

Growth in Cities and Countries

Chang-Tai Hsieh and Enrico Moretti

NBER Growth Group

Why Do Cities Matter for Aggregate Growth?

Large Differences in Economic Activity Across Cities

Local Labor Demand (TFP)

Labor Supply (Amenities, Housing Prices)

But workers can move between cities and indifferent between “good” and “bad” cities (in equilibrium)

Effect of Local TFP/Amenities/Housing Prices on Aggregate Welfare and Output

Aggregate Effect of Local Shocks

Rosen-Roback: Wage = Welfare – (Prices - Amenities)

Welfare in Rosen-Roback Model:

- + Average Local TFP
- Average Prices/Amenities
- ***Dispersion*** of Local Y/L (Wages)

Focus on Wage Dispersion

How does Wage Dispersion affect Aggregate Welfare?

Suppose high TFP cities have higher housing prices

Rosen-Roback \Rightarrow High TFP cities are also Wage Cities

High TFP cities are also cities where MP of Labor is high

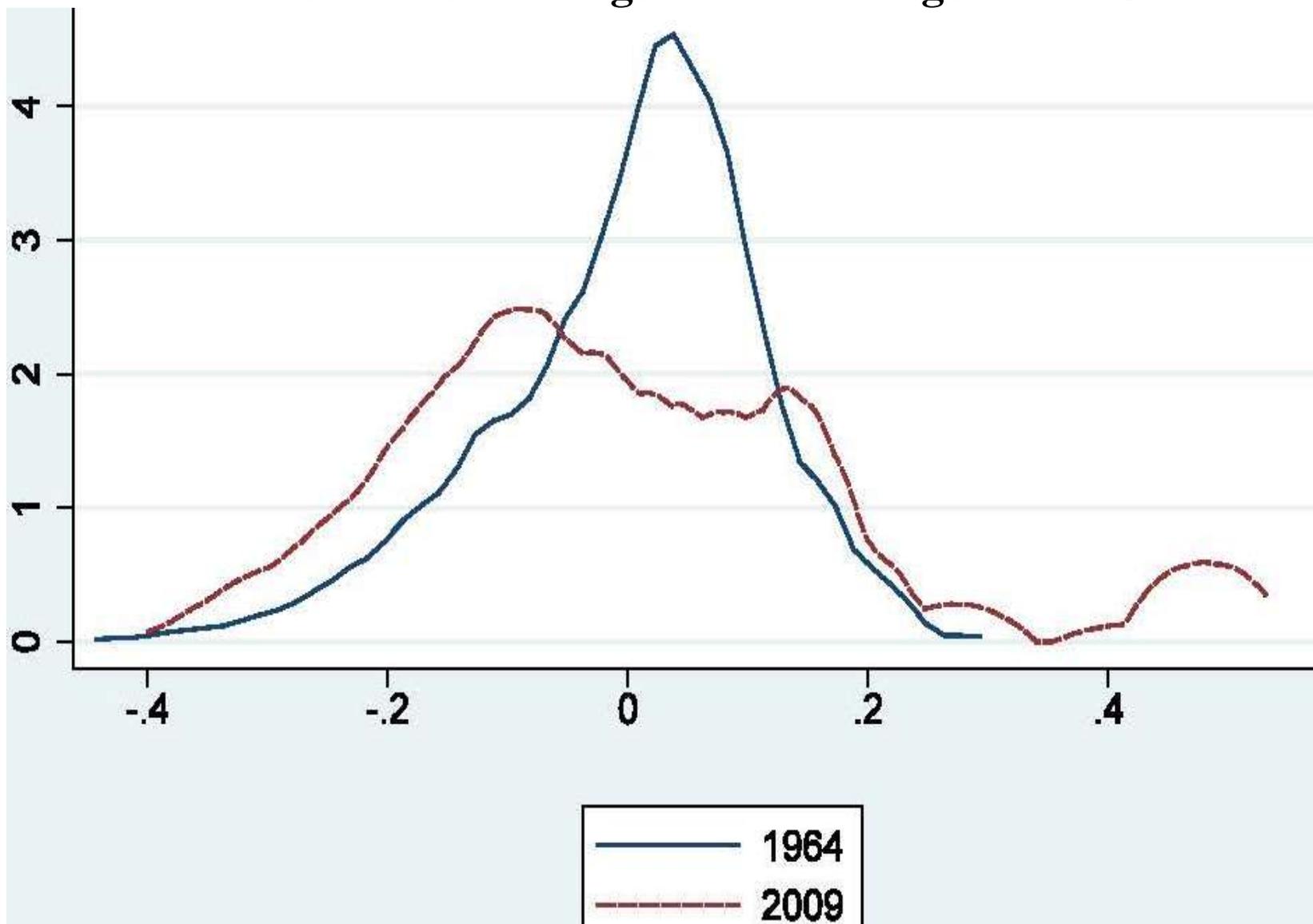
High Wage is equilibrium: Workers do not want to move to high TFP/high MP city

