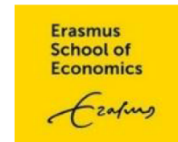


ERASMUS UNIVERSITY ROTTERDAM

Erasmus School of Economics

MSc Economics and Business

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Working from home and job satisfaction: The impact of the COVID-19 pandemic in the Netherlands

Master thesis

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Abstract

The forced migration to working from home due to the COVID-19 pandemic has underlined the importance of investigating the relationship between working from home and job satisfaction. To our knowledge we are the first to investigate the effect of the pandemic on this relationship. Previous studies mostly focused on China and the United States and as such, we pose the question how the COVID-19 pandemic affected the relationship between working from home and job satisfaction in the context of the Netherlands. Utilizing LISS panel data from 2013 to 2022, we run a time and individual fixed-effects regression. Our results confirm the economically and statistically significant positive relationship between working from home and job satisfaction. We do not find any evidence that the COVID-19 pandemic significantly impacted this relationship. We speculate that the absence of an effect of the COVID-19 pandemic is mostly due to the relatively high proliferation of working from home in the Netherlands pre-pandemic and the relatively old age of our sample. Our findings highlight the consistent importance of working from home as a fringe benefit in and of itself among employees and that its impact should not be underestimated by employers.

Key words:

Working from home – job satisfaction – COVID-19 – employees – work arrangements

The views stated in this thesis are those of the author and not necessarily those of the supervisor, second assessor, Erasmus School of Economics or Erasmus University Rotterdam.

Introduction

The outbreak of the COVID-19 pandemic has severely disrupted the way organizations function and it has uprooted the life of most individuals on an unprecedented scale. Although many were skeptical at first of whether the pandemic would have any serious effects, it soon became clear that it would, as governments around the world were forced to close down public life to protect the population from infection. As such, many employees were forced to start working from home, while offices remained largely closed. This led to significant changes for both employers and employees. On the one hand, employers had to rapidly adjust the companies' working arrangements and technologies so that employees could fulfil their tasks from their homes (DeFilippis et al., 2020). On the other hand, employees had to rapidly adjust to a new working environment, face new challenges in their work-life balance and adapt to a work environment in which digital technologies are their primary tool of communication (Bloom et al., 2022). These changes in work and employment have immediate implications for the economy, and may lead to permanent shifts that last beyond the pandemic (Barrero et al., 2021).

Previous literature shows that between April and December 2020, more than half of all worked hours in the United States were worked from home, an almost tenfold increase compared to the 5 percent of hours that were worked from home in the pre-pandemic period (Barrero et al., 2020; Brynjolfsson et al., 2020). Although working from home was already more common in the Netherlands, both countries show a similar, steadily increasing trend in working from home in the last decade. In 2013, 31 percent of the Dutch working population indicated to work at least incidental days at home, increasing to 35 percent in 2018 (CPL, 2021). Although the COVID-19 pandemic did not create as large a shock in the Netherlands as it did in the United States pertaining the proliferation of working from home, a sharp increase in the fraction of workers that work from home is observable in the Netherlands from 2020 onwards as well (CPL, 2021).

The direct effects of working from home on employers have been extensively studied using several different methodologies, and they all found similar results: working from home increases employee productivity, reduces costs due to office space reduction and reduces employee attrition rates (Aksoy et al., 2023; Barrero et al., 2021; Bloom et al., 2015, 2022; Etheridge et al., 2020). However, studying the effect of working from home on factors of main concern to employees, such as their job satisfaction, has yielded more mixed results.

One strand of research finds that working-from-home is positively correlated with job satisfaction (Bélanger, 1999; Church, 2015; Dubrin, 1991; Gajendran & Harrison, 2007; Virick et al., 2010). This positive correlation is mainly attributed to the separation of the employee from

the workplace, allowing for greater flexibility to adjust work tasks to personal and family needs and responsibilities (Duxbury et al., 1992; Gajendran & Harrison, 2007; Golden & Veiga, 2005). Employees furthermore report lower levels of stress and fewer unplanned interruptions from colleagues or superiors while working from home (Dubrin, 1991; Gajendran & Harrison, 2007; Guimaraes & Dallow, 1999). Theoretically, by being better able to adjust work responsibilities to family responsibilities and needs, working from home reduces work-family conflict and increases job satisfaction (Golden & Veiga, 2005). Golden and Veiga (2005) also find a strong positive relationship between working from home and job satisfaction, however they report that as the working from home frequency increases, the marginal contribution to job satisfaction approaches zero. They find that job satisfaction peaks at roughly 15 hours of at home work per week.

On the contrary, another strand finds that high levels of working from home may be dysfunctional and lead to lower levels of job satisfaction (Cooper & Kurland, 2002; Dahlstrom, 2013; Nakrošienė et al., 2019). Just like Dahlstrom (2011), Golden and Veiga (2005) theorize that these negative correlations are mostly explained by feelings of isolation, reduced face-to-face social interactions, strained coworker relationships and incompatible leadership strategies.

More recent studies find mostly a positive relationship between working from home and job satisfaction. In a randomized controlled trial among Chinese call-center employees, Bloom et al. (2015) find that working from home on average increases job satisfaction of employees by 15 percent. In another randomized controlled trial among Chinese engineers, financing and marketing employees, Bloom et al. (2022) find a similar positive relationship. Although in the minority, some studies have also found that working from home has no significant effect at all on job satisfaction (e.g., Bellmann & Hübler, 2021). While these studies mostly allow for a causal interpretation due to their research design, their samples lack external validity, especially for Western countries like the Netherlands.

It has become clear that previous research is somewhat divided and has mostly focused on samples from the United States and China, leaving the question “How did the COVID-19 pandemic influence the effect that working from home has on employee job satisfaction in the Netherlands?” Our contribution to the existing literature is twofold. First, we expand the literature by using data from the Netherlands, which, to our knowledge has not been studied yet in light of the relationship between working from home and job satisfaction. Second, to our knowledge this is the first research to investigate empirically how the COVID-19 pandemic affected the relationship between working from home and job satisfaction.

We employ a fixed-effects regression model that allows us to control for individual fixed effects and data from the Longitudinal Internet Studies for the Social Sciences (LISS) to estimate the relationship between working from home and job satisfaction, and how the COVID-19 pandemic has influenced this relationship. Our results are in line with previous research and corroborate our hypothesis that working from home is positively related to job satisfaction. We do not find any evidence however that the COVID-19 pandemic has changed the views that Dutch people have about working from home or that they changed their valuations of the importance of working from home for their job satisfaction. While surprising, we identify two key reasons why we may not have found a statistically and economically significant result: (1) our sample is relatively old and previous literature shows that older individuals are less quick and less likely to change their attitudes, and (2), the Netherlands is a country, unlike the often studied United States or China, in which working from home has been widespread even years before the pandemic. As such, we argue that working from home was already well received and valued by the Dutch working population and as such, the COVID-19 pandemic did not bring about as great change as we initially anticipated.

