1.283 (0.35)	7.260 (0.12)	7.192 (1.56)	1.597 (0.99)	1.327 (0.82)	6.800* (2.06)	6.866* (2.11)	-0.703 (0.29)	-0.226 (0.09)	-0.060 (0.02)	-0.351 (0.09)
stl02_sales	6.494 (0.36)	5.998** (3.16)	8.970 (0.36)	9.023 (1.57)	6.087** (2.87)	5.896** (2.80)	8.580* (2.02)	8.579* (2.04)	5.148 (1.87)	6.483* (2.54)	12.329* (2.02)	9.198 (1.70)
stl02_individual	0.677 (0.04)	2.258 (1.60)	7.430 (0.22)	7.532* (2.20)	3.925* (1.99)	3.575 (1.84)	9.992** (2.84)	10.007** (2.89)	0.629 (0.25)	1.530 (0.66)	13.789** (3.05)	10.530** (2.76)
stl02_corporate	-18.002 (1.03)	-19.398** (2.95)	-25.071 (0.54)	-25.073 (1.82)	-6.069 (0.91)	-6.714 (1.00)	4.309 (0.39)	4.332 (0.39)	-17.490* (2.12)	-18.959* (2.28)	-60.422** (3.90)	-55.423** (3.91)
stl02_rest	-11.147 (0.06)	2.124 (0.23)	-2.633 (0.01)	-2.244 (0.29)	2.455 (0.76)	1.549 (0.48)	7.167 (1.37)	7.225 (1.40)	2.166 (0.62)	2.814 (0.82)	9.870 (1.56)	3.565 (0.66)
stl02_firstsecond	-9.658 (0.16)	-6.788 (1.77)	-12.550 (0.30)	-12.605 (1.44)	-6.720 (1.53)	-7.009 (1.64)	-17.832* (2.01)	-17.790* (2.02)	-6.751 (1.94)	-8.288** (2.59)	1.210 (0.20)	4.087 (0.74)
stl02_hospitalhealth	-0.013 (0.00)	17.927 (1.85)	13.166 (0.15)	13.627 (0.68)	11.402 (1.02)	12.438 (1.13)	27.690 (1.20)	27.329 (1.18)	7.777 (0.92)	12.035 (1.68)	21.326 (1.31)	11.022 (0.74)
stl02_highway	-23.364 (0.11)	-6.039 (0.58)	-14.024 (0.11)	-13.804* (2.04)	-10.992** (3.30)	-10.480** (3.07)	-14.573* (2.29)	-14.709* (2.32)	-7.915* (2.22)	-6.712 (1.94)	-7.170 (1.16)	-10.390 (1.93)
stl02_publicsafety	21.703 (0.09)	3.062 (0.24)	5.808 (0.03)	5.413 (0.42)	1.518 (0.30)	1.795 (0.35)	-3.858 (0.40)	-3.644 (0.38)	8.778 (1.45)	8.787 (1.42)	-30.695* (2.04)	-26.928 (1.87)
stl02_envirohousing	25.399 (0.06)	-11.041 (0.48)	-9.309 (0.02)	-10.482 (0.52)	-13.224 (1.30)	-12.680 (1.25)	-48.164** (2.83)	-47.911** (2.83)	-2.484 (0.30)	-4.511 (0.55)	-30.410 (1.85)	-15.403 (1.03)
stl02_govtadmin	59.955 (0.09)	11.146 (0.35)	31.742 (0.06)	30.780 (1.39)	14.801 (1.85)	15.731* (1.97)	10.924 (0.85)	11.136 (0.88)	14.266 (1.80)	11.815 (1.44)	-13.958 (0.78)	-1.945 (0.12)
cty02property	1.951 (0.10)	0.485 (0.50)	2.517 (0.14)	2.484** (3.29)	0.708 (1.62)	0.698 (1.57)	1.798** (3.11)	1.820** (3.06)	0.573 (1.96)	0.578* (1.97)	1.696** (3.46)	1.939** (4.43)
cty02sales	-0.153 (0.00)	-5.875 (1.59)	5.308 (0.12)	5.183 (0.78)	-5.982 (1.80)	-6.388 (1.87)	-1.607 (0.28)	-1.449 (0.25)	-1.282 (0.38)	-2.053 (0.60)	4.003 (0.83)	4.936 (0.96)
cty02education	-2.129 (0.35)	-1.780** (4.24)	-4.415 (0.98)	-4.412** (5.42)	-1.787** (2.92)	-1.909** (3.30)	-4.966** (5.89)	-4.954** (6.00)	-1.729** (6.34)	-1.797** (6.48)	-4.202** (9.17)	-4.287** (9.87)
cty02highway	-3.658 (0.11)	-0.968 (0.53)	-1.480 (0.03)	-1.398 (0.48)	-0.874 (0.47)	-0.590 (0.33)	-1.510 (0.47)	-1.544 (0.49)	-0.721 (0.59)	-0.667 (0.55)	0.182 (0.07)	-0.575 (0.23)
cty02safety	2.077 (0.09)	3.660 (1.34)	3.528 (0.02)	3.389 (0.30)	2.859 (0.69)	3.019 (0.70)	1.625 (0.28)	1.474 (0.25)	1.117 (0.39)	1.540 (0.52)	-1.106 (0.13)	3.043 (0.36)
cty02naturalrec	0.461 (0.05)	-0.296 (0.47)	0.485 (0.05)	0.470 (0.32)	0.249 (0.52)	0.212 (0.45)	-0.298 (0.41)	-0.276 (0.38)	-0.109 (0.12)	-0.059 (0.07)	0.619 (0.42)	-0.014 (0.01)
cty02sewerage	-161.648 (0.07)	14.002 (0.12)	-99.121 (0.04)	-95.560 (1.18)	-14.042 (0.83)	-14.578 (0.83)	7.694 (0.37)	6.680 (0.34)	12.926 (1.39)	12.222 (1.32)	16.885 (0.68)	-9.665 (0.39)
Constant	5.512 (0.10)	9.832** (3.49)	8.912 (0.57)	8.890** (8.17)	10.219** (14.06)	10.205** (14.03)	7.722** (12.46)	7.715** (12.52)	8.921** (12.75)	9.035** (13.00)	9.324** (10.52)	9.683** (10.80)
Number of Clusters	174	174	174	174	167	167	167	167	129	129	129	129
F statistics (All endog. vars. =0)	8.35 (0.000)	8.74 (0.000)	15.35 (0.000)	14.87 (0.000)	9.55 (0.000)	9.90 (0.000)	8.30 (0.000)	7.72 (0.000)	9.29 (0.000)	9.95 (0.000)	21.98 (0.000)	24.40 (0.000)
DWH test for endogeneity	35.007 (0.009)	30.383 (0.034)	40.697 (0.001)	44.703 (0.001)	38.02 (0.004)	26.147 (0.097)	33.833 (0.013)	37.433 (0.005)	38.494 (0.003)	37.838 (0.004)	41.38 (0.001)	29.888 (0.039)
Sargan test of exogeneity of the instruments	NA	3.17 (0.205)	NA	0.34 (0.843)	NA	6.65 (0.036)	NA	0.14 (0.932)	NA	1.71 (0.425)	NA	9.16 (0.010)
Observations	1998	1996	1998	1996	1040	1039	1040	1039	958	957	958	957

