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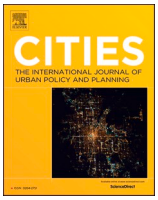

Assessing the link between COVID-19-induced telework adoption and residential relocation in France, the UK, and the US

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ABSTRACT

This study examines whether the rise of telework following COVID-19 has led to an increase in relocations, particularly considering the relaxation of proximity constraints between home and workplace. This question is especially relevant for major metropolitan areas, which accommodate a high concentration of telework-compatible jobs and experience strong real estate market pressures. The article explores two key questions: (1) Are teleworkers more likely to have relocated since 2020 and to have a relocation project? (2) Do teleworkers exhibit a greater tendency to relocate or plan a relocation outside metropolitan areas? To address these questions, this study draws on a large-scale survey conducted at the end of 2023 with 15,000 individuals from France, the US, and the UK, focusing on work characteristics and residential mobility since 2020. The findings indicate that while teleworkers have been more likely to relocate since 2020, they do not exhibit stronger intentions to relocate soon. Moreover, their residential trajectories suggest a reinforcement of metropolitan concentration rather than a move away from urban centers, challenging assumptions that telework necessarily leads to sub-urbanization or increased commuting distances.

1. Introduction

The year 2020, marked by COVID-19 and its periods of full or partial lockdown, led to a massive but often temporary adoption of remote work (OECD, 2021). This period, however, accelerated the spread of telework. In the US, "the percentage of workers who primarily teleworked during the week more than tripled from an estimated 5.7 percent in 2019 to an estimated 17.9 percent in 2021" and "the percentage of workers who teleworked for any portion of an average workday increased […] from an estimated 24 percent in 2019 to an estimated 38 percent in 2021" (GAO, 2023, p. 6). For the same period, in France, weekly teleworking is estimated to have jumped from 4 % to 27 % (DARES, 2022), while it rose from 12 % to 35 % in the UK (Hobbs & Mutebi, 2022). However, it is important to note that the estimates of WFH prevalence vary widely depending on the sources and definitions within the same country. Since 2021, trends in telework levels have been uncertain with a relative stagnation in telework levels (Bureau of Labor Statistics, 2023; Hendry et al., 2023). By the end of 2023, telework—defined in this research as an arrangement involving at least one day per week of working from home (WFH), including individuals working fully remotely—was adopted by 30 % of the employed workforce in France, 37 % in ten states around New York, and 40 % in the UK (Mobile Lives Forum, 2024).

These high levels of telework pose challenges for society insofar as telework is linked to different spatial and temporal practices. In particular, telework reduces the need for frequent commuting and allows individuals to live further away from their workplaces (González-Leonardo et al., 2022). As a result, individuals, especially teleworkers, are more likely to reside in suburban or exurban locations rather than in close proximity to their workplaces (Mouratidis & Peters, 2022). The spatial structure of cities is being reshaped by the rise of teleworking, with implications for urban planning and the distribution of labor markets (Gokan et al., 2022).

In this context, this work focuses specifically on the link between telework and residential mobility to examine its role in relaxing the constraint of proximity between places of residence and work. The existence of a rebound effect of telework on residential location choice and the lengthening of commutes was discussed some time ago by Ory and Mokhtarian (2006), while de Abreu e Silva's (2022) recent study shows a greater intention to telework among workers with longer commutes. The debate centers on whether long commutes lead to teleworking or if the potential for teleworking encourages longer commutes. To contribute to this debate, this study examines whether there has been an

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increase in relocations following COVID-19 in the context of increased telework and the relaxation of proximity constraints between residence and workplace. This inquiry is particularly relevant to major metropolitan centers, which are most likely to support hybrid work and where the real estate market is under the greatest pressure.

The article addresses the following questions: Are teleworkers (residing and working in a metropolis in 2020) more likely to have relocated since 2020? Are teleworkers (residing and working in a metropolis in 2023) more likely to have a relocation project? Are teleworkers more likely to have relocated or have a relocation project outside the metropolitan area?

This research draws on a large-scale survey conducted at the end of 2023. The sample includes 15,000 working individuals in France, the US, and the UK. The survey focuses on both work characteristics and residential relocation since 2020. Paris, London, and New York are largely oversampled in the survey because major telework-related changes were anticipated there. These cities have economic centrality, a high density of telework-compatible jobs, and wide urban influence. In this study, "metropolitan space" refers to the perimeter of these three major urban areas.

The results show that while teleworkers have tended to relocate more since 2020, they now have no more plans to relocate in the coming months and years. The analysis of their residential trajectories does not indicate an outward shift from metropolitan areas.

The remainder of the paper is organized as follows: In the next section, a literature review considers the associations of telework, commuting, and residential relocation, particularly in the context of COVID-19, from 2020 to the present. Section 3 presents the data, and Section 4 outlines the methodology used, while Section 5 summarizes the results. The paper concludes with a discussion in Section 5 and conclusions in Section 6.

2. Literature review

2.1. Telework and commuting

Recent literature seems almost unanimous on the fact that hybrid work comes with longer commuting distances. As early as the 2010s, results indicate this trend in the United States (Zhu, 2013) and the Netherlands (Ettema, 2010). Several pre-COVID-19 studies further confirm this pattern in England (Budnitz et al., 2020; Caldarola & Sorrell, 2022; Cerqueira et al., 2020; Melo & de Abreu e Silva, 2017), the United States (Zhu et al., 2018; Zhu & Guo, 2022), and the Netherlands (de Vos et al., 2018). A post-COVID-19 study based on a survey carried out in 2022 in Texas (US), also highlights the link between telework and longer commutes (Asmussen et al., 2024). This suggests that teleworkers are more willing to accept longer commuting distances, likely due to the reduced frequency of their commutes.

Longer commuting distances offset the benefits of reduced commuting frequency. Overall, teleworkers travel more miles and emit more CO2 than other workers. Several results from England confirm this observation and estimate the minimum number of WFH days required for telework to not be linked to increased CO2 emissions for commuting at three days (Caldarola & Sorrell, 2022; Cerqueira et al., 2020; Motte-Baumvol et al., 2024). Moreover, some studies indicate that teleworking can expand job search areas, leading to longer commutes even without a residential move (Wee et al., 2013). Zhao and Gao (2023) also show that in Beijing, teleworkers who changed workplaces did so with a pattern of spatial dispersion toward the periphery of the city.

