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## *policy brief*

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## U.S. Workers' Diverging Locations: Policy and Inequality Implications

By *Rebecca Diamond*

### Introduction

Over the past three decades, the earnings of workers with a college education have substantially increased relative to those with less education. In 1980, the average college graduate earned 38% more than the average high school graduate. By 2000, the college-high school graduate wage gap increased to 57%, and by 2011 it rose to 73%.<sup>1</sup> At the same time, workers have become increasingly spatially segregated by education. Cities that initially had a large share of college graduates in 1980 increasingly attracted larger shares of college educated workers from 1980 to 2000, while cities with relatively less educated populations in 1980 gained few college grads over the following 20 years. The increasingly "highly educated cities" also experienced higher wage growth for both low- and high-skill workers and substantially larger increases in housing costs. The economic trajectories of these increasing

high skill cities are diverging from those with fewer college graduates (Moretti, 2013).

The increase in spatial sorting of college and non-college workers into very different cities calls into question whether the large increases in wage inequality over the past three decades truly represents a similar increase in economic well-being inequality. Since college graduates are paying much higher housing costs than lower skill workers, it is possible that these high local prices dilute the real amount of consumption college workers' received from their high wages. For example, in 2013 the median studio apartment in San Francisco sold for \$863,000, however the median 4-bedroom house could be purchased in Las Vegas for only \$220,100.<sup>2</sup>

On the other hand, college workers chose to live in expensive cities. They were free to locate in the more affordable locations elected by high school graduates, but instead elected to pay the higher local prices. In exchange

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<sup>1</sup> Estimates refer to workers employed at least 35 hours per week and 50 weeks per year within the ages of 25 and 55. Controls include race, Hispanic origin, sex, and experience. Data are from 1980 and 2000 US Censuses, and the 2011 American Community Survey.

<sup>2</sup> These data come from Zillow.com

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for high housing prices, high skill cities not only offer inhabitants access to high wage labor markets, but also tend to offer an array of more desirable amenities. Indeed, cities that increased their shares of college graduates from 1980 to 2000 also gained more restaurants and bars per capita, improved their air quality, and lowered their crime rates (Diamond 2013). If the economic value of living in a high amenity city more than compensates college graduates for the high housing prices, the growth in wage inequality would *understate* the increase in economic well-being inequality. This brief draws from my recent paper Diamond (2013), which I will refer to throughout.

## **Increasing Return to Skill and Diverging Location Choices: Historical Facts**

The increase in the wage gap between high-school and college graduates was an important component of the overall increase in wage inequality from 1980 to 2000.<sup>3</sup> Relatively less attention has been paid to the concurrent increase in geographic segregation of these workers by skill level (Moretti 2004a, Berry and Glaser 2005, Moretti 2013, Diamond 2013). Specifically, cities with initially high population shares of college graduates in 1980, such as Boston, MA, and Atlanta, GA, disproportionately attracted even larger college populations over the following twenty years. Cities with smaller college populations in 1980, such as Albany, NY and Harrisburg, PA lagged further behind in attracting college graduates.

The divergence of workers' location choices are strongly related to the evolution of wages and rents across cities. Local housing rent increases from 1980 to 2000 strongly

predict cities' increases in their share of college graduates. From 1980 to 2000, for every 1% increase in a city's ratio of college graduates to non-college grads (referred to as the "college employment ratio"), a city experienced a 0.6% increase in rents (Figure 1).

Cities that experienced higher rates of growth in their shares of college graduates have also experienced higher wage growth for both college and non-college workers. I find for each 1% increase in a city's college employment ratio, the city experienced a 0.3% increase in wages for college workers (Figure 2) and a 0.2% increase in wages for non-college workers (Figure 3).

These increasingly expensive, high-skill cities also experienced larger improvement in local amenities. Increases in cities' shares of college graduates from 1980-2000 coincided with increases in the variety of local goods and services including bars, restaurants, dry cleaners, museums and art galleries. These cities also experienced larger decreases in pollution and property crime rates. High skill cities not only appear to offer the highest wages, but also offer a better quality-of-life.