While our results further underline the importance of working from home in determining job satisfaction, our initial conclusion would also be that the COVID-19 pandemic did not cause a large shift in perceptions and preferences of working from home in the Netherlands. Perhaps organizations in the Netherlands do not need to make rapid strides in providing working from home possibilities, at least, not more than they already had pre-COVID-19. We have to keep in mind the limitations of our sample and specification however, as we were not able to control for all relevant time-variant variables, which opens our results up to omitted variable bias. Nonetheless, we expect that such shifts in preferences and valuations of working from home might indeed have happened in other countries where working from home was not yet as prevalent in the pre-COVID-19 period as in the Netherlands. We suggest that future research could run similar research designs as ours, with more relevant time-variant control variables, in different countries or geographical locations.

Theoretical framework

Job satisfaction

While job satisfaction knows its fair share of different definitions in the literature and has been studied extensively for decades, the most common definition was put forward by Locke (1976), who described it as “a pleasurable or positive emotional state resulting from the appraisal of one’s job or job experiences” (p. 1304). In line with other common

conceptualizations of social attitudes (Eagley & Chaiken, 1993), the definition has expanded to include multifaceted psychological job responses consisting of cognitive, affective and behavioral dimensions (Hulin & Judge, 2003). Within these dimensions, the typical categorization consists of five factors: pay, coworkers, promotions, supervision and the job itself (Smith et al., 1969). Common additions provided by Locke (1976) are recognition, company management and working conditions. Three types of theories remain prominent in the literature that aims to find the causes of job satisfaction (Judge et al., 2017; Judge & Klinger, 2008).

The first are situational theories, which argue that job satisfaction originates from the nature of one's job or other aspects of the environment (Hackman & Oldham, 1976). Therein lies the job characteristics model, which argues that there are five core job characteristics that define a job that is intrinsically motivating and therefore create the highest job satisfaction in the individual performing the work: (1) *task identity*, the degree to which one can identify the start and end of their (part of the) job; (2) *task significance*, the degree to which one's job is deemed significant and important; (3) *skill variety*, how varied are the tasks an individual has to perform within their job; (4) *autonomy*, to what degree does one have control over how to execute their job; and (5) *feedback*, to what degree does the job itself provide feedback about the worker's performance. Empirical studies indeed find that the nature of the job itself is consistently considered the most important facet for individuals when asked to evaluate their jobs (Judge & Church, 2000). Furthermore, out of the five core factors of job satisfaction, satisfaction with the job itself is the facet that most highly correlates with overall job satisfaction as well as other outcomes of specific interest to employers, such as employee retention (Judge et al., 2017).

The second are dispositional theories, which argue that job satisfaction finds its roots in personal characteristics of the individual and that as such, job satisfaction remains relatively stable over time, even when individuals switch jobs or occupations (Staw & Ross, 1985). However, as rightfully argued by Judge and Larsen (2001) as well as Gerhart (2005), these indirect studies have other, more plausible explanations for their results: stable correlations of levels of job satisfaction over time could just as well be due to a relative consistency in the type of jobs an individual takes on, as it could be explained by stable characteristics of the individual. If an individual manages to successfully apply to a high-quality job at one time, that individual is likely to do so again further down the line, indicating that situational theories cannot be ignored, regardless of whether individuals change jobs (Hulin & Judge, 2003).

The third and final are interactive theories, which combine the first two theories into a model where personal (dispositions) and situational factors determine job satisfaction. The

parsimony of the interactive theories make it an attractive approach. Locke's (1976) *value-percept theory*, the most prominent interactive theory, argues that an individual's job satisfaction is determined by their personal values. Mathematically, he modeled it as

$$S = (V_c - P) \times V_i \quad (1)$$

where S is satisfaction, V_c is value content or amount wanted of a specific factor, P is the perceived amount provided by the job of the same factor, and V_i is the importance of that factor to the individual. As such, value-percept theory predicts that only if a particular facet is important ($V_i > 0$), will the discrepancy between what is desired and what is perceived cause dissatisfaction. Then, by aggregating over all facets of job satisfaction, can one estimate an overall job satisfaction rating. Naturally, one is expected to find a high correlation between V_c and V_i , because what is wanted and what is important to an individual often coincides. The biggest theoretical concern resides in the fact that the model omits any factors that are exogenous, such as opportunity costs and other economic and organizational factors (Judge & Klinger, 2008). From a mathematical standpoint, we note that the model does not in fact calculate job satisfaction, but job dissatisfaction. The difference, $(V_c - P)$, equates to what one wants minus what one perceives, which in a perfect, satisfaction maximizing situation means $V_c = P$. However, according to Locke's initial model, this would mean that a worker in a perfect situation for a specific factor would experience or receive zero job satisfaction ($S = 0$ if $V_c = P$) from that specific factor. This makes little logical sense and we argue this cannot have been Locke's intention, considering how he defines each variable in his model. We propose an altered and improved version of Locke's model that better reflects the original thought behind the model. We model job dissatisfaction by the formula

$$DS_{it} = \sum_{c=1}^n (W_{ict} - P_{ict}) \times V_{ict} \quad (2)$$

with $c \in [1, \dots, n], t \in [1, \dots, n], V_{ict} \in [0,1]$ and $DS_{it}, V_{ict}, P_{ict} \in [a, b]$

where DS_{it} is the job dissatisfaction of person i at time t , W_{ict} is the desired value content of a particular factor c for individual i at time t , P_{ict} is the perceived amount of value of a particular factor c for individual i provided by the job at time t , V_{ict} is the importance

attributed to a particular factor c by individual i at time t , n is the total amount of factors, t is a particular moment in time, a is the minimum satisfaction score, and b is the maximum satisfaction score. We further assume that $\sum_{c=1}^n V_{ict} = 1$, as to make V_{ict} the proportional weight of each factor c for individual i at time t . Job satisfaction can then be modeled by the simple formula

$$S_{it} = b - DS_{it} \tag{3}$$

with $S_{it}, b, DS_{it} \in [a, b]$ and $t \in [1, \dots, n]$

where S_{it} equals job satisfaction of individual i at time t , a equals the minimum value and b equals the maximum value of the measurement range of the satisfaction variables, and DS_{it} equals the job dissatisfaction of person i at time t .

An important assumption in this model is that, given all “wants” (desired) and “haves” (perceived) are perfectly matched for any particular individual in their job, we assume that this individual is perfectly satisfied with their job (i.e., a score of 10 out of 10). Additionally, it is paramount that each individual facet or factor and job (dis)satisfaction as a whole are measured in the same scale to guarantee the correct proportional influence of each factor in the total. Furthermore, this subtractive model assumes conceptually that every individual “starts” with perfect job satisfaction and that only through discrepancies within each factor does their job satisfaction decrease. It is important to note that changes in an individual’s preferences may be captured by both changes in W_{ict} , P_{ict} as well as V_{ict} and that changes in these preferences are likely highly correlated, making one of the model’s strengths, highlighting the importance and role of individual preferences, also one of its weaknesses (Judge & Klinger, 2008). From an empirical perspective it is likely challenging to isolate changes in these preferences. However, for practical interpretations of the model, it does not effectively matter whether an individual changes their desired want (W_{ict}) or whether an individual changes their importance (V_{ict}). The practical implication for employers or policy makers is to reduce the gap between the want and the perception, or reduce the importance of a certain factor, and it is very likely that measures targeting one of the two simultaneously affect the other in the desired direction as well. Theoretically, the model can be interpreted quite intuitively. The most straightforward to interpret is a change in W_{ict} . Is this change in the direction of P_{ict} , then the discrepancy between what is desired and what is perceived decreases and as a result job satisfaction increases. Vice versa applies to a change in the opposite direction. Now consider a factor c (e.g., working hour flexibility) with a certain