With the increase in telework in the workforce, it is crucial to understand how this higher commuting distance is formed among teleworkers. The hypothesis analysed here is that this distance is at least partially the result of the residential mobility of teleworkers.

2.2. Residential relocation and commuting

The current literature offers limited and sometimes dated results on the link between telework and residential relocation. No clear consensus has emerged, and findings often diverge. One of the first studies to explore this link was that of Ory and Mokhtarian (2006). This study, conducted on a small sample of 218 state workers in California, observes that telework is accompanied by residential relocation closer to the workplace when telework precedes relocation, and more distant relocation when telework follows relocation. These two directions in the relationship between telework and residential relocation have been the subject of several studies, but it is the first that is addressed in this research.

Regarding post-telework-adoption relocation, several recent studies contradict Ory and Mokhtarian, indicating that teleworkers have a higher propensity to relocate farther from their workplace. However, according to de Abreu e Silva (2022), these studies predict residential relocations further from employment centers based on economic theory and location models, assuming that reduced commuting costs allow teleworkers to reside farther from their workplace (Larson & Zhao, 2017; Safirova, 2002). Nevertheless, de Abreu e Silva argues that these results are not straightforward, as shown by Rhee (2008, 2009), who identifies both centripetal and centrifugal forces using a spatial equilibrium model. Moreover, these studies rely on data and models where the specifics of telework are not well established.

Ettema (2010) emphasizes that teleworking relaxes traditional spatial constraints, enabling workers to choose residential locations that better align with their lifestyle preferences, even if these involve increased commuting distances. Ravalet and Rérat (2019) also argue that teleworking creates a trade-off between commuting and residential choices, allowing workers to tolerate longer distances due to the reduced frequency of commutes. However, while these studies provide compelling correlations, the direct causal link between teleworking and residential relocation remains underexplored.

Residential mobility decisions depend on many factors besides telework—such as family needs, housing affordability, and lifestyle preferences—complicating the task of isolating telework's unique role (Abreu Silva & Abreu Silva & Melo, 2018). According to Muhammad et al. (2007), alongside the stages of the life course and the evolution of the financial situation of individuals and the composition of their household, the distance between home and the workplace has been identified as one of the most important factors to explain residential location preferences. They demonstrate that in the Netherlands, teleworking has allowed people to travel longer distances. However, the effect of teleworking on the probability of moving is not significant. Telework appears to have a limited effect on residential location preferences. Traditional factors, such as life cycle stages, remain the dominant explanatory factors. Prillwitz and Barr (2011) and Silva and Abreu Silva and Melo (2018) confirm this result and emphasize that family dynamics, life stage, and financial considerations play a significant role in shaping residential decisions among teleworkers.

Not all teleworkers relocate to suburban or rural areas, and the direction of relocation varies based on individual and household characteristics. For example, Huang et al. (2018) found that while some teleworkers move farther from their workplace, others relocate closer to urban centers to reduce their commuting distances. This divergence suggests that teleworking influences residential choices in different ways depending on factors such as family size, housing costs, and access to amenities.

2.3. Research contribution and gaps addressed

This research aims to contribute to the debate on whether teleworking facilitates urban dispersion or reinforces metropolitan concentration in the post-pandemic era. By distinguishing between general and metropolitan relocations, this study seeks to determine whether

teleworking encourages workforce decentralization or strengthens the appeal of metropolitan areas. Furthermore, it examines the interaction between residential relocation and workplace mobility, assessing whether longer commuting distances among teleworkers stem from residential shifts.

3. Data and characteristics of the populations studied

3.1. A survey across three countries

The "Teleworker Mobility and Lifestyle Survey" was conducted online at the end of 2023. It targeted a representative sample of 13,500 individuals, plus an oversample of 1500 teleworkers, evenly distributed among three countries: France, the United Kingdom, and the United States. This survey was commissioned and financed by the Mobile Lives Forum, a mobility-focused think tank supported by SNCF, the main French railway company. The Mobile Lives Forum regularly funds surveys and research projects on mobility-related topics. The "Teleworker Mobility and Lifestyle Survey" was initiated in 2021 in response to the COVID-19 crisis and is now in its second edition, with a new wave planned for 2025.

Participants were recruited through companies that manage panels of individuals willing to answer various types of questionnaires for a fee. Of all respondents, 13,654 individuals were included in the analysis after removing those with missing data and teleworkers who started teleworking before 2020, as their behavior significantly differed from other teleworkers. However, their limited number (70) did not allow them to be analysed as an independent group, and the chosen approach of group comparison prevented their inclusion as an exogenous variable since other workers did not have any teleworking experience before 2020.

3.2. Characteristics of the population studied

Among the studied population, teleworkers—defined as individuals with a hybrid work arrangement that includes at least one day per week of both working from home (WFH) and working outside the home—represent over 50 % (Table 1). This high proportion is due to the oversampling of teleworkers in the survey; without this adjustment, they would constitute only 43 % of the sample. Additionally, nearly half of teleworkers rarely visit a workplace outside the home, suggesting a limited hybrid workplace dimension.

Self-employed workers were not included in the study population and accounted for only 2 % to 4 % of respondents, depending on the country. This study focuses on teleworkers who started WFH during the 2020 health crisis and in subsequent years, as this group is most likely to exhibit changes linked to the relaxation of the proximity constraint between residence and workplace.

The overall population is well distributed across the three countries studied, with a slight overrepresentation of France. Due to the lower proportion of teleworkers in France, their share within the overall population is only 27 %, compared to 36 % in the UK and 37 % in the US (Table 1).

In terms of socio-demographic characteristics, teleworkers differ significantly from other workers. They include a slightly lower proportion of women, have a younger median age, and tend to have higher education levels and family incomes. Teleworkers are also more likely to live with a partner and less likely to live with parents.