## **Causes of Increased Skill Segregation across Cities**

The geographic divergence of skill across cities beginning in the 1980s was strongly driven by labor demands of different industries located across different cities (Moretti, 2013; Diamond, 2013). Due to a number of broad changes in the labor market from 1980 to 2000<sup>4</sup>, many industries substantially changed their demands for college graduate labor relative to their demand to hire non-college grads.

For example, industries that more aggressively adopted computers and information technology tended to hire more college graduates, as these new technologies improved the productivity of tasks involving high cognitive ability and abstract thinking (Autor, Katz, and Krueger 1998). However, computers and IT technologies often automated tasks historically preformed by lower skilled workers. Thus, industries that pursued the adoption of computers and IT more aggressively dramatically shifted their hiring away from non-college workers and towards more skilled college graduates.

Moretti (2013) shows that the cities that were historical geographic hubs of industries that shifted their labor demand away from non-college workers towards college grads were the cities that experienced the largest increases in their shares of college graduates from 1980 to 2000. The hiring demands of cities' local industries played a large role in attracting high and low skill workers to different cities, causing the divergence of skill across space.

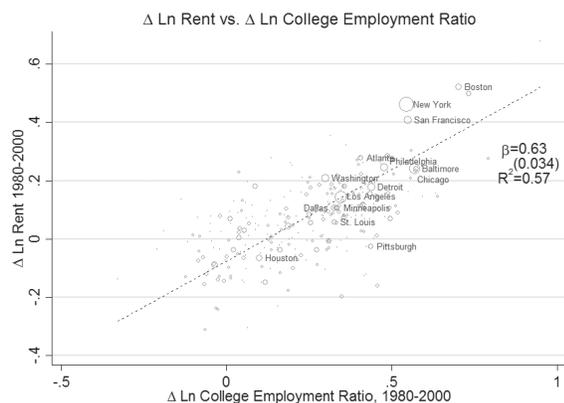
Cities' elasticity of housing supply further fueled the geographic skill sorting. If a city is unable to accommodate an increase in housing demand with an increase in the housing stock, housing prices will rise sharply to curtail the in-flux of migrants. Ganong and Shoag (2013) show cities that sharply increased their land-use regulations during this time period also experienced larger increases in their shares of college graduates.

Combining data on local labor demands by industries and variation in cities' housing supply elasticities, I estimate a model of how college and non-college workers trade off the relative benefits of cities' local wages, housing costs, and amenities when electing where to live. In addition, I estimate how local wages, housing price, and amenities themselves respond to changes

3 High-skill workers or college graduates are full-time workers who have completed at least 4 years of college. Low-skill workers or non-college graduates are all other full-time workers.

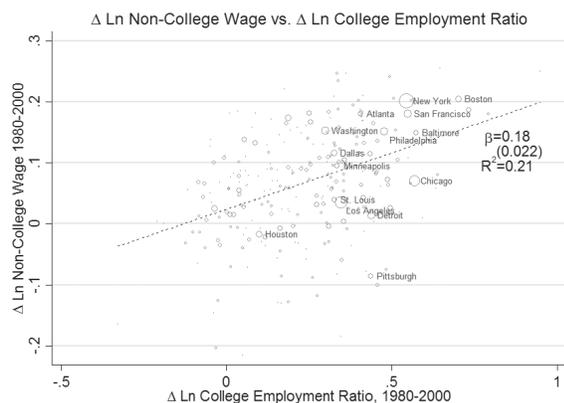
4 Important labor market changes from 1980 to 2000 include the advent of computers leading to skill-biased technological change, changes in labor market institutions such as the decline of unionization and the minimum wage, and the outsourcing of jobs overseas. See Goldin & Katz (2007) for a survey of the literature

