An exploration of demographic, work, home and commute aspects of part-day and whole-day homeworking

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Abstract

There are many forms of working practice associated with the term 'teleworking'. Of particular interest to transport planners has been the occasional homeworking undertaken by full-time paid employees. While previous research has centred upon whole-day homeworking in this context, this paper builds upon work by the authors to introduce consideration of part-day homeworking. The paper presents findings and analysis based upon the third wave of a national longitudinal survey in Great Britain. Survey results first confirm earlier findings that there is a higher incidence of part-day homeworking than whole-day homeworking. Results also indicate how part-day homeworking can displace, in particular, the timing of the evening commute home from work.

The paper then goes on to compare the explanatory power of a series of statements in the survey, which relate to work, commute and home factors, in terms of individuals' desire to part-day and full-day homework more. For both forms of homeworking three statements are common in their significance and importance in explanation: these relate to the avoidance of interruptions at work, avoiding wasted time in traffic and other household members appreciating the employee homeworking. Analysis is also carried out on how well the series of statements can help predict the frequency of homeworking for individuals observed to have practiced it in the reference week of the survey. From the analysis it emerges that more of the statements are significant in explaining whole-day homeworking desire than in explaining part-day homeworking desire and that the more of the variance in desire (and in predicting homework frequency) can be explained in the case of full-day homeworking than in the case of part-day homeworking.

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1. Introduction

Teleworking has been a field of interest to policymakers and researchers for many years. Such longevity for some has, it seems, brought a sense of avenues of enquiry and possibility having been exhausted. However, representing as it does interactions between social and work practices and work-related travel, the phenomenon of teleworking, the forms it takes and the societal roles it can perform continue to evolve.

Ongoing work by the authors (Lyons et al, 2006; Lyons and Haddad, 2008) is examining a specific form of teleworking, namely part-day occasional homeworking by full-time paid employees, which has hitherto received very little attention. This form of working practice is, arguably, of growing pertinence to a workforce oriented increasingly around the knowledge economy and faced with a need for time-space flexibility to accommodate patterns of work and non-work activities. The authors' preceding work has revealed an apparent higher incidence of part-day homeworking (where any period of working of at least 30 minutes duration in the home constitutes part-day homeworking) compared to whole-day homeworking (which has received much more attention in the literature). Part-day homeworking may prove to be an important consideration in relation to transport policy. In contrast to whole-day homeworking where a pair of commute trips are removed on a given day, where part-day homework takes place the commute trips, rather than being removed, have the potential to be displaced in time. The prospect arises that the practice of part-day homeworking may be contributing to or could in future (more substantially) contribute to the spreading of peak period traffic.

In this paper the focus is upon an examination of a number of factors which may affect the desire to homework or to homework more and which may be affecting current homeworking practice (in terms of the frequency with which individuals are undertaking homeworking). In particular, the paper concerns itself with a comparison of determinants of desire and frequency for part-day homeworking and whole-day homeworking. Analysis of quantitative data collected in 2007 as part of a national Internet-based survey of the workforce in Great Britain is presented. It is suggested that further understanding of factors affecting the (prospective) practice of (more) homeworking is of value to policymakers in terms of how patterns of commute traffic may change or could be changed. In this paper part-day homeworking is referred to as *varied spatio-temporal working* (VST working) which is defined as being when *at least 30 minutes of continuous work takes place at home and in the usual workplace in any given day*. Likewise 'H working' is used as a shorthand to refer to whole-day homeworking.

The next section of the paper examines what is known from the existing literature concerning factors that influence teleworking (homeworking). An explanation of the origins of the data used in the analysis is then provided before the analysis and interpretations are set out. The paper concludes with a discussion of the implications of the findings for ongoing developments in policy, practice and research.

2. Background

Previous research into teleworking has sought to examine its societal (macro) level effects such as those on travel, traffic and congestion (e.g. Mokhtarian, 1998; Nilles, 1993; Cairns et al, 2004; Balepur et al, 1998; Dodgson et al, 2000; Freeman, 1996), and pollution (e.g. Handy and Mokhtarian, 1993; Nilles, 1993). Research has also examined the individual (micro) level aspects of teleworking – such as attitudes

towards teleworking (e.g. Mokhtarian and Salomon, 1995; Beasely et al, 2001; Iscan and Naktiyok, 2005), travel impacts for the individual (e.g. Mokhtarian and Salomon, 1997; Mokhtarian, 1996; 1998; 2003; Helminen and Ristimäki, 2007), social and family-life effects (e.g. Handy and Mokhtarian, 1996; Baruch, 2000) and the sociodemographics of teleworkers (e.g. Beasley et al, 200l; Iscan and Naktiyok, 2005).

Previous research on determinants of teleworking

Determinants motivating individuals to adopt or continue teleworking include their work situation, family life, travel time, commute cost, health, crime avoidance, leisure and independence, and ideology (e.g. Mokhtarian and Salomon, 1997; Beasley et al, 2001). Such determinants may be positive (facilitators) or negative (constraints); and can affect *preference* or desire to telework or affect telework *behaviour* itself (Mokhtarian and Salomon, 1997). There are a number of constraints, facilitators and drivers that can influence the preference (e.g. Mokhtarian and Bagley, 2000; Peters et al, 2004) and practice of (e.g. Mannering and Mokhtarian, 1995; Mokhtarian and Salomon, 1996a; 1996b) of teleworking. Differences exist between wanting to telework and actually doing so - e.g. Mokhtarian and Salomon (1995) found that 88 per cent of their sample had a desire to telework and only 13 per cent actually did so. Mokhtarian and Salomon (1997) refer to a previously proposed conceptual model (Mokhtarian and Salomon, 1994) of preference and choice.