Wage Dispersion

\Rightarrow Lowers Aggregate Output and Higher Average Housing Prices

\Rightarrow Lowers Welfare (even for people in high wage city)

Distribution of Average Residual Wage in 220 Cities



Sources of Wage Dispersion

Entirely due to housing price dispersion (amenities lower wage dispersion)

Entirely due to higher housing prices in NY, DC, Boston, San Francisco, San Jose and Seattle

Somewhat offset by Southern Cities

Aggregate *Output* Effect of Wage Dispersion

Set 2009 Y/L Gap to 1964 Gap => Output Increases by 13.7 %

Aggregate Welfare = Output + Higher Housing Prices

Housing prices prevent workers from moving to high TFP cities

Rosen-Roback

Local Output:

$$Y_i = A_i K_i^\eta L_i^\alpha$$

A_i : Local TFP

Welfare (Indirect Utility):

$$V = \frac{W_i Z_i}{P_i^\beta}$$

Z_i : Amenities

P_i : Rental Price of Housing

Partial Equilibrium

Labor Productivity: $\frac{Y_i}{L_i} \propto W_i = \frac{VP_i^\beta}{Z_i}$

City Size: $L_i \propto \left(\frac{A_i}{W_i^{1-\eta}} \right)^{\frac{1}{1-\alpha-\eta}} = \left(\frac{A_i Z_i^{1-\eta}}{P_i^{\beta(1-\eta)}} \right)^{\frac{1}{1-\alpha-\eta}}$

Housing Price: $P_i = L_i^{\gamma_i} \Rightarrow W_i \propto \left(\frac{A_i^{\gamma_i \beta}}{Z_i^{1-\eta-\alpha}} \right)^{\frac{1}{(1-\eta)(1+\gamma_i \beta)-\alpha}}$

General Equilibrium

$$\text{Aggregate Welfare: } V \propto Y \cdot \sum_i L_i \cdot \frac{Z_i}{P_i^\beta}$$

$$Y = \sum_i Y_i = \left(\sum_i A_i^{\frac{1}{1-\alpha-\eta}} \left(\frac{\bar{W}}{W_i} \right)^{\frac{1-\eta}{1-\alpha-\eta}} \right)^{\frac{1-\alpha-\eta}{1-\eta}}$$

$$\bar{W} = \sum_i L_i W_i : \text{ employment-weighted average wage}$$

Welfare = Average local TFP + Average Amenities/Prices - Wage Dispersion

Aggregate Effect of Increase in Local TFP (New York, SF, South)

