Spatial Income Inequality in the United States

Francisco A. Castellanos-Sosa, Ph.D.

Senior Research Associate, Texas Census Institute

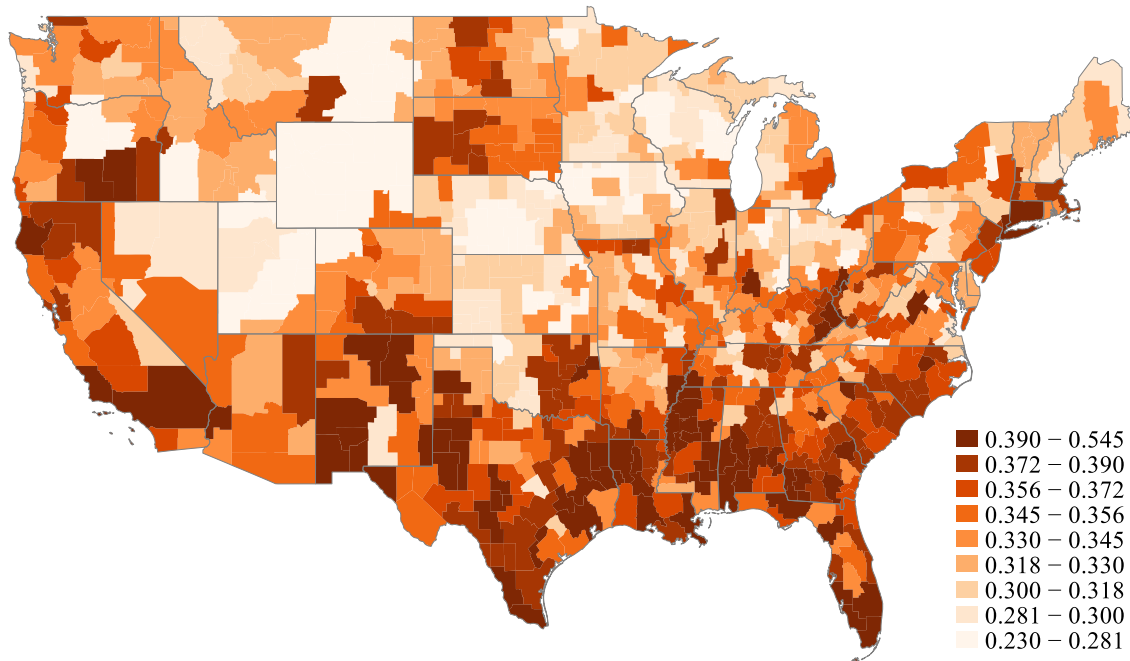May 17, 2023

2023 ACS Data Users Conference

Outline

a) Motivation

b) Research Questions

c) Policy Relevance

d) Contributions

e) Data and Methodology
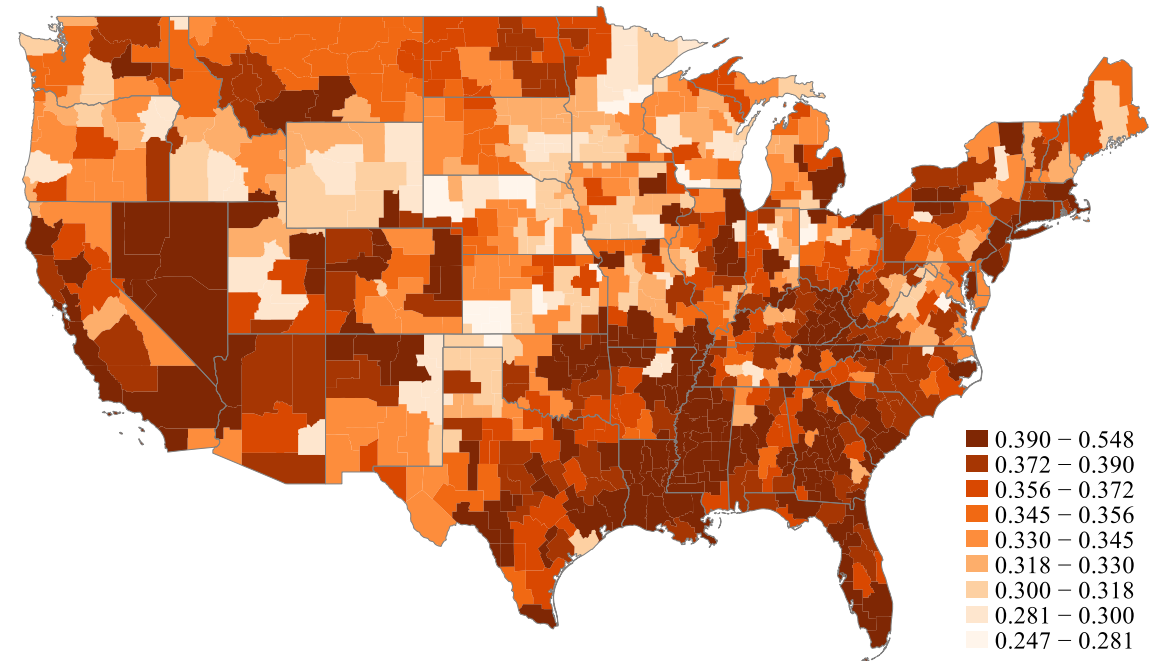
f) Results

g) Policy Implications

a) Motivation

Inequality increased in 72% of 722 Commuting Zones between 2005 and 2019

Figure 1.1: Spatial distribution of the Theil Index at the Commuting Zone level, 2005 and 2019.

a) 2005

a) 2019

| 0.390 − 0.545 |
| 0.372 − 0.390 |
| 0.356 − 0.372 |
| 0.345 − 0.356 |
| 0.330 − 0.345 |
| 0.318 − 0.330 |
| 0.300 − 0.318 |
| 0.281 − 0.300 |
| 0.230 − 0.281 |

| 0.390 − 0.548 |
| 0.372 − 0.390 |
| 0.356 − 0.372 |
| 0.345 − 0.356 |
| 0.330 − 0.345 |
| 0.318 − 0.330 |
| 0.300 − 0.318 |
| 0.281 − 0.300 |
| 0.247 − 0.281 |

Note: Color classification accounts for the 2005 nine quantiles.

b) Research Questions

To what degree is the rise in overall U.S. inequality due to the dynamics within and between local labor markets?

