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The Telework Productivity Puzzle in Japan

Georg D. Blind¹, David Chiavacci¹, Masahiro Kotosaka², and Stefania Lottanti von Mandach¹

¹ The University of Zurich, Switzerland; ²Keio University, Japan

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Keywords: telework, preference matching, cognitive dissonance, IT literacy acquisition

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Georg D. Blind¹, David Chiavacci¹, Masahiro Kotosaka², and Stefania Lottanti von Mandach¹

¹ University of Duisburg-Essen, Germany, ² The University of Zurich, Switzerland; ³Keio University, Japan

Abstract [209 words]

We conceive the Covid-19 pandemic as a natural experiment for the mandatory introduction of telework. Unlike earlier research on telework, we thus avoid a common self-selection bias by controlling for agents' preferences (for and against telework). In an n = 1500 survey conducted in December 2020 we inquired working arrangements, their being mandatory or voluntary, as well as agent preferences at three points in time: right before the pandemic (Jan 2020), at its outset (March 2020), and six months into pandemic life (Dec 20).

Productivity levels initially did not differ significantly for individuals newly into telework after correcting for age, gender, marital status, breadwinner and management roles, childcare gap, area, job type and general health conscience, but were negatively impacted by a preference mismatch (around -3pp) and a cognitive dissonance (not going by one's preference in spite of having a chance to do so; adding another -5pp). By December 2020, new teleworkers showed a significant productivity differential (around 5pp) even offsetting the mismatch impact. Similarly, stress levels initially did not differ for individuals newly into telework using largely the same controls as before. By December 2020 stress levels for individuals newly into fully remote telework were significantly lower than for the control group of individuals with unchanged working arrangements.

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1. Introduction

Covid-19 has bestowed researchers with the extraordinary epistemological opportunity to study the effects of telework not as a result of individual preferences, but as a result of a non-discriminating external shock. Unlike earlier studies, the widespread introduction of mandatory and voluntary telework schemes allows to consistently track the effects of a switch to telework while by controlling for agent's preferences.

Scientific interest in telework¹ has been substantial long before the COVID-19 pandemic and is mirrored in the vast amount of scholarly work on the topic (see for example the literature reviews by Bailey and Kurland 2002, Messenger and Gschwind 2016, or, Athanasiadou and Theriou 2021). However, almost all pre-COVID-19 research on human aspects and outcomes of telework comes with a substantial bias, stemming from the fact that telework was largely a voluntary employee benefit rather than a mandatory working arrangement.

In Japan research on telework started in the 1980s, which led to the foundation of the Japan Telework Society (Nihon Telewāku Shakai). Despite early academic and business interest in remote work, Japan has displayed chronically low ratios of telework.² The onset of the COVID-19 pandemic in early 2020 made many firms in Japan introduce both mandatory and voluntary telework schemes. By March the 2020 telework utilization rate was reported to have increased from 6% to 10%, which represents a relative increase of a staggering 66% in just two (!) months.³

Part of the reason for Japan's formerly low utilization of telework can be found in the so-called "Japanese management system" (Keys and Miller 1984, Waldenberger 2017), which is a set of practices that can predominantly be found in large firms; at the same time, these features represent an informal institution that small and medium firms aspire to realize as well. Although parts of the Japanese economy are tightly integrated in the global economy, most Japanese firms

¹ We define telework as work by persons with an affiliation to an employer in a remote work location while making use of ICTs (see Athanasiadou and Theriou, 2021). We use "remote work", "work from home" and similar terms interchangeably.

² Prior to the COVID-19-pandemic, 85% of firms and establishments in the US had introduced telework, 38% in the UK, and 22% in Germany (MIAC 2016). Japan, however, had the lowest use of telework among developed countries figuring at a mere 6%, as a survey done by Keio University and Nippon Institute for Research Advancement (NIRA) has found.