Employment characteristics also vary between teleworkers and non-teleworkers. Teleworkers are more frequently employed by large companies and are significantly more likely to work in a metropolitan area (45 % vs. 19 % for other workers). This higher share of individuals working and living in metropolitan areas is primarily due to the oversampling of workers in Paris, London, and New York, as the survey was designed to focus specifically on these spaces. If the distribution were fully representative of the broader working population in each country, only 23 % of workers in France, 23 % in the UK, and 26 % in the ten-state area in the US would have a metropolitan workplace.

Finally, in terms of residential location, teleworkers are significantly more likely to reside in cities (45 %) than other workers (24 %), whereas non-teleworkers are predominantly located in suburban (56 %) and rural areas (20 %).

Table 1
Description of the exogenous variables of the model.

Characteristic	Teleworkers, N = 7,488[1]	Other Workers, N = 6,861[1]	Overall, N = 14,349[1]	p-Value[2]
France	1987 (27 %)	2905 (42 %)	4892 (34 %)	<0.001
UK	2702 (36 %)	1961 (29 %)	4663 (32 %)	<0.001
US	2799 (37 %)	1995 (29 %)	4794 (33 %)	<0.001
Woman	3543 (47 %)	3674 (54 %)	7217 (50 %)	<0.001
Age	40 (32, 50)	43 (32, 54)	42 (32, 52)	<0.001
Education level				<0.001
Less than high school	744 (9.9 %)	1529 (22 %)	2273 (16 %)	
High school	1497 (20 %)	2223 (32 %)	3720 (26 %)	
Graduated college	3156 (42 %)	2230 (33 %)	5386 (38 %)	
Post-graduated	2091 (28 %)	879 (13 %)	2970 (21 %)	
Family income (std)	0.13 (−0.54, 0.95)	−0.27 (−0.88, 0.41)	−0.16 (−0.68, 0.60)	<0.001
Spouse with telework	2547 (34 %)	839 (12 %)	3386 (24 %)	<0.001
Single parent	652 (8.7 %)	561 (8.2 %)	1213 (8.5 %)	0.3
In a couple	4846 (65 %)	4145 (60 %)	8991 (63 %)	<0.001
Lives with parents	326 (4.4 %)	485 (7.1 %)	811 (5.7 %)	<0.001
Company size				<0.001
1–9 workers	685 (9.1 %)	753 (11 %)	1438 (10 %)	
10–49 workers	1187 (16 %)	1313 (19 %)	2500 (17 %)	
50–249 workers	1704 (23 %)	1559 (23 %)	3263 (23 %)	
250+ workers	3912 (52 %)	3236 (47 %)	7148 (50 %)	
Metropolitan workplace	3344 (45 %)	1293 (19 %)	4637 (32 %)	<0.001
Metropolitan residence	3085 (41 %)	1277 (19 %)	4362 (30 %)	<0.001
Residence area type				<0.001
City	3398 (45 %)	1659 (24 %)	5057 (35 %)	
Suburban	3223 (43 %)	3864 (56 %)	7087 (49 %)	
Rural	867 (12 %)	1338 (20 %)	2205 (15 %)	

[1] n (%); Median (IQR).
[2] Pearson's Chi-squared test; Wilcoxon rank sum test.
(Source: Teleworker Mobility and Lifestyle Survey 2023.)

4. Modeling

4.1. Model framework

This study employs a Structural Equation Model (SEM) in a multigroup configuration to analyse the probability of relocation from 2020 to a relocation project, while accounting for the influence of commuting characteristics. SEM is a composite statistical framework incorporating path analysis, allowing for the simultaneous examination of multiple dependency relationships within a single model (Kline, 2023; Rosseel, 2012). This approach enhances analytical power by providing robust assessments of model fit and the interrelations among all variables considered.

A multigroup SEM framework is applied to distinguish between teleworkers and other workers. This method enables direct comparisons of relocation likelihood and influencing factors across worker groups, offering a more nuanced understanding of telework's impact. By treating telework status as a structuring element rather than a single explanatory variable, the model ensures that group-specific dynamics are not diluted

within a single analysis. This distinction clarifies how telework status modifies the influence of commuting on relocation decisions (Byrne, 2013).

The model is structured into four hierarchical levels (A to D), each explaining one or more endogenous variables (Fig. 1). Exogenous variables exert both direct and indirect effects on higher-level endogenous variables, facilitating the identification of key relationship pathways In this analysis, only direct effects are presented, enabling a precise interpretation of each predictor's immediate influence on its corresponding dependent variable (Bollen, 1989).

At Level A, fourteen exogenous variables (fifteen in the overall model) related to individual and household characteristics explain the endogenous variable Relocation since 2020. Table 2 indicates that 33 % of teleworkers report having relocated since 2020, compared to 25 % of other workers.

At Level B, Commuting Time is the endogenous variable. It is influenced by the fourteen exogenous variables and the previous level's endogenous variable, Relocation since 2020. Table 2 shows that teleworkers have a median Commuting Time approximately 50 % higher than that of other workers, reflecting the distinct commuting dynamics within this group.

At Level C, the endogenous variable Pandemic Personal Effects is a latent variable informed by three observed variables: Family, Work-life balance, and Relationships. This level is directly influenced by Commuting Time and indirectly by earlier levels. This latent variable measures the perceived personal impact of the pandemic, which plays a significant role in shaping relocation decisions. As shown in Table 2, teleworkers are more likely to report higher pandemic effects on their family (25 % vs. 20 %), work-life balance (26 % vs. 21 %), and relationships (22 % vs. 17 %) compared to other workers.

At Level D, two endogenous variables are modeled: Relocation Project (D1) and Metropolitan Relocation Project (D2). These variables are influenced by all prior levels, including Pandemic Personal Effects. The model accounts for the relationships between D1 and D2. To address their interdependence, the model incorporates potential correlations between their measurement errors. Table 2 reveals that 85 % of teleworkers have a relocation project, with 70 % considering it certain, compared to 79 % and 66 % for other workers, respectively. Similarly, 22 % of teleworkers are considering a metropolitan relocation project, nearly three times the percentage of other workers (8.1 %).

4.2. Model estimation

The model estimation utilizes the Weighted Least Squares (WLS) method, which is particularly suited for analysing binary and ordered categorical variables and estimating indirect effects between variables (Golob, 2003). Because WLS operates on correlation matrices, the resulting coefficients are standardised, enabling consistent comparisons both within and across model equations.