What are the local labor markets exerting the most influence on the rise of U.S. income inequality?

c) Policy Relevance

*"If **progress against poverty has been disappointing** over the past half century...
...[is because of] **the rise of extreme inequality**"*

*"...**the main cause of persistent poverty** now is high inequality of market income..."*

(Krugman, 2014)

*"From 2018 to 2019, the **fastest growth [of wages] continued at the top** (4.5% at the 95th percentile), while median wages grew 1.0% over the year and wages at the bottom fell (-0.7% at the 10th percentile)."*

(Gould, 2020)

c) Policy Relevance

Figure 1.2: Simplified framework of the Political Economy of Income Inequality.
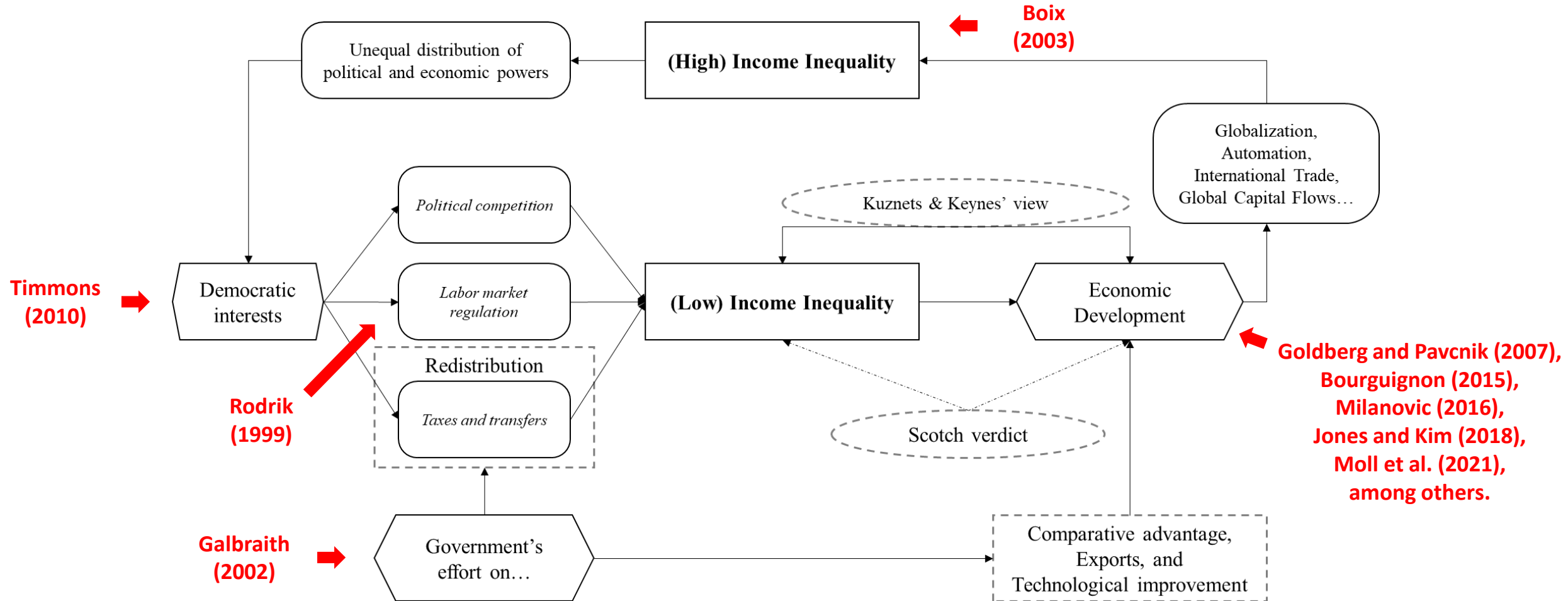
d) Contributions (to the literature)

- Literature on local labor markets dynamics:

    - *Starting wave*: Beck et al. (1978), Bloomquist (1990), Horan and Tolbert (1984), Kalleberg and Lincoln (1988), Kalleberg and Sorensen (1979), Parcel (1979), Singelmann and Deseran (1993), Tickamyer and Bokemeier (1988), Topel (1986), and **Tolbert and Sizer (1996)**.

