Are all non-urban places attractive enough to work from home?

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ABSTRACT. The rise of working from home (WFH) is arguably one of the most notable effects derived from the digital transition. Whether WFH arrangements correlates with urban sprawl remains an open question, let alone if this relationship holds universally across space. In this paper, we aim to study which features make non-urban areas attractive enough for remote workers to move in, while keeping their jobs in the cities. We conjecture that with WFH agreements individuals are more likely to work in a city and live in a non-urban area. But we also hypothesise that not all non-urban places are as attractive for remote workers. Using individual census data from a selection of European Union (EU) countries, we estimate a multinomial regression model relating individual residential-job location choices to the probability of WFH arrangements. Local amenities are our key control variable. We combine individual census data from a selection of European countries with Eurostat's skill-occupation matrices that allow us to circumvent data scarcity on WFH agreements. As a result, we provide a test on whether the contribution of WFH arrangements to urban sprawl is spatially invariant. We also identify which amenities correlate with the attractiveness of places for workers choosing WFH arrangements.

KEY WORDS: remote work; local attractiveness; urban sprawl

JEL CODES: J61; R11; R23;

EXTENDED ABSTRACT

1. Motivation, research question and contribution

The rise of working from home (WFH) is arguably one of the most notable effects of the digital transition. Admittedly, many workers returned to on-site (i.e.: in person) work after the Covid-19 sanitary restrictions were lifted. However, theory and empirical evidence gathered so far suggest that remote work will stick, at least to some extent (Barrero et al., 2021). What is more, some literature suggest a slow but steady shift towards remote work in some occupations (Aksoy et al., 2022; Barrero et al., 2023; Bloom et al., 2015).

Whether WFH arrangements can generally contribute to urban sprawl—i.e.: to the population dispersion towards non-urban areas—remains an open question. On the one hand, fewer commuting days enable workers to make joint residential and employment location choices with higher commuting distances (de Vos et al., 2018). In addition, workers with WFH arrangements can apparently "vote with their feet"—*à la* Tiebout (1956)—more than their on-site colleagues do: some studies suggest their residential-employment choices are more sensitive to the presence of local amenities, rather than physical distance to work (Jansen et al., 2024; Robbennolt et al., 2024; Song et al., 2023). Theoretical models (Larson & Zhao, 2017; Lennox, 2020) and evidence on housing prices and/or spatial consumption patterns (Ahrend et al., 2023; Ramani et al., 2024) appear to corroborate this hypothesis.

But, still, a number of studies do not find conclusive evidence supporting this relationship (Kim, 2016; Kim et al., 2012) or doubt on the size of its impact because remote workers remain a minority within the overall workforce (Florida et al., 2023). The variety of outcomes in empirical analyses suggests the existence of some space-specific factors affecting the relationship between WFH arrangements and urban sprawl.

In this paper, we aim to study which features make non-urban areas attractive enough for remote workers to move in, while keeping their jobs in the cities. Upon individual census data from a selection of European Union (EU) countries, we predicate a multinomial regression model relating individual residential-job location choices and the probability of WFH arrangements. Local amenities are our key control variable. Our contribution to the literature is twofold.

I) First, we provide a test on whether the contribution of WFH arrangements to urban sprawl is spatially invariant. We therefore complement already existing case studies (de Abreu e Silva, 2022; Jansen et al., 2024) and broader inquiries (Ahrend et al., 2023) conducted in EU territory.

II) Second, we identify which amenities correlate with the attractiveness of places for workers choosing WFH arrangements. In this regard, we build upon the extant literature on place attractiveness and drivers for (interregional) migration (see Panori et al., 2024 for a recent review).

2. Empirical application

2.1. Methods

We follow So et al. (2001) and build a multinomial regression model. We assume that individuals decide on residential and job locations simultaneously (Moretti, 2010; Siegel, 1975). The dependent variable is the individual's joint residential (i) and job (j) location choice. Individuals can work/live in places with three different degrees of urbanisation: cities, towns and suburbs, and rural areas. Therefore, households are allowed nine possible choices between work and residence locations. To operationalise the utility of each individual choice u_{ij} we assume the linear form:

$$u_{ij} = \beta h + \gamma w_{ij} + \delta c_{ij} + \eta p_{ij} + \theta t_i + \lambda m_i + \mu s + \omega_i + \varepsilon_{ij} \quad (1)$$

In equation (1), h stands for our variable of interest: a WHF arrangement. Relative income, commuting costs, relative prices, individual preferences are captured in w_{ij}, c_{ij}, p_{ij}, and t_i respectively. Relative measures always refer to differences between the place of residence and the place of work. Our key control variable is m_i, a vector of different local amenities. We define individual fixed-effects based on the individual's industry. Finally the fixed-effects term ω_i captures unobserved institutional and cultural aspects of the residential location.

If, for each 9 equations that can be derived from (1), the error terms are independently drawn from an extreme value distribution, then multinomial logit estimation is appropriate (So et al., 2001). To test whether the contribution of WFH arrangements to urban sprawl is spatially constant, we observe how elasticities between WFH agreements and living in a non-urban area —while working in a city—vary across our sample of EU countries and regions. We also derive the elasticity between each local amenity and the choice to work in an urban area while living in a non-urban one. We thus identify which amenities correlate with the attractiveness of places for workers in WFH arrangements.

2.2. Data

Our main data source is a set of scientific use files containing individual level observations for a selection of 2021 censuses in countries of the EU. Our data allows us to observe the residential and job locations for a representative sample of individuals, at least, at the national level. Census files also contain individual characteristics that we use to proxy individual preferences. We obtain geographical information (e.g.: distance measures) from publicly available map files. The differences in income between the degree of urbanisation can only be observed at the national level, given the current data available from Eurostat.

Response variable. We take the degree of urbanisation (Dijkstra et al., 2021) of the local administrative unit of resident and local administrative unit of work for each individual. The degrees of urbanisation can be: cities, towns and suburbs, and rural areas. The response variable is the joint pair of degrees of urbanisation.

State variable. We proxy the probability of a WFH agreement relying on Eurostat's skill-occupation matrices (Eurostat, 2021). Skill-occupation matrices breakdown up to 296 skills required for each occupation type. We identify a set of digital skills that can allow for employees to work remotely. The higher the percentage of those skills required by an occupation; the more likely remote work is.

Control variables. We define differences in income between degrees of urbanisation according to national level data for the nine possible i, j choices—when $i = j$, $w_{ij} = 1$. We approximate commuting costs c_{ij} with the distance between i and j. Relative living costs can be proxied as a positive function of distance to the nearest city out of 117 cities defined by Eurostat, thus assuming that (a) they are mainly driven by housing costs (Renkow & Hoover, 2000) and (b) that housing costs decrease with distance to central business districts (Alonso, 1964). We individual preferences considering gender, education level, age and number of children in charge. This information is available for each individual in the census files.

Local amenities. In line with the abovementioned literature, the utility of the residential-job choice is assumed to be related to local amenities—e.g.: schools, hospitals, transportation, parks, shops—for which m_i stands. We use web scraping to approximate the set of amenities in each individual's place of residence.

Fixed effects. Finally we also control for the industry in which each individual works (s), since it is also a strong predictor of whether someone can work from home (Dingel & Neiman, 2020). The term ω_i captures unobserved institutional and cultural aspects of the residential location i that can influence its attractiveness as well (Silvanto & Ryan, 2018).

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