When all variables included in the different model equations are observed, the general equation for this method is:

$$y = By + \Gamma x + \zeta \quad (1)$$

where:

- y represents the vector of endogenous variables,
- B is the matrix containing coefficients for the relationships among endogenous variables,
- x represents the vector of exogenous variables,
- Γ is the matrix of coefficients linking exogenous variables to endogenous variables, and
- ζ denotes the vector of residuals from structural relationships (Kline, 2023).

The path model coefficients presented in Section 5 are estimated using the lavaan R package (Rosseel, 2012), which is widely used in SEM applications due to its flexibility and robustness in handling complex structural relationships.

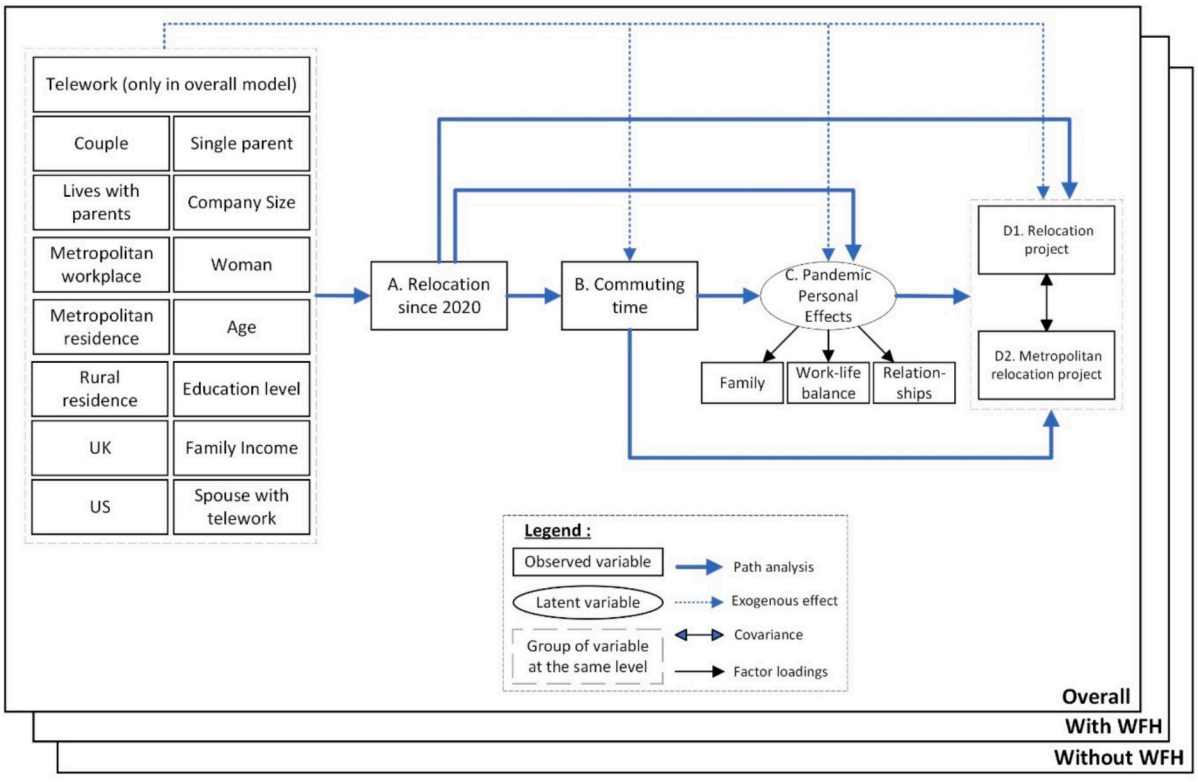

Fig. 1. Path diagram.

Table 2
Description of the endogenous variables of the model.

Characteristic	Teleworkers, $N = 7,488$[1]	Other Workers, $N = 6,861$[1]	Overall, $N = 14,349$[1]	p-Value[2]
Relocation since 2020	2394 (32 %)	1749 (25 %)	4143 (29 %)	<0.001
Commuting Time	30 (20, 45)	20 (12,30)	25 (15, 40)	<0.001
Pandemic Effect on Family				<0.001
Not really	727 (9.7 %)	813 (12 %)	1540 (11 %)	
A little	2316 (31 %)	2363 (34 %)	4679 (33 %)	
Somewhat	2565 (34 %)	2327 (34 %)	4892 (34 %)	
A lot	1880 (25 %)	1358 (20 %)	3238 (23 %)	
Pandemic Effect on Work-life balance				<0.001
Not really	531 (7.1 %)	597 (8.7 %)	1128 (7.9 %)	
A little	1973 (26 %)	2184 (32 %)	4157 (29 %)	
Somewhat	3046 (41 %)	2634 (38 %)	5680 (40 %)	
A lot	1938 (26 %)	1446 (21 %)	3384 (24 %)	
Pandemic Effect on Relationships				<0.001
Not really	970 (13 %)	1069 (16 %)	2039 (14 %)	
A little	2358 (31 %)	2519 (37 %)	4877 (34 %)	
Somewhat	2485 (33 %)	2091 (30 %)	4576 (32 %)	
A lot	1675 (22 %)	1182 (17 %)	2857 (20 %)	
Relocation project				<0.001
No	1111 (15 %)	1412 (21 %)	2523 (18 %)	
Yes, Probably	1932 (26 %)	1886 (27 %)	3818 (27 %)	
Yes, Certainly	4445 (59 %)	3563 (52 %)	8008 (56 %)	
Metropolitan relocation project	1661 (22 %)	554 (8.1 %)	2215 (15 %)	<0.001

[1] n (%); Median (IQR).
[2] Pearson's Chi-squared test; Wilcoxon rank sum test.
(Source: Teleworker Mobility and Lifestyle Survey 2023.)