    - *Current wave*: Acemoglu et al., 2016; Acemoglu and Restrepo, 2020; Atkin, 2016; **Autor and Dorn, 2013**; Autor et al., 2015; Chamberlain, 2016; Chetty et al., 2016; Finkelstein et al., 2021; Fowler et al., 2016; Maestas et al., 2013; McHenry, 2014, 2015; Peri, 2016.

d) Contributions (to the literature)

- Literature on income inequality studies:

  - *Closest pieces*: 1969–2004 and 1969–2007 state-level works of ***Galbraith and Hale (2008, 2014)***, and the national cross-section demographical analysis of ***Liao (2019)*** for the US in 2007 and 2017.

d) Contributions (empirically)

Overall

i)   *Provides a new data panel of income inequality measures at the commuting zone-year level along the 2005-2019 period.*

ii) *Explores a new disaggregation for shared and differentiated structures of the households' income distribution.*

iii) *Identifies spatial correlation and local labor markets exerting the most and the least influence on the rising of overall income inequality.*

e) Data and Methodology

Period: 2005–2019

Sources: American Community Survey (Ruggles et al., 2020)

Level for panel: 722 Commuting Zones (Local labor markets as in Autor et al. 2013)

Lowest data level: Households

e) Data and Methodology

Table 1.1: Household total income summary statistics by year.

Year	Unweighted Sample Size	Weighted Sample Size	Mean	Std. Dev.	Maximum
2005	1,151,938	110,368,809	$52,354	$54,948	$1,484,024
2006	1,156,218	110,922,496	$53,240	$55,854	$1,729,644
2007	1,167,047	111,671,245	$54,727	$58,443	$1,584,684
2008	1,177,964	112,386,052	$54,296	$58,217	$1,670,369
2009	1,184,411	112,878,274	$53,611	$56,618	$1,358,973
2010	1,195,993	113,815,183	$51,768	$53,720	$1,341,584
2011	1,197,232	114,238,268	$50,787	$53,544	$2,640,257
2012	1,200,289	115,232,855	$51,249	$54,297	$1,515,162
2013	1,203,930	115,561,754	$52,339	$57,142	$1,494,350
2014	1,210,911	116,529,240	$52,782	$57,241	$1,373,504
2015	1,219,416	117,481,998	$55,052	$60,584	$1,476,300
2016	1,224,774	118,121,105	$55,979	$61,121	$2,195,816
2017	1,236,252	119,309,966	$56,737	$62,052	$2,178,911
2018	1,249,872	120,765,496	$57,526	$63,704	$1,710,540
2019	1,269,060	122,042,138	$59,596	$65,182	$1,895,755

Notes: The sample of households considers those with a positive total income. Therefore, as reported by the ACS, the minimum household income is $1 in all years. Monetary values are constant at 1999 prices.

e) Data and Methodology

$$T = \sum_{i=1}^{n} x_i \log x_i$$

- Theil's Index

$$T = \sum_{j=1}^{m} v_j T_j + \sum_{j=1}^{m} v_j \log \frac{v_j}{w_j}$$

- Liao's (2016) decomposition

$$T_W = \sum_{j=1}^{m} v_{j,a} T_{j,a} + \sum_{j=1}^{m} v_{j,b} T_{j,b}$$

- Moran's Index

$$I = \frac{m}{\sum_{k \neq j} \sum_j w_{j,k}} \sum_j \sum_{k \neq j} \frac{w_{j,k}(T_j - \bar{T})(T_k - \bar{T})}{(T_j - \bar{T})^2}$$

- OLS elasticities

$$\Delta T_y = \alpha + \beta_1 \Delta T_{W,y} + \beta_2 \Delta T_{B,y} + \varepsilon_y$$

$$\Delta T_y = \alpha + \beta_2 \Delta T_{B,y} + \beta_3 \Delta T_{W-S,y} + \beta_4 \Delta T_{W-D,y} + \varepsilon_y$$

f) Results

**There is a spatial correlation
of the Theil index**

**Figure 1.5:** Evolution of the spatial autocorrelation of income inequality at different distances, 2005-2019.
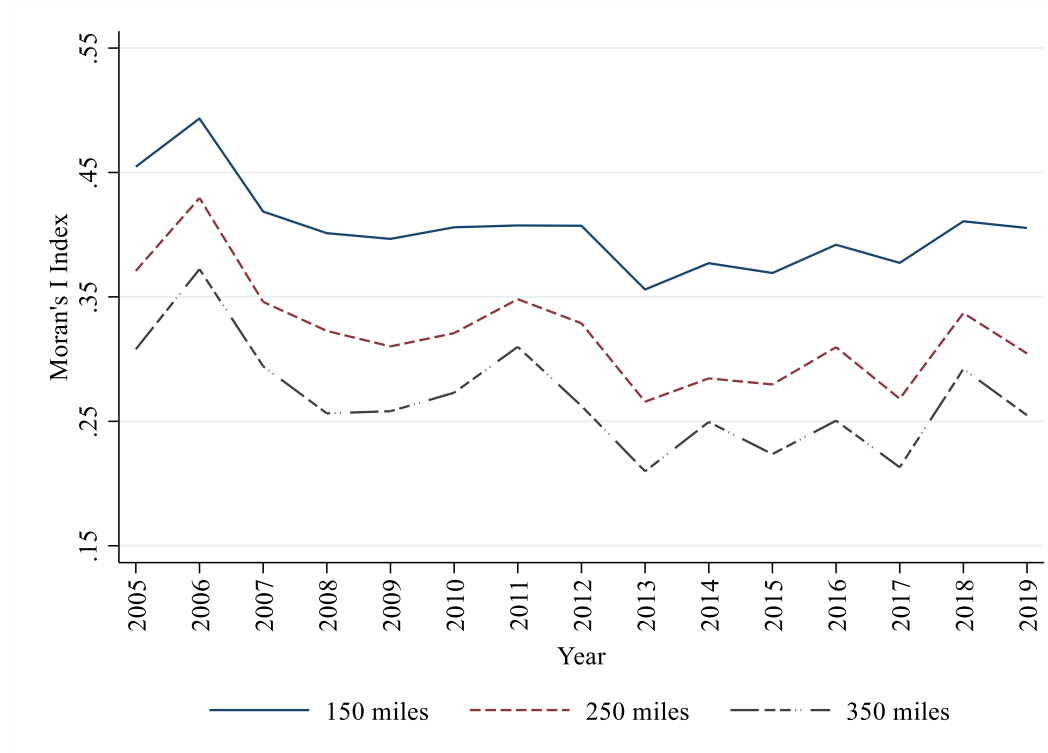
Note: Moran's I Global Index of spatial autocorrelation of the Theil index across the 722 commuting zones for each year is estimated with a binary contiguity matrix at different distances from the geographical centroid.