Social and demographic determinants

With flexibility becoming increasingly important especially within a climate of changing sociodemographic trends (Handy and Mokhtarian 1996, Beasley et al 2001) it has been suggested that teleworking is more attractive to females (e.g. Shamir and Salomon, 1985; Mokhtarian, Bagley and Salomon, 1998; Iscan and Naktiyok, 2005). Acknowledging an increasing number of women entering the workforce (Schwartz and Scott, 2000), it is found that the opportunity that teleworking presents to spend more time with one's children has a greater importance for women than men (Beasley et al 2001). Handy and Mokhtarian (1996) highlight that, alongside childcare, many workers also care for elderly parents and as the baby boom population moves towards retirement, an increase in flexible work practice becomes increasingly important – enabling work and caring responsibilities to be reconciled. However, homeworking has also been found to increase home-work conflict (Baruch and Nicholson, 1997; Standen et al 1999; Golden et al, 2006). Although many teleworkers attempt to develop spatial boundaries between work and home life - such as assigning a dedicated room at home for working - working at home can still blur the boundaries not only for the teleworker but for the family too (Ellison, 1999). Another source of family-related stress is where work time spills over into family time representing difficulties in defining the temporal boundaries within the home (Standen, 2000; Steward, 2000). Meanwhile, teleworking can have the stress-reducing benefits of providing a better working environment than that of the conventional workplace (Baruch and Nicholson, 1997; Mann et al, 2000).

Other personal and household attributes, which may be predictive in homeworking preference, include: lack of personal discipline; household distractions; and family orientation (Bailey and Kurland, 2002).

Demographic variables affecting homeworking include the presence of small children, the number of people in the household (Mannering and Mokhtarian, 1995; Iscan and Naktiyok, 2005) and education and age (Bagley and Mokhtarian, 1997). It

has also been suggested that people in suburban areas telework more than those in urban areas (Polydoropoulou et al, 2006) and that likelihood of teleworking increases with commute distance (Iscan and Naktiyok, 2005; Helminen and Ristimäki, 2007). Research from Turkey suggest that women, married employees, employees who have children less than five years old, employees whose house is big enough, employees whose house is relatively farther to the workplace are more likely to have a more positive attitude towards teleworking (Iscan and Naktiyok, 2005).

Organisational

Organisational factors are frequently citied as facilitators, inhibitors and consequences of teleworking. Teleworkers report increased freedom and flexibility, increased productivity and the lack of interruptions as some of the reasons that they choose to work at home (e.g. Apgar, 1998; Bailey and Kurland, 2002; Hill et al, 1996; Baruch, 2000). Other factors include a higher commitment of an employee to their organisation (Olson, 1987), greater likelihood to remain with their current employer (Frolick et al, 1993) and increased job satisfaction (Bailyn, 1988). Meanwhile, some commentators argue that there is little evidence of increased job satisfaction amongst teleworkers (Bailey and Kurland, 2002; Crossan and Burton, 1993; Hill et al 1996). Views on productivity also appear mixed suggesting the absence of a universal truth: some research suggests that teleworking can increase a worker's productivity (e.g. Hodson, 1995; Baruch and Nicholson, 1997) while other research has found no change (Olson, 1989) or even lower productivity for certain employees (Ramsover, 1985). Questions can also be raised over whether any observed higher productivity may arise from longer hours being worked ('overworking') prompted by teleworking (Lyons and Haddad, 2008).

Regardless of such potential organisational benefits, employees themselves may consider their employment role unsuitable for teleworking (Mokhtarian, 1998; Mokhtarian and Salomon, 1996; Peters et al, 2004). Mokhtarian and colleagues (Mannering and Mokhtarian, 1995; Mokhtarian and Salomon, 1997; Stanek and Mokhtarian, 1998; Bagley and Mokhtarian, 1997) suggest that work-related factors are most predictive of an individual's choice to work remotely. An employer's (lack of) support has repeatedly emerged as an important factor (Mokhtarian and Salomon, 1994, 1995, 1996; Huws et al 1990; Mokhtarian et al 1998). It has often been found or is suggested that managers fear losing control over staff who telework (Huws et al, 1990; Kugelmass, 1995; Kurland and Egan, 1999; Mokhtarian et al, 1998). Some argue that this is the principal barrier to the growth of teleworking (Olson, 1988). Although not clear whether and how affected by employee circumstances, desire and attitudes or employer support, recent figures in the UK suggest that 83 per cent of full-time employees consider it would not be possible for them to work at home (DfT, 2005).

Another commonly citied obstacle to teleworking is professional and social isolation (Salomon and Salomon, 1984; Broder, 1996; Tomaskovic-Dervy and Risman, 1993; Bailey and Kurland, 2002). For many workers the social interaction of the workplace is highly important, with the separation through teleworking from professional colleagues and the social 'banter and buzz' that constitutes an office environment causing psychological stress (Mann and Holdsworth, 2003). Social isolation can restrict the ability to sort out issues, leading to frustration, and can restrict the availability of emotional support from fellow workers to help deal with situations (Mann and Holdsworth, 2003).

The need for information and communications technology (ICT) to support work is also a factor governing opportunity to telework. For instance, the ability to borrow a computer from work has proved important in whether somebody can telework or not (Mannering and Mokhtarian, 1995; Mokhtarian and Salomon, 1997; Iscan and Naktiyok, 2005). Indeed for the modern workplace at least for those who are information workers, ICTs have become almost a prerequisite for carrying out many work tasks (Lyons, 2002) – at the same time, affordability and availability of ICTs in the home has also increased dramatically.

Travel

For the individual, teleworking can also introduce the possibility for travel time savings and some avoidance of the 'struggle' of the daily commute (e.g. Novaco, 1989; Brimsek and Bender, 1995; Bagley and Mokhtarian, 1997; Spillman and Markham, 1997; Mann et al 2000; Gatersleben and Uzzell, 2007). It has, however, been suggested that commute removal may actually increase stress in the teleworker as 'private' time associated with commuting is removed (Richter, 1991). The commute between home and work has traditionally enabled the transition between roles to occur (Ellison, 1999; Lyons and Chatterjee, 2008; Jain and Lyons, 2008) and thus can be seen to represent positive utility in itself (Redmond and Mokhtarian, 2001) as opposed only to the traditionally assumed disutility of travel. Removal of commute trips may, as noted above, lead to greater productivity and increased time with family. A potential consequence of teleworking and thus arguably a motivating factor is that of residential relocation – notably further from the workplace, 'compensated' for the individual by fewer commute trips (Lund and Mokhtarian, 1994; Nilles, 1991). A distinction should be noted, however, between teleworking being a facilitator residential relocation as opposed to being a driver for relocation.