³ <https://voxeu.org/article/COVID-19-and-teleworking-japan>

have retained some or all of these distinctively Japanese practices since the 1960's. Crucial within this context are an emphasis on, and the necessity of physical presence and interaction among stakeholders (employees, clients, business partners), such as in product development (Griffin and Hauser 1992, Imai et al. 1984), production (Ngin and Chong 1997), or knowledge creation and transfer (Bennett 2001, Nonaka and Takeuchi 2007). Significantly, Japanese firms are characterized by a relative higher frequency of formal and informal meetings and communication. Moreover, relationships between co-workers have been described as “sticky”, i.e., communication is not limited to business topics (Chiavacci and Lottanti 1999, Blind, Chiavacci and Lottanti von Mandach 2020). Physical presence and long office hours are also taken as a proxy for commitment and are expected from regular employees (Ono 2018); for women this represents an informal hurdle for combining work and family.

Our research inquires the effects of the introduction of telework on employee productivity and stress level. Given the differences in individual employee preferences and backgrounds, the same “treatment” is expected to yield very different results. As preparation for future pandemics, however, such information is crucially needed to define a targeted, employee-centred approach when designing measures for maintaining firm operations.

Methodologically, we adopted an explorative mixed methods design with a data collection process separated into three phases: qualitative interviews in August 2020 informed the development of a n=1500 survey conducted in December 2020. Results were then triangulated in a second round of qualitative interviews in spring 2022.

Our manuscript is structured as follows. Section 2 reviews the literature on telework in general and on telework in Japan in particular. Section 3 develops hypothesis and provides pertinent description of our survey and sample. Section 4 presents results, further discussed in section 5. Section 6 concludes.

2. State of research on telework

With COVID-19 implying an external shock to working arrangements, our exploratory study benefits from an absence of selection effects that have troubled most of the earlier research in the field (see also Bloom, Liang, Roberts, and Ying 2015). It may thus serve to re-appreciate

the past two decades of research on tele- and distributed working arrangements (for reviews, see for example Bailey and Kurland 2002; Blount 2015).

Research on telework in Japan – including most recent contributions – has focused mainly on explaining the reasons behind the country’s comparatively low adoption rate (see Higa et al. 1996, Higa and Wijayanayake 1998, Ono 2018, Sato 2019, Ono 2022) and are either based on samples with a self-selection bias, almost naturally so before the pandemic (see Henmi 2015, Kazekami 2020,), or – surprisingly - not capitalizing on the opportunity to distinguish between mandatory vs. voluntary telework arrangements since the pandemic (see Okubo, Inoue and Sekijima 2020, Hosoda 2021; Ishiii, Morikawa 2021, Nakayama and Urakawa, Niu et al. 2021).

Among the few studies distinguishing between voluntary and mandatory telework we find Magnier-Watanabe et al. (2022). By means of an online survey of 400 married couples in the Greater Tokyo area they retrospectively assess changes in work style, satisfaction and preference for teleworking and its effect on job performance and potential work–family conflicts. However, they treat the preference for telework as an outcome variable, i.e., the desire to continue to telework beyond the pandemic was a result of their experiences with telework. We hold, however, that the preference, in our case for or against telework, should be treated, and understood as an independent variable as in other organizational research.⁴ Does a negative preference for telework significantly impact productivity and satisfaction? Only in a second step (and in a separate manuscript), we may ask: Do preferences change through the actual telework experience?

Our study contributes a Japanese perspective to international research on whether telework reduces employee productivity (Golden and Eddleston, 2017; Lautsch et al., 2009), facilitates the inclusion of certain groups, such as married people with little children, especially women, into the labor force (Chung and van der Horst, 2018), increases employees’ job satisfaction (Müller and Niessen, 2019, Morganson et al., 2010; Virick et al., 2010), as well as its impact on the work-life balance (Chung and van der Horst (2018), on social isolation (Illegems and Verbeke, 2004).

⁴ For instance, Dutta and Rangnekar (2022) inquire how a preference for teamwork improves employees’ attitude toward sharing organizational knowledge.