Notes: Absolute t statistics are in parenthesis are. P-values are in bracket. * indicates significant at 5% level, ** significant at 1% level. Nall stands for all nonmetropolitan counties, N468 (N579) stands for nonmetropolitan counties adjacent (nonadjacent) to a metro area. IV1 is the 2SLS model using lagged fiscal variables as instruments. IV2 is same as IV1 but instead adding two more political voting behavior variables (PRES_REP72, PRES_TO72) as instruments. The wage model is based on Model 4 and the rent model is based on Model 3. NA stands for not applicable. Wage and Rent data are the Census.

Appendix Table 14. Difference Equation Model Results for Sample N468 and N579, Dependent Variables: Δ wage and Δ rent

	N468				N579			
	Δ wage		Δ rent		Δ wage		Δ rent	
	Base	Base+ERS	Base	Base+ERS	Base	Base+ERS	Base	Base+ERS
Δ st_property	-0.109 (0.12)	-0.114 (0.13)	1.260 (0.97)	1.185 (0.92)	0.297 (0.28)	1.350 (1.32)	-1.977 (1.71)	-1.845 (1.56)
Δ st_sales	1.928 (1.36)	1.911 (1.37)	7.971** (4.00)	7.916** (4.03)	0.389 (0.25)	1.379 (0.91)	2.537 (1.28)	2.603 (1.31)
Δ st_individual	-1.953* (2.06)	-1.873* (2.02)	2.977* (2.17)	2.907* (2.12)	-2.199 (1.73)	-2.782* (2.37)	0.067 (0.04)	-0.001 0.00
Δ st_corporate	3.168 (1.07)	3.372 (1.20)	9.411 (1.66)	9.729 (1.73)	7.368 (1.64)	9.900* (2.26)	-8.846 (1.38)	-8.243 (1.30)
Δ st_rest	0.836 (0.59)	1.004 (0.73)	-1.330 (0.57)	-1.138 (0.49)	-0.519 (0.27)	0.185 (0.10)	-3.523 (1.30)	-2.889 (1.05)
Δ st_firstsecond	0.379 (0.43)	0.094 (0.11)	-5.230** (3.67)	-5.423** (3.85)	1.815 (1.63)	1.269 (1.18)	-1.924 (1.21)	-2.455 (1.57)
Δ st_hospital	-2.633 (1.53)	-2.138 (1.24)	-6.937** (2.78)	-7.199** (2.90)	0.357 (0.18)	1.655 (0.85)	0.053 (0.02)	0.193 (0.08)
Δ st_highway	2.120 (1.47)	1.686 (1.21)	1.111 (0.50)	1.159 (0.53)	0.178 (0.11)	-0.656 (0.41)	5.868** (2.87)	5.512** (2.67)
Δ st_safety	0.409 (0.14)	0.030 (0.01)	-4.303 (0.87)	-4.294 (0.88)	5.344 (1.47)	1.466 (0.42)	7.181 (1.54)	6.447 (1.35)
Δ st_envirohousing	-1.156 (0.69)	-1.233 (0.75)	-0.645 (0.26)	-0.535 (0.22)	1.146 (0.52)	1.343 (0.64)	3.596 (1.43)	4.438 (1.74)
Δ st_govtadmin	-7.478** (2.68)	-6.697* (2.52)	-12.282** (3.11)	-11.322** (2.84)	-8.977** (2.88)	-6.212* (2.05)	-27.961** (6.77)	-27.081** (6.57)
Δ ct_property	0.459* (2.15)	0.597* (2.46)	0.425 (1.39)	0.504 (1.64)	0.047 (0.23)	-0.038 (0.19)	-0.038 (0.16)	-0.051 (0.22)
Δ ct_sales	1.135 (1.37)	0.879 (1.01)	3.920** (3.23)	3.994** (3.45)	-0.894 (0.88)	-0.552 (0.69)	-0.096 (0.10)	-0.070 (0.07)
Δ ct_education	-0.092 (0.48)	-0.078 (0.43)	-0.267 (1.39)	-0.257 (1.31)	-0.609** (3.42)	-0.627** (3.42)	0.027 (0.15)	0.061 (0.33)
Δ ct_highway	-0.420 (0.82)	-0.520 (1.07)	0.483 (0.75)	0.493 (0.75)	1.521** (2.69)	1.409** (2.72)	0.219 (0.55)	0.207 (0.52)
Δ ct_safety	-2.361* (2.49)	-2.628** (2.99)	-3.824** (2.68)	-3.876** (2.69)	-0.503 (0.95)	-0.644 (1.27)	-0.617 (0.87)	-0.576 (0.80)
Δ ct_naturalrec	-0.685* (2.42)	-0.716** (2.62)	1.089** (3.63)	1.116** (3.73)	1.066 (1.54)	1.102 (1.47)	0.712 (0.88)	0.795 (0.95)
Δ ct_sewerage	0.185 (0.27)	0.377 (0.52)	0.385 (0.63)	0.432 (0.69)	-0.362 (0.45)	-0.279 (0.36)	0.381 (0.45)	0.612 (0.74)
Constant	0.323** (3.51)	0.281** (3.17)	0.014 (0.14)	0.031 (0.29)	0.435** (5.27)	0.395** (4.82)	-0.065 (0.72)	-0.075 (0.85)
Observations	1040	1040	1040	1040	958	958	958	958
Adjusted R-squared	0.16	0.20	0.31	0.31	0.16	0.23	0.28	0.28

Notes: Robust t statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level. N468 (N579) stands for nonmetropolitan counties adjacent (nonadjacent) to a metro area. Δ wage= $\ln(\text{wage2002}) - \ln(\text{wage1992})$ and Δ rent= $\ln(\text{fmr02_2}) - \ln(\text{fmr92_2})$. Column 1 in the wage equation is based on the benchmark Model 4 and Column 2 adds to Column 1 four additional ERS variables (fm, mi, fl, rec). Column 3 in the rent equation is based on the benchmark Model 3 and Column 4 adds to Column 3 four additional ERS variables.

