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Monthly condensed analyses of crucial real estate and economic issues offered by UCLA Anderson Forecast and UCLA Ziman Center for Real Estate. In this October 2023 Letter, UCLA Ziman Center for Real Estate Staff Economist Sayantani S., Ph.D. and University of California, Irvine, Professor of Economics Jan K. Brueckner examine the influence upon cities of work-from-home trends. The full report – "Intercity Impacts of Work-From-Home with Both Remote and Non-Remote Workers" – is available here.

The Work-From-Home Equation:

How both remote and non-remote workers factor into housing, wages, and urban productivity

By Jan K. Brueckner and S. Sayantani

Attempting to counter the work-from-home (WFH) trend, many large employers (for example FedEx and Lyft) focused on Labor Day 2023 as a time to push their workers to return to the office. While this goal may or may not be successful, it is instructive to look at the impacts on cities of long-term work-from-home patterns. Most important, perhaps, are the impacts upon home pricing and wages.

Before the coronavirus pandemic, 17 percent of U.S. employees worked from home five days or more per week, a share that increased to 44 percent during the pandemic. Within a given city, WFH enables residents to work without physically traveling to their offices, thus reducing commuting costs and making suburban residential locations more attractive. Looking across cities, WFH enables employees to relocate to a different city, working remotely for their employer which remains in their original city. Breaking the connection between residence and employment location offers an opportunity to rethink urban spatial models, which otherwise assume that people live and work in the same city.

Our study emanates from a previous paper: "A New Spatial Hedonic Equilibrium in the Emerging Work-from-Home Economy?" In that 2022 study, Jan K. Brueckner, Matthew E. Kahn, and Gary C. Lin (BKL) explore the intercity effects of WFH. They analyze the patterns of WFH-induced changes in employment levels and populations as well as wages and housing prices across cities. In particular, they examine two city characteristics: productivity and amenities (A high-productivity region observes higher worker density, higher housing demand, and consequently higher housing prices and rents. A region with better amenities has better natural and locational attributes, such as more desirable weather and lower crime rates. It is important to note that these are locational amenities that do not change over the short term and were not affected by the pandemic. In other words, amenities, as defined in the paper, do not include restaurants or theaters that were affected by COVID.) When cities differ in productivity, WFH causes some workers to relocate from high-productivity cities to low-productivity cities, which have cheaper housing, while maintaining their jobs in the original city. When cities differ instead in amenities, better weather or lower crime rates tempt workers to relocate to high-amenity cities while working remotely at their original jobs at relatively lower-amenity cities.

BKL uses a mathematical model to capture the shift in the spatial equilibrium (the set of changed city-level outcomes theorized by relocations, movements in wages, employment, and welfare) arising from WFH. And its findings are instructive. However, it unrealistically assumes that all workers are able to work remotely. The purpose of the current paper is to extend BKL's model to incorporate two kinds of workers: those who can work remotely and those who cannot. Non-remote workers must live in the city where they work, implying that if they wish to relocate, they need to change jobs. Our paper asks how the intercity impacts of WFH differ in this more realistic scenario while retaining BKL's model.

> *"The need for workers to reside near central business districts creates high demand and high home prices in these employment centers. Work-from-home reverses this, causing relatively lower demand and lower rents and prices in city centers and higher prices in the suburbs."*

The model is highly stylized, using simplified theoretical characterizations of two cities: San Francisco and Detroit. (In the paper we use San Francisco and Detroit as city-types that model the urban characteristics we study. Our key conclusions do not use actual data from these cities; although our data survey section does relate empirical analyses using real city-level data.) These model scenarios ascribe to San Francisco either higher productivity or higher amenities than Detroit, at any point of time (but not both). In other words, in the different-productivity scenario, amenities are assumed to be uniform across locations, while in the different-amenity case, productivities are assumed to be the same in the two cities. The results follow from these two theoretical scenarios where San Francisco is superior in each characteristic, one at a time. When San Francisco has higher productivity, the movement of workers under WFH from San Francisco to Detroit (where housing is cheap) leads to a decline in the price of housing in San Francisco while raising it in Detroit. Due to its relatively higher productivity, employment rises in San Francisco despite the WFH decline in its population. Conversely, given its inferior productivity, employment falls in Detroit, despite the increase in its WFH population. With workers able to work in either city regardless of residential location, it is assumed that workers will migrate to places with higher wages and away from locations offering low wages. Increments in workers (increased labor supply) at higher-wage locations (e.g., San Francisco) ultimately serve to drive down wages in those areas, while migration away from lower-wage locations (reduction in labor supply) serve to make labor scarce and ultimately drive up existing wages. Worker migration from low productivity (e.g., Detroit) places and to higher productivity places (e.g., San Francisco) and subsequent changes in wages at each of the two locations continue until the two locations find their wages equalized. In the scenario where San Francisco has higher productivity than Detroit, the wage equalization implies that the new remote worker wage is the same in San Francisco and Detroit. This new wage is lower than the pre work-from-home wage in San Fransisco and higher than the old pre work-from-home wage in Detroit.