f) Results

Figure 1.6: Evolution of the Theil index and its within-CZ component, 2005-2019.
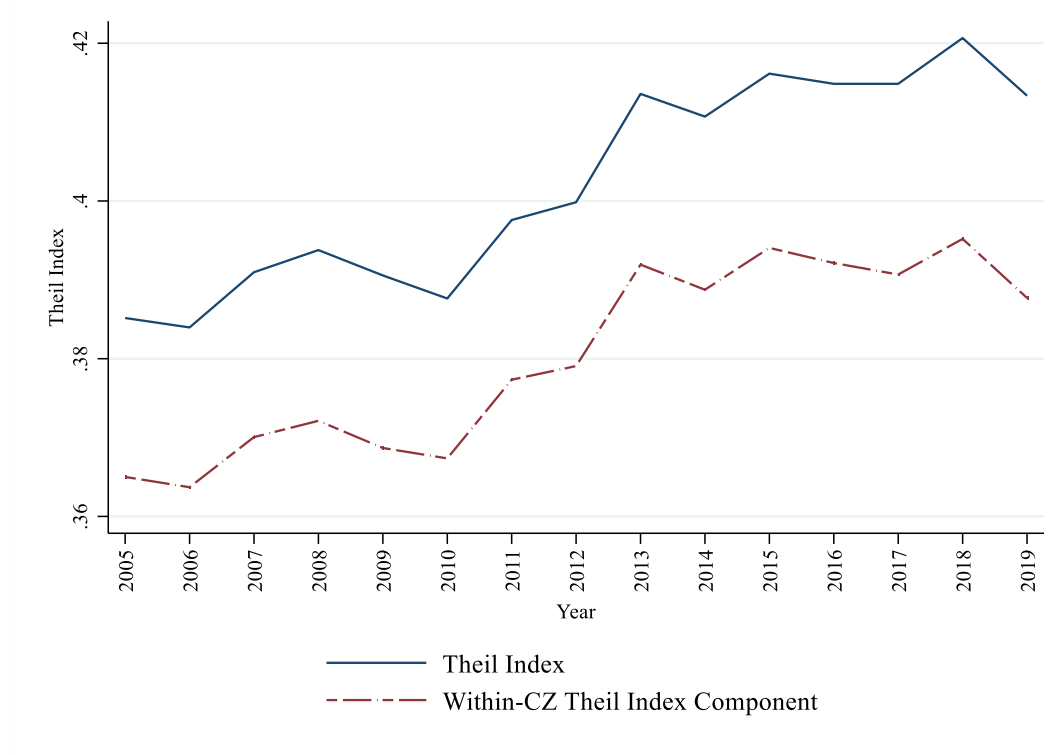
For the within-CZ component, the share of income held by each CZ weights each CZ's Theil index.

Therefore, its pattern might be driven by those CZs with the highest income, such as New York, New Jersey, San Francisco, Chicago, LA-Riverside, DC, and Boston.

f) Results

Figure 1.7: Evolution of the within-shared and within-differentiated Theil index subcomponents, 2005-2019.
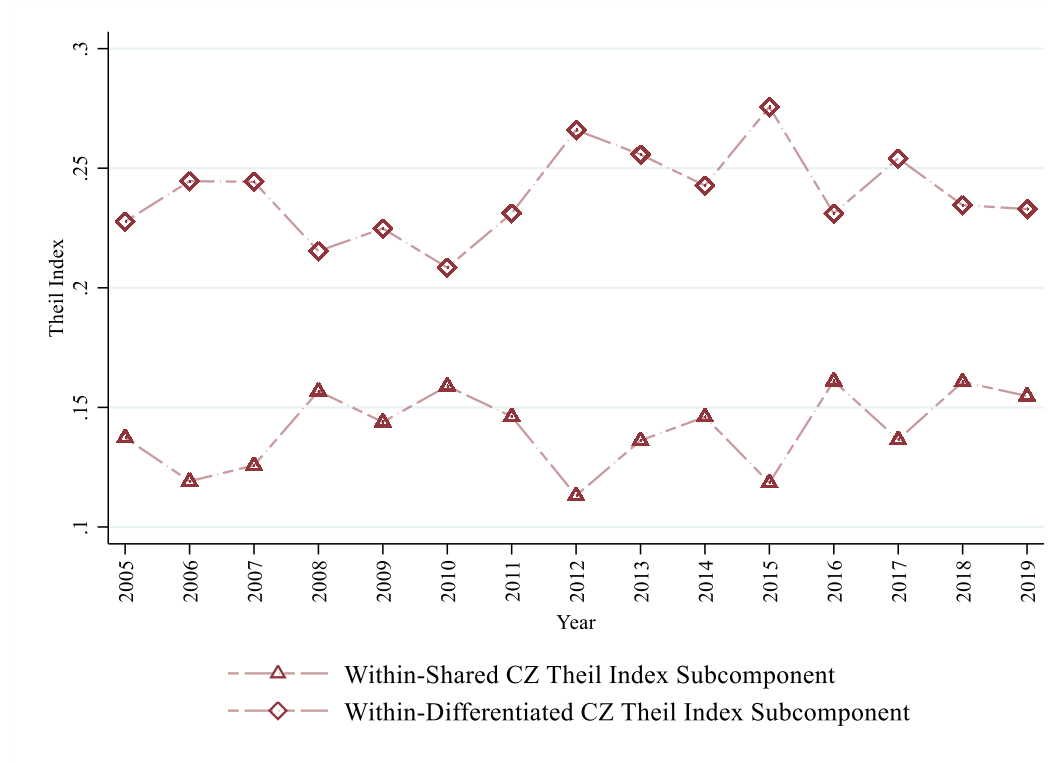
f) Results