VST working

Most of the research cited in this section of the paper has concerned itself with H working. (Some research has also considered changes brought about to commute length by working at telecentres (e.g. Bagley and Mokhtarian, 1997)). Previous research by this paper's authors into VST working revealed that the incidence of VST working and the numbers of people working in this way was twice as high as for H working (Lyons et al, 2006). Blue collar workers were found to practice more VST working than H working and women were more likely to VST work than men while the reverse was true for H working. Qualitative research has further shown that VST working can be more spontaneous in nature than H working but is also associated with shorter commute distances (Lyons and Haddad, 2008). There is the suggestion for there being restorative benefits associated with commuting from work to home on VST working days where the individual leaves the workplace 'early' to then continue working at home.

Such findings suggest strongly that there may be differences in the factors governing desire/opportunity to VST work and its actual practice compared to those for H work which have been summarised in this section. Accordingly the paper now goes on to explore possible differences between VST and H working through analysis of survey data collected in 2007 in GB. The next section describes the data and its origins.

3. Data description

3.1 Sample

A focal point of the work by the authors into VST working is a longitudinal survey of the workforce in Great Britain (as detailed in Lyons et al, 2006). The primary aim of the research is to examine the potential for VST working and its effects on the daily commute – thus the population of interest is adults (aged 18-64) in full-time paid employment. A response sample of c1000 individuals has been secured in each of three 12-monthly survey waves to date. Sample quotas are set relating to gender, age, occupation (blue/white collar workers) and GB region. The Internet-based survey is administered by GfK NOP[1] and draws upon their panel of 120,000 weekly Internet users. The intention over time is to gather panel data. Accordingly respondents to previous survey waves are targeted in each new wave and then, due to attrition, the sample must be refreshed with new respondents.

This paper analyses the third wave (most recent) data from the survey carried out in March 2007. The wave three sample size is 1015, of which 43.5 per cent of respondents are female. The mean age was 42 (age range 18 to 64, SD = 12.7 years). The most frequent income is between £28,001 - 34,000. 59 per cent of respondents indicated having been educated up to higher national diploma level (including GCSEs, A-levels and HND). 21 per cent indicated having a degree or equivalent with 10 per cent having a postgraduate qualification. The average commute distance is between 5 and 10 miles. 22.5 per cent of respondents had dependent children. 45.5 per cent of respondents have also participated in previous waves of the survey.

3.2 Questionnaire

The survey questionnaire has been designed with the primary purpose of recording respondents' patterns of work during the preceding 5-day (Monday to Friday) reference week (for wave three this was the period 19-23 March 2007). For each reference week day a set of questions are asked to enable classification of working day and to capture commute-related details (where appropriate). For classification of working day, respondents were able to choose from the following seven options: worked at my workplace only (W); worked at home only (H); worked at home and then at my workplace (H-W); worked at my workplace and then at home (W-H); worked at home then my workplace then at home (H-W-H); did not work today; and other working pattern (O). The patterns H-W, W-H and H-W-H are taken together to represent VST working in the reference week. Classification of individuals as VST workers and/or H workers has been based on their recorded reference week work pattern.

A subsequent section of the questionnaire consisted of 16 statements (as shown later in Table 4) concerning circumstances, experiences, attitudes and desires towards homeworking. This list was constrained by overall space in the survey design and it is thus acknowledged that it does not reflect a more extensive list of factors of possible relevance to questions of desire to, opportunity to and practicing of telework. However, the statements were chosen based on previous research (Beasley et al, 2001) and a small number of focus groups conducted as part of the piloting exercise for the survey (Jones and Lyons, 2005). The statements are now introduced and discussed (quotations are drawn from the focus groups referred to). It should be noted that the statements have been phrased to be applicable both to those individuals

[1] GfK NOP (formally NOP World) is an international market research company. More information can be found at http://www.gfknop.co.uk/

who do currently practice homeworking and to those who do not. For each statement Likert scale responses ranged from '1 = strongly disagree' to '5 = strongly agree'. 'Not applicable' responses have been treated as missing in terms of the following analysis. Statements were presented in a randomised order to each respondent.

Travel related statements

In total, seven of the 16 statements related to *travel* aspects or impacts of teleworking. Two statements have been included to investigate whether the commute is a causal factor for working at home. These are: "*I find travelling to work a 'struggle'*" and "*I find travelling home from my workplace a 'struggle'*". The distinction between the commute to and from the workplace is deliberate. It has been suggested that the commute journey is a 'stressful experience' for many commuters (Novaco et al, 1989). Kluger (1998) reports that longer car commutes have been found to be positively correlated with high blood pressure, self-reported tension, reduced task performance, negative mood in the evening hours after work, and the following symptoms: a stiff neck, tiredness, lower back pain, a difficulty in focusing attention, and anger. Previous research has also indicated that the removal of the commute journey is one of five influences that drive an individual to start working at home (Mokhtarian and Salomon, 1997).

"I prefer to work just at home. Drives me mad the traffic"

The statement "*Avoiding the 'wasted' time in traffic is a motivation for me to work at home*" seeks to address whether individuals view the time they spend commuting as productive or 'wasted' time.

"God yes hate it [commuting]…it's such an incredible waste of time. Behind the wheel of a car when I could be doing something more productive"

Two statements ("*I appreciate the time I have to myself on my way to work*" and "*I appreciate the time I have to myself on my way home from work*") investigate a positive aspect of commuting. It was hypothesised at the time of designing the questionnaire that some individuals may choose not to work at home for more days per week than they currently do because they welcome their commuting time (as discussed earlier with reference to positive utility of travel).

"I do like going to the studio and having 20-30 minutes travel"

One statement, "*If I (could) work at home others in my home (would) find it helpful to have my car on those days*", aims to probe the significance or not of car availability and use in the household. A final travel-related statement considers residential relocation influence: "*Homeworking has/would influence(d) how far I live from my workplace*".

Workplace related statements

Two statements are concerned with motivations/inhibitors associated with the workplace; namely around interruptions and employer support. One statement investigates attitudes towards the avoidance of interruptions - "*Avoiding interruptions from other people at work is a motivation for me to work at home*". Interruptions at work it seems can be both a motivator and constraint to work at home.

"You get more done (at home) than you would at work, you're not physically working (at work) because people are chatting to you"

"It is nice to go into work to speak to other people and communicate, and get the office gossip and interact with everybody else"

A second statement says "*My employer is/would be supportive of me working at home*". As mentioned earlier, various studies have suggested that some workers are more likely to face opposition from management to their requests to work at home (Huws et al, 1990; Mokhtarian et al, 1998).