degree of importance V_{ict} to individual i . This individual has a desired score of $W_{ict} = x$ and a perceived score of $P_{ict} = y$. A personal event in the life of individual i occurs (e.g., becomes a parent) such that the degree of importance of factor c , V_{ict} , increases. Now any discrepancy between what the individual desires and perceives for this factor, $W_{ict} - P_{ict} = x - y$, has an increased impact on the overall job satisfaction score of this individual. Of course, an event with an opposite effect is interpreted following the same rhetoric. A drawback of our adapted model is that we cannot discern between a positive discrepancy and a negative discrepancy, because we assume that if an individual receives more of a certain factor than what they would ideally want (positive discrepancy), they would penalize their perception score (P_{ict} decreases) in such a manner that $P_{ict} < W_{ict}$. As such, for example, an individual who receives more time flexibility than desired and an individual who receives less time flexibility than desired, might score their job satisfaction as a result of that factor identically within the framework of our model.

Working from home

Working from home, remote-work, or previously referred to as telecommuting in the literature, involves working from a location outside of the space provided by the company, most commonly at home, and subsequently communicating with colleagues, clients, etc., by means of computer-based technologies such as the internet (Cooper & Kurland, 2002). Although research on working from home predates the invention of the internet, it is only after the internet became widely available that working from home has become of keen interest to researchers, companies and managers (Bloom et al., 2015).

Within our model, working from home is one of the factors that determines job satisfaction. While one could model working from home as a factor on its own, it is evidently part of a set of working conditions that apply to a job. Previous research finds that working from home is positively correlated with job satisfaction (Bélanger, 1999; Church, 2015; Dubrin, 1991; Gajendran & Harrison, 2007; Virick et al., 2010). This positive correlation is mainly attributed to the separation of the employee from the workplace, allowing for greater flexibility to adjust work tasks to personal and family needs and responsibilities (Duxbury et al., 1992; Gajendran & Harrison, 2007; Golden & Veiga, 2005). Employees furthermore report lower levels of stress and fewer unplanned interruptions from colleagues or superiors while working from home (Dubrin, 1991; Gajendran & Harrison, 2007; Guimaraes & Dallow, 1999). Theoretically, by being better able to adjust work responsibilities to family responsibilities and needs, working from home reduces work-family conflict and increases job satisfaction

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The COVID-19 pandemic and working from home

The outbreak of the COVID-19 pandemic triggered a social experiment in working from home on a massive scale. For example, in the U.S., between April and December 2020, workers provided roughly fifty percent of all workhours, an increase of 45 percentage points compared to the pre-pandemic period. While the increase in the Netherlands was not as dramatic as in the U.S., partly because the prevalence of working from home was already at a much higher level in the Netherlands than in the U.S. in the pre-pandemic period, Planbureau voor de Leefomgeving¹ (2021) reported an increase in the proportion of people working from home in some capacity of five percentage points, from 41 percent in 2020 compared to 2019, a significant, positive deviation from the pre-pandemic trend. In the Netherlands the PBL

¹ Planbureau voor de Leefomgeving is the Dutch national institute for strategic policy analysis on the environment, nature and living space. More info on: <https://www.pbl.nl>

observed an especially large increase in the proportion of people who work exclusively from home, increasing from six percent in 2019 to 17 percent in 2020.

Previous research indicates why the effects of this initial shock in working from home will have lasting effects on the way employers and employees look at and experience working from home. First, the COVID-19 pandemic created the necessity for large scale, costly experimentation with working from home by both individuals and organizations. Basic game and decision theory predict that compulsory experimentation with a new technology has lasting effects even after the initial event that forced the experimentation has ended. This is a result of new information that comes to light during the experimentation process that forces agents to re-optimize working from home arrangements (Barrero et al., 2021). Tied into this is the fact that both workers and employers have invested in their infrastructures to facilitate working from home, e.g., desks, monitors and back-end systems, that position both to make working from home effective.

Second, Bloom et al. (2021) show that the share of new patent applications that advance technologies that facilitate working from home have more than doubled in the U.S. from January to September of 2020. This development is expected to increase the quality and efficiency of working from home over time, further solidifying the trend of a switch to working from home even now that the pandemic has ended. Additionally, the increase in working from home related patents fits well within theories that put an emphasis on the influence market size effects have on the direction of technological progress (Acemoglu, 2002). Furthermore, the pandemic also instigated developments in policy, especially in healthcare related fields, making it easier for doctors, psychologists and social workers, traditionally jobs that were considered the least fitting to a work from home environment, to do their jobs remotely (Barrero et al., 2021).

Third and final, Barrero et al. (2021) report that responses to their Survey of Working Arrangements and Attitudes indicate that attitudes have changed post-pandemic to better support working from home arrangements. More than two thirds of their sample reports that people they know take a more positive stand towards working from home than before the pandemic. Additionally, only 28 percent of the respondents indicate that they would want to go back to working at the office at all times. Furthermore, Bloom et al. (2015) found that in a randomized control trial individuals who worked from home on average scored their job satisfaction .155 points higher than those who strictly worked from the office. Seven years later, in another randomized control trial in the same company, Bloom et al. (2022) found that this estimate had increased by more than fifty percent to .351. Through the lens of our theoretical framework, this indicates that in the post-COVID-19 period, the average want for

working from home (W_{ic}) has increased, while not all jobs can provide this increased want, thus increasing the discrepancy for those individuals who cannot work from home. Additionally, we argue, following the reasoning of self-determination theory (Deci & Ryan, 2000) that working from home has shifted from a luxury work arrangement to a basic component of the autonomy of the worker. Indeed, Van Den Broeck et al. (2016) show in their extensive meta-analysis that the fulfilment of basic psychological needs, of which autonomy is a core component, is significantly associated with job satisfaction. We thus argue that the relative importance (V_{ict}) of working from home has also increased in the post-COVID-19 period. As such, we expect that individuals who do not work from home in the post-COVID-19 period will indicate even lower job satisfaction levels than those who did not work from home in the pre-COVID-19 period (H_2).

Data

The aim of this longitudinal study is to examine the relationship between working from home and job satisfaction, with a particular focus on the impact the COVID-19 pandemic had on this relationship. To test our hypotheses, we utilize data that is sourced from the Longitudinal Internet Studies for the Social Sciences (LISS) panel managed by CentERdata (Tilburg University, the Netherlands). The LISS panel provides researchers with a true probability sample of the Dutch population, based on a simple random sample of the nationwide address frame provided by Statistics Netherlands (Scherpenzeel, 2009). All surveys are filled in online using a computer and internet connection. Participants that have no access to a computer and/or an internet connection are provided with either, or both, including assistance in the setup and use of the tools.

Participants are contacted and recruited using an announcement letter and a follow-up phone call. If no phone number details were available, respondents were contacted through a follow-up visit by one of the interviewers. Participants are monetarily compensated for their participation. Prior to filling in their first survey, participants are informed that their answers will remain anonymous and are required to read and sign an informed consent form (LISS, 2023a). Although extensive recruitment procedures are in place, participants participate voluntarily and are free to quit at any point in time. Participant self-selection is not possible. Only those households that are part of the original true probability sample qualify for participation (Scherpenzeel, 2009).