4.3. GOF

The SEM model, estimated using data from the "Teleworker Mobility and Lifestyle Survey", demonstrates strong goodness-of-fit (GOF) metrics. The model exhibits low values for both the root mean square error of approximation (RMSEA) and the standardised root mean square residual (SRMR), both falling below the 0.05 threshold, indicating a satisfactory fit (Golob, 2003; Hu & Bentler, 1999). Additionally, the comparative fit index (CFI) reaches 0.990, significantly exceeding the 0.900 benchmark, which suggests strong model adequacy (Bentler, 1990).

The null model, in which all variables are assumed uncorrelated, serves as a baseline for assessing the fit of the SEM. The Chisq test results for each group within the User Model (Group 1: 97.347, Group 2: 96.813) indicate that the model fits the data well across different worker categories, reinforcing its robustness and validity (Schermelleh-Engel et al., 2003).

5. Results

5.1. Explaining relocation since 2020

Fig. 2 shows that all other things being equal, the proportion of relocation since 2020 is higher for teleworkers in the overall population, confirming the observations made from the descriptive statistics in Table 1.

Regarding the explanatory factors of relocation since 2020, few variables show significant correlations. Age has a strong negative correlation, with no significant difference between teleworkers and other workers. Living with parents is also negatively correlated with relocation, with a significantly weaker effect for teleworkers. Similarly, being In a couple is negatively associated with relocation, but this correlation is not significant for teleworkers.

Among the positive correlations, Woman and Education level are positively linked to relocation, except for teleworkers, where these associations are not significant. Conversely, Family income is positively correlated with relocation for teleworkers, but not for other workers.

Overall, the analysis confirms that all else being equal, teleworkers have a higher probability of relocating since 2020, with age being the strongest predictor. Few other variables show significant relationships, and those that do have weaker effects. However, model estimates for teleworkers tend to be lower and less often significant than for other workers. Despite these weaker associations, the underlying relocation patterns remain consistent across both groups, with the exception of Family income, where a potential divergence appears.

5.2. Explaining commuting time

Commuting Time is positively associated with telework. However, in terms of structural relationships, there is no significant link between Commuting Time and Relocation Since 2020 (Fig. 3).

Among exogenous variables, US, Company size, Education level, and Family income are positively and significantly correlated with Commuting Time. Notably, for Family income, this link is significant only for teleworkers. Metropolitan workplace also shows a positive association, particularly for non-teleworkers, who differ significantly from teleworkers in this regard.

Stronger differences emerge in residential location variables. Metropolitan residence and Rural residence are positively associated with Commuting Time for teleworkers, but negatively for non-teleworkers, highlighting distinct spatial dynamics between the two groups. Regarding other negative correlations, Woman and Age are significantly linked to lower Commuting Time, but only for non-teleworkers. Meanwhile, UK shows a negative correlation with Commuting Time, though this relationship is significant only for teleworkers.

The results indicate that commuting times differ notably between teleworkers and non-teleworkers, particularly in their relationship with workplace and residential locations. While Metropolitan residence and Rural residence increase Commuting Time for teleworkers, they have the opposite effect for non-teleworkers. Additionally, Family income and Company size play a stronger role in shaping Commuting Time for teleworkers.

5.3. Pandemic personal effects

Pandemic Personal Effects is represented in the models by a latent variable determined by three observed variables (see Fig. 1) relating to the satisfaction of the individuals interviewed with their situation in terms of family relationships, work-life balance, and relationships in general. The standardised factor loading values for the three observed variables are all around 0.8, indicating a strong association with the latent variable Pandemic Personal Effects, regardless of the model (multigroup or overall) and the group in question (teleworkers and other

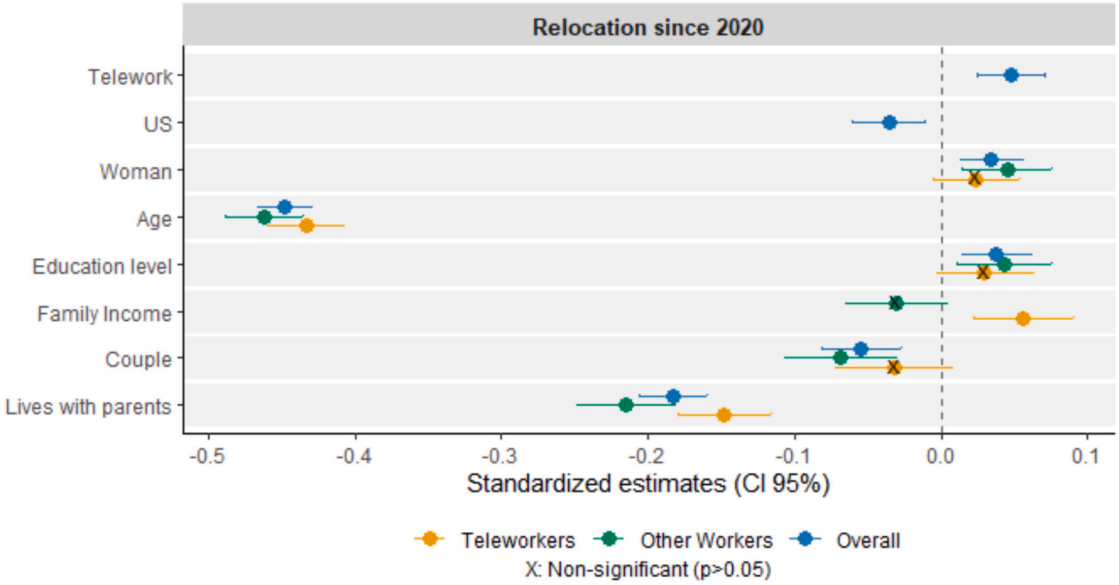

Fig. 2. Regression results for "Relocation since 2020".