Household related statements

Three statements look at household related issues. Two statements - "*I (would) work longer hours by working at home*" and "*Working at home can/could conflict with my personal life*" - concern attitudes toward a work-life balance and how homeworking might encroach upon personal time.

"If there's nothing else to do I work. I work longer hours than I ever worked before"

The statement "*Other members of my household (would) appreciate me working at home*" aims to further probe the significance of positive or negative interaction between home and work.

"I think that again there is a new generation of working mums with young children coming through that need that flexibility to fit in their day"

"If she's off school you know the amount of homework that she gets, and if I happen to be working at home the same day she's expecting to do something on the computer – clash"

Two further statements relating to the home are included: "*The cost of travel to/from work is a burden on my household*" and "*Our household has a suitable room to allow me to work at home*".

Attitude towards homeworking

Two statements measure people's desire to H and VST work: "*I would like to work at home (more)*" and "*I would like to have (more) days where I do some work at the workplace and some work at home*". The latter was a new addition to wave three of the survey and is central to the analysis of this paper. It is important to note that, strictly speaking, the first of these statements does not refer explicitly to H working though it is to this statement which later analysis of desire to H work will refer.

The final part of the online survey collected further details concerning respondent characteristics – including age, gender, occupation, level of education and commute distance.

4. Analysis and results

4.1 Summary of behaviour recorded in survey

135 respondents had practiced one or more days of VST working in the reference week (13.3 per cent); the corresponding figure for H working is 73 (7.1 per cent). 39 of these individuals had undertaken both VST and H working at least once during the reference week.

Table 1 shows, as with previous work (Lyons et al, 2006), that W-H is the most practiced VST working pattern – accounting for 157 of the 287 reported days of VST work overall in the reference week. Table 2 indicates number of occasions which individuals were practicing each form of homeworking during the reference week.

Table 1. Frequency of patterns of working day during the reference week

Day Type	Day of reference week						
	Mon	Tue	Wed	Thu	Fri	Mean	Total
W	776	788	785	758	735	768	3842
H	23	32	28	25	35	29	143
H-W	18	12	13	14	7	13	64
W-H	59	32	24	21	21	31	157
H-W-H	14	9	7	16	11	11	57
Other	20	32	30	25	23	26	130
Not working	105	110	128	156	183	136	682
Total	1015	1015	1015	1015	1015	1015	5075

Table 2. Days per week homeworked per individual

	Number of respondents	
Number of days/week	VST	H
1	58	37
2	40	12
3	16	17
4	13	4
5	8	3

To examine whether or not such weekly behaviour captured in the reference week was reflective of week-to-week behaviour, in wave three respondents were asked about their homeworking behaviour in the past month. The results are shown in Table 3. 22 per cent of the sample has done one or more days of VST in the past month, compared to a corresponding figure of 17 per cent for H working. The monthly data suggests a smaller gap between individuals who experience some VST working and those who experience some H working than the reference week would suggest. However, VST is being practiced more frequently per month by more individuals than H working – indeed, when an approximation is made of the total number of VST and H days worked by the sample during the past month, the weekly equivalent is broadly compatible with the actual weekly figures above.

Wave three data indicate that 16.0 per cent of white collar workers VST worked at least once in the reference week, compared to 7.0 per cent of blue collar workers. This compares with 9.2 per cent of white collar workers and 2.3 per cent of blue collar workers who H worked at least once in the reference week. As in wave 1 (Lyons et al, 2006) it is found that a much higher incidence of homeworking amongst blue collar workers is revealed once VST working is included.

Table 3. Frequency of homeworking in the past month

Number of days/month	VST		H	
	n	%	n	%
1-2 days	78	7.7	69	6.8
3-5 days	67	6.6	58	5.7
6-10 days	24	2.4	14	1.4
11-15 days	18	1.8	10	1.0
More than 15 days	41	4.0	19	1.9
None	787	77.5	845	83.3
Total	1015	100	1015	100

In wave one (Lyons et al, 2006) 17 per cent of females in the sample had VST worked in the reference week compared with 12 per cent of males. However, in wave three 11.5 per cent of females have VST worked in the reference week compared with 14.7 per cent of males. This indication of likelihood of males being more likely to homework than females concurs with findings by Hjorthol and Gripsrud (2008). Whether this inter-wave change is a temporal effect or reflective of variation that cannot be captured by a single reference week per survey wave is unclear. It does however highlight the importance and challenge of accounting for behaviour and behaviour change over time.

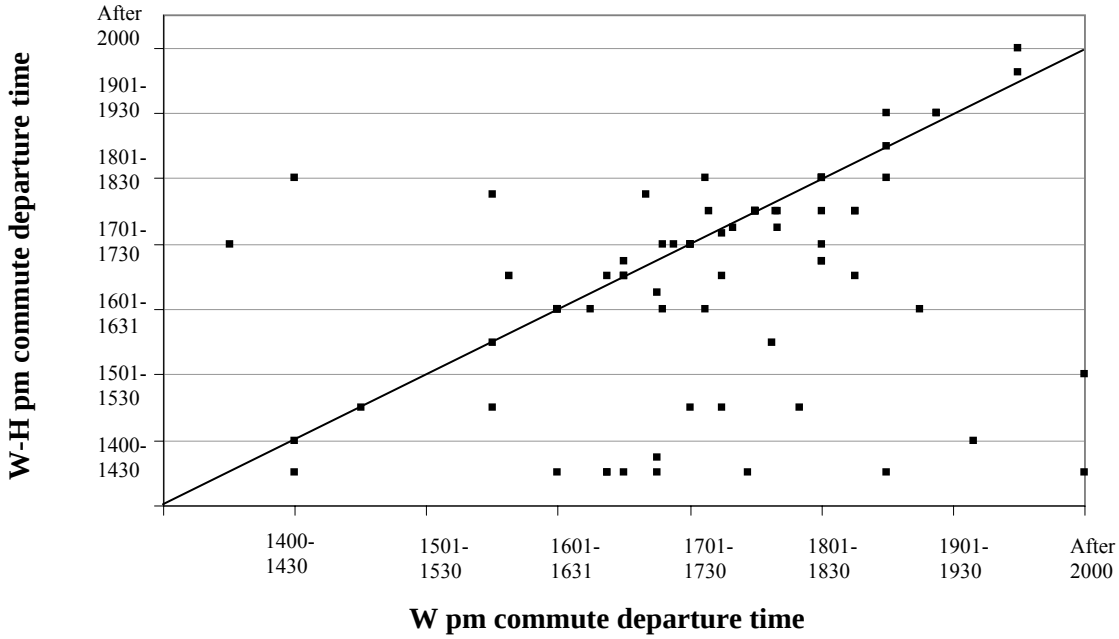

Figure 1. Comparisons, for individuals who have worked one or more VST days in the reference week, of PM commute departure times on W days and W-H days

