

Pandemic and Work from Home: A Spatial Oligopsony Model

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Abstract

Work-from-home is a rising observation of working away from a fixed job location in the office that can be carried out in home and any place. It has the beauty to help reduce energy consumption, traffic congestion and air pollution, save office space and provide work-life balance. This study is motivated by the onset of Covid-19 pandemic and the rapid development of digitalization that accelerated work from home that has received much attentions recently. The COVID-19 pandemic in the last two years and the ensuing social distancing have caused a huge shock to both the demand and supply sides of the real economy and the labor markets.

We attempt to establish a spatial framework of a circular labor market with oligopsony a la Bhaskar and To (1999), Bhaskar and To (2003) and Kaas and Madden (2010) to analyze how work from home affects the labor market along with the factor of pandemic. It contributes to the existing limited theoretical studies by focusing on the effects from both the competition and undertaking several factors of benefits and difficulties from work from home, such as the percentage of work from home, the number of firms, commuting costs, costs from saving in office space, personal costs related to work from home, productivity of labors, and the production technology of firms. Analysis on the equilibrium wages, labor allocation, labor welfare, firms' profit and social welfare is derived.

Among recent growing empirical studies on work from home, Bartik et al. (2020) reveal that both small and large businesses have considerable workers switch to work from home. Brynjolfsson et al. (2020) find that about half are working from home during the Covid-19 pandemic. Dingel and Neiman (2020) suggest 37% of jobs in US can be performed entirely at home, although there appears significant variation across cities and industries. Kitagawa et al. (2021) also find 34.5% of work-from-home among workers during the pandemic period of 2000, while work-from-home is likely associated with lower productivity. However, Bloom et al. (2015) use the data of travel agency and find positive effects on productivity for work from home.

There are still limited theoretical developed studies on work-from-home. Lund and Mokhtarian (1994) adopt the Alonso model to analyze how remote work affects the choice of residence and distance to the offices. Safirova (2002) uses CBD model to discuss the urban economy and land use pattern when work-from-home reduce the agglomeration near CBD and traffic congestion in commuting. Rhee (2008) further examines relocation and substitution effects and show the commute time saved and possible increased vehicle distance traveled. Behrens et al. (2021) analyze a general equilibrium model with construction, intermediate and final goods and find a inverse U-shaped association between telecommuting and productivity.

We adopt a circular model following Salop (1978), Bhaskara and To (2003) and Hakenes and Schnabel (2010) with equal distanced firms as a spatial oligopsony. Consider two types of workers with either high or low productivities. The main results are as follows. First, work-from-home can be beneficial to both workers and overall social interest when the distance costs are high, firms are less competitive, the extra cost for work-from-home and the productivity gap are low. This result is consistent with empirical findings of positive impacts on productivity and workers' satisfaction in Bloom et al. (2015) and Bloom et al. (2015). Second, wage dispersion among workers may become wider in work from home under similar conditions. The implied increased wage dispersion in pandemic was found in empirical data (Bonacini et al., 2021). Third, pandemic risk can induce increased wage dispersion, although the level of wages may either increase or decrease, depending on the extent of productivity shock and the cost from pandemic spread.

Potential empirical explanations from the proposed model and related empirical predictions are further discussed. Moreover, several extensions for robustness are provided to include investment game of digitalization, partially covered labor markets and unemployment, and linear model with both consumption and labor markets.

Keywords: Covid-19 pandemic, work from home, oligopsony, circular market, labor markets, wage dispersion, welfare analysis.

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