LISS panel data are published as yearly cross-sections and the panel data from 2013 to 2022 was constructed by appending these cross-sections based on unique participant identifiers. Variables of interest were obtained from several different survey databases that are

part of the LISS Core Study. The panel data is inherently unbalanced due to an attrition rate of approximately 12 percent per year and non-response (Scherpenzeel, 2014) . To retain an ample sample size, new households and respondents are recruited periodically. Within our timeframe, two stratified refreshment waves occurred, the first between November 2013 and June 2014 (third refreshment overall) and the second between November 2016 and June 2017 (fourth refreshment overall) (LISS, 2023b).

Our raw data sample consisted of 9,777 unique individuals and a total of 41,473 year-observations. Due to the inherent nature of our dependent and independent variables, we follow previous literature and restrict the final sample to all participants aged between 18 and 65, the working population, who have a job (Emmenegger et al., 2015; Owens & Pedulla, 2014). If respondents did have a job in some years, but not in others, the year-observations for which they did not have a job were excluded from the final sample. Since we are interested in the difference pre- and post-COVID-19, we furthermore omit all individuals who do not have at least one observation in each of the periods. Then, as a last step, we drop any incomplete observations for our variables of interest because our statistical analysis software would exclude these from the fixed-effects regression either way. Our final sample then consisted of 1,698 unique individuals and a total of 11,401 year-observations. On average, each individual was observed just shy of seven times. Although variation exists in the number of observations for each year, the number of observations remains consistently high with the lowest number of year-observations equaling 739 in 2013 and the highest number of year-observations equaling 1,479 in 2020. On average, our data consists of 1,140 year-observations per year.

The representativeness of our final sample and non-random attrition pose potential threats to the validity of our findings. Scherpenzeel and Bethlehem (2010) found that the LISS panel performs similarly to their face-to-face survey for most demographic characteristics. Only people above the age of 70 and those without internet access were less likely to participate in the LISS panel compared to their face-to-face survey, but these characteristics are highly correlated. Considering the age restrictions on our final sample, we do not expect our findings to be biased significantly because of this. Nonetheless, when comparing our final sample to working population statistics provided by Statistics Netherlands, we find that those without tertiary education and those between the ages of 18 and 25 are underrepresented (see Tables A1 through A3 in Appendix 1). We furthermore observe that those aged between 55 and 65 are overrepresented when compared to the population statistics. Age is an interesting concept within panel data, because without refreshments of the sample, the age distribution will always move outward and the sample becomes older. We clearly observe this as well within our final sample (see Table A2). Finally, we observe that people who work from home

are underrepresented in our final sample, however both the sample and the population follow a similar increasing trend (see Table A4 in Appendix 1). Although these compositional differences are not directly alarming, we should keep them in mind when discussing our findings, with a particular eye on the age distribution. Considering we are interested in how a national event affected attitudes towards working from home and that attitude flexibility and the rate at which individuals change their attitudes declines as age increases (Wilson et al., 2018), we expect our results to be downward biased towards finding a less significant effect of the COVID-19 pandemic on the relationship between working from home and job satisfaction.

Variables

Dependent variables

Job satisfaction is our dependent variable and was directly measured in the LISS Core Study. Respondents were asked “How satisfied are you with your current work? 0 means that you are not at all satisfied with your work; 10 means that you are fully satisfied” and were given 11 valid answer options, ranging from 0 to 10. A twelfth answering option was also available, indicating “I don’t know”, however, this answer was coded as a missing value. Job satisfaction is thus a discrete measure with a minimum value of 0 and a maximum value of 10. The average over all year-observations is a 7.42, with a standard deviation of 1.41. Job satisfaction was technically measured on a Likert scale and thus ordinal. Norman (2010) shows however that even with relatively high skewness and non-normality, the results are robust to using a Likert scale variable as continuous. As such, we treat job satisfaction as a continuous variable in our analysis. It is important to note that the Dutch grading system in schools employs a similar grading scale where a 5.5 is the minimum required to pass. As such, a 5 out of 10 should likely not be considered as a neutral middle value, because any score below a 6 is generally considered insufficient.

Independent variables

Working from home is our main independent variable of interest as we are interested in how working from home affects workers’ job satisfaction. Respondents were asked “Do you have a (partial) ‘working-at-home day?’” and were given four answer options: (1) “no,” (2) “yes, less than one day per week,” (3) “yes, about one day per week,” and (4) “yes, more than one day per week.” Initial analysis showed that there was very little variation in the answers given by respondents, where the vast majority of respondents either answered (1) or (4). As such, the

variability in the answers could not be utilized for statistical testing and we recoded this variable into a binary working-from-home variable, condensing answer options (2) through (4) into one. We were left with a zero one coded binary variable, where 0 indicates that the respondent does not work from home and 1 indicates that the respondent works at least some hours from home. Our sample data indicates that in 2013, one in five workers worked at home in some capacity. This proportion of people that worked from home almost doubled in the following decade, as almost forty percent of the respondents indicated they worked from home in some capacity in 2022. Especially noteworthy is the stark increase in 2021, where we observe a ten percentage point increase in the proportion of people who work from home. Of course, we expected to observe such an increase, given that 2021 was the first full year in which the COVID-19 regulations were in effect. See *Table A4*.

Post-COVID-19 is a binary variable equaling “1” if a specific year-observation took place in a year after the start of the COVID-19 pandemic and “0” if the year-observation took place prior to the pandemic. Although COVID-19 was officially diagnosed for the first time in 2019, hence the name, it was only in the spring of 2020 that the Netherlands notably experienced the presence of the COVID-19 virus and subsequent measures to curb its spread (Planbureau voor de Leefomgeving, 2021). Therefore, the year 2020 was deemed the first year of the COVID-19 pandemic and the panel data thus contains seven pre-COVID-19 and three post-COVID-19 years.

Control variables

We control for several demographic variables and characteristics in our fixed-effect model. These are discussed below.

Age was measured directly as part of the background variables section of the LISS Panel. It is a discrete variable in whole years. Because the surveys are sent out in waves, some participants might answer a survey twice in their effective age-years, resulting in some cases where the age of the participant does not change between two year-observations.² Various studies have shown that job satisfaction varies significantly with age and that their relationship is U-shaped (Clark et al., 1996; Gazioglu & Tansel, 2006). Initially young workers are very happy with their job, which diminishes over time. However, job satisfaction slowly increases again from the mid-thirties and until retirement. To reflect this curvilinear relationship, we also include a squared age term as a control variable in our model.

² For example, a participant answers a respective survey in October 2018 and answers that same survey again in July 2018, yet their birthday is August.

Education was measured directly as part of the Work and Education section of the LISS Panel. The original variable had more than twenty answering options, including some legacy education levels that have since been replaced in the contemporary schooling system but were relevant for older generations to indicate their education levels as accurately as possible. To better reflect previous literature, the education variable was recoded to match the International Standard Classification of Education (ISCED) (OECD et al., 2015). After recoding, five categories remained: “no education,” “primary education,” “lower secondary education (middle school),” “higher secondary education (high school)” and “tertiary education (bachelor’s degree and higher).” Previous literature suggests a positive relationship between education and job satisfaction, in particular because higher education improves the access to jobs with characteristics that provide higher satisfaction (Fabra & Camisón, 2009; Vila, 2000).