Note: While the paper used these two cities as models in their 2022 paper, these trends continue nationwide in other cities. As a June 17, 2023 New York Times article notes, "In the couple of years post pandemic, metros like San Francisco and New York each recorded an increase in emigration of approximately 4.5 times their pre-pandemic levels. While some workers have moved to metros offering remote-friendly jobs, a second group has moved to vacation areas like the Maryland and Delaware beach towns."

The reverse patterns emerge when the advantage of San Francisco lies in higher amenities. Relocation to San Francisco raises its (already high) housing price and depresses the price in Detroit. The better San Francisco amenities result in more people relocating to San Francisco from Detroit, raising the total population in San Francisco, once work-from-home is introduced. The new total population in Detroit is conversely lower. The workers of Detroit, who can now work remotely (after work-from-home is introduced) relocate to San Francisco to enjoy better amenities. In this different amenity case, there's no productivity gain from moving jobs and working in San Francisco. Hence, these workers now live in San Francisco, while continuing to work remotely at their original Detroit jobs. Therefore, the new total employment in San Francisco is lower than before, driving up the wages of both remote and non-remote workers in SF. The exact opposite movements in employment and wages occur in Detroit.

In the differential-productivity case, WFH again leads to a decrease in the population and housing price in San Francisco, and an increase in employment. In addition, the new common wage for remote workers is lower than their original wage in San Francisco. Changes in the exact opposite directions occur in Detroit. Along with an increase in WFH population, Detroit sees a decrease in employment, and an increase in remote worker wage relative to original Detroit wages. Both the differential-amenity case (where two cities are assumed to be different only in amenities or advantages for residents) and the differential productivity case (where two cities are assumed to be different only in worker productivities) yield parallel conclusions with BKL, in terms of remote workers and total workers. Preservation of BKL's main results is an important conclusion because it shows their simple model is robust to changes that make it more realistic.

The model does not focus on impacts of WFH within the same city. These impacts have been studied in much of the WFH literature (also in BKL), and they discuss workers relocating away from city centers. Owing to lesser commute to the workplace, these workers "decentralize" even while they remain in the same city. This decentralization is predicted to raise suburban housing prices while putting downward pressure on prices near the city center, leading to a suppression of the urban price gradient. Traditionally, the need for workers to reside in or near central business districts creates high demand and high home prices in these employment centers, with prices decreasing towards the suburbs. With work-from-home, this gradient suppresses this trend, causing relatively lower demand and lower housing prices in city centers and higher prices in the suburbs.

BKL carry out an empirical test of their model's intercity predictions, focusing on the case where cities differ in productivity. They find evidence of downward pressure on housing prices in high-productivity cities during the first year of the pandemic (when WFH increased), as predicted by the model. Since the present model yields the same housing-price predictions, BKL's empirical results can be viewed as affirming the current model as well. However, BKL's assumption that all workers can work remotely is especially unrealistic. This is why our paper introduces the second class of non-remote workers: Those who must live in the city where they work. The effects of this modification are noteworthy: Even though the conclusions are largely similar, the addition of non-remote workers removes the unrealistic assumption that all workers are eligible to work remotely.

TAKEAWAYS

With work-from-home on the rise, this research (both in industries that allow remote work as well as those that don't) sheds light on workers' overall welfare arising from remote work. The changing wage dynamics may lead to changing sentiments about living in city centers or in high-productive neighborhoods. And, over time, this may change the residential outcomes in these places. It also informs industries on how their decision to allow or not allow remote work can induce large-scale changes across cities.

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