To provide a best approximation of whether and how commute trips may be displaced in time on VST working days compared to W days, evening commute departures from work to home in the reference week for each individual were averaged for any VST working day(s) and W working day(s). This approximation must be caveated with a recognition that day to day variation in workday duration and departure times may also be occurring. Figure 1 shows the results. These do suggest

that for a proportion of individuals VST is indeed resulting in earlier evening commutes with a notable incidence of 'early' departures between 2pm and 3pm.

4.2 Preliminary analysis - Bivariate correlations

Further to a familiarisation with the working behaviours captured by the survey, the paper now moves to an examination of bivariate correlations concerning the set of statements outlined in section 3. The means, correlations and standard deviations resulting from the bivariate analysis are set out in Table 4.

The desire to VST work (more) has its strongest correlation with wanting to H work (more) ($r = .66$, $p < .001$). This is intriguing given that two key distinctions between VST and H working are whether or not commute trips take place and whether or not one has (face-to-face) social interaction with colleagues in the workplace. These distinctions reflect factors highlighted from the literature as being potentially important determinants of homeworking desire. However, most respondents had not practiced H or VST work in the previous month. It may therefore be that the positive correlation simply reflects a wish to homework (more) regardless of the form that it takes. Descriptive analysis of wave one reference week data (Lyons et al, 2006) and, to a lesser degree with the wave three dataset, suggests that the majority of participants who *had* homeworked in the reference week had either H worked or VST worked but not done both. This points to a possible distinct separation of preference or opportunity at the level of the individual between the two working practices.

In relation to travel-related factors the following can be observed. There is a weak but significant negative correlation between appreciating time to oneself travelling to/from work and desire to H work (more). No correlation exists here for desire to VST work. Travelling to/from work being a struggle has modest positive correlations with desire to H and with desire to VST work (more). Avoiding 'wasted' time in traffic is positively correlated to a greater extent and significant with desire to H work more and to VST work more. Thus it would appear that the features of the commute being considered, while correlating with desire to homework do not do so very strongly – with the exception of avoiding 'wasted' time in traffic. There are strong positive correlations for the two pairs of statements that distinguish between the commute *to* work and the commute home *from* work ($r = .78$, $p < .01$ for the commute being a 'struggle'; $r = 0.76$, $p < 0.01$ for time to oneself during the commute being appreciated).

In terms of workplace factors, avoiding interruptions being a motivation for working at home positively correlates with the desire to work (more) from home itself - for H and for VST. Correlation between employer support for working at home and desire to work at home (more) is very minor. This is not to imply that there is no link between employer support and being *able* to work at home (and actually doing so).

The smallest positive correlation with desire to homework (more) in terms of household-related statements relates to the cost of commuting being a burden on the household. This may reflect in part the modest average commute distance band of 5-10 miles for the response sample. This small correlation aligns with observations above about features of the commute.

Table 4. Summary results of bivariate analysis

Statement	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
[1]I find travelling to work a 'struggle'	2.46	1.20																
2I appreciate the time I have to myself on my way TO WORK	3.27	.99	-.08*															
3If I could) work at home others in my home would) find it helpful to have my car on those days	2.46	1.19	.36**	-.03														
4The cost of travel to/from work is a burden on my household	2.77	1.24	.55**	.02	.26**													
5Our household has a suitable room to allow me to work at home	3.37	1.35	.19**	-.04	.14**	.17**												
6Other members of my household (would) appreciate me working at home	3.15	1.13	.33**	-.04	.37**	.27**	.43**											
7I find travelling home from my workplace a 'struggle'	2.50	1.19	.78**	-.04	.32**	.55**	.17**	.31**										
8I appreciate the time that I have to myself on my way HOME FROM WORK	3.34	1.00	-.09**	.76**	.00	.02	-.04	-.04	-.07*									
9Working at home can/could conflict with my personal life	2.83	1.16	-.06	.09*	.00	-.03	-.25**	-.22**	-.04	.13**								
10Avoiding interruptions from other people at work is a motivation for me to work at home	3.21	1.13	.278**	-.06	.28**	.16**	.43**	.42**	.25**	-.08	-.20**							
11I (would) work longer hours by working at home	2.89	1.17	.32**	.08*	.29**	.23**	.34**	.40**	.34*	.06	-.10	.42**						
12My employer is/would be supportive of me working at home	2.36	1.20	.16**	.12**	.14**	.12**	.21**	.16**	.16*	.07*	-.02	.16**	.22*					
13Avoiding the 'wasted' time in traffic is a motivation for me to work at home	3.40	1.16	.46**	.02	.34**	.46**	.38**	.48**	.49*	-.01	-.11**	.42*	.43**	.22*				
[14]I would like to work at home (more)	3.43	1.19	.34**	-.08*	.25**	.28**	.49**	.57**	.32**	-.10**	-.30**	.55*	.47*	.10**	.50**			
15Homeworking has/would influence(d) how far I live from my workplace	3.11	1.11	.29**	.02	.35**	.29**	.30**	.42**	.25**	.03	-.03	.39**	.32**	.11**	.50**	.44*		
16I would like to have(more) days where I do some work at the workplace and some work at home	3.32	1.14	.27**	-.01	.26**	.24**	.39**	.51**	.26*	.00	-.17*	.52*	.39**	.07	.46**	.66**	.39*	

* Correlation is significant at the .01 level; * * Correlation is significant at the .05 level

Meanwhile, other household-related factors appear somewhat more pronounced in terms of correlation with desire to homework (more). Having a suitable room at home for homeworking, household members appreciating the employee homeworking and working longer hours by working at home all have significant positive correlations with desire to homework (more) for both H and VST working. In all three cases the correlation is stronger for H working than for VST working. It is intuitively sensible that working at home conflicting with one's personal life correlates negatively with desire to homework. This correlation is notably greater for H than for VST. With regard to working longer hours and homeworking it must be recognised that the sample contains mainly people who have (seemingly) not homeworked and thus their response may be assumed to be less well informed than those who have homeworked. When a bivariate analysis is conducted only on data for respondents who did *not* report homeworking (VST or H) in the reference week or past month, the correlation is stronger ($r = .72$) whereas when conducted for individuals who have homeworked on the reference week or past month the correlation is weaker ($r = .5$).