3. Hypotheses and survey design

Any change in organizational setup is commonly associated at least with a temporary negative impact on productivity. Taking this perspective to the individual level, a sudden change from work in physical presence to a telework arrangement much resembles a new job assignment. At the same time new job assignments are initially associated with higher levels of stress. This suggests:

Hypothesis 1: New teleworkers initially display higher levels of stress and lower productivity than individuals with no change in working arrangement.

From a scientific and a practitioner's perspective, two groups of teleworkers are of special interest: (a) Individuals who always wanted to do telework but were not given an opportunity to do so (from a preference mismatch to a preference match), and (b), those who never wanted, but were "forced" to do telework (from a preference match to a preference mismatch). The question of interest here with regards to both groups is: How does a transition from preference match to preference mismatch (and vice versa) impact productivity, stress levels and satisfaction of these individuals? With regards to this question we hold that as the perceived threat of a COVID-19 infection becomes smaller, forcing employees (regardless of firm type they are working in) with an original preference against telework might negatively impact productivity and employee satisfaction. This leads us to:

Hypothesis 2: Employees with a negative preference for telework display higher stress, and less productivity if telework is mandatory.

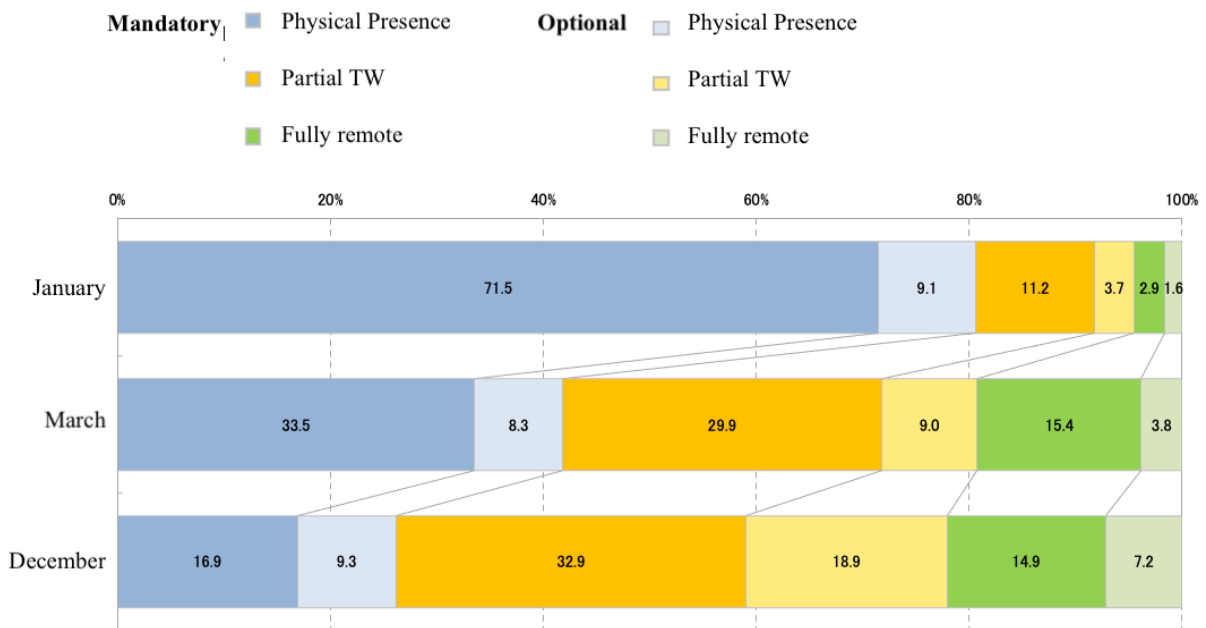
As agent learning kicks in, productivity may be expected to increase, and stress levels are expected to decline. This suggests:

Hypothesis 3: Over time, new teleworkers increase their relative productivity, and experience a decline in stress levels.

To test our hypotheses, we build on n = 1500 randomized online survey among full-time employees in Japan conducted in December 2020. The survey constructs a retro-active panel for three points in time: January, March, and December 2020. It thus covers the transition from before the pandemic, during its onset, and eight months into its course. The main variables of

interest in this research were the working arrangements of respondents, and their reported levels of stress and productivity. Figure 1 provides an overview of the changes in the sample for the three points in time.