Appendix Table 15. Difference Equation Model Results for Sample N468 and N579, Instrumental Variables Estimation, Dependent variable: Δ wage and Δ rent

	N468				N579			
	Δ wage		Δ rent		Δ wage		Δ rent	
	IV1	IV2	IV1	IV2	IV1	IV2	IV1	IV2
Δ st_property	-1.497 (0.17)	1.237 (0.46)	-32.948 (1.56)	-8.632 (1.62)	2.200 (0.25)	-4.722* (2.01)	-15.082 (1.25)	-5.804 (1.88)
Δ st_sales	-1.033 (0.11)	0.116 (0.02)	-10.186 (0.40)	-3.583 (0.27)	-3.632 (0.41)	-0.525 (0.14)	22.022 (1.42)	12.624* (2.48)
Δ st_individual	4.656 (0.22)	-1.086 (0.12)	77.393 (1.61)	32.659 (1.88)	-19.037 (1.25)	-8.989* (2.31)	7.695 (0.36)	-9.165 (1.63)
Δ st_corporate	6.088 (0.48)	6.543 (0.56)	2.611 (0.05)	1.719 (0.07)	1.153 (0.03)	23.914 (1.72)	-1.518 (0.03)	-6.830 (0.30)
Δ st_rest	-1.870 (0.32)	-0.904 (0.18)	-7.989 (0.36)	5.901 (0.58)	-2.574 (0.19)	-3.846 (0.72)	26.606 (0.98)	12.995 (1.39)
Δ st_firstsecond	-5.059 (0.69)	-2.996 (0.81)	-26.343 (1.35)	-6.258 (0.98)	7.137 (1.59)	7.051** (3.25)	-4.868 (0.72)	-4.650 (1.69)
Δ st_hospital	-13.089 (0.75)	-16.360 (1.34)	40.612 (0.70)	29.730 (1.01)	-11.935 (0.89)	-15.170* (2.51)	2.564 (0.11)	-1.819 (0.20)
Δ st_highway	3.128 (0.24)	-0.565 (0.10)	56.263 (1.65)	25.392* (1.98)	7.127 (0.59)	2.529 (0.78)	-8.893 (0.47)	3.576 (0.71)
Δ st_safety	30.125 (1.64)	29.526 (1.66)	-11.866 (0.20)	-27.550 (0.89)	14.990 (0.89)	16.176* (1.98)	-10.828 (0.46)	-10.538 (1.08)
Δ st_envirohousing	10.524 (0.78)	6.971 (0.98)	41.255 (1.17)	4.955 (0.43)	-11.314 (0.58)	-0.326 (0.06)	41.120 (1.12)	12.330 (1.31)
Δ st_govtadmin	-41.475** (2.81)	-42.065** (2.92)	2.580 (0.05)	16.111 (0.59)	-30.762 (0.95)	-6.668 (0.74)	-17.184 (0.48)	-26.431 (1.86)
Δ ct_property	0.851 (0.18)	-0.439 (0.15)	11.501 (0.92)	-0.953 (0.22)	-7.891 (0.89)	-0.570 (0.36)	12.911 (1.02)	1.649 (0.74)
Δ ct_sales	8.404 (0.47)	4.081 (0.44)	62.169 (1.48)	30.789 (1.70)	-8.642 (1.33)	-4.517* (2.16)	4.774 (0.39)	-4.749 (1.50)
Δ ct_education	1.070 (0.52)	1.574 (1.40)	-6.732 (1.28)	-2.977 (1.31)	-0.577 (0.31)	-0.371 (0.44)	-3.929 (0.76)	-1.399 (0.78)
Δ ct_highway	0.956 (0.24)	1.885 (0.88)	-7.500 (0.79)	-2.662 (0.59)	3.231 (1.41)	1.825* (2.37)	-0.927 (0.35)	0.451 (0.49)
Δ ct_safety	-3.346 (1.55)	-3.010 (1.56)	-3.424 (0.49)	-1.588 (0.44)	17.264 (0.87)	1.347 (0.34)	-35.771 (1.17)	-8.790 (1.55)
Δ ct_naturalrec	-0.595 (0.61)	-0.638 (0.68)	1.546 (0.39)	1.711 (0.81)	9.043 (0.83)	2.114 (0.63)	-0.636 (0.05)	0.311 (0.06)
Δ ct_sewerage	-0.613 (0.26)	-0.181 (0.11)	-6.789 (1.04)	-3.999 (1.24)	-3.291 (0.95)	-1.577 (1.17)	-0.262 (0.06)	-2.258 (1.32)
Constant	0.334 (1.62)	0.277* (2.35)	0.168 (0.46)	0.094 (0.49)	0.227 (0.75)	0.414** (4.53)	-0.033 (0.11)	-0.194 (1.84)
F statistics (All endog. vars. =0)	2.30[0.002]	2.17[0.003]	5.18[0.000]	5.05[0.000]	2.67[0.000]	2.62[0.000]	7.12[0.000]	6.65[0.000]
DWH test for endogeneity	54.65[0.000]	55.63[0.000]	80.22[0.000]	68.32[0.000]	33.30[0.015]	33.79[0.013]	82.74[0.000]	76.21[0.000]
Sargan test of exogeneity of the instruments	NA	0.13[0.937]	NA	6.05[0.049]	NA	3.52[0.172]	NA	5.81[0.055]
Observations	1040	1039	1040	1039	958	957	958	957

Notes: Absolute value of t statistics is in parentheses. P -values are in bracket. * indicates significant at 5% level, ** significant at 1% level. N468 (N579) stands for nonmetropolitan counties adjacent (nonadjacent) to a metro area. Δ wage= $\ln(\text{wage2002})-\ln(\text{wage1992})$ and Δ rent= $\ln(\text{fmr02_2})-\ln(\text{fmr92_2})$. Column 1 in the wage equation is based on the benchmark Model 4 and Column 2 adds to Column 1 four additional ERS variables (fm, mi, fl, rec). Column 3 in the rent equation is based on the benchmark Model 3 and Column 4 adds to Column 3 four additional ERS variables. IV1 is the 2SLS model using lagged fiscal variables as instruments. IV2 is same as IV1 but instead adding two more political voting behavior variables (PRES_REP72, PRES_TO72) as instruments. NA stands for not applicable.