Life satisfaction was measured directly similarly to job satisfaction. Respondents were asked how satisfied they are with their lives at that point and were given a 0 to 10 answering scale. Following the same line of reasoning as with job satisfaction, we treat life satisfaction as a continuous variable. Chacko's (1983) spillover model is probably one of the most widely recognized theories that describes the relationship between job and life satisfaction. In his theory, Chacko argues that the degree to which someone is satisfied in one area of their life automatically partly determines how satisfied they are in other areas. As such, the existence of a positive relationship between job satisfaction and life satisfaction is implied (Heller et al., 2002; Ignat & Clipa, 2012). Rode (2004) shows that the apparent positive relationship between job satisfaction and life satisfaction is in fact the result of several core self-evaluations all of which affect both life and job satisfaction. However, since these core self-evaluations have not been measured in the LISS surveys, life satisfaction can be used as a reasonable proxy variable to control for these effects that are not captured by our individual fixed-effects.

Income was measured directly as part of the background variables section of the LISS Panel. Respondents were asked to indicate their gross monthly income on a monthly basis. As is common in surveys, respondents are reluctant to disclose their income levels, resulting in many missing values. To combat this issue without losing valuable data, we constructed our final income variable as follows: for each year-observation we took the average of the twelve (one for each month) non-missing gross monthly income values and then took the natural log to smooth out the distribution. The result of the natural log transformation is that any respondent with zero income is recoded into having missing income. For our analysis this is in fact desirable, as we only want to include participants in paid employment in our sample. As with many other (subjective) measures, there is a positive, concave relationship between income and job satisfaction (Grund & Sliwka, 2001).

Manual labor was constructed from an eight category item that asked respondents what type of profession they had. Within the answer frame of the question a division between manual and mental or non-manual labor was already created, e.g. “semi-skilled manual work” and “intermediate academic or independent profession”. Following this same division, the variable was recoded in a binary variable equaling “1” if the respondent had a manual job. Manual labor was shown to affect both job satisfaction (Cornelißen, 2009) and an individual’s propensity to work from home (Garrote Sanchez et al., 2021).

Children is our final control variable indicating whether or not respondents had children. It was directly measured as a binary variable where “1” equals that the respondent had at least one child. Previous research has shown that the presence of children and parental responsibilities affect determinants of both job satisfaction and the likelihood of working from home (Graham et al., 2021; Xiao et al., 2021).

We present a summary of descriptive statistics in *Table 1*. We see that on average, individuals score their job satisfaction at 7.43 out of 10 with a standard deviation of 1.41. The minimum reported value for job satisfaction was 0, the lowest possible answer on the scale, indicating that some individuals are completely dissatisfied with their jobs. Life satisfaction is similarly distributed, averaging at 7.42 with a standard deviation of 1.06. Our results are in line with the renowned World Happiness Report, who indicated a score of 7.40 for the Netherlands in 2023 (Helliwell et al., 2023). Our sample has an average monthly income of EUR 3,150.14 and a standard deviation of EUR 1,696.47, which indicates quite high variations in income, further indicated by the minimum and maximum values. However, such a distribution is not uncommon and fits well within the general population statistics. Furthermore, we observe that a large majority of our sample, 81.9 percent, performs non-manual labor (e.g., administrative work, teaching, management). This is no surprise however, considering the high correlation between education and non-manual labor and the fact that our sample is relatively highly educated with 84.2 percent of individuals achieving at least a higher secondary education. Finally, we did not observe any extreme outliers that we could or should delete in good conscience. The variables job satisfaction, life satisfaction and monthly income are the only three variables that could potentially harbor extreme outliers as the rest of the variables are measured on a binary scale. Life satisfaction and job satisfaction are limited by the nature of the scale they were measured in and while unlikely that someone is completely satisfied with their life or job, we cannot convincingly discount such an observation. Monthly income is not conceptually bounded by the measurement scale, however, the largest reported value of monthly income was still within the realm of reality and as such, we did not delete any observations because they were deemed an extreme outlier.

Table 1. Descriptive Statistics for the Longitudinal Internet Studies for the Social Sciences (LISS) sample, working population (ages 18 to 65), with employment

Variable	<i>N</i>	Mean/ percentage	SD	Min.	Max.
Job Satisfaction	11401	7.43	1.413	0	10
Age (in years)	11401	45.46	10.725	18	65
Life satisfaction	11401	7.42	1.062	0	10
Monthly income (€)	11401	3,150.14	1696.47	47.83	36451.11
Children (at least 1)	11401	66.0%			
Non-manual labor	11401	81.9%			
Education					
None	11401	0.32%			
Primary	11401	.88%			
Lower Secondary	11401	14.6%			
Higher Secondary	11401	28.2%			
Tertiary	11401	56.0%			
Working from home	11401	27.1%			
Male	11401	47.7%			
Supervisor	11401	27.0%			

Note: *N* = number of observations, SD = standard deviation, Min. = minimum value, Max. = maximum value. In the descriptive statistics the non-log transformed monthly income is reported to provide a more meaningful interpretation of the mean and standard deviation of this variable.

Method of analysis

We estimate the effect of working from home on job satisfaction, and the effect that the COVID-19 pandemic had on this relationship, using a fixed-effects regression model. The most important benefit of choosing this model is that it allows us to control for time-invariant factors, such as religion, culture and gender, that influence both job satisfaction and a person's propensity to work from home, even if those variables are unobserved. Effectively, we measure the difference in job satisfaction as a result of working from home and the COVID-19 pandemic within an individual over time and average the effect over all treated individuals to compute the average treatment effect on the treated. We utilize the xt suite of functions in Stata 17 to conduct our fixed-effects regression analysis. Data cleaning and producing descriptive statistics are performed in IBM SPSS Statistics 25 and Stata 17 (see *Appendix 2*).

Mathematically, our specification looks as follows:

$$JobSatisfaction_{it} = \rho_i + \tau_t + \beta_1 WFH_{it} + \beta_2 WFH_{it} * PostCovid_t + \beta_3 X_{it} + \varepsilon_{it}$$

where $JobSatisfaction_{it}$ is a measure of individual i 's self-reported job satisfaction score at time t , ρ_i is the unobserved individual-level component, τ_t is the unobserved year-level component, WFH_{it} is a binary indicator for whether person i worked at home in some capacity at time t , $PostCovid_t$ is a binary indicator whether time t was a post-COVID-19 year, X_{it} is a set of time-variant control variables and ε_{it} the idiosyncratic error term.