Figure 1.8: Elasticity of the annual changes of Theil index and its components and subcomponents.
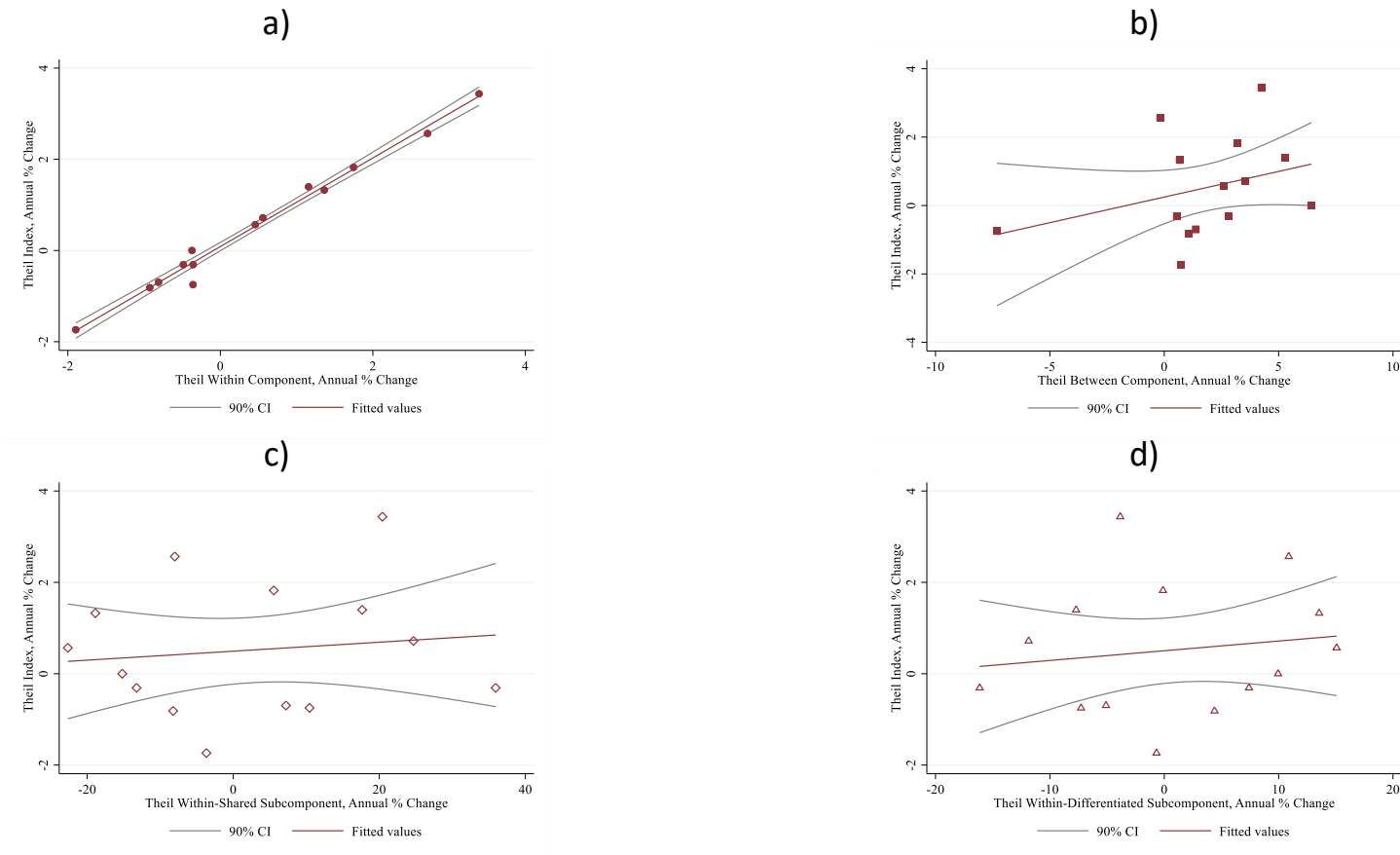
Note: Solid symbols, or markers, indicate a statistically significant coefficient, at least at the 90% level.

f) Results

Table 1.2: Elasticity between Theil index annual change and the annual change of its components and subcomponents

| Dep. Variable: Theil index Annual Change	(1)	(2)	(3)	(4)	(5)	(6)
Within Component	0.972*** (0.024)		0.945*** (0.002)			
Between Component		0.150* (0.080)	0.055*** (0.001)			-0.005 (0.0427)
Within-Shared Subcomponent				0.010 (0.020)		0.254*** (0.030)
Within-Differentiated Subcomponent					0.021 (0.027)	0.465*** (0.038)
R^2	0.985	0.113	0.999	0.015	0.021	0.825