Appendix Table 16. Difference Equation Model Results for Sample N468 and N579, Instrumental Variables Estimation with Clustering Method, Dependent variable: Δ wage and Δ rent

	N468				N579			
	Δ wage		Δ rent		Δ wage		Δ rent	
	IV1_cluster	IV2_cluster	IV1_cluster	IV2_cluster	IV1_cluster	IV2_cluster	IV1_cluster	IV2_cluster
Δ st_property	-1.497 (0.10)	1.237 (0.33)	-32.948 (0.76)	-8.632 (0.91)	2.200 (0.14)	-4.722 (1.42)	-15.082 (0.80)	-5.804 (1.01)
Δ st_sales	-1.033 (0.07)	0.116 (0.01)	-10.186 (0.21)	-3.583 (0.16)	-3.632 (0.26)	-0.525 (0.11)	22.022 (1.04)	12.624 (1.54)
Δ st_individual	4.656 (0.14)	-1.086 (0.08)	77.393 (0.80)	32.659 (1.12)	-19.037 (0.78)	-8.989 (1.88)	7.695 (0.25)	-9.165 (0.90)
Δ st_corporate	6.088 (0.30)	6.543 (0.41)	2.611 (0.03)	1.719 (0.04)	1.153 (0.02)	23.914 (1.09)	-1.518 (0.02)	-6.830 (0.18)
Δ st_rest	-1.870 (0.22)	-0.904 (0.15)	-7.989 (0.19)	5.901 (0.40)	-2.574 (0.14)	-3.846 (0.59)	26.606 (0.66)	12.995 (0.91)
Δ st_firstsecond	-5.059 (0.45)	-2.996 (0.60)	-26.343 (0.60)	-6.258 (0.54)	7.137 (1.70)	7.051** (2.93)	-4.868 (0.69)	-4.650 (1.11)
Δ st_hospital	-13.089 (0.44)	-16.360 (0.87)	40.612 (0.39)	29.730 (0.63)	-11.935 (0.76)	-15.170 (1.53)	2.564 (0.09)	-1.819 (0.13)
Δ st_highway	3.128 (0.14)	-0.565 (0.07)	56.263 (0.79)	25.392 (1.03)	7.127 (0.41)	2.529 (0.71)	-8.893 (0.34)	3.576 (0.49)
Δ st_safety	30.125 (1.04)	29.526 (1.04)	-11.866 (0.10)	-27.550 (0.44)	14.990 (0.68)	16.176 (1.26)	-10.828 (0.44)	-10.538 (0.74)
Δ st_environhousing	10.524 (0.53)	6.971 (0.72)	41.255 (0.54)	4.955 (0.21)	-11.314 (0.37)	-0.326 (0.04)	41.120 (0.72)	12.330 (0.87)
Δ st_govtadmin	-41.475 (1.68)	-42.065 (1.82)	2.580 (0.02)	16.111 (0.27)	-30.762 (0.50)	-6.668 (0.60)	-17.184 (0.30)	-26.431 (1.18)
Δ ct_property	0.851 (0.10)	-0.439 (0.09)	11.501 (0.49)	-0.953 (0.13)	-7.891 (0.43)	-0.570 (0.28)	12.911 (0.64)	1.649 (0.58)
Δ ct_sales	8.404 (0.29)	4.081 (0.28)	62.169 (0.78)	30.789 (1.04)	-8.642 (0.83)	-4.517 (1.16)	4.774 (0.27)	-4.749 (1.15)
Δ ct_education	1.070 (0.33)	1.574 (0.98)	-6.732 (0.77)	-2.977 (0.94)	-0.577 (0.18)	-0.371 (0.34)	-3.929 (0.50)	-1.399 (0.69)
Δ ct_highway	0.956 (0.16)	1.885 (0.62)	-7.500 (0.45)	-2.662 (0.40)	3.231 (0.95)	1.825 (1.94)	-0.927 (0.38)	0.451 (0.59)
Δ ct_safety	-3.346 (1.23)	-3.010 (1.27)	-3.424 (0.39)	-1.588 (0.35)	17.264 (0.45)	1.347 (0.28)	-35.771 (0.73)	-8.790 (1.15)
Δ ct_naturalrec	-0.595 (0.53)	-0.638 (0.64)	1.546 (0.29)	1.711 (0.70)	9.043 (0.54)	2.114 (0.43)	-0.636 (0.05)	0.311 (0.05)
Δ ct_sewerage	-0.613 (0.17)	-0.181 (0.07)	-6.789 (0.58)	-3.999 (0.74)	-3.291 (0.60)	-1.577 (1.04)	-0.262 (0.04)	-2.258 (1.28)
Constant	0.334 (1.03)	0.277 (1.74)	0.168 (0.34)	0.094 (0.40)	0.227 (0.47)	0.414** (4.05)	-0.033 (0.07)	-0.194 (1.14)
Number of Clusters	167.000	167.000	167.000	167.000	129.000	129.000	129.000	129.000
F statistics (All endog. vars. =0)	2.22[0.004]	2.11[0.006]	4.02[0.000]	3.69[0.000]	4.53[0.000]	4.40[0.000]	4.47[0.000]	4.56[0.000]
DWH test for endogeneity	32.23[0.021]	32.03[0.022]	37.81[0.004]	33.61[0.014]	28.85[0.050]	30.32[0.03]	30.82[0.03]	27.14[0.07]
Sargan test of exogeneity of the instruments	NA	0.06[0.972]	NA	1.63[0.444]	NA	2.17[0.338]	NA	3.58[0.167]
Observations	1040	1039	1040	1039	958	957	958	957