In theory, a fixed-effects model would allow for causal inference if and only if all relevant time-variant (control) variables are included (Strumpf et al., 2017). While we have gone to great lengths to both identify relevant control variables and to extract them from the available data set, great care should be taken in interpreting our estimates as causal. Some relevant factors that have been identified by previous literature that influence both job satisfaction and propensity to work from home include a worker's relationship with their supervisor, their relationships with colleagues and the level of control a worker has over their own tasks (Barrero et al., 2021; Bloom et al., 2015, 2022; Böckerman & Ilmakunnas, 2009; Clark, 2005; Cornelißen, 2009). While our fixed-effects specification does control for individual level time-invariant factors that might highly correlate with these confounding time-variant variables (e.g., degree of introversion and relationships with colleagues), we cannot control for the time-variant proportion due to the limitations of the available variables in our dataset. Furthermore, and perhaps most importantly, in order to interpret our fixed-effects estimate as causal, the treatment assignment should be effectively random. Arguably, this is not the case here. Individuals were free to switch jobs in the post-COVID-19 period, for example, to be able to work from home which was not possible in their previous job. Thus, individuals were able to affect their treatment assignment. While some reasons for one individual switching jobs while another does not are captured by our fixed-effects, e.g. one individual is by nature more proactive while another is more resistant to change, many time-varying confounding factors that may determine whether an individual changes their job are unaccounted for and thus bias our estimates. While we cannot determine the size of the bias, it is good to keep the above in mind when interpreting our results.

Results

We estimate a fixed-effects regression, with job satisfaction as our dependent variable, measured by a score scaled between 0 and 10. Our independent variables are *Working from*

home, indicating whether someone works from home in some capacity or not, and an interaction term between Working from home and *Post-COVID-19*, a binary variable indicating whether a given observation was in the period after the outbreak of the COVID-19 pandemic. We include individual and time fixed-effects dummies in our regression specification. We cluster standard errors at the individual level to account for heteroskedasticity and serial correlation, as is most common when analyzing individual level panel data and a fixed-effects regression model (Abadie et al., 2017).

Working from home and job satisfaction

The results from the individual and time fixed-effects analysis predicting job satisfaction as a function of working from home, the interaction between Working from home and Post-COVID-19, and key control variables are presented in *Table 2*. Our overall model explains a statistically significant amount of variation in job satisfaction ($R^2 = .019$, $F = 4.99$, $p < .000$), albeit a small proportion of the variation indicated by the low R^2 value. We find evidence in support of our first hypothesis. On average, individuals who work from home in any capacity, score their job satisfaction $.148$ ($SE = .061$, $p = .017$) higher than those who do not work from home. We deem the economic impact of the effect size to be significant, as we have to keep in mind that job satisfaction is a concept consisting of a large pool of determinants. Perhaps the best way to illustrate the economic significance of this result, is to compare it to how much other factors impact job satisfaction. Artz (2010) finds in their longitudinal study using data from the National Longitudinal Study of Youth that (after measurement scale adjustments) employees score their job satisfaction $.17$ points higher if their employer has a pension or retirement plan, $.29$ points higher if their employer provides parental leave and $.26$ points higher if their employer provides child care. Additionally, the fixed-effects regression results from Cornelißen (2009) indicate that fringe benefits as a whole increase job satisfaction by $.161$ points, good relations with colleagues increases job satisfaction by $.203$ points, while stress and strict control over performance decrease job satisfaction by $.167$ and $.162$ points respectively. By comparing our results with the regression estimates of other factors that are practically impactful for the individual, we can conclude that working from home is a significant factor contributing to an individual's job satisfaction. Our results are in line with other recent studies, such as Bloom et al. (2022) who find in their randomized control trial that working from home increases job satisfaction by $.351$ points on average compared to individuals who always work in the office.

Table 2. Results from the individual and time fixed-effects analysis predicting job satisfaction as a function of working from home, the interaction between Working from home and Post-COVID-19, and key control variables

Variable	β	SE	t	p	[95% CI]	
Working from home	.148	.062	2.40	.017**	.027	.268
Working from home X Post-COVID-19	.050	.053	.94	.345	-.054	.154
Education (reference group: no education)						
Primary	.309	.413	0.75	.454	-.502	1.120
Lower secondary	.360	.436	0.82	.410	-.496	1.216
Higher secondary	.330	.447	0.74	.460	-.546	1.206
Tertiary	.364	.456	0.80	.424	-.530	1.258
Monthly income (ln)	.102	.088	1.17	.243	-.069	.273
Life satisfaction	.186	.024	7.86	.000***	.139	.232
Age	-.123	.071	-1.73	.083*	-.262	.016
Age ²	.000	.000	-0.06	.956	-.001	.000
Manual labor	-.369	.173	-2.14	.032**	-.707	-.030
Supervisor	-.010	.063	-0.16	.873	-.134	.114
Children	-.035	.063	-0.56	.579	-.158	.088
Constant term	4.712	.916	5.15	.000***	2.916	6.508
R-squared (within)	.019		N		11401	
F-test	4.99		Prob > F		.000	

Note: Job satisfaction is measured on a scale from 0 to 10, with 0 indicating complete dissatisfaction and 10 indicating complete satisfaction with the job. Working from home, post-COVID-19, Manual labor, Supervisor and Children are binary variables with base category “no”, e.g., not working from home, not a supervisor, no children. The interaction term is interpreted as an individual working from home in the post-COVID-19 period. β indicates the size of the regression estimate of the corresponding variable, *N* indicates the total amount of observations over all time periods, SE indicates the standard error clustered at the individual level, 95% CI indicates the 95 percent confidence interval of the estimate. Significance levels are indicated by asterisks, where *** $p < .01$, ** $p < .05$, * $p < .1$

COVID-19 and job satisfaction

Theoretically we deem it highly unlikely that the COVID-19 pandemic on its own affected job satisfaction directly, especially because to our knowledge no other research has found results that would even remotely indicate this. Due to our regression specification, we cannot test this, however. Recall that we include time-fixed effects in our specification by including year-dummies. The variable Post-COVID-19 is perfectly collinear with these year-dummies and therefore its effect cannot be estimated.

Our second hypothesis was that we expected that COVID-19 had shifted the demand for working from home outward (increased) and that we theoretically predicted that COVID-19 increased the relative importance of working from home as a factor that determines job satisfaction. As such, we expected people who do not work from home in any capacity post-COVID-19 to report significantly lower job satisfaction scores than those who are able to work from home in some capacity in the post-COVID-19 period. Our regression results do not provide us with any evidence in favor of this hypothesis. The interaction term *Working from home X Post-COVID-19* is not statistically significant ($\beta = .050$, $SE = .053$, $p = .345$).

Control variables

Our regression results indicate that education has no effect on job satisfaction, regardless of the level of education that the individual has attained. Previous literature indicated that education is positively correlated with job satisfaction, theorizing that a higher education provides access to jobs with characteristics that produce higher job satisfaction in workers (Fabra & Camisón, 2009; Vila, 2000). We speculate that it could be the case that in the Netherlands, jobs that require a lower level education manage to adapt well to the wishes of individuals with lower levels of education, e.g, in terms of fringe benefits, work atmosphere and job content. However, it is most likely the case that the effect of education on job satisfaction is largely captured by our fixed-effects estimate. As shown by the population statistics of Statistics Netherlands (2023), a vast majority of individuals attain their highest level of education before the age of 30. We have shown that our sample is underrepresented in the lowest age brackets which happen to coincide with that exact same period of educational attainment. The result is very little variation over time in the education variable per individual and as such, we do not find a statistically significant effect of education on job satisfaction.

As expected we find that life satisfaction is positively correlated with job satisfaction, where a 1 point increase in life satisfaction corresponds to a .186 points increase in job satisfaction ($SE = .024$, $t = 7.86$, $p < .000$). This is in line with previous research, however, there is a large concern for reverse causality issues. Considering Chacko's (1983) spillover

model, it is just as likely that individuals bring a certain degree of dissatisfaction with their lives into their job as it is likely that the reverse is true.