Note: Each independent variable is measured as the percentual annual change. Robust standard errors are in parentheses. Coefficients are rounded to the third decimal place. The symbols ***, **, and * refer to statistical significance at the 1%, 5%, and 10% level, respectively.

f) Results

Figure 1.9: CZ's contribution to the between component of Theil index, 2005-2019.
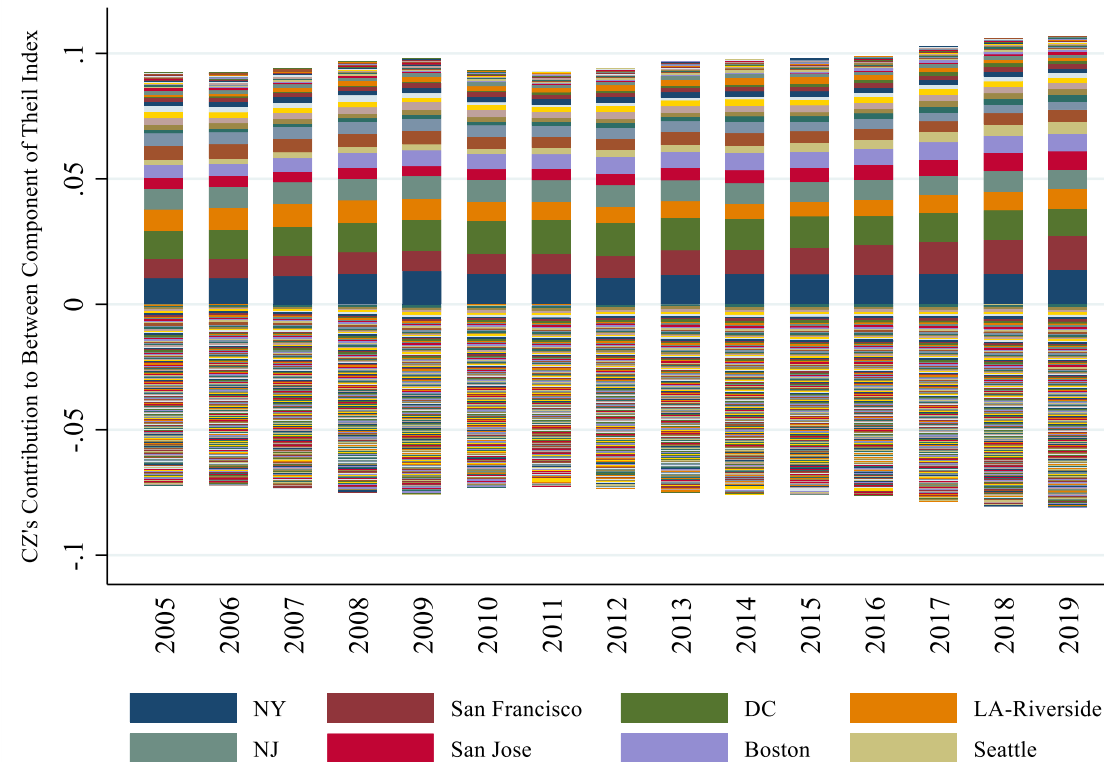

Note: The eight CZs with the highest positive contribution to the between component in 2019 are the only ones listed due to space limitations. The list of counties embraced by each CZ is presented in the original note to this figure in the dissertation.

f) Results

Top CZs seem to be associated with the financial and high-tech industries.
Bottom CZs tend to be touristic, industrial, or border areas.