4.3 VST and H desire prediction - regression results

To develop further the preliminary insights from bivariate analysis, regression analyses were undertaken in which desire to H work and desire to VST work were taken as the dependent variables. To allow for control over the demographic variables, two-step hierarchical multiple regressions were performed, where these were entered first; – the second step added the 14 remaining statements. The aim of this analysis is to establish the extent to which statements (as a whole) that offer explanatory power in terms of people's desire to homework (more) are common to H and to VST working. Regression analysis results, in terms of Beta weights and statistical significance, are summarised in Table 5[3].

Desire to VST work (more)

Regression analysis for step one indicates that demographic factors alone explain 4.7 per cent of the variance of wanting to VST work (more) (F (df = 7, 403) 2.85, $p < .005$). In step one, age is the only significant variable ($\beta = -.11$, $p < .05$), with the negative beta weighting indicating that the older a person is the less likely they are to want to VST work. The addition of the set of statements in step two of the regression analysis explains a further 34.4 per cent of the variance – in total 39.1 per cent of the variance in desire to VST work (more) is explained (F (df = 21, 389) = 11.89, $p < .001$).

Age marginally loses its significance in the second step of the regression ($\beta = -.08$, $p = .06$). However, with the inclusion of the statements, gender becomes a more important predictor to wanting to VST work ($\beta = -.09$, $p < .05$), suggesting that males are less attracted to VST working than females. Avoiding interruptions at work ($\beta = .26$, $p < .01$) and other household members appreciating the employee homeworking ($\beta = .23$, $p < .01$) are the strongest predictors of VST desire, followed by avoiding wasted time in traffic being a motivation for homeworking ($\beta = .17$, $p < .01$). Though marginally not significant at the 95 percent confidence level,

[3] As this is part of a longitudinal survey, some respondents have taken part in this survey 1, 2 or 3 times (panel), and some respondents are new to wave 3. As a test of whether this had an influence in the results, a dummy variable coded as 'panel' and 'not panel' was entered into all regression analyses, and was shown not to be significant. Thus from this, it is concluded that being a member of the 'panel' is not a biasing factor in the results.

appreciation of the commute home from work could be considered as an important predictor to the model (β = .13, p = .06). (Appreciation of either commute did not show any significance at the bivariate level.) Working longer hours if homeworking and having a suitable room both had significant yet modest correlations (r = 0.39) in the bivariate analysis but did not emerge as significant in the regression analysis.

Table 5. Summary of hierarchical regression analysis of study variables and desire to VST and H

	VST			*H*		
Variable	Beta	*t*-score	*p*-value	Beta	*t*-score	*p*-value
Step 1						
Age	-.11	-2.11	.04	-.03	-.58	.59
Gender (male)	-.08	-1.60	.11	-.06	-1.23	.22
Occupation (white collar)	.09	1.54	.12	.15	2.59	.01
Household yearly income	-.06	-1.00	.32	-.03	-.47	.64
Highest level of education completed	.11	1.90	.06	.08	1.38	.17
Parent of dependent children	.05	1.02	.31	.09	1.73	.09
Distance of one-way commute from home to workplace	.02	.35	.73	-.01	-.10	.92
Step 2						
Age	-.08	-1.91	.06	.01	.12	.91
Gender (male)	-.09	-2.14	.03	-.05	-1.32	.19
Occupation (white collar)	.02	.48	.63	.06	1.55	.12
Household yearly income	-.04	-.78	.44	.00	.02	.98
Level of education completed	.06	1.30	.20	-.01	-.13	.90
Parent of dependent children	-.01	-.22	.83	.01	.40	.69
Distance of one-way commute from home to workplace	.00	.03	.98	-.08	-1.96	.05
I find travelling to work a 'struggle'	-.02	-.11	.91	-.02	-.29	.77
I appreciate the time I have to myself on my way TO WORK	-.07	-1.08	.28	-.02	-.39	.70
I find travelling home from my workplace a 'struggle'	-.01	-.08	.94	.03	.59	.56
I appreciate the time that I have to myself on my way HOME FROM WORK	.13	1.90	.06	-.02	-.43	.67
Our household has a suitable room to allow me to work at home	.07	1.31	.19	.24	5.63	.00
Other members of my household (would) appreciate me working at home	.23	4.49	.00	.18	4.01	.00
Avoiding interruptions from other people at work is a motivation for me to work at home	.26	5.39	.00	.19	4.58	.00
I (would) work longer hours by working at home	.09	1.83	.07	.11	2.68	.01
My employer is/would be supportive of me working at home	-.08	-1.73	.09	-.06	-1.49	.14
Avoiding the 'wasted' time in traffic is a motivation for me to work at home	.17	3.16	.00	.11	2.41	.02
Homeworking has/would influence(d) how far I live from my workplace	.04	.73	.47	.09	2.19	.03
Working at home can/could conflict with my personal life	-.04	-1.01	.31	-.12	-3.28	.01
The cost of travel to/from work is a burden on my household	.01	.13	.89	.12	2.71	.01
If I (could) work at home others in my home (would) find it helpful to have my car on those days	-.08	-1.71	.09	-.05	-1.16	.25

Desire to H work (more)

Regression analysis for step one indicates that demographic factors alone explain 4.7 per cent of the variance of wanting to H work (more) (F (df = 7, 405) = 2.83, $p < .001$). At the 95 per cent confidence level, occupation (white or blue collar) is the only significant variable ($\beta = .15$, $p < .05$), with white collar workers more attracted to VST working than blue collar workers. The addition of the set of statements in step two of the regression analysis explained a further 49.9 per cent of the variance – in total 54.6 per cent of the variance in desire to H work (more) is explained ($F = (21, 391) = 22.36$, $p < .001$).