Notes: Absolute value of t statistics is in parentheses. P -values are in bracket. * indicates significant at 5% level, ** significant at 1% level. N468 (N579) stands for nonmetropolitan counties adjacent (nonadjacent) to a metro area. Δ wage= $\ln(\text{wage}_{2002}) - \ln(\text{wage}_{1992})$ and Δ rent= $\ln(\text{fmr}_{02_2}) - \ln(\text{fmr}_{92_2})$. Column 1 in the wage equation is based on the benchmark Model 4 and Column 2 adds to Column 1 four additional ERS variables (fm, mi, fl, rec). Column 3 in the rent equation is based on the benchmark Model 3 and Column 4 adds to Column 3 four additional ERS variables. IV1 is the 2SLS model using lagged fiscal variables as instruments. IV2 is same as IV1 but instead adding two more political voting behavior variables (PRES_REP72, PRES_TO72) as instruments. Standard errors are clustered by BEA defined economic areas. NA stands for not applicable.

**Appendix Table 17. Difference Equation Model Results for Sample N468 and N579,
Dependent Variables: Δ earning and Δ housing**

	N468				N579			
	Δ earning		Δ housing		Δ earning		Δ housing	
	Base	Base+ERS	Base	Base+ERS	Base	Base+ERS	Base	Base+ERS
Δ st_property	-2.141 (1.44)	-1.959 (1.39)	3.360* (2.36)	3.173* (2.28)	1.549 (0.95)	3.362* (2.19)	-0.634 (0.37)	0.763 (0.47)
Δ st_sales	-1.840 (0.85)	-1.370 (0.63)	7.448** (3.58)	7.527** (3.68)	3.830 (1.61)	5.633* (2.51)	1.827 (0.70)	2.886 (1.17)
Δ st_individual	-3.377* (2.41)	-3.096* (2.32)	-6.534** (4.64)	-6.522** (4.69)	-1.840 (0.87)	-2.710 (1.37)	-7.159** (3.23)	-7.723** (3.66)
Δ st_corporate	0.710 (0.14)	-0.020 (0.00)	-24.693** (4.78)	-23.285** (4.55)	-3.720 (0.53)	1.040 (0.15)	-35.474** (4.81)	-30.738** (4.28)
Δ st_rest	-8.048** (3.90)	-7.177** (3.60)	-8.322** (4.22)	-7.708** (4.16)	-4.120 (1.41)	-4.110 (1.42)	-8.628** (3.02)	-7.145* (2.57)
Δ st_firstsecond	-0.470 (0.33)	-0.170 (0.12)	-0.124 (0.09)	-0.676 (0.51)	0.840 (0.46)	0.920 (0.54)	4.745* (2.34)	3.246 (1.69)
Δ st_hospital	2.790 (1.13)	3.950 (1.65)	8.569** (3.40)	8.816** (3.58)	0.610 (0.19)	1.940 (0.65)	-3.691 (1.04)	-2.008 (0.58)
Δ st_highway	4.497* (2.03)	3.610 (1.69)	-0.040 (0.02)	-0.483 (0.25)	3.400 (1.35)	2.400 (1.00)	2.101 (0.81)	0.383 (0.15)
Δ st_safety	10.387* (2.43)	8.583* (1.99)	7.028 (1.55)	5.542 (1.24)	26.652** (4.36)	18.719** (3.19)	20.278** (3.41)	14.344* (2.50)
Δ st_envirohousing	2.170 (0.87)	2.070 (0.88)	15.414** (6.48)	14.425** (6.19)	5.580 (1.77)	3.200 (1.06)	3.425 (1.08)	3.951 (1.27)
Δ st_govtadmin	1.660 (0.44)	2.520 (0.70)	-20.276** (5.74)	-18.021** (5.13)	-17.355** (3.26)	-13.259** (2.64)	-19.817** (3.63)	-16.062** (3.04)
Δ ct_property	0.550 (1.11)	0.610 (1.18)	0.069 (0.13)	0.329 (0.71)	0.550 (1.35)	0.350 (1.04)	0.467 (1.41)	0.314 (0.87)
Δ ct_sales	0.590 (0.46)	0.150 (0.12)	-1.847 (1.47)	-2.322 (1.81)	-4.123* (2.48)	-3.134* (2.35)	0.173 (0.11)	0.815 (0.45)
Δ ct_education	-0.530 (1.40)	-0.661* (2.09)	-0.323 (1.06)	-0.319 (1.08)	0.330 (1.06)	0.220 (0.74)	-0.034 (0.11)	-0.025 (0.08)
Δ ct_highway	0.070 (0.10)	-0.250 (0.38)	-1.026 (1.23)	-1.177 (1.41)	0.830 (0.82)	0.370 (0.37)	0.424 (0.54)	0.330 (0.44)
Δ ct_safety	1.360 (1.07)	1.420 (1.06)	1.966 (1.17)	1.700 (0.96)	1.460 (1.88)	1.050 (1.33)	-0.564 (0.45)	-0.550 (0.45)
Δ ct_naturalrec	-0.050 (0.13)	-0.270 (0.75)	-0.012 (0.02)	-0.079 (0.16)	0.770 (0.98)	0.510 (0.68)	-0.180 (0.18)	-0.191 (0.20)
Δ ct_sewerage	1.320 (1.58)	1.290 (1.69)	0.624 (0.86)	0.828 (1.21)	0.210 (0.18)	-0.040 (0.04)	-0.330 (0.27)	0.039 (0.03)
Constant	0.393** (2.97)	0.342** (2.67)	0.744** (5.97)	0.746** (6.00)	0.286* (2.09)	0.230 (1.67)	0.699** (4.50)	0.611** (4.06)
Observations	1040	1040	1040	1040	958	958	958	958
Adjusted R-squared	0.38	0.43	0.62	0.64	0.45	0.52	0.39	0.44

Notes: Robust t statistics based on Huber-White standard errors are in parentheses. * indicates significant at 5% level, ** significant at 1% level. N468 (N579) stands for nonmetropolitan counties adjacent (nonadjacent) to a metro area. The data for wage and rent are from the Census. Δ earning= $\ln(\text{earning00})-\ln(\text{earning90})$ and Δ housing= $\ln(\text{housing00})-\ln(\text{housing90})$. Column 1 in the wage equation is based on the benchmark Model 4 and Column 2 adds to Column 1 four additional ERS variables (fm, mi, fl, rec). Column 3 in the rent equation is based on the benchmark Model 3 and Column 4 adds to Column 3 four additional ERS variables.

