The Determinants and Welfare Implications of US Workers' Diverging Location Choices by Skill: 1980-2000

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Moretti's Great Divergence

Moretti (2004) pointed out that the period between 1980 and 2000 was characterized by the following stylized facts:

- an increase in skill sorting across cities;
- growing-skill cities experienced higher increases in wages and housing prices;
- an increase in college premium;
- an increase in amenities in growing cities.

Since some of these effects are off-setting each other, it is useful to try to explain these facts within a spatial model of local labor markets that allows for mobility across markets.

Fact 1: An Increase in Sorting by Skill

- We can rank cities by the the 1980 college employment share.
- We observed that the higher the 1980 college share the higher the growth in college employment share between 1980-2000.
- We also observe that these cities experience higher growth in rents, college wages, and non-college wages.
- Note that the relationship between college employment ratios and rents seem to be the strongest.

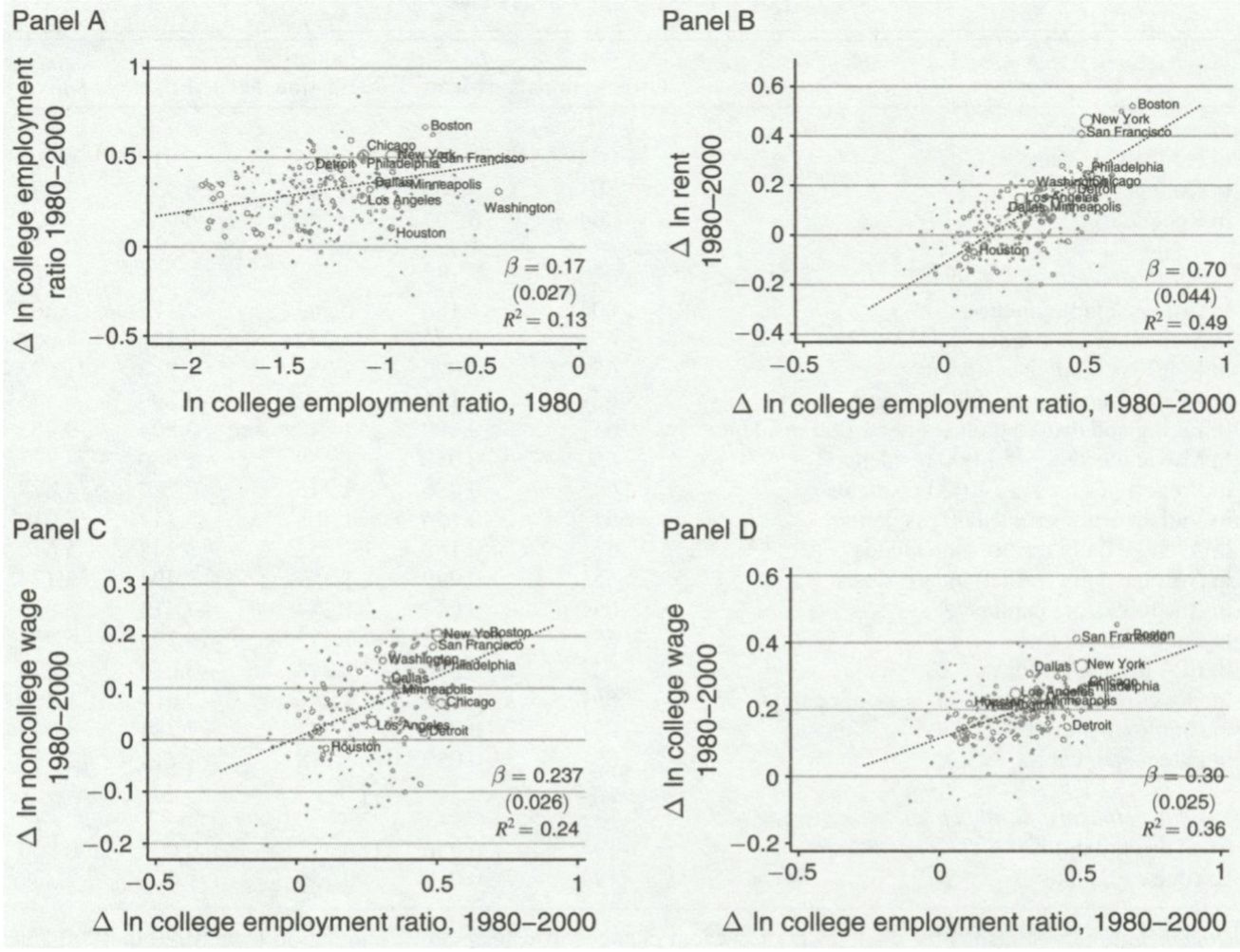

FIGURE 1. CHANGES IN WAGES, RENTS, AND COLLEGE EMPLOYMENT RATIOS, 1980–2000

Notes: Weighted by 1980 population. Largest 15 MSAs in 1980 labeled.

Fact 2: Increase of College Premium

TABLE 2—OBSERVED CHANGES IN WAGES AND LOCAL REAL WAGES, 1980–2000

Year	College/high school grad wage gap (1)	College/high school grad rent gap (2)	Local real wage gap (3)
1980	0.383 [0.0014]	0.048 [0.0004]	0.353 [0.0014]
1990	0.544 [0.0010]	0.145 [0.0007]	0.454 [0.0009]
2000	0.573 [0.0009]	0.119 [0.0004]	0.499 [0.0009]
Change, 1980–2000	0.190	0.072	0.146

Notes: Wage gap measures the log wage difference between college and high school graduates. Rent gap measures the log rent difference between college and high school graduates. Note that rent is measured as the city-level rent index and does not reflect differences in housing size choices. Local real wage gap measures the wages net of local rents gap.

Fact 3: Amenity Increases

TABLE 3—MSA COLLEGE RATIO CHANGES ON AMENITY CHANGES, 1980–2000

Panel A. Retail amenities

	Apparel stores per 1,000 residents	Eating and drinking places per 1,000 residents	Movie theaters per 1,000 residents
Δ College emp. ratio	0.477***	0.182***	0.230