Having a suitable room to work at home is the strongest predictor of desire to H work (more) ($\beta = .24$, $p < .01$). This is followed by avoiding interruptions at work ($\beta = .19$, $p < .01$), avoiding wasted time in traffic ($\beta = .11$, $p < .05$) and other household members appreciating the employee homeworking ($\beta = .18$, $p < .01$). Further significant explanatory variables are working at home causing conflict ($\beta = -.12$, $p < .01$), the cost of the commute as a burden ($\beta = .12$, $p < .05$), working longer hours ($\beta = .11$, $p < .05$) and influence of homeworking on distance to workplace ($\beta = .09$, $p < .05$).

Discussion

Having a suitable room at home to allow homeworking appears particularly important for the desire to H work and yet not a significant consideration in the desire to VST work. In relation to H work this may appear intuitively sensible and yet it may suggest that the distinction between desire and opportunity may be blurred or that individuals' desire is shaped by opportunity – i.e. if one does not believe a suitable room is available then it is not considered desirable to try and work at home (as distinct from one not believing a suitable room is available but desiring to homework (should this be resolved) nonetheless). For VST working the apparent lack of importance of room availability is intriguing. If all VST working were comprised of 30 minute intervals only per day of homeworking then it could be argued that room importance would be diminished compared to a whole day at home. However, since many VST workers work for longer intervals it seems somewhat surprising that room availability offers no significant explanatory power for the desire to VST work (more). This may be partly explained by the high proportion of respondents for whom the prospect of VST working will be new and untested and for which an informed view on the importance or not of room availability may be limited.

Three statements seem of common importance to explaining both the desire to VST and to H work (more): avoiding interruptions at work, avoiding wasted time in traffic and other household members appreciating the employee homeworking.

It can be noted from above that appreciating the time to oneself on the way home *from* work is more important in terms of desire to VST work than H work (more). It is tentatively suggested that this may relate to earlier findings (Lyons et al, 2006; Lyons and Haddad, 2008): the most popular form of VST working in practice is W-H working (suggesting an earlier than 'normal' departure time from work); people appear to consider the commute home on such a VST day as a positive experience – a transition time and a time to restore, rejuvenate and refocus.

Homeworking influencing where people live was not significant for wanting to VST work, though was for H working. This is intuitively sensible in so far as H working reduces the overall vehicle miles travelled for commuting providing something against which to offset a longer commute distance between home and the

workplace. There is no reduction in vehicle miles travelled on VST working days (unless routes to work change as a result of different trip timings and patterns of traffic and congestion). Likewise, cost of commuting being a burden to the household was only significant in relation to desire to H work but not to VST work (more).

Other people finding having the car useful was not a significant predictor for either VST or H working desire. This supports findings of others in the literature that early concerns surrounding a possible third party generation of new car trips by other household members when an employee is homeworking may not be founded – especially in a society in which household car ownership has, overall, continued to increase.

For both VST and H working, demographics seem to provide little explanatory power regarding desire to VST or to H work. Women are more likely to want to VST work than men, but this was only notable when the statements had been taken into account. White collar workers are more attracted to H working than blue collar workers, and this also applies to VST working. The importance of occupation category appears to lose its significant when statements are accounted for. It is notable that being a parent has not emerged as a significant predictor in wanting to VST or H work (more). This said, those in the sample with dependent children were more likely to agree with the statement "*other members of my household (would) appreciate me working at home*" than those without. Thus the multivariate results must be treated with some caution.

Considering the step two regression analysis results overall it is notable that more of the statements used in the survey are significant in relation to desire to H work (more) than is the case for desire to VST work (more) with more overall variance in the former being explained than in the latter based on these statements. This may suggest at least two important points. Firstly, that while there is common ground between these two forms of homeworking in terms of factors determining desire (attested to earlier also by the strong positive correlation of significance between desires for the two) there appear to be other factors as yet to be identified which may contribute to a better appreciation that the role VST working may (be perceived to) play in people's lives. Secondly (or indeed by way of an alternative explanation) many people may, as yet, have less well-formed perceptions and attitudes towards the concept of VST working as opposed to H working which has, accordingly, affected, in ways undetected, their indication of desire to VST work.

4.4 VST and H frequency prediction - regression results

To help gain a better understanding of what aspects of personal characteristics and circumstance are important in VST and H behaviour, regressions were carried out on those people who did such VST and H work in the reference week.

A number of different hierarchical regression analyses were undertaken. Applying square root transformations to better distribute the figures to the frequency scores and using the full set of independent variables produced very weak model results. It was therefore important to reduce the number of variables entered into each of the equations. Initially, the Cronbach's alpha scores categories as described in the method section yielded low reliability scores. Further, Principal Components Analysis was carried out, though the results from this were not used because the variance explained was low and interpretation of the solutions appeared ambiguous. Therefore it was decided to examine the variables manually. The decision to retain and exclude the selected variables was made based on knowledge from previous

analysis within this paper. The conscious decision to avoid 'grouping' variables in this instance further allowed the study of particular variables to be examined.

The final regression analyses chosen have their results shown in Table 6. Regression analysis for step one indicates that respondent characteristics alone explain 4.8 percent of the variance in frequency of VST working in the reference week ($F(4, 130) = 1.62$, $p = .17$). When the set of reduced statements are entered in the second step, explained variance is increased by 10.3 per cent to 15 per cent of the variance in frequency of VST working in the reference week explained ($F = (11, 123)$ 1.98, $p < .05$). The only significant variable in the regression is appreciation of time to oneself on the way home from work ($\beta = .23$, $p < .01$).