Appendix Table 18. Difference Equation Model Results for Sample N468 and N579, Instrumental Variables Estimation, Dependent variable: Δ earning and Δ housing

	N468				N579			
	Δ earning		Δ housing		Δ earning		Δ housing	
	IV1	IV2	IV1	IV2	IV1	IV2	IV1	IV2
Δ st_property	0.180 (0.01)	-2.415 (0.57)	-9.456 (0.73)	6.666 (1.42)	14.848 (1.00)	-8.032 (1.36)	7.968 (0.31)	-17.928* (2.53)
Δ st_sales	-0.654 (0.05)	1.806 (0.15)	4.575 (0.26)	4.063 (0.33)	7.441 (0.51)	12.685 (1.40)	-29.067 (0.81)	1.191 (0.10)
Δ st_individual	-11.754 (0.37)	-12.643 (0.88)	26.094 (0.92)	7.454 (0.47)	-25.571 (1.01)	-1.821 (0.19)	-91.621 (1.84)	-42.138** (2.94)
Δ st_corporate	31.039 (1.66)	37.524* (2.00)	25.823 (0.85)	0.247 (0.01)	-25.755 (0.41)	50.068 (1.44)	90.150 (0.66)	67.825 (1.25)
Δ st_rest	-17.428* (2.07)	-20.306** (2.59)	-38.047* (2.54)	-22.995** (2.73)	6.338 (0.29)	-11.119 (0.83)	-101.193 (1.54)	-45.351* (2.12)
Δ st_firstsecond	-2.942 (0.27)	-4.742 (0.81)	-31.310* (2.19)	-13.721* (2.29)	1.744 (0.23)	0.229 (0.04)	2.285 (0.13)	8.380 (1.25)
Δ st_hospital	-29.734 (1.17)	-33.800 (1.73)	-31.582 (0.93)	-18.554 (0.80)	5.186 (0.23)	-12.936 (0.85)	-81.583 (1.53)	-71.673** (3.36)
Δ st_highway	-5.775 (0.30)	-4.336 (0.50)	29.551 (1.45)	14.597 (1.26)	8.077 (0.40)	7.281 (0.89)	86.217 (1.90)	37.722** (3.19)
Δ st_safety	49.054 (1.83)	48.139 (1.69)	66.776 (1.68)	49.221 (1.78)	3.257 (0.12)	10.402 (0.51)	43.423 (0.76)	54.094* (2.37)
Δ st_environghousing	4.219 (0.21)	5.366 (0.47)	59.649** (2.69)	37.081** (3.34)	-20.659 (0.64)	1.311 (0.09)	-111.142 (1.32)	-18.826 (0.84)
Δ st_govtadmin	-31.384 (1.45)	-28.303 (1.23)	-79.796* (2.31)	-71.450** (2.89)	-31.883 (0.59)	45.897* (2.03)	47.132 (0.57)	34.004 (1.04)
Δ ct_property	1.011 (0.15)	3.384 (0.71)	4.531 (0.53)	-5.114 (1.16)	-14.524 (0.98)	7.754 (1.94)	-32.565 (1.25)	-2.802 (0.56)
Δ ct_sales	-4.795 (0.18)	-5.637 (0.38)	22.967 (0.96)	12.717 (0.84)	-9.370 (0.87)	1.949 (0.37)	-36.216 (1.38)	-13.505 (1.73)
Δ ct_education	1.657 (0.54)	1.738 (0.96)	0.495 (0.20)	1.085 (0.66)	2.641 (0.86)	2.492 (1.17)	9.824 (0.88)	6.555 (1.60)
Δ ct_highway	0.052 (0.01)	0.483 (0.14)	-3.125 (0.61)	-2.919 (0.84)	-0.979 (0.26)	-4.822* (2.49)	4.162 (0.66)	-0.224 (0.10)
Δ ct_safety	4.791 (1.51)	4.121 (1.34)	4.157 (0.91)	5.138 (1.56)	33.100 (1.01)	-15.780 (1.59)	78.964 (1.29)	10.061 (0.78)
Δ ct_naturalrec	-0.836 (0.58)	-0.997 (0.66)	-2.402 (0.90)	-1.177 (0.64)	7.353 (0.40)	-10.719 (1.27)	-15.405 (0.46)	-24.650 (1.88)
Δ ct_sewerage	1.997 (0.58)	2.452 (0.91)	-3.243 (0.76)	-3.234 (1.09)	-2.630 (0.46)	1.579 (0.47)	-7.099 (0.62)	-0.387 (0.09)
Constant	0.344 (1.14)	0.405* (2.15)	0.882** (3.77)	0.824** (4.96)	-0.182 (0.36)	0.274 (1.19)	0.090 (0.13)	0.419 (1.62)
F statistics (All endog. vars. =0)	2.47[0.001]	2.49[0.000]	12.27[0.000]	11.67[0.000]	3.18[0.000]	5.71[0.000]	14.74[0.000]	14.35[0.000]
DWH test for endogeneity	43.49[0.000]	49.16[0.000]	126.65[0.000]	116.76[0.000]	83.09[0.000]	97.99[0.000]	205.68[0.000]	172.39[0.000]
Sargan test of exogeneity of the instruments	NA	1.44[0.488]	NA	4.90[0.086]	NA	9.22[0.01]	NA	13.20[0.001]
Observations	1040	1039	1040	1039	958	957	958	957

Notes: Absolute value of t statistics is in parentheses. P -values are in bracket. * indicates significant at 5% level, ** significant at 1% level. N468 (N579) stands for nonmetropolitan counties adjacent (nonadjacent) to a metro area. The data for wage and rent are from the Census. Δ earning= $\ln(\text{earning00})-\ln(\text{earning90})$ and Δ housing= $\ln(\text{housing00})-\ln(\text{housing90})$. Column 1 in the wage equation is based on the benchmark Model 4 and Column 2 adds to Column 1 four additional ERS variables (fm, mi, fl, rec). Column 3 in the rent equation is based on the benchmark Model 3 and Column 4 adds to Column 3 four additional ERS variables. IV1 is the 2SLS model using lagged fiscal variables as instruments. IV2 is same as IV1 but instead adding two more political voting behavior variables (PRES_REP72, PRES_TO72) as instruments. NA stands for not applicable.