Fig. 1: Working arrangements of respondents by January, March and December 2020



We also added an indirect measure for productivity to minimize subjective biases. In concrete terms, we inquired working hours, workload and share cleared thereof, and did so in separate items dispersed across the questionnaire. This allowed to compute productivity differentials relative to January 2020 for March and December 2020. The level of stress was measured on a 6 point scale in order to avoid a centrality bias.

Appended Table A provides the sample composition by area, age, and type of occupation. In addition, we found 44% of respondents were holding a lower to upper management position. Female respondents were set at 50% to allow appropriate inferences about gender differences. We also inquired cohabitation status with a spouse/partner resulting in 37% single households, 58% couple households with the remaining 5% subject to a qualitative change during the observation period. 53% of respondent did not report having children. Within the remaining respondents with one or more children all but 7pp had their children co-residing with them. The ratio of respondents identifying as breadwinners was 62.5%.

Further details can be found in a separate research report (Blind, Chiavacci, Kotosaka and Lottanti von Mandach 2022).

Adding to our survey, we further explored findings through semi-structured interviews with employees (n=30) in established Japanese, Japanese startup firms and foreign subsidiaries in Japan (10 each); further selection criteria were a minimum of 30% female employees and some 20% (male or female) with a management role. The interviews were conducted online during February and March 2022. Interviews were conducted in Japanese and lasted for approximately 30 minutes.

4. Quantitative Results

We run separate regressions for productivity and levels of stress reported for the data pertaining to March and December 2020, respectively. As “new teleworkers” we define all respondents that reported having worked in physical presence by January 2020. We further distinguish partial from fully remote teleworking arrangements to account for substantially differing implications on the individuals concerned. Both groups are dummy-coded and contrast to respondents with no change in working arrangement. As further variables of interest we add a preference mismatch dummy (for respondents working in an arrangement that does not correspond to their preference), a cognitive dissonance dummy (for the subgroup of respondents that could have, but did not choose by their preference),

Besides pertinent controls such as area, job type, gender, we add cohabitation status to account for differences in social exchanges at the home turned workplace. A breadwinner dummy corrects for the “responsibility burden” (stress) and for “preferential treatment” by dependents (productivity). In a similar vein, a management dummy corrects for differential complexity when managing changes in working arrangements. As schools were being shut down due to a government lockdown in March, we also include a variable “childcare gap” that measures the number of weekly hours during which childcare would be desired, but was unavailable. We also correct for respondents’ general health conscience measured on a 6-point scale and framed by inquiring the degree to which respondents would be happy about the development of a drug that may cure all types of cancer. Finally, we adjust for pre-existing stress levels. Tab. 1 and 2 present estimation output.

Tab. 1: Productivity levels March vs. December 2020 (relative to January 2020)

	March		December	
	Estimate	T	Estimate	T
Intercept	0.368	4.184	0.508	5.394
New Teleworker (Partial)	-0.012	-0.703	0.049	2.713
New Teleworker (Fully remote)	-0.009	-0.358	0.048	1.887
Preference mismatch	-0.030	-1.844	-0.057	-3.039
Cognitive dissonance	-0.051	-1.906	0.016	0.630
Age	0.004	4.882	0.002	2.735
Female	0.011	0.534	0.029	1.378
Single	0.073	1.998	0.087	2.260
Management	-0.041	-2.480	-0.027	-1.547
Breadwinner	0.065	1.704	0.093	2.291
Childcare gap	-0.001	-1.750	-0.001	-1.741
<i>Further controls</i>				
Health conscience	0.027	4.663	0.022	3.465
Area		Yes		Yes
Job type		Yes		Yes

Notes: Bold font indicates significance of 90% or above.