	[0.0928]	[0.0539]	[0.166]

Panel B. Transportation amenities

	Bus routes per capita	Public transit index	Avg. daily traffic: interstates	Avg. daily traffic: major roads
Δ College emp. ratio	1.045***	0.0161	−0.169*	−0.0513
	[0.376]	[0.338]	[0.0979]	[0.0704]

	Property crimes per 1,000 residents	Violent crimes per 1,000 residents	Gov. spending on parks per capita	EPA air quality index
	Panel C. Crime amenities		*Panel D. Environment amenities*	
Δ College emp. ratio	−0.231*	0.115	0.263	−0.539***
	[0.122]	[0.155]	[0.172]	[0.171]

	Gov. K–12 spending per student	Student–teacher ratio	Patents per capita	Employment rate
	Panel E. School amenities		*Panel F. Job amenities*	
Δ College emp. ratio	0.129**	0.00423	0.104	0.0105
	[0.0639]	[0.0631]	[0.234]	[0.00787]

Notes: Standard errors in brackets. Changes measured between 1980 and 2000. All variables are measured in logs. College employment ratio is defined as the ratio of number of full-time employed college workers to the number of full-time employed lower skill workers living in the city. Retail and local service establishments per capita data come from County Business Patters 1980, 2000. Crime data is from the FBI. Air Quality Index is from the EPA. Higher values of the air quality index indicate more pollution.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Contributions

- This paper provides a quantitative assessment of the determinants of sorting by skill and their welfare implications.
- It develops and estimates a spatial equilibrium model *à la* Rosen (1979) and Roback (1982).
- The model allows for heterogeneous preferences for cities as well as the endogenous supply of amenities which are partially determined by the local skill mix.
- The paper finds that college welfare gap increased more than suggested by the increase in college wage gap. That is somewhat counterintuitive.

Variables and Data Sources

- Wages, housing costs, residence locations are based on the 5 percent IPUMS sample provided by the U.S. Census.
- Cities are defined as MSA (218 in the U.S.). The rural area are the non-MSAs.
- Key variable: "skill mix" is defined as the ratio of college to non-college workers in the MSA.
- Amenities are broadly defined and include access to retail, transportation, crime, environment, school, and job quality.