We do not find a clear significant relationship between age and job satisfaction at the conventional 95% confidence interval ($\beta = -.123, SE = .071, p = .083$). The squared age term is not significant either ($\beta = .000, SE = .000, p = .956$). Previous literature suggested that there is a U-shaped relationship between age and job satisfaction, yet we do not find any evidence to support that claim within our sample. At the 90% confidence level we find that for every year an individual gets older, they would score their job satisfaction .123 points lower. Because we do not find a significant effect of the squared age term, this would suggest a negative linear relationship between age and job satisfaction. We suspect that the absence of the curvilinear relationship is due to the age distribution in our sample and the fact that we focus on the within-person variation. As Clark et al. (1996) clearly point out, an adequate distribution across all age groups, especially in the lower age brackets, is crucial to adequately uncovering the relationship between age and job satisfaction, which is not the case in our sample.

Contrary to our expectations, we find that income does not significantly relate to job satisfaction ($\beta = .108, SE = .088, p = .243$). The suspected reason for this finding, which is in contrast to previous research, is twofold. First, we were unable to control for the suspected curvilinear relationship between income and job satisfaction. Grund & Sliwka (2001) showed that as income increases, the marginal contribution to job satisfaction decreases. By only including a linear factor for this variable, we are likely incorrectly identifying the relationship. Second, income is a variable that individuals are very likely to omit or misreport when answering survey questions. Generally, income information is considered confidential or personal information to the individual. Furthermore, gross and net income are often confused and mixed as income is measured over time (Collischon & Eberl, 2020). Considering the lowest tax bracket in the Netherlands requires one to pay 37 percent income tax, this confusion or mixed-reporting of the income variable can create a high degree of variation. As a result, it is likely that there is a large degree of measurement error in our income variable.

In line with previous research, we do find a significant relationship between manual labor and job satisfaction. Our regression results suggest that an individual who works a manual labor job scores their job satisfaction on average .369 points lower than those that work a non-manual labor job ($SE = .173, p = .032$). The children variable ($\beta = -.035, SE = .063, p = .579$) is insignificant in our model. Because children is a binary variable equal to 1 if the individual has at least one child, there is likely very little variation over time within individuals. Consider an individual who has a child in the third year of observation and is

observed over the entire period. The coefficient is now an estimation of the average impact on job satisfaction as a result of the switch between the pre-child and the post-child period. These switches generally speaking only happen once and as such require that having a child has a significant and lasting effect on job satisfaction, while it is more likely that having a child has an initial shock-like effect and that this effect fades over time.

Discussion

The goal of this research is to expand the growing body of knowledge around the relationship between working from home and job satisfaction, with a particular focus on the impact of the COVID-19 pandemic on this relationship in the context of the Netherlands. Job satisfaction has been shown to positively relate to factors of direct concern to employers, such as employee productivity (Böckerman & Ilmakunnas, 2012; Imran et al., 2015), employee loyalty (Javed et al., 2014; Tschopp et al., 2014) and organizational commitment (Ćulibrk et al., 2018; Top et al., 2015). As such, improving the job satisfaction of its workers is one of the key avenues through which an organization can get the best out of its employees.

The relationship between working from home and job satisfaction has been extensively studied with most researchers finding it to be positive (e.g., Barrero et al., 2021; Bloom et al., 2015, 2022; Church, 2015; Virick et al., 2010), however, there also seems to be a consensus that the marginal benefits of working from home related to job satisfaction reduce as the frequency of working from home increases (Dahlstrom, 2013; Golden & Veiga, 2005). The results from our fixed-effects regression analysis are in line with previous research and provide evidence for our first hypothesis, as we find that working from home is economically and statistically significantly correlated with job satisfaction, even after controlling for previously established determinants such as life satisfaction, income and education. By comparing our estimates with previous research on other determinants of job satisfaction, we can paint a picture of how the impact of working from home on job satisfaction relates to other important determinants. We conclude that working from home in any capacity increases job satisfaction about as much as an employer arranged pension plan, good relations with your colleagues and receiving general fringe benefits (Artz, 2010; Cornelißen, 2009). Through the lens of our theoretical model, this would indicate that the discrepancy between what employees want and what they perceive is on average larger than zero ($W_{ict} > P_{ict}$). If the wants of an employee regarding working from home and their perception would have been perfectly matching ($W_{ict} = P_{ict}$), we would not have observed a significant effect of working from home on job satisfaction. Combined with the results from previous research, this clearly indicates that employers can use the provision of working from home arrangements to their advantage, both

in recruitment of new employees as well as in the retention of existing employees. Of course each organization will have to weigh the costs of providing such arrangements against the benefits to determine whether providing the possibility of working from home to their employees is feasible in their particular domain.

The COVID-19 pandemic forced governments to close down public life for extended periods and as a result, many employees were abruptly made to work from their homes. Employees had to rapidly adjust to a new working environment, face new challenges in finding their preferred work-life balance and resort to digital technologies as their main form of communication with colleagues (Bloom et al., 2022). Meanwhile employers had to quickly adjust their work arrangements and prepare their systems and technologies so employees could do their jobs adequately remotely (DeFilippis et al., 2020). Barrero et al. (2021) predict that the changes that the COVID-19 pandemic has caused in relation to working from home are a permanent shift in demand and perception of working from home, and as such, these effects will last beyond the duration of pandemic itself. We hypothesized that individuals who do not work from home in the post-COVID-19 period score their job satisfaction even lower than individuals who do not work from home in the pre-COVID-19 period. Or in other words, the difference in job satisfaction between those who work from home and those who do not work from home has widened in the post-COVID-19 period when compared to the pre-COVID-19 period. We theorized that the COVID-19 pandemic caused an outward shift on the valuation of working from home (V_{ict}) and possibly an outward shift on the demand for working from home (W_{ict}). Because many jobs are hard to do remotely or in many cases also practically impossible, we predicted that on average P_{ict} could not expand outward enough to keep the average discrepancy ($W_{ict} - P_{ict}$) the same pre- and post-COVID-19. Additionally, any increase in the discrepancy is further accentuated by the expected increase in valuation or importance of working from home in the post-COVID-19 period. Our results suggest this is not the case however, as we do not find a significant effect of our interaction term between post-COVID-19 and working from home. We have identified two possible reasons as to why our empirical evidence does not match our theoretical prediction.

First, the Netherlands is a country in which working from home has been much more widespread than in most other countries, especially compared to the most researched countries China and the United States. This would indicate that the values for W_{ict} and V_{ict} are already relatively high on average in the Netherlands and as such are less likely to drastically increase as a result of a nationwide shock like the pandemic. Recall that especially V_{ict} knows a theoretical upper bound, as the sum of the valuations of all individual factors that contribute to job satisfaction have to be equal to one. With working from home already absorbing a

relatively large proportion of the overall evaluation, it means that it would have to take away importance from likely already relatively marginalized valuations of other determinants of job satisfaction. For example, consider a situation wherein job satisfaction is determined by two factors, working from home and wages. While one can imagine that you can forego some wages in order to maximize your working from home, there is a lower limit as to how much you can devalue wages to increase the valuation of working from home, likely at the point where your wages match your expenses. A similar logic can apply to a whole range of other factors with which working from home has to compete for valuation within an individual.