Tab. 2: Stress levels March vs. December 2020

	March		December	
	Estimate	T	Estimate	T
Intercept	0.692	2.341	0.960	2.756
New Teleworker (Partial)	0.070	1.169	-0.001	-0.020
New Teleworker (Fully remote)	-0.026	-0.301	-0.255	-2.692
Preference mismatch	0.051	0.960	0.246	3.915
Age	0.006	2.113	-0.000	-0.201
Female	-0.012	-0.182	0.024	0.302
Single	0.021	0.247	0.214	2.159
Management	0.072	1.277	-0.087	-1.310
Breadwinner	-0.127	-1.331	0.233	2.072
Childcare gap	0.009	3.694	0.000	0.096
<i>Further controls</i>				
Health conscience	0.068	3.365	0.006	0.233
Stress _{t-1}	0.615	31.930	0.527	22.537
Area		Yes		Yes
Job type		Yes		Yes

Notes: Bold font indicates significance of 90% or above.

Most strikingly, we must reject our hypothesis 1 of lower productivity and higher levels of stress upon the sudden introduction of teleworking arrangements in March 2020. Estimates were not significant for either group of teleworkers at that point in time. By December 2020, productivity was significantly up in both sub-groups relative to those working in continuing arrangements of physical presence. Moreover, stress levels of new fully remote teleworkers were significantly lower than the reference group by December 2020. Results thus turned out contrary to our expectations.

In contrast, evidence supports our second hypothesis with a preference mismatch implying a 5pp loss of productivity and a significant contribution to stress levels in fully remote teleworkers by December 2020. Interestingly though, the negative effects on productivity only became significant about 8 month into the arrangements, which suggests that respondents were understanding of the external shock nature of the March 2020 events. In a similar vein, the preference mismatch in partial teleworkers did no impact significantly on stress levels as their preference match was not a complete one (either preference being partially met).

We equally found supporting evidence for our third hypothesis with productivity increasing and stress levels declining during the eight months from March through December 2020. The effects were not only visible in the main variables of interest, but also in the estimates for a few learning-related controls. In concrete terms, age significantly contributed to stress levels in March (signaling a more challenging situation for the less tech-savvy generations), but no more so after eight months into the new arrangements. In a similar vein, respondents with a management role showed significant decline in productivity of about 4pp in March, but the gap become insignificant by December. While technically not significant, estimates of their stress levels show a sign change from positive to negative for the two points in time.

Interacting the dummies for new teleworkers with the gender flag, we also found limited evidence of more pronounced effects for women, particularly during the early stages of the pandemic (March 2020). In contrast to these positive findings on women, we gathered rather troubling results for single individuals. While they started well off early into the pandemic with no significant increase in stress levels and a significant relative over-performance of 7pp in March 2020, by December 2020 they had lost their positive productivity differential and started reporting significant increases in stress levels.

To further triangulate our findings, we conducted qualitative interviews with n=30 respondents to whom we presented the findings from our quantitative analysis and asked for their view or explanation: On average, individuals in Corona-triggered telework arrangements turned out to

be more productive (1) and subject to lower levels of stress (3) than those continuing to commute. By late 2020, new teleworkers - including those that did so involuntarily - were back to pre-pandemic (lower) stress levels, but this does not apply to continuing commuters; their stress levels remained high (2). Productivity of new teleworkers was higher in women and single individuals (4). By December 2020, stress levels became significantly equally higher in single individuals relative to (5).

Productivity

The absence of commuting – very frequently referred to as “commuting hell” by our respondents – was mentioned by respondents of both sexes as the most important factor behind the increased productivity across all types of firms, regardless of whether the respondents had preferred telework or not. Commuting not only consumes a substantial amount of time, but was described as extremely tiring, mentally and physically. Respondents reported that by the time they arrived at their office, they already felt exhausted. The lack of commuting frees up considerable time and energy and allows the employees to gain an extra hour of sleep.

A second factor mentioned by respondent of all types of firms is the elimination of time-consuming and tiring social relationships at work. By not having to cultivate interpersonal relationships at the office, interview partners responded that they could concentrate better, use their time more efficiently (no sitting around in their offices just to please superiors) and that there was less workplace distraction in general, especially no need to pay close attention to their colleagues.