Log-linear Labor Demand

There are two types of labor – high skill and low skill – and the (inverse) demand for labor in each city j at time t is given by:

$$\begin{aligned} w_{jt}^{H} &= \gamma_H + \gamma_{HH} \ln H_{jt} + \gamma_{HL} \ln L_{jt} + \epsilon_{jt}^{H} \\ w_{jt}^{L} &= \gamma_L + \gamma_{LH} \ln H_{jt} + \gamma_{LL} \ln L_{jt} + \epsilon_{jt}^{L} \end{aligned}$$

where

- w_{jt}^{H} : wages of high skill workers.
- H_{jt} : employment of high skill workers.
- w_{jt}^{L} : wages of low skill workers.
- L_{jt} : employment of low skill workers.

Worker's Problem and Indirect Utility

$$\max_{M,O} \ln\left(M^{\zeta}\right) + \ln\left(O^{1-\zeta}\right) + s_i\left(A_{jt}\right) \tag{11}$$
$$s.t.\ P_t O + R_{jt} M \leq W_{jt}^{edu}.$$

$$\begin{aligned} V_{ijt} &= \ln\left(\frac{W_{jt}^{edu}}{P_t}\right) - \zeta \ln\left(\frac{R_{jt}}{P_t}\right) + s_i\left(A_{jt}\right), \\ &= w_{jt}^{edu} - \zeta r_{jt} + s_i\left(A_{jt}\right), \end{aligned} \tag{12}$$

where:

- M : local consumption good
- R_{jt} : price of local good (housing and other nontradeble goods)
- O : national good consumption
- P_t : price of national good
- A_{jt} : vector of amenities
- W_{jt}^{edu} : local wage

Decomposing Amenities

$$
\begin{aligned}
s_i\left(A_{jt}\right) &= a_{jt}\beta_i^a + x_{jt}^A\beta_i^x + x_j^{st}\beta_i^{st} + x_j^{\text{div}}\beta_i^{\text{div}} + \sigma_i\varepsilon_{ijt} && (14)\\
\beta_i^x &= \beta^x z_i \\
\beta_i^a &= \beta^a z_i && (15)\\
\beta_i^{st} &= st_i\beta^{st} z_i \\
\beta_i^{\text{div}} &= \text{div}_i\,\beta^{\text{div}} z_i && (16)\\
\sigma_i &= \beta^\sigma z_i && (17)\\
\varepsilon_{ijt} &\sim \text{Type I Extreme Value.}
\end{aligned}
$$

where:

- a_{jt} : city endogenous amenities (fraction of high skill labor)
- x_{jt}^A : city exogenous amenities
- x_j^{st}: 1×50 vector of state-time dummies
- x_j^{div}: 1×9 vector of division dummies

Re-write the Indirect Utility a la BLP

$$V_{ijt} = \underbrace{\left(w_{jt}^{edu} - \zeta r_{jt}\right)\beta^{w}\mathbf{z}_i + a_{jt}\beta_i^{a} + \mathbf{x}_{jt}^{A}\beta_i^{x}}_{\delta_{jt}^{z}} + \beta_i^{st}\mathbf{x}_j^{st} + \beta_i^{\text{div}}\mathbf{x}_j^{\text{div}} + \varepsilon_{ijt}\,.$$

$$\delta_{jt}^{z} = \left(w_{jt}^{edu} - \zeta r_{jt}\right)\beta^{w}z + a_{jt}\beta^{a}\mathbf{z} + x_{jt}^{A}\beta^{x}\mathbf{z}.$$

$$V_{ijt} = \delta_{jt}^{z} + \mathbf{x}_j^{st}\mathbf{st}_i\beta^{st}\mathbf{z}_i + \mathbf{x}_j^{\text{div}}\mathbf{div}_i\beta^{\text{div}}\mathbf{z}_i + \varepsilon_{ijt}.$$

- δ_{jt}^{z}: mean utility of worker type z in city j at time t (BLP)
- Not sure why she hits first term with $\beta^{w}z_i$, since this is a money metric utility, heterogeneity should be in ζ.
- z also includes characteristics such as race, immigration status, etc.