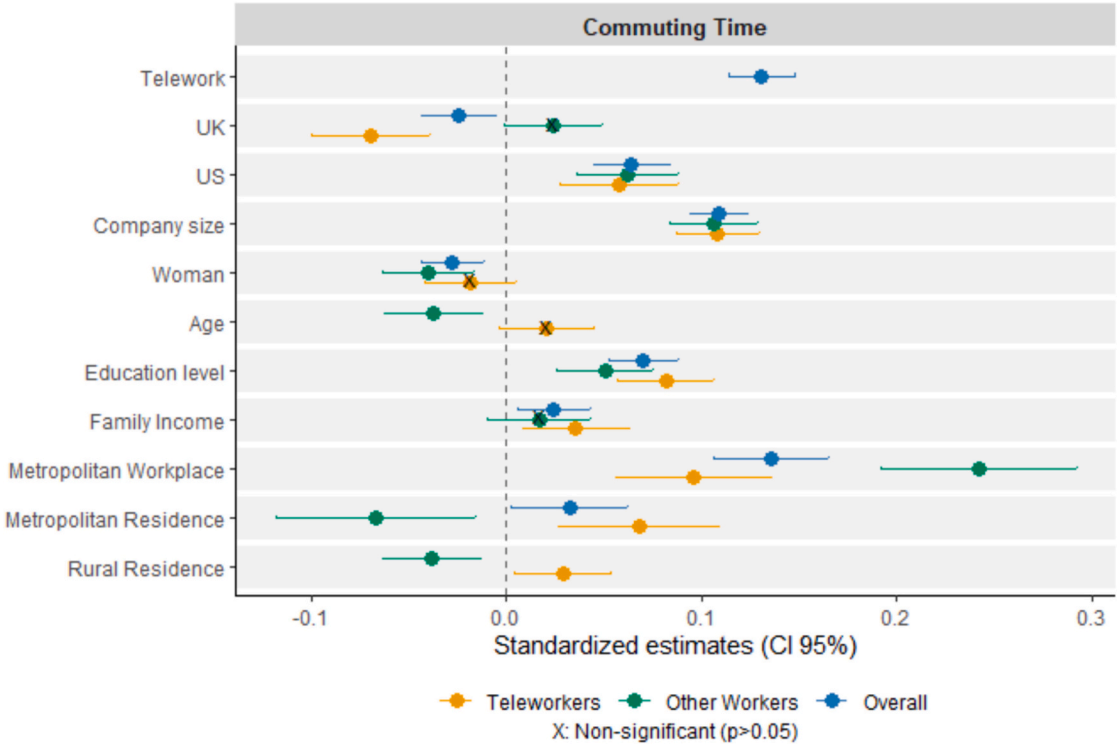

Fig. 3. Regression results for "Commuting Time".

workers). These results suggest that all three indicators consistently and reliably measure the concept of Pandemic Personal Effects as a latent variable. The uniformity of the high and significant factor loads implies that each indicator contributes substantially to the representation of this latent variable. The homogeneity and strength of the associations between the indicators and the latent variable suggest that the variable Pandemic Personal Effects is well conceptualized and measured by these three indicators in the model.

The probability of experiencing Pandemic Personal Effects (Fig. 4) is higher for teleworkers. This is expected, as transitioning to telework introduced significant changes to daily life that those who continued working on-site did not experience. In terms of structural relationships, Relocation Since 2020 is positively linked to Pandemic Personal Effects. Commuting Time also shows a positive relationship, but the effect is weaker and not significant for teleworkers.

Among exogenous variables, positive associations are observed with UK, Woman (except for teleworkers), Spouse with WFH, In a couple (except for non-teleworkers), and Single Parent. Negative associations are primarily found with Age, Family income, Rural residence, Education level, and US (except for teleworkers).

The findings confirm that teleworkers were more affected by pandemic-related disruptions, reinforcing the idea that WFH reshaped

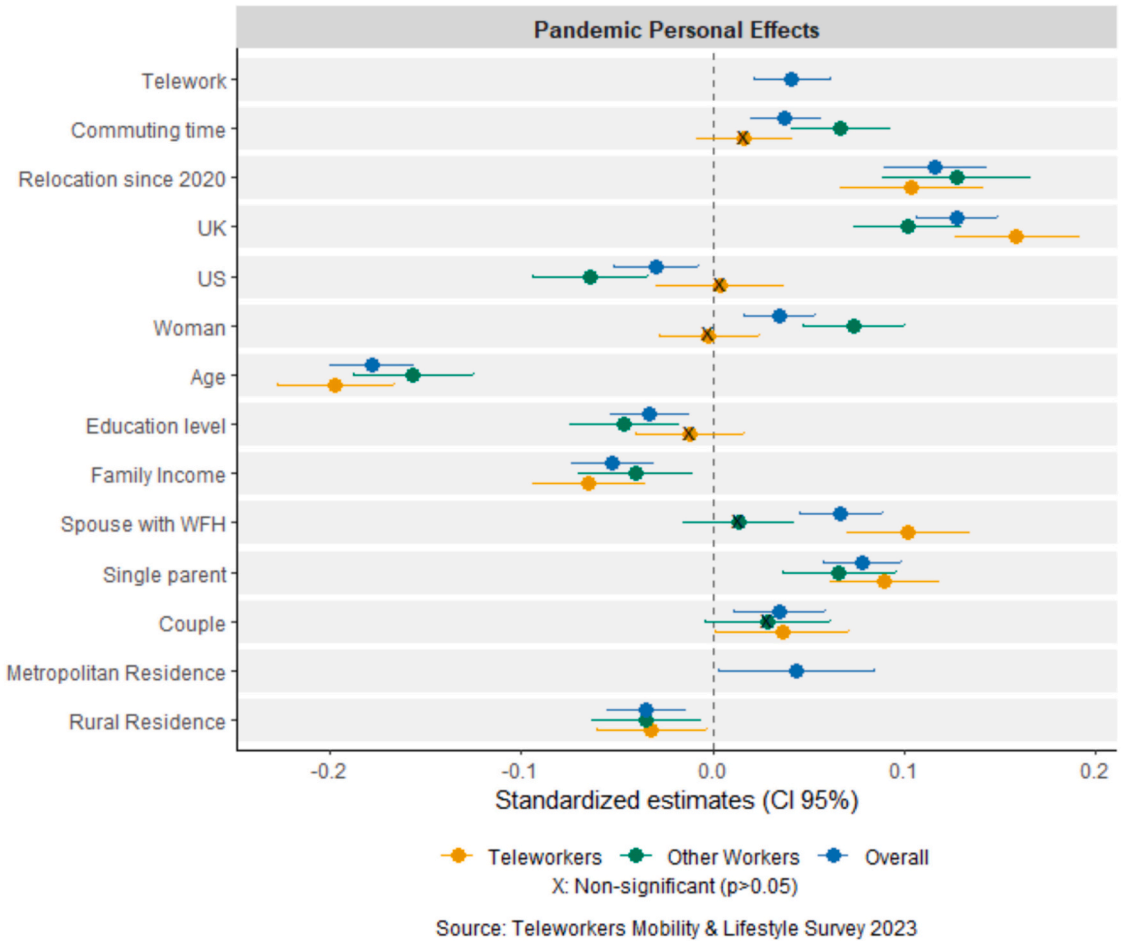

Fig. 4. Regression results for "Pandemic Personal Effects".

daily life beyond just work arrangements. The links between Pandemic Personal Effects and relocation, commuting, and socio-demographic factors suggest that the pandemic influenced mobility decisions differently for teleworkers and non-teleworkers.