**Figure 1: Changes in Rents vs. College Employment Ratios: 1980-2000**



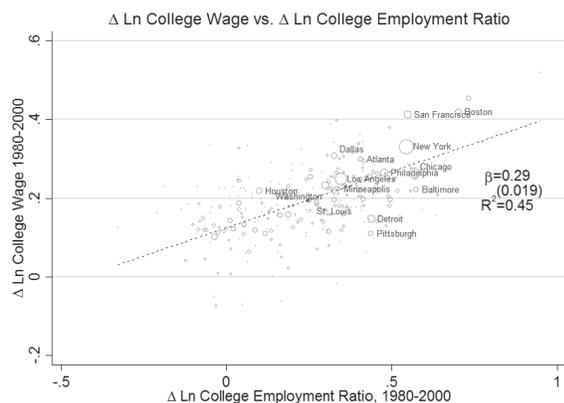
Source: Diamond (2013)

**Figure 2: Changes in College Wages vs. College Employment Ratios: 1980-2000**



Source: Diamond (2013)

**Figure 3: Changes in Non-College Wages vs. College Employment Ratios: 1980-2000**



Source: Diamond (2013)

in the size of local college and non-college populations.

Consistent with Moretti (2013), I find that the primary driver of the increased skill segregation was changes in the labor demands of industries located in different cities. Even though local wage changes were the initial cause of workers' migration, cities that attracted a higher share of college graduates endogenously became more desirable places to live.

Increasing a city's share of college graduates causes increases in the quality and variety of the local retail market including increases in per capita amounts of clothing stores, bar, restaurants, movie theaters, and grocery stores. College share increases also lead to declines in property crime rates and pollution levels.

To build intuition for these effects, consider the metropolitan areas of Detroit and Boston. The economic downturn in Detroit has been largely attributed to decline of auto manufacturing, but the decline goes beyond the loss of high paying jobs. In 2009, Detroit public schools had the lowest scores ever recorded in the 21-year history of the national math proficiency test. In contrast, Detroit's public school system was lauded as a model for the nation in urban education in the early 20th century when manufacturing was booming.

By comparison, Boston has increasingly attracted high skill workers with its cluster of biotech, medical device, and technology firms. In the mid 1970s, Boston public schools were declining in quality, driven by racial tensions from integrating the schools. In 2006, however, the Boston public school district won the Broad Prize, which honors the urban school district that demonstrates the greatest performance and improvement in student achievement. The prosperity of Boston and decline of Detroit go

beyond jobs and wages, directly impacting the amenities and quality-of-life in these areas.

Increasing a city's share of college graduates also leads to local productivity increases for both college and non-college workers, driving up all workers' wages. For example, increased physical proximity of educated workers may lead to better sharing of ideas, faster innovation, or faster technology adoption driving up wages of college grads. Further, low skill workers' wages can also benefit as the increased college share drives demand for local goods and services, creating jobs for the less skilled.

The combination of desirable wages and amenities in these increasingly high skill cities made them very desirable places to live for both college and non-college workers, leading to sharp increases in housing prices. However, housing price increases mitigate the in-migration of low-skill workers much more than the high skill. While both college and non-college workers prefer cities with high wages, low housing costs, and high levels of amenities, college grads place much more weight on the quality of amenities, while non-college graduates make their choices much more based on affordability. This may not be surprising, as lower skill workers earn less, and thus gain more from an additional dollar of savings.

### **Economic Well-being Inequality: The Importance of Considering Amenities**

The effects of increased skill segregation on the economic well-being of college and non-college workers depend on why exactly these workers chose to live in different cities. Moretti (2013) notes that high-skill workers have experienced a larger increase in housing costs than low-skill workers due to their concentration in high housing cost cities. Controlling

for differences in the changes in housing costs for low- and high-skill workers, he estimates that while the wage premium between college and high school graduates increased by 50% from 1980 to 2000, the wage premium, net of housing costs, increased by 20% less. Essentially, this would mean that the differences in consumption growth from 1980 to 2000 between college graduates in New York, NY and high school graduates living in Cleveland, OH aren't actually as large as the differences in the growth in their incomes suggest. The New Yorker college graduates would be "paying a lot of their income back for housing" and not actually getting that much "bang for their buck."