Conditional Logit and Populations Shares

$$\Pr(V_{ijt} > V_{i-jt}) = \frac{\exp(\delta_{jt}^{z_i} + \beta^{st} z_i st_i x_j^{st} + \beta^{\text{div}} z_i \, \text{div}_i \, x_j^{\text{div}})}{\sum_k^J \exp(\delta_{kt}^{z_i} + \beta^{st} z_i st_i x_k^{st} + \beta^{\text{div}} z_i \, \text{div}_i \, x_k^{\text{div}})}.$$

$$\begin{aligned} H_{jt} &= \sum_{i \in \mathcal{H}_t} \frac{\exp(\delta_{jt}^{z_i} + x_j^{st} st_i \beta^{st} z_i + x_j^{\text{div}} \, \text{div}_i \, \beta^{\text{div}} z_i)}{\sum_k^J \exp(\delta_{kt}^{z_i} + x_k^{st} st_i \beta^{st} z_i + x_k^{\text{div}} \, \text{div}_i \, \beta^{\text{div}} z_i)} \\ L_{jt} &= \sum_{i \in \mathcal{L}_t} \frac{\exp(\delta_{jt}^{z_i} + x_j^{st} st_i \beta^{st} z_i + x_j^{\text{div}} \, \text{div}_i \, \beta^{\text{div}} z_i)}{\sum_k^J \exp(\delta_{kt}^{z_i} + x_k^{st} st_i \beta^{st} z_i + x_k^{\text{div}} \, \text{div}_i \, \beta^{\text{div}} z_i)}. \end{aligned}$$

- H_{jt}, L_{jt} : total high and low skill populations in city j.

Inverse Housing Supply, Housing Demand, and Rental Prices

To close the model we need to specify a housing supply function, and impose the housing market clearing condition.

$$
\begin{aligned}
r_{jt} = \ln\left(R_{jt}\right) &= \ln\left(\iota_t\right) + \ln\left(CC_{jt}\right) + \gamma_j \ln\left(HD_{jt}\right), && (18)\\
\gamma_j &= \gamma + \gamma^{geo} \exp\left(x_j^{geo}\right) + \gamma^{reg} \exp\left(x_j^{reg}\right), && (19)\\
HD_{jt} &= L_{jt} \frac{\zeta W_{jt}^L}{R_{jt}} + H_{jt} \frac{\zeta W_{jt}^H}{R_{jt}}, && (20)
\end{aligned}
$$

where:

- ι_t : interest rate (unobserved)
- CC_{jt} : construction costs (unobserved)
- x_j^{geo} : nearby share of land unavailable for development
- x_j^{reg} : local land use regulation

Static Sorting Equilibrium

Given a set of cities, $j = 1, .., J$ an equilibrium of this model is defined by a set of wages, rents and amenity levels $\left(w_{jt}^{L*}, w_{jt}^{H*}, r_{jt}^{*}, \frac{H_{jt}^{*}}{L_{jt}^{*}}\right)$ with populations $\left(H_{jt}^{*}, L_{jt}^{*}\right)$ such that for each city and each point of time:

- The high skill labor demand equals high skill labor supply.
- The low skill labor demand equals low skill labor supply.
- The housing demand equals housing supply.
- The endogenous amenities are consistent with household sorting.

Principle Component Analysis for Amenities

TABLE 4—PRINCIPLE COMPONENT ANALYSIS FOR AMENITY INDICES

	Loading	Unexplained variance
Panel A. Retail index		
Apparel stores per 1,000 residents	0.653	0.411
Eating and drinking places per 1,000 residents	0.525	0.619
Movie theaters per 1,000 residents	0.545	0.591
Panel B. Transportation index		
Public buses per capita	0.566	0.5099
Public transit index	0.7015	0.2476
Average daily traffic—interstates	0.332	0.8315
Average daily traffic—major roads	0.277	0.8823
Panel C. Crime index		
Property crimes per 1,000 residents	0.707	0.395
Violent crimes per 1,000 residents	0.707	0.395
Panel D. Environment index		
Government spending on parks per capita	0.707	0.4541
EPA air quality index	−0.707	0.4541
Panel E. School index		
Government K–12 spending per student	0.707	0.3425
Student–teacher ratio	−0.707	0.3425
Panel F. Job index		
Patents per capita	0.707	0.4417
Employment rate	0.707	0.4417
Panel G. Overall amenity index		
Retail index	−0.2367	0.9039
Transportation index	0.4861	0.5948
Crime index	−0.1518	0.9605
Environment index	0.3973	0.7293
School index	0.5222	0.5323
Job index	0.5041	0.5643

Notes: All amenity data measured in logs. See online Appendix for detailed description of amenity data and their data sources. Panels A–F report weights used in each subindex construction. Panel G reports loadings on each subindex to create overall amenity index. See text for further details.