Table 6. Summary of regression analysis of reduced study variables and VST and H reference week frequency

	VST			*H*		
Variable	Beta	*t*-score	*p*-value	Beta	*t*-score	*p*-value
Step 1						
Age	.16	1.77	.08	.02	.15	.88
Gender (male)	-.01	-.17	.91	.20	1.50	.14
Occupation (white collar)	-.09	-1.00	.32	-.01	-.10	.92
Distance of one-way commute from home to workplace	-.10	-1.14	.26	-.16	-1.19	.24
Step 2						
Age	.17	1.77	.08	-.03	-.20	.84
Gender (male)	-.01	-.07	.94	.14	1.12	.27
Occupation (white collar)	-.08	-.93	.36	-.25	-1.10	.06
Distance of one-way commute from home to workplace	-.09	-1.03	.31	-.16	-1.31	.20
Avoiding interruptions from other people at work is a motivation for me to work at home	.14	1.48	.14	-.28	-1.77	.08
My employer is/would be supportive of me working at home	-.04	-.43	.67	.57	3.95	.00
Avoiding the 'wasted' time in traffic is a motivation for me to work at home	-.15	-1.43	.15	.42	2.52	.01
The cost of travel to/from work is a burden on my household	-.04	-.43	.67	-.09	-.66	.52
Other members of my household (would) appreciate me working at home	-.12	-1.17	.25	-.14	-.81	.42
I appreciate the time that I have to myself on my way HOME FROM WORK	.30	3.34	.00	-.16	-1.22	.23
Our household has a suitable room to allow me to work at home	.04	.40	.69	-.02	-.12	.90

In terms of frequency of H working in the reference week, step one takes the same respondent characteristics as above which explain 7 per cent of the variance ($F = (4, 54)$ .99, $p = .42$). Step two explains a further 32.8 per cent to the variance – in total 39.6 per cent of the variance in frequency of H working in the reference week is explained ($F(11, 47) = 2.8$, $p < .05$). The only significant variables are employer support of homeworking and avoiding wasted time in traffic as a motivation to homework. Employer support has the largest beta-weighting ($\beta = .57$, $p < .001$) with avoiding wasted time in traffic as a motivation for working at home having a ($\beta = .42$ ($p < 0.05$).

Discussion

What is clear from this exploratory analysis is that of the available factors in the response data, those offering most explanatory behaviour concerning homeworking frequency are different between H and VST working.

For both VST and H working, the regression models of behavioural desire have performed better than those of current (or strictly speaking 'past') behaviour. This said, much more of the variance in H working frequency is explained that than in VST working frequency. It should be noted that survey respondents are full-time paid employees who have a conventional workplace. Thus in nearly all cases homeworking is an occasional practice for the individuals. It can be suggested that as such, behaviour in terms of homeworking may not follow a regular and repeatable pattern week by week or even month by month. The pattern of homeworking may fluctuate throughout the year according to home and work spatio-temporal constraints as well as fluctuations in the specific set of work tasks. Thus it may be inherently easier to predict behavioural desire than to predict behaviour itself.

For the VST analysis, the results again suggest however that VST working behaviour (as with desired behaviour) is linked to an individual's appreciation of the time they have to themselves on the way home from work. Considered alongside the fact that the majority of VST work is the form of working at work and then at home, it does suggest that people are achieving more than getting to their destination (home) in undertaking the commute with an indication of positive utility of travel.

Employer support is not a significant predictor with desire to VST and H work, but it is notably important when looking at frequency of H working while having an absence of significance for frequency of VST working behaviour. On a VST day an employee will still have been present at the workplace and perhaps it is this presence that is importance in according with a workplace culture. At the same time by having been present in the workplace it may be that accompanying working from home is less readily identified as 'teleworking' and as such is also treated as a more informal flexible practice.

5. Conclusions

In this paper we have revisited past literature on factors associated with people's attitudes towards and the consequences of homeworking. Having introduced the concept of part-day (VST) homeworking, the paper has then proceeded to examine how part-day and full-day (H) homeworking compare for a sample of full-time paid employees. The comparison has first been in turn of examining actual behaviour which reveals (as in earlier reported work by the authors) a higher incidence of VST working compared to H working both in terms of number of individuals and number of days practiced. Evidence has been presented to suggest that there is indeed some displacement of the commute on VST working days. This centres upon earlier departure on the commute home from work associated with the most common form of VST – namely working in the 'workplace' followed by working at home (W-H). Following on from this the paper has sought to examine factors which contribute to explaining the desire to homeworking and to predicting the frequency of homework amongst individuals who practiced homework during a reference week. This analysis has compared VST and H working.

Within the paper a number of caveats and considerations associated with the data and analysis have been highlighted. These include a distinction between individuals who were responding to survey statements based on experience of homeworking and those who were not. The number of statements included in the

survey was limited due to space – this has restricted the opportunity to based examination of factors on more than one statement. Some comparison between wave one and wave three results suggests some inter-wave variations that may be explained by the inability of a reference week 'snapshot' to capture the richness of people's work pattern variations. It must also be acknowledged that the wording of some of the statements themselves might, with the benefit of hindsight, have avoided direct reference to homeworking (which may have caused some peculiarities in how statements were responded to in relation to the response to the statements themselves about homeworking desire.

Notwithstanding such issues, the paper has revealed a number of observations in relation to how VST and H working compare. For both forms of working practice, the factors considered are better able to explain desire to homework than current (past) frequency of homeworking. This is perhaps not surprising given the variability of work patterns at the level of the individual that can occur from week to week (or even from month to month) making it difficult for reference week data to align with explanatory variables. Meanwhile desire can be considered more 'stable' and thus more determinable.

In terms of key factors that explain desire to homework the following can be said. For VST working, avoiding interruptions at work and other household members appreciating the employee homeworking are the strongest predictors of desire followed by avoiding wasted time in traffic being a motivation for homeworking. Meanwhile having a single room to work at home is the strongest predictor of desire to H work (more), then followed by avoiding interruptions at work, avoiding wasted time in traffic and other household members appreciating the employee VST working. Thus in three key respects, factors governing desire to homework (more) appear common to VST working and to H working. There are some indications that the commute experience itself has a more subtle part to play for VST working with significance to the time one has on the way home from work in also helping to explain desire. Broadly speaking, however, it seems that work environment is more important than household and commute factors. At the same time it can be said that all three factors emerge as important explanatory factors.

This similarity between VST and H may suggest that both are able to meet similar needs and aspirations for individuals. However, it would appear that other factors are at work in explaining desire to VST work. The set of factors considered was able to explain more of the variance in desire to H work than in the desire to VST work and more factors were significant for the former. Recent qualitative research by the authors has revealed that VST working can be more impulsive or ad-hoc in nature compared to H working. This in itself may partly explain the above.

Overall, we can conclude that while there are common factors of appeal and limitation to different forms of homeworking practice it must nevertheless be recognised that different forms of homeworking practice do exist. To an extent this paper has been based upon insights from prior research into H working. It is important for further consideration to be given to other factors that may prove more significant to explaining VST working desire.

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