Appendix Table 19. Difference Equation Model Results for Sample N468 and N579, Instrumental Variables Estimation with Clustering Method, Dependent variable: Δ earning and Δ housing

	N468				N579			
	Δ earning		Δ housing		Δ earning		Δ housing	
	IV1.cluster	IV2.cluster	IV1.cluster	IV2.cluster	IV1.cluster	IV2.cluster	IV1.cluster	IV2.cluster
Δ st_property	0.180 (0.01)	-2.415 (0.35)	-9.456 (0.35)	6.666 (0.79)	14.848 (0.55)	-8.032 (1.07)	7.968 (0.24)	-17.928 (1.67)
Δ st_sales	-0.654 (0.03)	1.806 (0.08)	4.575 (0.12)	4.063 (0.17)	7.441 (0.37)	12.685 (1.02)	-29.067 (0.59)	1.191 (0.06)
Δ st_individual	-11.754 (0.22)	-12.643 (0.57)	26.094 (0.38)	7.454 (0.25)	-25.571 (0.64)	-1.821 (0.14)	-91.621 (1.20)	-42.138 (1.52)
Δ st_corporate	31.039 (1.32)	37.524 (1.37)	25.823 (0.44)	0.247 (0.01)	-25.755 (0.28)	50.068 (1.38)	90.150 (0.49)	67.825 (0.82)
Δ st_rest	-17.428 (1.32)	-20.306 (1.92)	-38.047 (1.21)	-22.995 (1.46)	6.338 (0.21)	-11.119 (0.65)	-101.193 (1.05)	-45.351 (1.33)
Δ st_firstsecond	-2.942 (0.14)	-4.742 (0.46)	-31.310 (1.01)	-13.721 (1.40)	1.744 (0.24)	0.229 (0.03)	2.285 (0.11)	8.380 (0.72)
Δ st_hospital	-29.734 (0.82)	-33.800 (0.95)	-31.582 (0.39)	-18.554 (0.41)	5.186 (0.26)	-12.936 (0.57)	-81.583 (1.15)	-71.673 (1.85)
Δ st_highway	-5.775 (0.18)	-4.336 (0.33)	29.551 (0.64)	14.597 (0.66)	8.077 (0.35)	7.281 (0.62)	86.217 (1.38)	37.722* (2.31)
Δ st_safety	49.054 (1.01)	48.139 (0.74)	66.776 (0.79)	49.221 (0.84)	3.257 (0.11)	10.402 (0.37)	43.423 (0.67)	54.094 (1.38)
Δ st_envirohousing	4.219 (0.12)	5.366 (0.26)	59.649 (1.37)	37.081 (1.81)	-20.659 (0.44)	1.311 (0.07)	-111.142 (0.91)	-18.826 (0.51)
Δ st_govtadmin	-31.384 (0.79)	-28.303 (0.50)	-79.796 (1.05)	-71.450 (1.36)	-31.883 (0.31)	45.897 (1.78)	47.132 (0.36)	34.004 (0.63)
Δ ct_property	1.011 (0.07)	3.384 (0.37)	4.531 (0.25)	-5.114 (0.63)	-14.524 (0.48)	7.754 (1.52)	-32.565 (0.86)	-2.802 (0.34)
Δ ct_sales	-4.795 (0.11)	-5.637 (0.23)	22.967 (0.38)	12.717 (0.43)	-9.370 (0.53)	1.949 (0.38)	-36.216 (1.03)	-13.505 (1.18)
Δ ct_education	1.657 (0.37)	1.738 (0.64)	0.495 (0.10)	1.085 (0.44)	2.641 (0.47)	2.492 (0.70)	9.824 (0.60)	6.555 (1.24)
Δ ct_highway	0.052 (0.01)	0.483 (0.09)	-3.125 (0.29)	-2.919 (0.49)	-0.979 (0.18)	-4.822 (1.81)	4.162 (0.50)	-0.224 (0.04)
Δ ct_safety	4.791 (1.18)	4.121 (1.09)	4.157 (0.79)	5.138 (1.24)	33.100 (0.51)	-15.780 (1.71)	78.964 (0.88)	10.061 (0.64)
Δ ct_naturalrec	-0.836 (0.54)	-0.997 (0.56)	-2.402 (0.45)	-1.177 (0.38)	7.353 (0.29)	-10.719 (0.74)	-15.405 (0.30)	-24.650 (0.60)
Δ ct_sewerage	1.997 (0.39)	2.452 (0.60)	-3.243 (0.36)	-3.234 (0.60)	-2.630 (0.28)	1.579 (0.40)	-7.099 (0.41)	-0.387 (0.06)
Constant	0.344 (0.60)	0.405 (1.37)	0.882 (1.80)	0.824** (2.82)	-0.182 (0.230)	0.274 (0.910)	0.090 (0.090)	0.419 (0.090)
Number of Clusters	167	167	167	167	129	129	129	129
F statistics (All endog. vars. =0)	2.460 [0.001]	2.430 [0.001]	5.730 [0.000]	5.520 [0.000]	1.880 [0.000]	4.170 [0.000]	12.810 [0.000]	12.030 [0.000]
DWH test for endogeneity	26.660 [0.086]	26.870 [0.082]	35.910 [0.000]	33.020 [0.017]	30.680 [0.031]	28.840 [0.050]	31.910 [0.023]	21.090 [0.275]
Sargan test of exogeneity of the instruments	NA	1.70 [0.427]	NA	1.75 [0.417]	NA	6.49 [0.039]	NA	2.45 [0.294]
Observations	1040	1039	1040	1039	958	957	958	957

Notes: Absolute value of t statistics is in parentheses. P -values are in bracket. * indicates significant at 5% level, ** significant at 1% level. N468 (N579) stands for nonmetropolitan counties adjacent (nonadjacent) to a metro area. The data for wage and rent are from the Census. Δ earning= $\ln(\text{earning00})-\ln(\text{earning90})$ and Δ housing= $\ln(\text{housing00})-\ln(\text{housing90})$. Column 1 in the wage equation is based on the benchmark Model 4 and Column 2 adds to Column 1 four additional ERS variables (fm, mi, fl, rec). Column 3 in the rent equation is based on the benchmark Model 3 and Column 4 adds to Column 3 four additional ERS variables. IV1 is the 2SLS model using lagged fiscal variables as instruments. IV2 is same as IV1 but instead adding two more political voting behavior variables (PRES_REP72, PRES_TO72) as instruments. Standard errors are clustered by BEA defined economic areas. NA stands for not applicable.