However, the desirability of the increased amenities in high skill cities was an important reason college graduates were willing to pay such high housing costs. A substantial part of the reason the New Yorker college graduate was willing to pay such high housing prices to live in New York City was to enjoy the many amenities available in New York. Thus, even though the New Yorker must pay significantly more for housing in New York than he would in Cleveland, he is not only getting housing for his money. He is enjoying the benefits of New York City, and this should be taken into account when considering the inequality effects of spatial skill segregation.

Diamond (2013) finds that the additional benefits college graduates gained from having access to a variety of desirable local amenities actually outweighs the negative effects of high housing costs. The 50 percent increase in the wage gap between high school and college graduates from 1980 to 2000 actually understates the true increases in economic inequality. Changes in wages, housing costs, and local amenities from 1980 to 2000 led to an increase in economic well-being inequality of at least by

at least 67 percent.

These dynamics can be thought of as a nationwide "gentrification effect." The initial changes in local firms' labor demand for college and non-college workers created the initial spark to increase the college share in these high skill cities. This spark was then amplified as the presence of college workers within the city makes it a more desirable place to live, but also a more expensive place. Lower skill workers are thus unable to afford to pay these high prices to gain access to the best cities, forcing them to relocate to more affordable, lower amenity areas.

### **Policy Implications of Spatial Sorting by Skills**

These dynamics of spatial skill sorting inform policy in a number of ways. First, from the perspective of a local government, policies that attract college graduates to live in a city have large spillovers on improving the local productivity of firms in the city and creating desirable amenities, which will further attract additional college graduates. Policies that could achieve this include offering tax incentives to firms employing high skill workers, or funding amenities valued by college graduates such as policies targeting reductions in crime or improvements in the quality of local schools.

While these policies that attract college graduates to a city may improve local economic conditions and quality-of-life within the city, they also have the potential to drive away the less educated and lower income inhabitants. The high skill city is surely a high functioning city, but the lower income and less educated residents, who may be those in need of the most help, are unlikely to get the bulk of its benefits.

These dynamics are also important for understanding the

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welfare effects of local land-use regulation policy that restricts areas' elasticity of housing supply. Restricting local land use and preventing real estate development in high housing demand areas leads to the standard effect of rising house prices. This then has the indirect effect of increasing the college share of city, as rising house prices disproportionately discourage lower skill workers from living in the area. Rising college share then improves local amenities and productivity, leading to a more desirable city, which again benefits the college educated at the expense of lower skill workers forced to relocate elsewhere. These types of policies force the local policy maker to decide whether he or she wants to improve the city at the possible expense of less skilled inhabitants' economic well-being.

As a broader policy point, from the federal government's perspective, it is not clear what the optimal allocation of college graduates across cities should be. A local government may desire to attract college graduates, but this comes at the cost of another city losing college educated residents. For the federal government to implement socially optimal policies which incentivize college graduates to locate in certain types of cities, the government would need to know what type of cities gain the most from additional college workers (Glaeser and Gottlieb, 2008).

Despite this, the US federal government spends at least \$15 billion per year on spatially targeted development activities (Kline and Moretti, 2013a). Generally, these programs target "underperforming" geographic areas in order to help improve economic conditions. Kline and Moretti (2013b) analyze the effects of a specific

development program targeted at revitalizing the Tennessee Valley (including Tennessee and parts of surrounding states), with most subsidies occurring from 1940 to 1958. They find that the subsidies from the federal government led to improvements in the local area's infrastructure and that the benefits outweighed the costs of the subsidies. However, they find that the resulting relocation of economic activity to the Tennessee Valley from other areas of the US appeared to have a net-zero effect. The Tennessee Valley benefited from the influx of more economic activity, while other local areas declined as a result. From the perspective of the federal government, it is not clear that spatially targeted development policies are beneficial.

Nonetheless, a key way to improve the share of college graduates across all cities is to implement policies that incentivize more students to attend and graduate from college. These policies likely are best funded by the federal government, as opposed to state and local governments. When local governments subsidize higher education, they pay the full cost of the subsidy, but face the risk that another city or state will receive the benefits if the college student migrates away to another local area after graduation (Kline and Moretti 2013a).

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