5.4. *Explaining a relocation project in general and toward a metropolitan area*

Teleworkers do not have a higher probability of having a *Relocation Project* in general (Fig. 5a). However, they are more likely to have a *Metropolitan Relocation Project* (Fig. 5b). This result highlights distinct relocation dynamics between teleworkers and other workers. While teleworkers are not more likely to have a Relocation Project overall, they show a significantly higher probability of relocating within metropolitan areas. This suggests that telework does not necessarily drive suburban or rural moves but instead reinforces intra-metropolitan mobility.

Among the structural effects observed in the model, Pandemic Personal Effects is strongly and positively associated with Relocation Project, both in general (Fig. 5a) and toward a metropolitan area (Fig. 5b). This association is significantly stronger for teleworkers compared to other workers. Relocation Since 2020 also shows a positive relationship with Relocation Project, whether general (Fig. 5a) or metropolitan (Fig. 5b), although the strength of this association does not differ significantly between teleworkers and other workers. Finally, Commuting Time has a significant positive effect on Relocation Project in general (Fig. 5a), but not on Metropolitan Relocation Project (Fig. 5b), with no significant differences between the two worker groups.

Key structural effects confirm that Pandemic Personal Effects strongly influence relocation intentions, with an even greater impact on teleworkers. Additionally, Relocation Since 2020 and Commuting Time play significant roles, though with varying effects depending on the relocation type.

Beyond structural effects, correlations between Relocation Project and exogenous variables differ depending on whether the project is general (Fig. 5a) or metropolitan (Fig. 5b). These differences do not alter the direction of the relationships but rather affect their strength and significance.

For a General Relocation Project (Fig. 5a), positive correlations are observed with UK (though non-significant for teleworkers), Spouse with WFH, and Lives with Parents. Negative correlations are found with Age, In a couple, Rural residence, and Company size. The strength of these relationships is generally similar across both worker groups, except for Age, where the negative correlation is significantly weaker for teleworkers, and Company size, which is non-significant for non-teleworkers.

For a Metropolitan Relocation Project (Fig. 5b), more exogenous variables show significant associations. Positive correlations are found with UK, US, Education level, Family income, Spouse with WFH, Metropolitan residence, and Metropolitan workplace. Among these, notable differences between the two groups emerge: Spouse with WFH is significant only for teleworkers, whereas UK, Metropolitan workplace, and Education level are significant only for non-teleworkers.

Regarding negative correlations, Age shows the strongest negative association, followed by Rural residence, In a couple, Woman, and Company size. Company size is not significant for non-teleworkers, but for the other negative correlations, there are no significant differences between the two groups.

Finally, differences in exogenous variables show that socio-

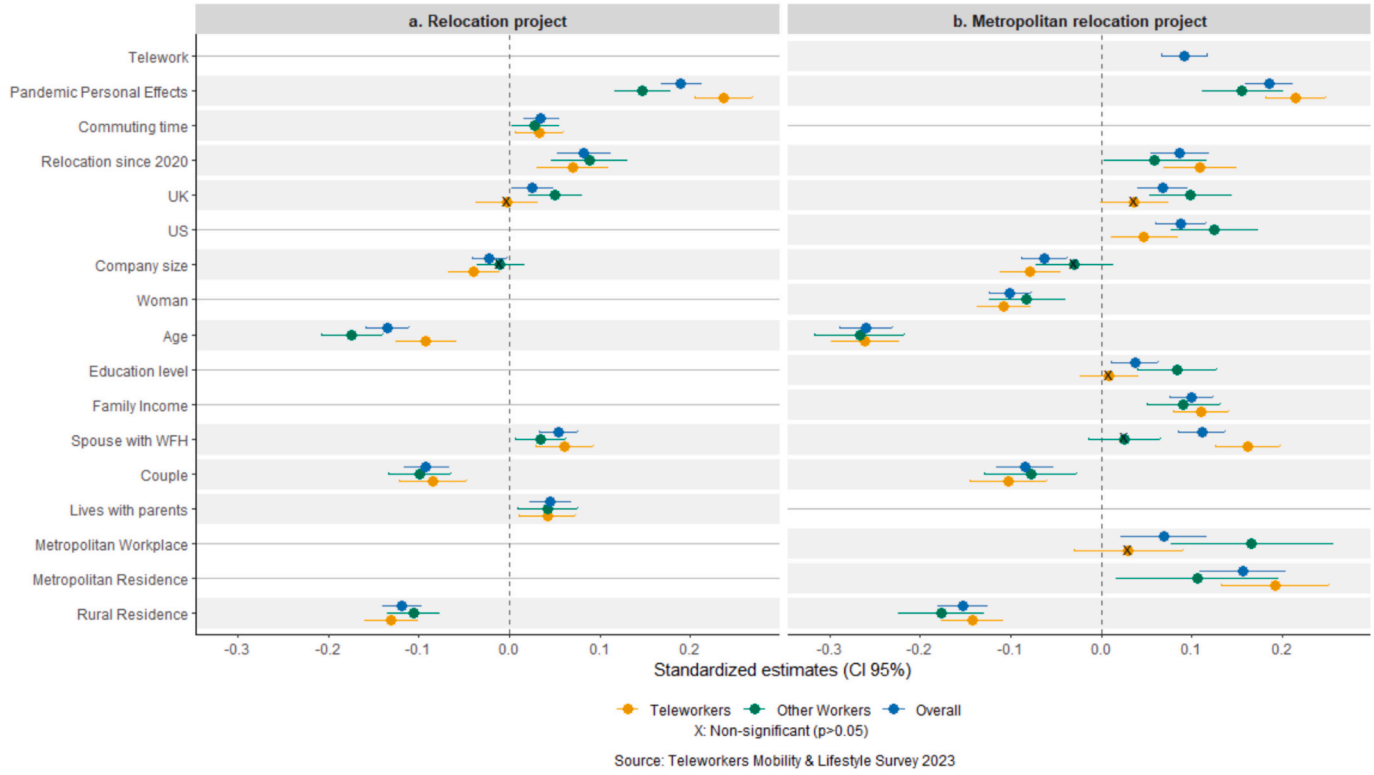

Fig. 5. Regression results for "Relocation project" and "Metropolitan Relocation Project".