Average Local TFP

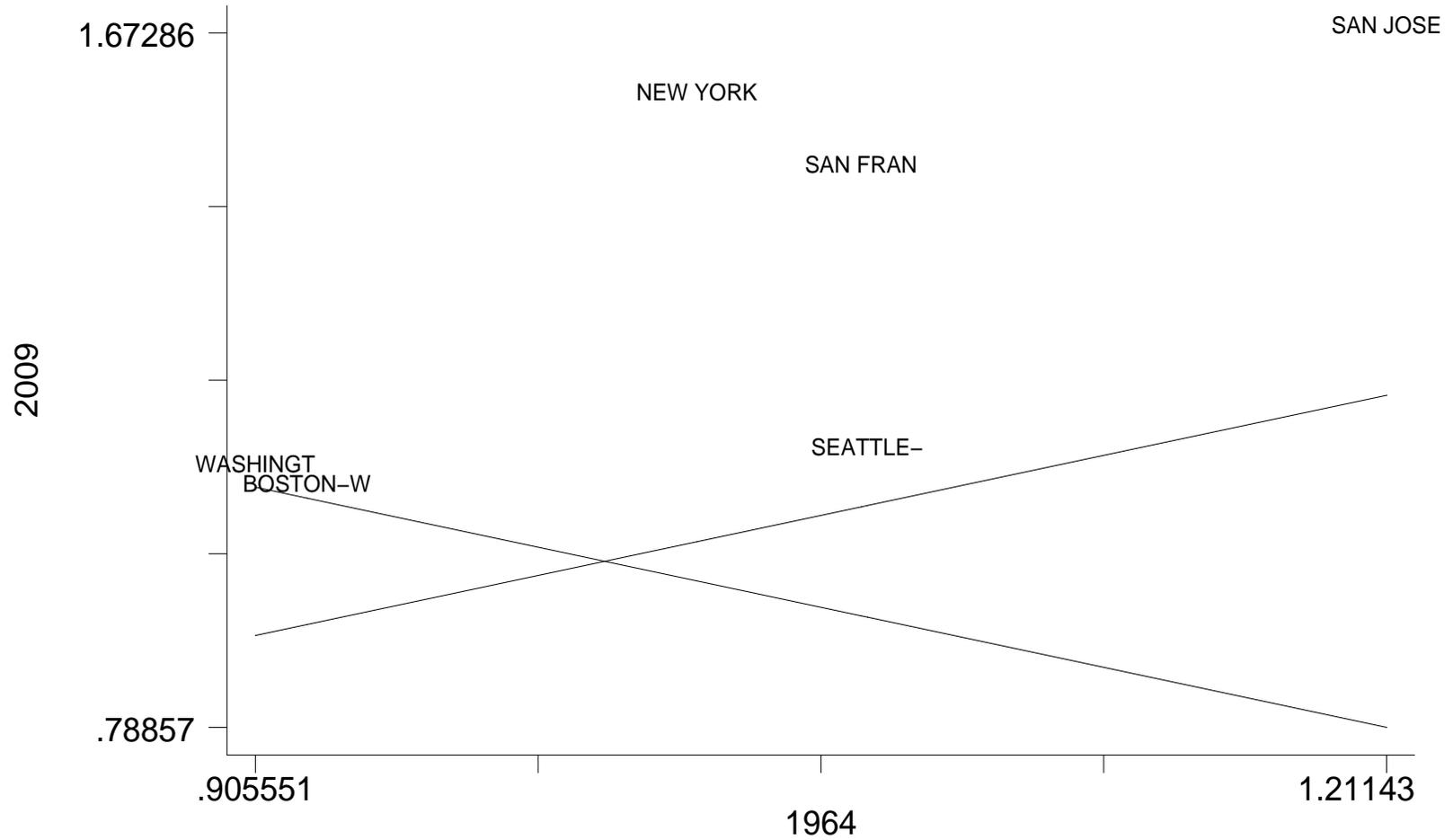
Average Housing Prices increase (depending on housing supply elasticity)

W_i Dispersion

Increase Dispersion if high wage city (by a lot if housing supply inelastic) (New York, SF)

Decrease Dispersion if low wage city and housing prices don't increase by "too much" (South)

Relative Wages for "Innovation Hubs"



Aggregate Effect of *Decrease* in Local TFP (Rust Belt Cities)