Bartik Shocks

$$\Delta B_{jt}^{H} = \sum_{ind} \left(w_{ind,-j,t}^{H} - w_{ind,-j,1980}^{H} \right) \frac{H_{ind,j1980}}{H_{j1980}} \tag{23}$$

$$\Delta B_{jt}^{L} = \sum_{ind} \left(w_{ind,-j,t}^{L} - w_{ind,-j,1980}^{L} \right) \frac{L_{ind,j1980}}{L_{j1980}},$$

- Note that these are weighted averages of industry shocks.
- The first term measures the shock using industry wages leaving out city j to avoid endogeneity.
- The second term measures the relative exposure of the city to industry in 1980. Lags are used to deal with endogeneity of current industry structure.

Changes to Productivity

Recall that:

$$w_{jt}^{H} = \gamma_{HH} \ln H_{jt} + \gamma_{HL} \ln L_{jt} + \varepsilon_{jt}^{H} \quad (9)$$

$$w_{jt}^{L} = \gamma_{LH} \ln H_{jt} + \gamma_{L:L} \ln L_{jt} + \varepsilon_{jt}^{L}. \quad (10)$$

where we model exogenous productivity ε_{jt}^{H}, ε_{jt}^{L} as follows:

$$\Delta\varepsilon_{jt}^{H} = \gamma_{BHH}\Delta B_{jt}^{H} + \gamma_{BHL}\Delta B_{jt}^{L} + \Delta\tilde{\varepsilon}_{jt}^{H}, \quad (24)$$

$$\Delta\varepsilon_{jt}^{L} = \gamma_{BLH}\Delta B_{jt}^{H} + \gamma_{BLL}\Delta B_{jt}^{L} + \Delta\tilde{\varepsilon}_{jt}^{H}, \quad (25)$$

Labor Demand Equations

First-difference (9)-(10), plug in (24)-(25):

$$\Delta w_{jt}^{H} = \gamma_{HH}\Delta \ln H_{jt} + \gamma_{HL}\Delta \ln L_{jt} + \Delta\varepsilon_{jt}^{H} \quad (26)$$

$$\Delta w_{jt}^{L} = \gamma_{LH}\Delta \ln H_{jt} + \gamma_{L:L}\Delta \ln L_{jt} + \Delta\varepsilon_{jt}^{L} \quad (27)$$

$$\Delta w_{jt}^{H} = \gamma_{HH}\Delta \ln H_{jt} + \gamma_{HL}\Delta \ln L_{jt} + \gamma_{BHH}\Delta B_{jt}^{H} + \gamma_{BHL}\Delta B_{jt}^{L} + \Delta\tilde{\varepsilon}_{jt}^{H} \quad (28)$$

$$\Delta w_{jt}^{L} = \gamma_{LH}\Delta \ln H_{jt} + \gamma_{L:L}\Delta \ln L_{jt} + \gamma_{BLH}\Delta B_{jt}^{H} + \gamma_{BLL}\Delta B_{jt}^{L} + \Delta\tilde{\varepsilon}_{jt}^{L}. \quad (29)$$

Moment Restrictions I

$$E\left(\Delta\tilde{\varepsilon}_{jt}^{H}\Delta Z_{jt}\right)=0$$

$$E\left(\Delta\tilde{\varepsilon}_{jt}^{L}\Delta Z_{jt}\right)=0$$

$$\text{Instruments:}\Delta Z_{jt}\in\left\{\begin{array}{c}\Delta B_{jt}^{H}x_{j}^{reg},\Delta B_{jt}^{L}x_{j}^{reg}\\ \Delta B_{jt}^{H}x_{j}^{geo},\Delta B_{jt}^{L}x_{j}^{geo}\end{array}\right\}$$