Figure 1.10: CZs with the highest contributions, positive and negative, to the between component of Theil index, 2019.
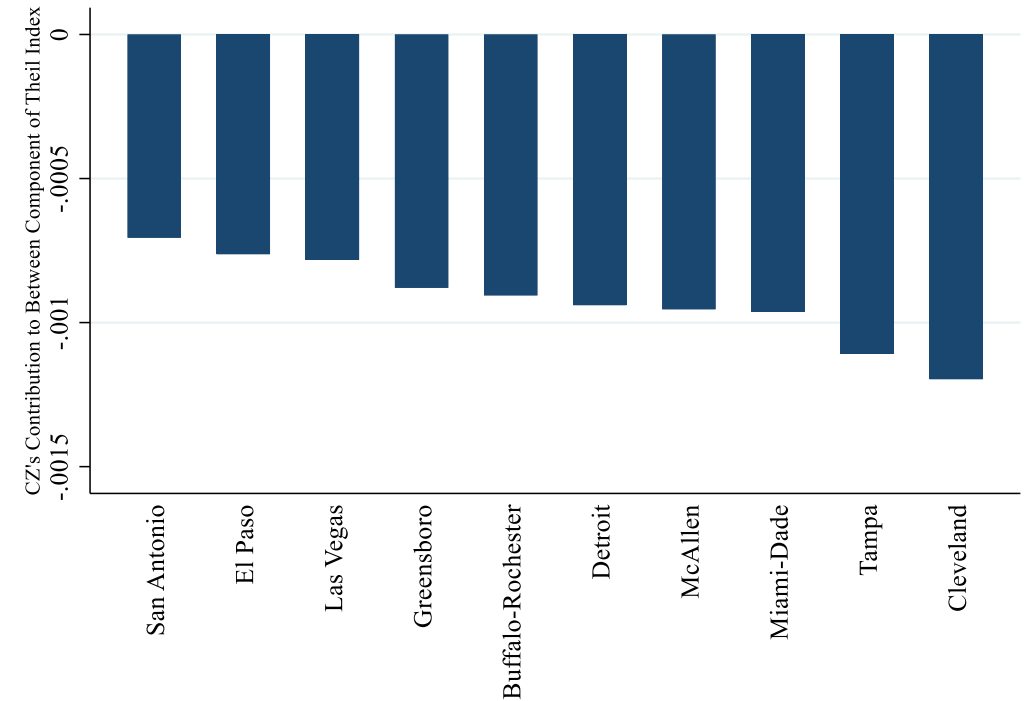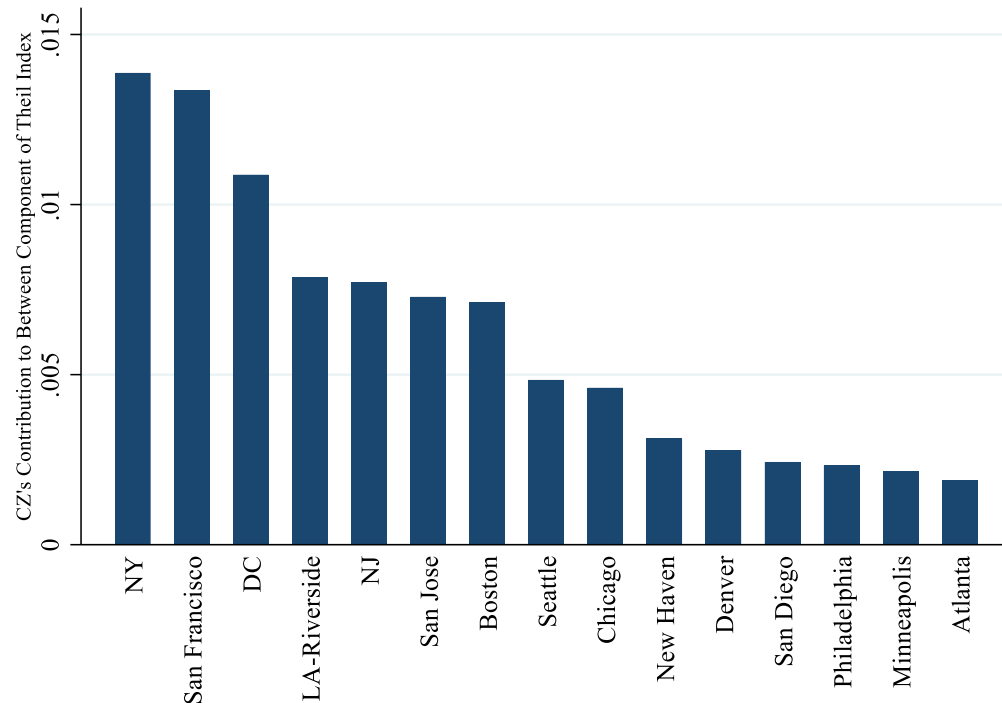
Note: The list of counties embraced by each CZ is presented in the original note to this figure in the dissertation.

g) Policy Implications

- Redistributive policies should consider realistic labor market areas.

- Income inequality should be treated as a regional phenomenon via spatial spillovers.

- Post-production policies related to the top part of the income distribution (such as wealth taxes and redistribution through social transfers and social insurance policies) seem to be the most appropriate in the U.S. context.

- Redistributive policies should account and compensate for industrial tradeoffs.

High-Tech + Financial vs Tourism + Border + Formerly industrial

Spatial Income Inequality in the United States

Francisco A. Castellanos-Sosa, Ph.D.