Second, our final sample is a relatively old sample when compared to the overall population statistics of the Netherlands. Especially the lower ages, individuals between the ages of 18 to 30, are quite underrepresented. It happens to be the case that flexibility in terms of attitudes is highest among that group and that it decreases as age increases (Wilson et al., 2018). We suspect that if our sample had been more similarly distributed as the population, we would have been more likely to observe a significant effect of the pandemic on the relationship between working from home and job satisfaction. This would suggest that the valuation of individual factors, V_{ict} , becomes more inelastic as age increases.

While we have gone to great lengths to keep the limitations of our study to a minimum, it remains important to address them adequately. First, we are limited by the measurement level of our working from home variable. There was too little variation in our original variable, forcing us to recode it to a binary variable. While it did allow us to confirm the previous established positive relationship between working from home and job satisfaction, it did not allow us to test whether the curvilinear relationship suggested by Golden and Veiga (2005) exists. Knowing what the optimal frequency of working from home is, both from the perspective of the employer as well as the employee, can have valuable policy implications for organizations who want to find a good balance between working from home and office work. We therefore highly recommend that future research measures working from home in terms of frequency with more variation in the answers and smaller answer bins. This would greatly aid in giving practical recommendations for working from home.

Second, due to our fixed-effects regression design, we are unable to uncover the influence that gender has on the relationship between working from home and job satisfaction. Previous research suggests that women are less likely to experience the benefits of working from home because they tend to carry more responsibility for household chores and family related tasks (Xiao et al., 2021). If these differences also persist in job satisfaction, this could have important implications for recruiters and employers, as this could suggest that offering

the availability to work from home or even requiring employees to partly work from home, is more attractive to men than it is for women.

Third, the external validity of our sample is limited. Our sample is relatively representative of the Dutch population and as such, our results can be used by any organization within the country. However, translating our results to other countries, especially those with large differences in key characteristics is rather difficult. The Netherlands is known for its strong internet infrastructure (Toepoel & Hendriks, 2016) and as such a switch to working from home requires relatively little effort from the employees' side in terms of infrastructural investments. We would therefore expect that in countries where the internet infrastructure is not as strong and widely developed that the added benefit in job satisfaction that working from home brings might be significantly lower. Similarly, judging from the pre-COVID-19 proliferation of working from home in the Netherlands, the Netherlands has a work culture that naturally fits well with working from home arrangements. Identifying key differences between countries among these and other factors could provide key insights for both multinational companies, as well as governing bodies like the European Union.

Conclusion

All in all, the present research produced further evidence that working from home is positively associated with job satisfaction. The Netherlands remains a relatively under researched country when it comes to job satisfaction and working from home, but it possesses some key differences related to the prevalence of working from home. We were unable to produce any evidence in favor of our theory that the COVID-19 pandemic shifted the valuation and demand for working from home outward, but suspect that the fact that working from home was already so widespread in the Netherlands even before the pandemic, is part of the reason why. We have shown that although working from home might be perceived by employers as an unimportant factor, employees do perceive it as a significant determinant of job satisfaction, which in turn affects many aspects of employer-employee relationships that employers are heavily invested in, such as employee retention, productivity and organizational commitment. Where possible, employers should provide employees the possibility to work from home even if only in a relatively small capacity. It seems clear that working from home is here to stay and although it might be beneficial for both employer and employee to return to a world where working at home full-time is not the standard, reverting back to working full-time purely in the office is not recommended for either party involved. Providing working from home arrangements has similar effects on job satisfaction as other fringe benefits and it can be used to improve overall employee

satisfaction, or as an effective bargaining chip in wage negotiations. From a theoretical perspective, future research could further expand the value-percept model to allow for the theoretical identification of subcategories within determining factors. Empirically, future research should focus on expanding the measurement levels of working from home to try and uncover the optimal working from home to working from office ratio. Additionally, by expanding the set of time-variant control variables the suspected causal relationship between working from home and job satisfaction can be further solidified.

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Appendix 1. LISS sample and population statistics distribution tables

Table A1. Representativeness of the LISS sample compared to population statistics from Statistics Netherlands, gender distribution

Gender distribution (in %)	Year									
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<i>LISS Sample</i>										
Male	55.4	53.8	54.2	53.4	53.8	51.5	51.0	50.2	51.1	51.2
<i>Statistics Netherlands</i>										
Male	53.4	54.1	53.5	53.4	53.3	53.1	52.9	52.8	52.8	52.8

Source: Statistics Netherlands, LISS panel.

Table A2. Representativeness of the LISS sample compared to population statistics from Statistics Netherlands, age distribution

Age distribution (in %)	Year									
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<i>LISS Sample</i>										
18-24	3.0	2.6	2.8	3.0	2.5	2.7	2.4	0.8	0.3	0.4
25-34	16.8	17.8	16.9	16.3	19.1	20.5	18.9	18.3	16.4	13.4
35-44	29.4	28.4	27.9	25.5	24.2	23.1	21.9	20.6	21.8	22.6
45-54	39.4	37.2	36.3	35.8	33.1	29.8	30.9	30.2	29.3	29.3
55-65	11.5	14.1	16.0	19.4	21.1	23.9	26	30.2	32.2	34.3
<i>Statistics Netherlands</i>										
18-24	16.7	16.6	16.9	16.8	17.1	17.2	17.4	16.8	16.9	17.6
25-34	20.6	20.8	20.7	20.8	21.1	21.3	21.3	21.6	21.7	21.6
35-44	22.7	22.1	21.2	20.7	20.1	19.8	19.6	19.6	19.8	20.0
45-54	24.7	24.9	24.9	24.9	24.6	24.1	23.5	23.1	22.5	21.7
55-65	15.2	15.6	16.2	16.7	17.2	17.6	18.2	18.9	19.0	19.1

Source: Statistics Netherlands, LISS panel.

Table A3. Representativeness of the LISS sample compared to population statistics from Statistics Netherlands, tertiary education distribution

Education distribution (in %)	Year									
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<i>LISS Sample</i>										
Tertiary education	48.0	49.4	52.2	51.6	52.5	54.8	59.5	61.1	61.2	61.4
<i>Statistics Netherlands</i>										
Tertiary education	33.2	34.5	35.4	35.6	36.4	37.3	38.0	39.3	40.8	41.7

Source: Statistics Netherlands, LISS panel.

Table A4. Representativeness of the LISS sample compared to population statistics from Statistics Netherlands, working from home distribution

Working from home (in %)	Year									
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<i>LISS Sample</i>										
No	81.6	81.2	78.4	77.4	76.5	74.0	72.7	71.3	61.6	62.1
Yes	18.4	18.8	21.6	22.6	23.5	26.0	27.3	28.7	38.4	38.0
<i>Statistics Netherlands</i>										
No	65.5	64.8	64.1	64.0	63.3	62.9	60.9	59.0	-	-
Yes	34.5	35.2	35.9	36.0	36.7	37.1	39.1	41.0	-	-

Source: Statistics Netherlands, LISS panel. Note: population data on working from home from Statistics Netherlands was not available for the years 2021 and 2022.