Housing Supply Changes

$$\begin{aligned}
\Delta r_{jt} &= \Delta \ln (i_t) + \left(\gamma + \gamma^{geo} \exp\left(x_j^{geo}\right) + \gamma^{reg} \exp\left(x_j^{reg}\right)\right) \Delta \ln (HD_{jt}) + \Delta \ln (CC_{jt}), \\
HD_{jt} &= L_{jt} \frac{\zeta W_{jt}^L}{R_{jt}} + H_{jt} \frac{\zeta W_{jt}^H}{R_{jt}}.
\end{aligned}$$

Moment Restrictions II

$$E\left(\Delta \ln\left(CC_{jt}\right)\Delta Z_{jt}\right)=0$$

$$\text{Instruments:}\Delta Z_{jt}\in\left\{\begin{array}{c}\Delta B_{jt}^{H},\Delta B_{jt}^{L}\\ \Delta B_{jt}^{H}x_{j}^{reg},\Delta B_{jt}^{L}x_{j}^{reg}\\ \Delta B_{jt}^{H}x_{j}^{geo},\Delta B_{jt}^{L}x_{j}^{geo}\end{array}\right\}$$

BLP Estimation

$$
\begin{aligned}
V_{ijt} &= \delta^z_{jt} + \beta^{st} z_i st_i x^{st}_j + \beta^{\text{div}} z_i \,\text{div}_i\, x^{\text{div}}_j + \varepsilon_{ijt} \\
\delta^{z_i}_{jt} &= \beta^w z_i \left(w^{edu}_{jt} - \zeta r_{jt} \right) + \beta^x z_i x^A_{jt} + \beta^a z_i a_{jt}.
\end{aligned}
$$

$$
\Delta\delta^z_{jt} = \beta^w z \left(\Delta w^{edu}_{jt} - \zeta \Delta r_{jt} \right) + \beta^x z \Delta x^A_{jt} + \beta^a z \Delta a_{jt}.
$$

$$
\Delta\xi^z_{jt} = \beta^A z \Delta x^A_{jt}.
$$

$$
\Delta\delta^z_{jt} = \beta^w z \left(\Delta w^{edu}_{jt} - \zeta \Delta r_{jt} \right) + \beta^a z \Delta a_{jt} + \Delta\xi^z_{jt}.
$$

Moment Restrictions III

$$E\left(\Delta\xi_{jt}^{z}\Delta Z_{jt}\right)=0$$

$$\text{Instruments:}\Delta Z_{jt}\in\left\{\begin{array}{c}\Delta B_{jt}^{H},\Delta B_{jt}^{L}\\ \Delta B_{jt}^{H}x_{j}^{reg},\Delta B_{jt}^{L}x_{j}^{reg}\\ \Delta B_{jt}^{H}x_{j}^{geo},\Delta B_{jt}^{L}x_{j}^{geo}\end{array}\right\}.$$

Differencing the Amenity Equation

$$\Delta a_{jt} = \gamma^a \Delta \ln \left(\frac{H_{jt}}{L_{jt}} \right) + \Delta \varepsilon^a_{jt}.$$

Moment Restrictions IV

$$E\left(\Delta\varepsilon_{jt}^{a}\Delta Z_{jt}\right)=0$$

$$\text{Instruments:}\Delta Z_{jt}\in\left\{\begin{array}{c}\Delta B_{jt}^{H},\Delta B_{jt}^{L}\\ \Delta B_{jt}^{H}x_{j}^{reg},\Delta B_{jt}^{L}x_{j}^{reg}\\ \Delta B_{jt}^{H}x_{j}^{geo},\Delta B_{jt}^{L}x_{j}^{geo}\end{array}\right\}.$$