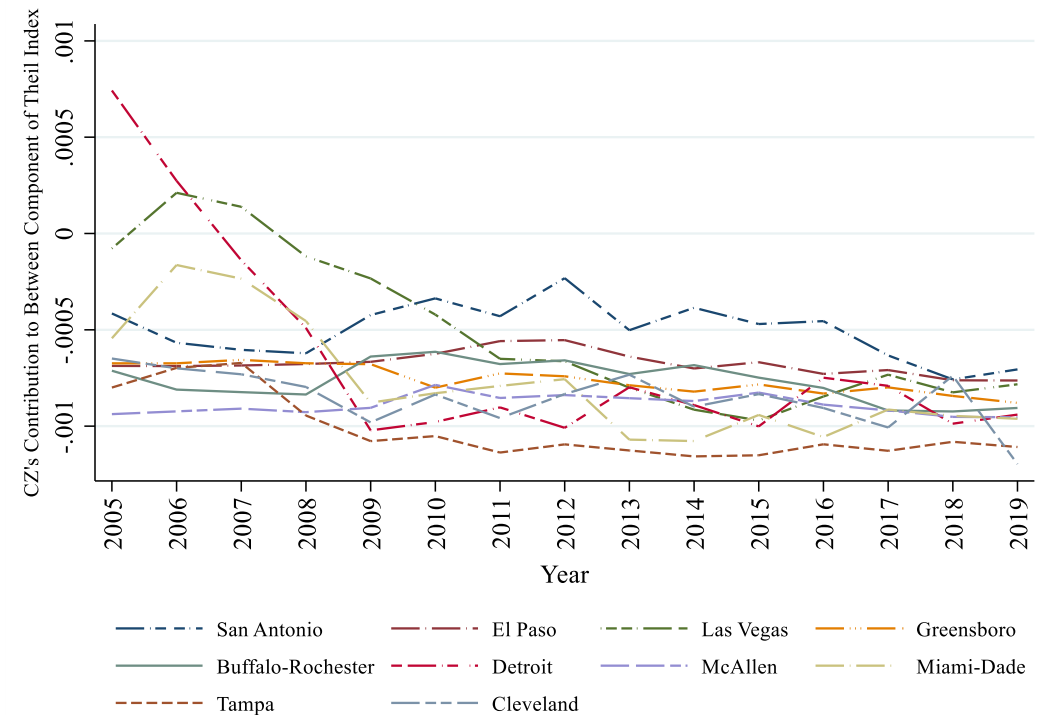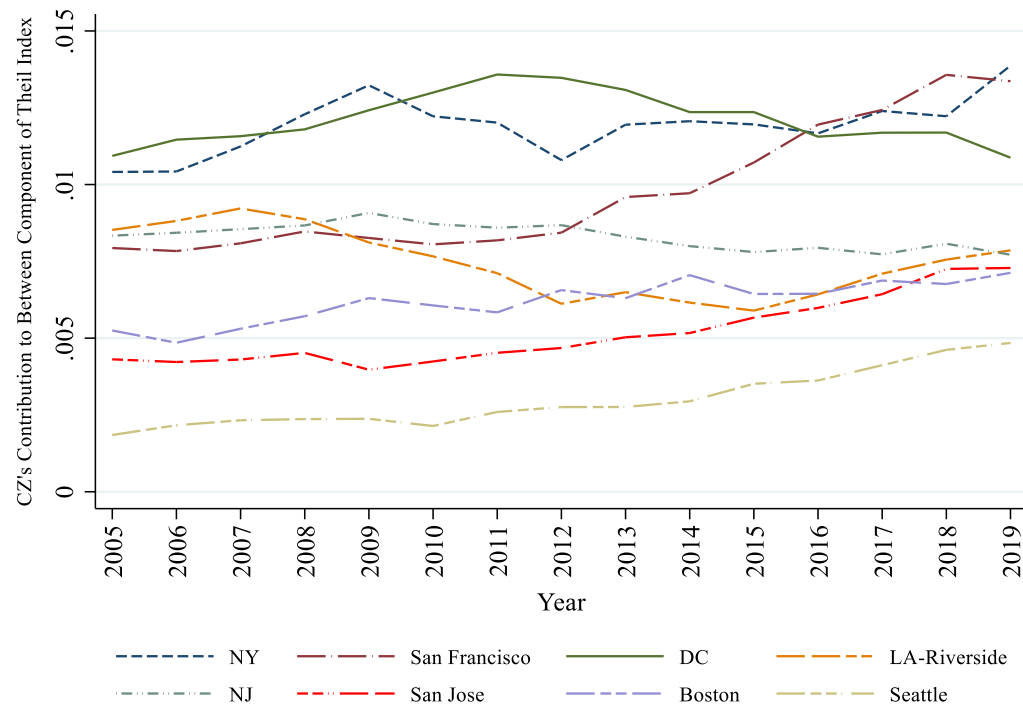Senior Research Associate, Texas Census Institute

May 17, 2023

2023 ACS Data Users Conference

Appendix

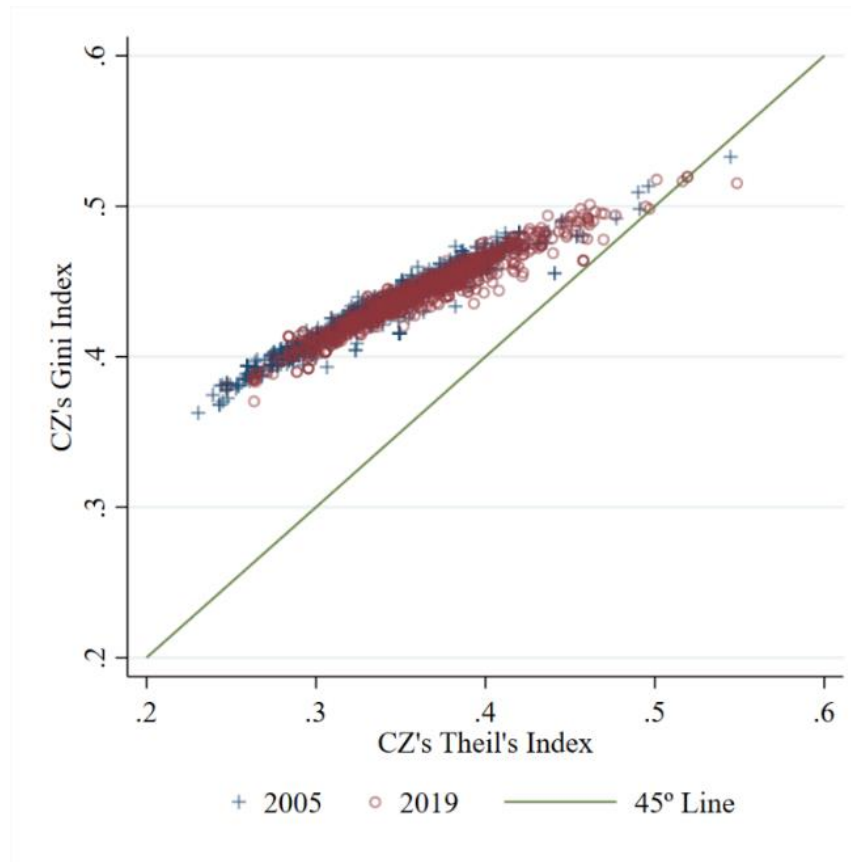Spatial income inequality in the United States

f) Results

Figure 1.11: Evolution of Top and Bottom CZs in Contribution to between Component of Theil index, 2005–2019.

Note: The list of counties embraced by each CZ is presented in the original note to this figure in the dissertation.

f) Results

Figure A1.1: Gini and Theil index per Commuting Zone, 2005 and 2019.

Note: Theil and Gini indices were obtained with total household income.