**Pre-pandemic Work-from Home Capability and Firm Performance During the COVID-19 Crisis: Evidence from Israeli Businesses**

**Abstract**

The COVID-19 pandemic has highlighted the importance of work-from-home (WFH) arrangements as a determinant of firm performance. This study investigates the impact of pre-existing WFH capabilities prior to the pandemic on firms during the first stages of the lockdowns in Israel. Using comprehensive and detailed panel data from a survey of Israeli businesses conditions during the pandemic, I two categories of firms are identified: those with pre-existing WFH capabilities and those compelled to adopt WFH during the lockdown. The findings reveal that firms with robust pre-pandemic WFH feasibility experienced a moderate reduction in monthly revenue. However, firms lacking prior WFH feasibility but needing to transition to remote work during the pandemic did not outperform those that did not implement WFH practices during the pandemic. Furthermore, firms with pre-pandemic WFH capabilities placed a smaller share of their workforce on unpaid leave. These results emphasize the importance of information and communication technology systems in facilitating an efficient WFH adoption and enrich the current literature by introducing a novel method for classifying and differentiating these two types of firms. The external validation of the findings is strengthened by the common effects experienced at the initial stage of the pandemic across countries with different labor markets.

**Introduction**

Extensive economic literature has explored the effects of various firm attributes and capabilities, including innovation capacity, managerial quality, and productivity levels, on firm performance. Additionally, the impact of information and communication technology (ICT) investments on firm success has been a focal point of research interest. These factors are particularly critical during business cycles and each financial crisis sparks increased interest and empirical investigation into their effects.

The COVID-19 pandemic introduced unprecedent elements that highlight an underexplored determinant in economic literature: the ability of firms to rapidly implement work-from-home (WFH) arrangements. This aspect became especially relevant during the pandemic, as many firms had to adapt to new working conditions. Consequently, national statistics offices (NSOs) have released estimates of WFH rates segmented by industries or worker characteristics.

Prior to the COVID-19 pandemic, the literature on WFH focused primarily on WFH policies as a managerial tool, examining their impact on employee job satisfaction. Studies such as those by Timothy D et al. (2006) and Mary M et al. (2008) reported positive effects of WFH measures on job satisfaction and decreased employee stress levels. Other studies, such as that conducted by Ravi G et al. (2007), found that firms that adopted WFH policies experienced lower job turnover, thus indirectly affecting their performance.

As the pandemic unfolded, many researchers across various economic disciplines such as macroeconomics, labor, and industrial organization examined the phenomenon of WFH measures during COVID-19. This growing interest in the topic is a result of the unique circumstances created by the pandemic, which prompted many firms to adopt WFH arrangements on an unprecedented scale.

In April 2020, nearly 30% of the Israeli workforce (excluding food and hospitality, and arts and entertainment employees) worked from home. This relatively high rate created a challenge in this studying of ascertaining whether businesses that transitioned to remote work during the first lockdown possessed common capabilities. Specifically, did the decision to transition to remote work have a positive effect on firms that adopted it compared to those that decided to close temporarily or accepted a drastic reduction in activity due to the government’s restriction on the maximum share of employees in workplaces?

The findings here indicate that firms that adopted work-from-home (WFH) arrangements at the outset of the pandemic were not homogenous and fall into two distinct groups that exhibit significant differences. This conclusion was drawn from detailed and comprehensive data from the survey of Israel’s Central Bureau of Statistics (CBS) of the business impact of the coronavirus, which was conducted three times in the second quarter of 2020 on the same set of firms. The survey provided estimates of employment flows such as layoffs, WFH rates, on-site work, and other factors related to businesses’ situations and expectations.

The detailed panel data from the survey facilitated a differentiation between two distinct types of firms that implemented WFH measures during the peak of the pandemic in April 2020. The first group included firms that already had WFH policies in place and had the capacity to implement WFH measures before the pandemic; the second group comprised firms that were compelled to implement WFH measures during the lockdown period despite lacking such capabilities. By merging the panel with the ICT survey significant disparities between these two groups were found with regard to their ICT systems, thus validating the chosen parameters for classifying each type of WFH firm.