Average Local TFP Falls

Glaeser-Gyourko: Housing Supply Inelastic in Declining Cities

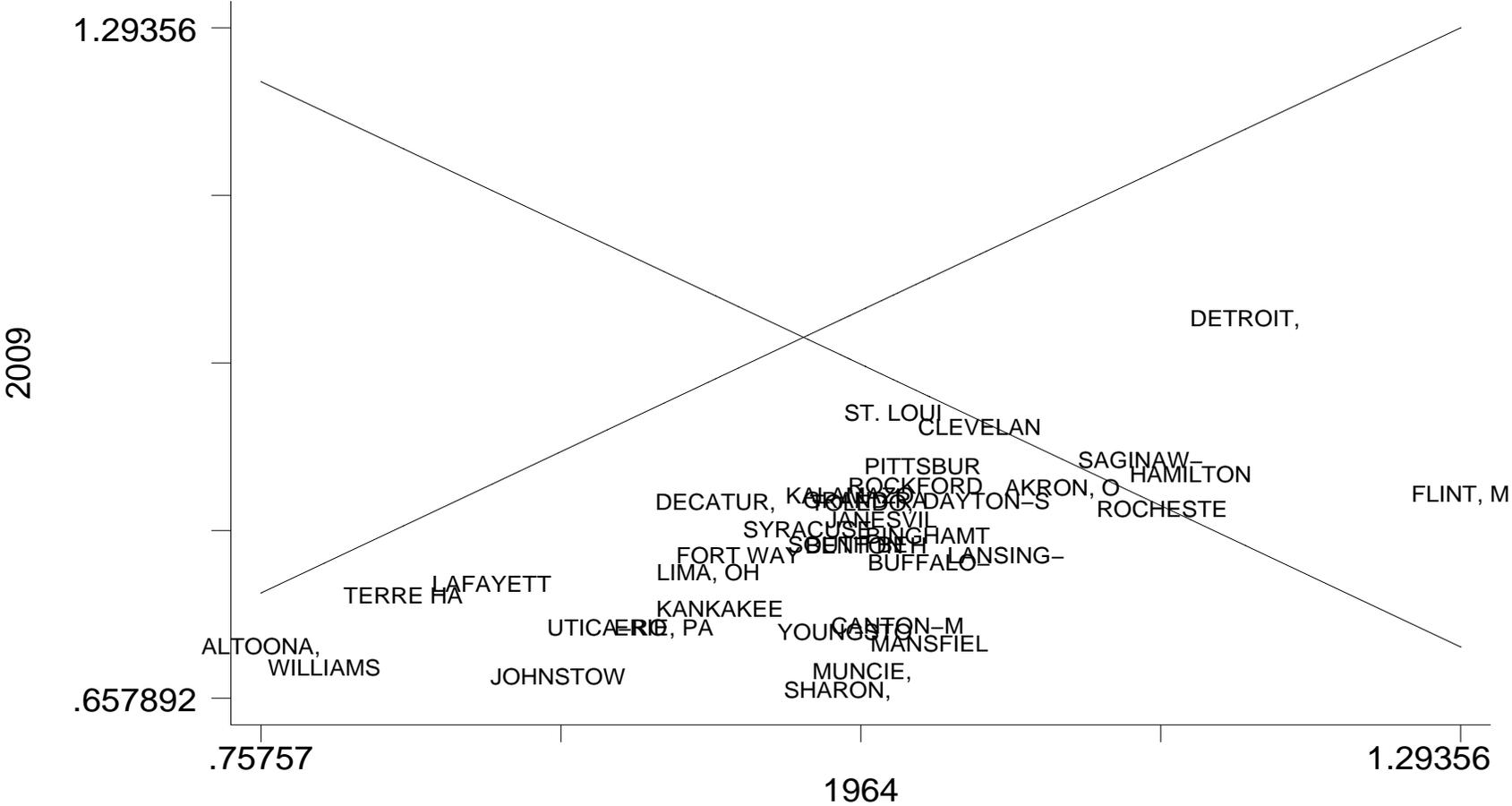
Average Housing Prices (across all cities) Fall

W_i Dispersion

Decrease Dispersion if wages are “very high”

Increase Dispersion if wages are not “too high”