Stress levels

The fact that respondents in fully remote working arrangements reported lower stress levels by late 2020 compared to those who continued to commute was explained by respondents from all three types of firms with the commute stress relief and the reduced threat of getting infected once employees had gotten used to telework. Spending more time with the family, more “me-time”, less interpersonal interaction, and more time for exercising added to stress reduction. Continuing commuters, however, were not only cut off from these advantages, but were exposed to a constant health risk of an. Respondents from established Japanese firms reported that commuters had to “hold the fort” at the office and cover for those employees working from home, as the absence of teleworkers created difficulties in daily operations.

Higher productivity in women

The higher productivity in women did not come as a surprise to the majority of respondents. Marginal utility from telework is assumed to be greater for women than for men due to the fact or the reality that in Japan, the majority of household chores and caretaking of children is still borne by women. To combine work, family and housework is easier when working from home. Women can take care of older children by simply being at home. They are closer to kindergarten or school to pick up smaller children. Household chores like washing and hanging up clothes can be done during short breaks. During the early days of the pandemic a fully remote working arrangement substantially helped to compensate for the stress related to school closures.

Higher productivity in singles

While productivity in women was higher because they could multitask, the higher productivity in singles, regardless of sex, was explained with the absence of disturbance and distraction. Singles can fully concentrate on work in a quiet working environment with less distractions than at work and less social obligations, i.e. going out for an after work-drink or paying attention to their superiors and colleagues (“less kizukai”).

Higher stress levels for single individuals

Singles in telework arrangements have the least distractions at home and thus can or are expected to fully concentrate on their work. There seems to be, however, a substantial downside to a fulltime telework arrangement for singles: loneliness. While social interactions can be cumbersome and a reduction thereof is often felt as a relief, too few interactions, too much time spent alone with no occasion to exchange a few words during coffee breaks results in social isolation, which can become a major source of stress. Picking up the phone just to exchange a few pleasantries is not an option, according to the respondents. The feeling of isolation was further aggravated during the pandemic because social contacts and places for meeting people outside the firm were also substantially reduced.

Furthermore, precisely because singles could work in a quiet environment when at home and were not distracted by other family members, especially children, expectations and workload placed on singles might have been higher compared to other groups of employees. This might have placed additional stress on singles in telework arrangements.

5. Discussion

The reluctance of employers to impose telework arrangements on employees against their preferences is obvious and comprehensible. To our surprise, in our study we witnessed a strong shift toward a preference for telework even in individuals who originally had preferred working in physical presence. Between Jan and March 2020, some 45% of individuals originally preferring to work in physical presence changed their views and stated to prefer to telework by March 2020. 84% of these early “convertites” kept their views until December 2020. Moreover, another 20% of individuals originally preferring to work in physical presence happened to have changed their views between March and December 2020, bringing the total “conversion” rate to 65%. In the same timeframe, about one in six “convertites” returned to their original views, far less than the further 20% of new “convertites”. Furthermore, by December 2020, as much as 87% of the “convertites” had a chance to benefit from teleworking arrangements.

As we understood from our series of qualitative interviews, this positive assessment may partly be attributable to the fear of getting infected while commuting. These fears might have outweighed the reservations against telework, especially at a time when vaccination was not yet available (Dec 2020). Others clearly stated that they changed their minds once they were actually working in telework arrangements. It seems, therefore, that the mandatory introduction of telework helped to overcome earlier reservations against telework in these respondents.

In January 2020, women’s preference for telework was 50.4% higher (if they already worked in telework arrangements, their preference was 73% higher) compared to their male colleagues, and in December 2020, women’s preference was still 42% higher (350% higher if they worked in telework arrangements). In contrast to their male colleagues, the female preference for telework arrangements might be less driven by the pandemic, and more by the reconciliation of work and family life.

Surprisingly, we did not find a significant impact of a general preference mismatch on stress levels early in the pandemic (March 2020). Indications from qualitative interviews pointed to a broadly shared initial understanding by respondents of the “external shock” nature of measures taken by their employers. However, eight months into the pandemic (December 2020), a preference mismatch started to exert a significant negative impact on stress levels. Equally, the negative impact on productivity almost doubled in size (vom -3 to -6pp).