TABLE 5—GMM ESTIMATES OF MODEL PARAMETERS

	Non-college	College	Non-college	College	Non-college	College	Non-college	College
	(1)		(2)		(3)		(4)	
Panel A. Worker preferences for cities								
Wage	4.155***	5.523***	3.757***	−1.783***	4.026***	2.116***	3.261***	4.976***
	[0.603]	[1.797]	[0.561]	[0.682]	[0.727]	[1.146]	[1.064]	[1.671]
Rent	−2.418***	−1.404	−2.329***	1.105***	−2.496***	−1.312***	−2.944***	−2.159***
	[0.349]	[0.833]	[0.348]	[0.423]	[0.451]	[0.711]	[0.551]	[0.821]
Implied local expenditure share	0.582***	0.254**	0.62	0.62	0.62	0.62	0.903***	0.434***
	[0.0678]	[0.078]	—	—	—	—	[0.261]	[0.0810]
Amenity index	—	—	—	—	0.274*	1.012***	0.771***	0.638***
					[0.147]	[0.115]	[0.307]	[0.185]
Differential effects: Blacks								
Wage	3.146***	7.852*	0.299	2.549*	1.681	5.423***	4.604***	8.882***
	[0.971]	[3.701]	[0.872]	[1.390]	[2.122]	[2.019]	[1.629]	[4.059]
Rent	−0.620	−3.443*	−0.173	−1.478*	−0.975	−3.362***	0.181	−4.565***
	[0.555]	[1.637]	[0.506]	[0.806]	[1.231]	[1.252]	[0.679]	[1.795]
Amenity index	—	—	—	—	0.741***	1.077***	−1.103***	0.551
					[0.221]	[0.271]	[0.406]	[0.387]
Differential effects: Immigrants								
Wage	1.786	7.780**	−3.872***	−4.022**	0.307	0.942	1.682	7.054*
	[1.157]	[3.259]	[1.066]	[1.402]	[3.052]	[2.138]	[2.288]	[3.785]
Rent	1.324**	−1.501	2.246**	2.333	−0.190	−0.594	1.490*	−1.177
	[0.635]	[1.361]	[0.618]	[0.813]	[−1.893]	[1.325]	[0.807]	[1.510]
Amenity index	—	—	—	—	1.075***	0.982***	−0.544	−0.348
					[0.300]	[0.238]	[0.444]	[0.358]

Notes: Table 5 continues on following page. See bottom of table on following page for differences in model specifications in columns 1 to 4 above.

(*Continued*)

TABLE 5—GMM ESTIMATES OF MODEL PARAMETERS (*CONTINUED*)

	1	2	3	4
Panel B. Housing Supply				
Exp(Land use regulation)	0.084***	0.064***	0.091***	0.101***
	[0.020]	[0.013]	[0.019]	[0.027]
Exp(Land unavailability)	0.019*	0.014*	0.021**	0.025**
	[0.011]	[0.007]	[0.010]	[0.012]
Base house supply elasticity	0.002	0.063	0.014	−0.021
	[0.084]	[0.072]	[0.089]	[0.102]
Panel C. Labor demand				
ρ	0.392***	0.393***		
	[0.119]	[0.1371]		
Elasticity of college wage w.r.t. college emp.			0.229	0.205
			[0.307]	[0.320]
College wage w.r.t. noncollege emp.			0.312	0.376
			[0.367]	[0.388]
Noncollege wage w.r.t. noncollege emp.			−0.552***	−0.448***
			[0.202]	[0.196]
Noncollege wage w.r.t. college emp.			0.697***	0.642***
			[0.163]	[0.172]
Panel D. Amenity supply				
College emp. ratio			2.60**	2.65***
			[1.13]	[1.107]
Hansen's J (p-value):	0.0185	0.0095	0.135	0.213
χ^2 test: estimates = calibrated local expenditure model estimates (p-value):	0.0000			0.489
Endogenous amenity index			—	—
Calibrated local good expenditure share		—	—	
CES labor demand	—	—		
Reduced-form labor demand			—	—

Notes: Standard errors in brackets. Data include 334 observations from 167 cities. Changes measured relative to 1980. For workers' preferences, Black and immigrant estimates measure the differential preferences of these groups for each city characteristic, relative to base estimates for college and noncollege workers. Magnitude of workers' preference estimates represent worker's demand elasticity with respect to the given city characteristic, in a small city. Sample is all heads of household with positive labor income working at least 35 hours per week and 48 weeks per year. See text for model details. Housing supply estimates measure parameters in the inverse housing supply equation. ρ in the labor demand equations comes from the CES functional form. Reduced-form labor demand estimates measure own and cross-price inverse labor demand elasticities with respect to college and noncollege wages. Amenity supply measures the elasticity of amenity supply with respect to the college employment ratio. Standard errors clustered by MSA.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Comments

- Estimates of housing shares are implausible.
- Model seems to have a rough time fitting the data without endogenous amenities.
- Note sure what the differential college non-college preference paper capture, maybe differential housing shares.
- Note sure whether differential effects by race or immigration type are reasonable.