Relative Wages for *Rust Belt* Cities



Aggregate Effect of Improvement in Local Amenities

Value of Good Weather, Consumer Amenities, Good Public Schools

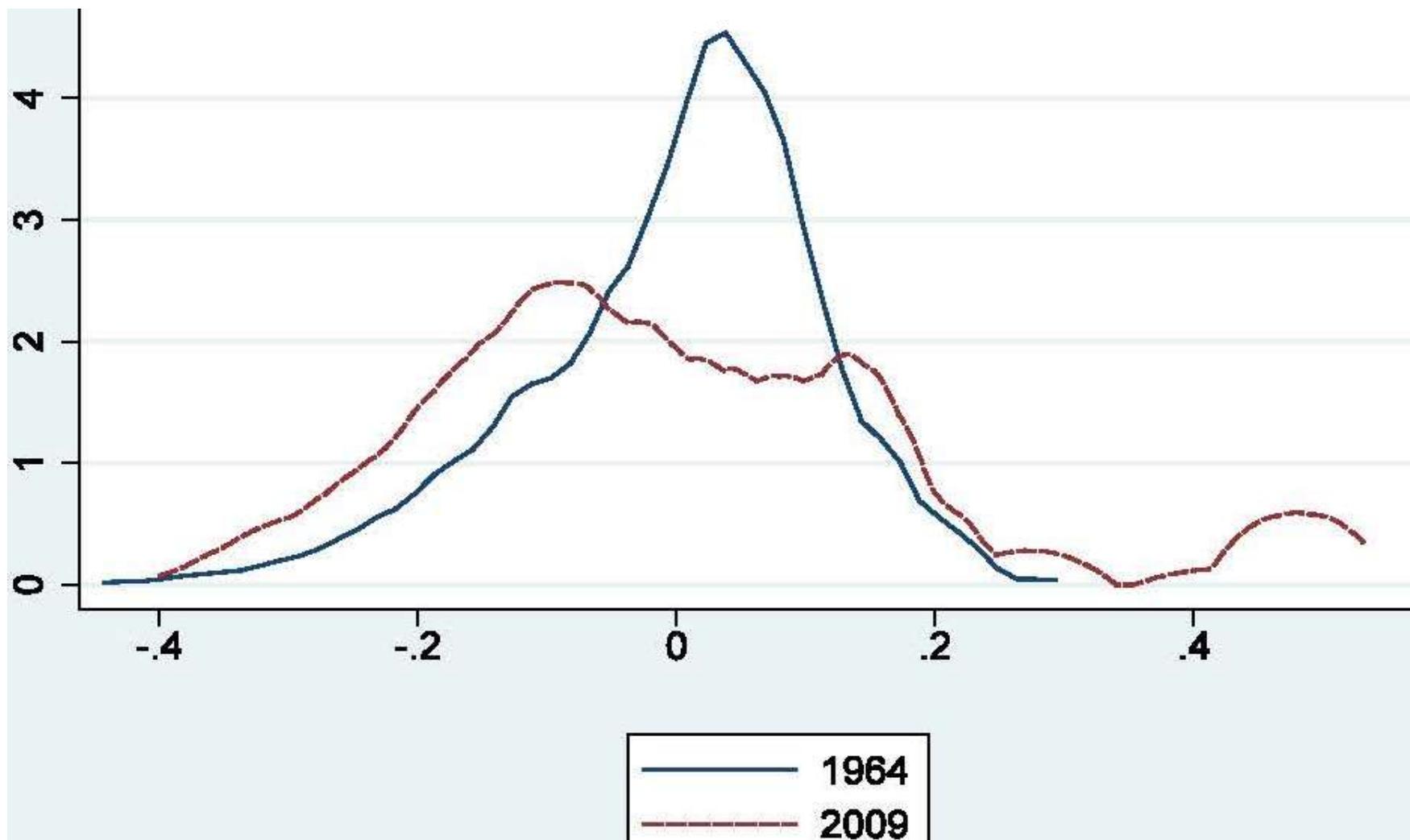
Average Amenities Increase

W_i Dispersion

Decrease Dispersion if high wage city (New York, SF)

Increase Dispersion if low wage city (South)

Distribution of Average Residual Wages Across 220 Cities



Standard Deviation of Log Average Wage Across 220 Cities

	1964	2009
Average Wage	0.132	0.205
Average <i>Residual</i> Wage	0.109	0.189

Aggregate Output Effect from Setting Wage Gap to 1964 Gap

- *Set Distribution* of Housing Prices and Amenities to 1964
- Keep Local TFP Fixed
- Reallocate L and K

% Change Aggregate Output

All Cities	13.7%
NY, DC, Boston, SF, Seattle, San Jose	14.1%
Southern Cities	-3.2%
Rust-Belt Cities	0.6%

Aggregate Output Effect of Setting Amenities to 1964 Level

% Change in Aggregate Output

All Cities -1.4 %

Amenities:

Improved in high wage cities

Worsened in low wage cities

Amenities narrows wage dispersion (but effect quantitatively small)

Summary:

Wage Dispersion Entirely due to Housing Costs

Driven by NY, SF, San Jose, Seattle, Boston, DC

Offset by Southern Cities

Wage Dispersion due to higher housing costs suggests average housing costs increased => Welfare Loss = Output Loss + Higher Prices

High housing prices prevent workers from moving to high TFP cities

Large welfare gains from changing housing supply restrictions (zoning laws) or transportation (fast trains?) that allow more workers to access high TFP labor markets.