In contrast, we did find a significant negative impact on productivity in individuals with a cognitive dissent; namely, those that had a chance to choose their work arrangement, but eventually decided against their own preference. This share is sizeable and more than doubled

through the pandemic (6.3% in January 2020, 9.9% in March 2020, and 14.2% in December 2020).

6. Conclusion and outlook

Unlike earlier research, our study allowed to correct for self-selection effects resulting from preference-matching, a bias affecting virtually all pre-COVID-19 research on telework. This is because the COVID-19 pandemic made telework transform from a largely voluntary employee benefit to a predominantly mandatory working arrangement. In contrast to our hypothesis, new teleworkers did not show any significant decrease in productivity nor an increase in stress levels upon the sudden introduction of teleworking schemes in March 2020. Also, a preference mismatch did not contribute to higher stress, but only meant a small (3pp) decline in productivity. Within the eight months from March to December 2020, productivity levels in new teleworkers increased and their stress levels even reached below those of respondents continuing to commute.

In contrast to these generally very promising results, we found that a sustained preference mismatch implied a doubling productivity losses from 3 to 6pp during the eight months between our two points of observation. Similarly, single individuals seemed to initially cope well with the new situation, but started losing productivity and developing higher levels of stress eight months into the pandemic.

In our data, 65% of respondents that stated a preference for physical presence in January 2020 report a change in preference for telework until December 2020 (544 of 834 including 462 without a teleworking arrangement prior to the pandemic, and 111 without any telework experience even during the pandemic). While we have indicative evidence that the actual telework experience led indeed to a change in preferences. Our qualitative interviews with n=30 respondents support this view that the pandemic “mandate” helped to overcome initial reservations against telework. Indications also are that women tend to benefit from a larger marginal effect in terms of stress relief, whereas a loss of social contacts in single individuals implies increased levels of stress.

Stress levels of respondents with families were significantly higher in our data, likely due to an offset of positive and negative factors (less commuting, but more challenging working environment). Two family-related variables were significantly related to higher level of stress and lower productivity: the extent to which childcare was unavailable during the government’s

early lockdown measures (March 2020; stress and productivity); and bearing a breadwinner role (March to December 2020; stress levels).

During the confirmatory interviews in our earlier project on telework, it became evident that a significant number of interviewees were very much in favour of telework because it allowed them to reduce what they perceive as cumbersome social interactions at work. Considering the importance of personal interactions in the so-called “Japanese management system”, the question arises how a reduction in physical attendance will impact on process savviness.

In a similar vein, women’s stronger preference for telework may lead to creating a substantial gender gap in terms of the work arrangement. Being physically absent from the workplace, however, supposedly comes with a negative effect on career advancement. Golden et al. (2020), for example, found that the extent of teleworking was negatively associated with promotions and salary growth. Visibility in the workplace has been identified as an essential ingredient for career success. Absences attract substantial career penalties for many employees, not only in relation to gendered flexible work options such as part-time employment and parental leave, but also traditionally uncontested entitlements such as annual and long service leave (McDonald et al. 2008). Women more than men fear being side-lined if they make use of telework (see Lott et al. 2020). Hence, if women were to be more physically absent compared to their male colleagues, telework might indeed be detrimental to female career advancement.

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APPENDIX

Table A: Sample composition by area, age, and type of occupation

Age	(%)	Area	(%)	Job Type	(%)
20-24	3.2	Hokkaido	2.1	Upper Management	3.9
25-29	12.7	Tohoku	2.2	Clerical work	46.3
30-34	13.5	Kanto	56.7	Technical work	24.0
35-39	12.9	Chubu	10.8	Other staff	23.6
40-44	13.4	Kinki	17.2	Self-employed	1.4
45-49	15.2	Chugoku	3.0	Liberal profession	0.8
50-54	11.2	Shikoku	1.3		
55-59	10.7	Kyushu	6.6		
60+	7.3				

Sample size: N= 1548.