Amenity Rankings

Best Amenities for College Workers, 2000	
msa	Amenity
Los Angeles-Long Beach, CA	1.767
Washington, DC/MD/VA	1.710
San Francisco-Oakland-Vallejo, CA	1.653
Seattle-Everett, WA	1.652
Denver-Boulder, CO	1.650
Boston, MA-NH	1.646
Atlanta, GA	1.609
Phoenix, AZ	1.562
New York-Northeastern NJ	1.491
Chicago, IL	1.445
Worst Amenities for College Workers, 2000	
msa	Amenity
Youngstown-Warren, OH-PA	0.000
Allentown-Bethlehem-Easton, PA/NJ	0.076
Syracuse, NY	0.134
Harrisburg-Lebanon--Carlisle, PA	0.155
Scranton-Wilkes-Barre, PA	0.184
Toledo, OH/MI	0.207
Akron, OH	0.308
Buffalo-Niagara Falls, NY	0.309
Albany-Schenectady-Troy, NY	0.323
Fresno, CA	0.362

Productivity Rankings

Table A.6: Largest and Smallest Productivity Changes across 75 Largest Cities

Largest Increases in College Productivity	
msa	Δ Productivity
San Jose, CA	0.237
Milwaukee, WI	0.236
Tulsa, OK	0.213
San Francisco-Oakland-Vallejo, CA	0.202
New York-Northeastern NJ	0.170
Hartford-Bristol-Middleton- New Britain, CT	0.168
Oklahoma City, OK	0.163
Philadelphia, PA/NJ	0.160
Chicago, IL	0.153
Birmingham, AL	0.131

Largest Increases in Non-College Productivity	
msa	Δ Productivity
Fresno, CA	-0.014
Baton Rouge, LA	-0.058
Austin, TX	-0.060
Greensboro-Winston Salem-High Point, NC	-0.090
Salt Lake City-Ogden, UT	-0.094
New Orleans, LA	-0.103
Honolulu, HI	-0.112
Hartford-Bristol-Middleton- New Britain, CT	-0.114
Sacramento, CA	-0.116
Riverside-San Bernardino,CA	-0.117

Welfare Implications

TABLE 9—DECOMPOSITION OF WELL-BEING INEQUALITY: WAGES, RENTS, AND ENDOGENOUS AMENITIES, 1980–2000

Year	(1)	(2)	(3)	(4)
1980	0.383	0.383	0.383	0.383
	—	—	—	—
1990	0.540	0.519	0.570	0.730
	[0.0022]	[0.0024]	[0.0316]	[0.1344]
2000	0.601	0.577	0.639	0.956
	[0.0033]	[0.0012]	[0.0364]	[0.2398]
Change: 1980–2000	0.218	0.194	0.256	0.573
	[0.0033]	[0.0012]	[0.0364]	[0.2398]
Wages	—	—	—	—
Rents		—	—	—
Endog. amenities from resorting of workers			—	—
Endog. amenities from national supply of college graduates				—

Notes: Well-being gap is measured by the difference in a college and high school graduate's willingness to pay to live in his first-choice city from the choices available in 2000 versus his first choice in 1980. For example, the well-being gap due to wage changes only accounts for the welfare impact of wage changes from 1980 to 2000, while the well-being due to wages and rents accounts for both the impacts of wages and rents. The well-being gap is normalized to the college wage gap in 1980. Standard errors for welfare estimates use the delta method.

Why is the effect of rents so small given that rents increased by so much?

Conclusions

- U.S. skill sorting in 1980-2000 caused by divergence in high and low skill productivity across space
- Cities that became productive for high skill workers attracted a higher share of high skilled workers
- This in turn increased productivity, wages and amenities, which caused more in-migration.
- In-migration caused rents to increase, and low-skilled workers went to more affordable, low-amenity cities
- Welfare impact: an increase in well-being inequality between college vs. non college workers
- Magnitude: inequality gap increase was at least 30 percent larger than suggested by changes to college wage gap alone