demographic and employment factors shape relocation choices differently for teleworkers and other workers. The findings emphasize the complex relationship between telework, residential mobility, and metropolitan dynamics, which contradicts the common assumption that telework systematically leads to urban sprawl.

6. Discussion

6.1. Re-evaluation of the proximity constraint: analysis of the residential trajectories of teleworkers since 2020

While teleworkers have relocated more frequently since 2020, there is no evidence that these relocations contribute to urban sprawl. Instead, the findings indicate that teleworkers are more likely to move within metropolitan areas rather than to suburban or rural locations. This suggests that telework does not necessarily weaken the traditional urban hierarchy but instead reinforces intra-metropolitan mobility patterns.

The survey's broad spatial categories may not fully capture the nuances of these relocation dynamics, particularly intra-metropolitan movements. Additionally, the increased likelihood of relocation among teleworkers does not appear to fundamentally alter the balance between different urban zones. It is possible that these relocations primarily involve changes such as moving to larger or better-quality housing without significantly modifying the overall spatial distribution of populations. The absence of detailed housing condition variables in the survey limits our ability to specify how these relocations affect residential choices. Future research with more refined spatial and housing indicators would be necessary to fully assess how WFH influences residential mobility decisions.

6.2. Residential trajectories since 2020 that have no effect on the increase in commuting time

The analysis reveals a significant difference in Commuting Time between teleworkers and non-teleworkers. However, there is no significant impact of relocations since 2020 on Commuting Time. This suggests that the relaxation of the proximity constraint between home and workplace has not led to relocations that result in increased travel times.

This absence of correlation may suggest that teleworkers adjust their work arrangements primarily through job flexibility rather than residential relocation. Teleworkers may opt for jobs further away while maintaining the same residence, enabled by WFH opportunities. Alternatively, long commuting times among some teleworkers may reflect a preference for hybrid work models, where individuals who already live far from their workplace continue to do so while commuting less frequently. While this hypothesis is plausible, the current data structure does not fully allow for an in-depth analysis of nuanced work arrangements. Differentiating between full WFH, hybrid, and occasional teleworkers in future studies could provide a clearer picture of how commuting behaviors evolve in response to telework.

6.3. Teleworkers' relocation projects: a metropolitan focus

Regression analyses indicate that general relocation plans do not differ substantially between teleworkers and other workers, suggesting relative uniformity in relocation intentions across the groups. However, when looking specifically at metropolitan relocation projects, a distinct pattern emerges: teleworkers have a significantly higher probability of planning to move to a metropolitan area.

This finding contradicts the assumption that WFH weakens the appeal of metropolises. Instead, it highlights that even with increased workplace flexibility, metropolitan areas remain attractive for teleworkers due to their economic centrality, career opportunities, and professional networks. Factors such as Family income, Education level, and Current Metropolitan residence—which are higher among teleworkers—contribute to this trend, reinforcing existing preferences for urban locations. While the survey's spatial categories may not fully capture relocation details, the results suggest that teleworkers continue to perceive large cities as strategic locations for career progression and

social mobility. This indicates that rather than decentralizing, telework may be reinforcing the role of metropolises in employment structures, albeit with greater internal flexibility in work arrangements.

6.4. Strong similarities in the trends observed between the different countries

Relocation patterns since 2020 show no major differences between the studied countries, suggesting a degree of uniformity in teleworkers' residential behaviors. However, the likelihood of relocating within metropolitan areas is significantly higher in the United States and the United Kingdom compared to France. These differences may reflect the earlier adoption of WFH in the UK and US, as well as their more flexible labor markets, which may encourage greater intra-metropolitan mobility.

Contrary to the hypothesis that telework encourages geographical dispersion, the findings suggest that it may instead strengthen metropolitan concentration. This trend raises important questions for urban planning: rather than causing widespread suburbanization, telework appears to be reshaping internal metropolitan dynamics, influencing housing demand and workplace accessibility within major cities.

7. Conclusion

This research sheds additional light on the residential mobility of teleworkers, a potential major issue for urban policies and mobility. Teleworking, which affects about a third of the working population depending on sources and definitions, could lead to significant residential shifts.

However, the results presented in this study do not support this: while teleworking is linked to a higher probability of workers relocating, it does not result in significant departures from metropolitan areas to surrounding or less densely populated areas. The scope of these results is limited by the lack of spatial precision in the data, preventing detailed analysis of origins and destinations at scales such as city centers versus peripheries or metropolitan versus non-metropolitan areas. This limitation is unfortunate, given the robust sample size of around 15,000 respondents across three different countries, which could have provided a more substantial contribution to urban development issues.

Nevertheless, the current findings suggest that residential mobility may not fully account for the greater distance between residence and workplace for teleworkers. It is necessary to also examine workplace relocations, which could explain part of this increased distance. Thus, there is an urgent need for new results based on data with greater geographical precision and an understanding of workplace dynamics and their evolution with job changes.

CRediT authorship contribution statement

Benjamin Motte-Baumvol: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Thomas Porcher:** Writing – review & editing, Writing – original draft, Conceptualization.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Benjamin Motte-Baumvol reports financial support was provided by Mobile Lives Forum. Benjamin Motte-Baumvol reports a relationship with Mobile Lives Forum that includes: funding grants and non-financial support. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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