Appendix Table 20. Sample-Split Chow Test Results for Wage and Rent (or, Earning and Housing) Equations in Tables 18-27, Respectively

Table	Equation	n	k	RSS _{Nall}	RSS _{N468}	RSS _{N579}	F-Statistic	F-Critical	Conclusion
Tables (18; 19)	Wage	1998	53	0.119	0.053	0.061	1.544	1.347	Rejection
	Rent	1998	34	0.533	0.305	0.209	2.070	1.436	Rejection
Tables(20; 21)	Earning	1998	53	0.228	0.083	0.133	2.164	1.347	Rejection
	Housing	1998	43	0.784	0.307	0.414	3.896	1.386	Rejection
Tables (22; 24)	Wage	1998	60	0.117	0.052	0.060	1.398	1.325	Rejection
	Rent	1998	41	0.502	0.289	0.193	1.932	1.395	Rejection
Tables (23; 25)	Wage	1998	64	0.110	0.049	0.056	1.412	1.315	Rejection
	Rent	1998	45	0.497	0.287	0.190	1.789	1.377	Rejection
Table 26	Earning	1998	60	0.223	0.079	0.131	1.971	1.325	Rejection
	Housing	1998	50	0.745	0.290	0.394	3.391	1.357	Rejection
Table 27	Earning	1998	64	0.204	0.073	0.120	1.701	1.315	Rejection
	Housing	1998	54	0.711	0.276	0.379	2.968	1.343	Rejection

Notes: RSS_{Nall} is the total sum of the squares of the residuals in the full sample. RSS_{N468} and RSS_{N579} are the sum of the squares of the residuals in two-subsample regression respectively. The parameter k is the regression coefficients and n is the total observations in the full sample ($Nall$). Rejection means that the null hypothesis is rejected, implying that the pooled (whole) sample regression is inadequate and we should run separate regressions for the two subsamples ($N468$ and $N579$) in this study. The Chow test (Chow, 1960) or F test statistic is defined as $F(k, n-2k) = \{(RSS_{Nall} - RSS_{N468} - RSS_{N579})/k\} / \{(RSS_{N468} + RSS_{N579})/2k\}$.

VITA

YIHUA YU

Candidate for the Degree of

Doctor of Philosophy

Dissertation: A HEDONIC ANALYSIS OF STATE AND LOCAL FISCAL POLICY
ON NONMETROPOLITAN ECONOMIC DEVELOPMENT

Major Field: Regional Economics

Education

Ph.D., Economics, Oklahoma State University, December 2008

M.A., Economics, University Of Missouri-Kansas City, December 2002

B.A., International Trade, Nanchang University, China, July 1999

Research Interests

Regional/Urban Economics, Economics Forecasting, Applied Econometrics

Research Papers

“Determinants of variations in state per capita personal income: a panel data approach”. *Applied Economics Letters*. Forthcoming.

“SPATDWM: Stata modules for US State and County spatial distance matrices”. *Statistical Software Components*, S500501, Boston College Department of Economics.

“Stochastic Frontier Approach to Measuring Regional Technical Efficiency in China”.

Honors, Awards, Certifications

SAS Certified Advanced Programmer, 2008

Richard W. and Lynn Poole Distinguished Graduate Fellowship, 2003-2004

Omicron Delta Epsilon International Honor Society, 2001

Professional Membership: American Economic Association

Name: Yihua Yu

Date of Degree: December, 2008

Institution: Oklahoma State University

Location: Stillwater, Oklahoma

Title of Study: A HEDONIC ANALYSIS OF STATE AND LOCAL FISCAL POLICY
ON NONMETROPOLITAN ECONOMIC DEVELOPMENT

Pages in Study: 160

Candidate for the Degree of Doctor of Philosophy

Major Field: Economics

Scope and Method of Study: Following the quality-of-life hedonic pricing approach of Rosen (1979) and Roback (1982) as extended to fiscal conditions by Gyourko and Tracy (1989; 1991), this paper examines how state and local government taxes and expenditures affect the location decisions of households and firms in U.S. nonmetropolitan areas. We consider comprehensively the government budget constraint, sample heterogeneity, fixed effects, endogeneity, and spatial correlation in modeling.

Findings and Conclusions: This study finds that growth of the state tax variables (general sales tax, individual income tax, corporate income tax, selective, license taxes) generally are negatively associated with both wage and rent growth, reflecting the households' disamenity and firms' counter-productivity effects, which is in accordance with the theory that greater taxes increase business cost and discourage labor supply.

This study also finds that the state expenditures on first-secondary education, highway, and public safety are positively associated with wage and rent. This result indicates that education, highway, or public safety have both amenity and productivity effects, in addition, the productivity effects of these the expenditure variables would have to dominate their amenity effects to be consistent with the positive sign in the wage model. These results indicate that more investment in education, highway, and public safety are preferred by both households and firms. None of the existing literatures has done such fiscal study at the nonmetropolitan level.

No hedonic fiscal policy studies have been done at the non- metropolitan level, which hence is the focus of this dissertation. This study could fill the gap in the hedonic literature and should be of interest to economists and policy makers. Specifically, policy makers should be aware of the dual role of taxes and public services in affecting households and firms in their location decisions. Furthermore in order to further the economic development of nonmetropolitan territories, it is better for the state governments to lower the personal income tax and corporate income tax while still being able to maintain the education, public safety and highway expenditures on a high level.

ADVISER'S APPROVAL: Dr. Dan S. Rickman