The COVID-19 pandemic is distinct from previous crises due to the speed with which a sharp reduction in demand occurred, causing the unemployment rate to surge from 3.6% in early March 2020 to 20% in April. The latter month is regarded as the month with the highest level of unemployment in the past two decades for Israel. This study centers on a panel of firms surveyed during that period. The detailed panel allows for more accurate assessment of whether firms with pre-existing WFH capabilities experienced a more less severe decline in demand during the first lockdown compared to firms that were implementing WFH measures for the first time during the lockdown.

The central finding is that firms with high pre-pandemic WFH feasibility experienced a moderate decrease in monthly revenue during the peak of the crisis. Notably, firms that were forced to transition part of their workforce to remote work without the benefit of pre-pandemic WFH feasibility did not outperform firms that did not implement WFH measures at all, even in the harsh first lockdown. These findings emphasize the importance of ICT systems as a critical feature that enables efficient WFH adoption.

The adoption of WFH measures proved critical during the waves, contributing to the success of both health policy and lockdown measures. Caselli et al. (2022) demonstrated that regions with more occupations that could be performed remotely experienced less severe negative effects from the pandemic.

This paper focuses on the peak of the COVID-19 crisis during the first lockdown period, a time characterized by great uncertainty and a sharp downturn in all economic activity. These conditions were common to all countries regardless of the stringency of their social-distancing restrictions. This scenario strengthens the external validation of the result here and amplifies its importance and relevance for other countries whose labor markets differ from that of Israel.

The study also contributes to the economic literature by employing a novel method to classify and differentiate between firms that incorporated WFH with the assistance of ICT systems and firms that had to employ part of their workforce from home in order to deal with the government’s restrictions. I validated this method by testing it in three different ways, thus strengthening its assumptions and results.

The paper is organized as follows: Section 2 presents the evolution of WFH rates before and during the COVID-19 crisis in Israel and other countries. Section 3 reviews the economic literature on WFH polices before the crisis as well as the main papers addressing the effect of WFH on firms’ performance. Section 4 introduces our data sources and the variables of the special survey by the CBS. Section 5 outlines the methodology used to identify and classify firms with WFH feasibility before the crisis and the robustness tests used to validate our classifications. The results are presented in Section 6, followed by the conclusion in Section 7.

**2. WFH rates before and at the onset of the crisis**

The COVID-19 pandemic began to exert significant effects on the global economy in March 2020, following alarming reports from Italy about the escalating strain on healthcare facilities. As the situation evolved into a sustained crisis, it had a persistent impact on numerous aspects of the labor market.

At the onset of the pandemic, most governments imposed stringent restrictions on social and economic activities that involved physical proximity. These drastic changes required employers and organizations to adapt rapidly to remote work arrangements in order to maintain, or at least partially sustain, economic activity during lockdowns.

These comprehensive transformations businesses experienced are reflected in the official labor market statistics of various countries. While some businesses had already adopted WFH practices or possessed the necessary technological infrastructure to transition to them smoothly during the crisis, others struggled to implement WFH measures due to lack of experience and efficient communication systems.

The prevalence of WFH practices during the second quarter of 2020 strongly correlates with pre-pandemic remote-work rates. Countries with a high proportion of remote work before the crisis, such as the Netherlands, which reported a 20% WFH rate in 2019, experienced an increase to over 35%, saw this figure rise to over 35% during 2020. In contrast, other countries, including Italy, Israel, and Poland, recorded less than half this rate at the height of the crisis.

The prevalence of WFH practices before the crisis may also be linked to variations in workplace culture. For example, merely 13% of employers in Spain were willing to offer their employees remote work opportunities (Eurofound and International Labour Office, 2017). Conversely, Swedish managers demonstrated a greater propensity to allow their employees to work remotely.

In this section, I delineate the WFH measures applied in the Israeli labor market before the crisis and during the second quarter of 2020. The lack of formal estimates of these measures until September 2020 necessitates the use of estimations. In contrast to Israel, the EU countries have been monitoring the occurrence of remote work over the past decade as an integral part of their labor-force surveys.

To ascertain the rate of WFH employment and its evolution before and during the pandemic, I utilized three distinct sources from the CBS:

1. The Social Survey—an annual survey among individuals aged 19 and above;
2. The Survey of Businesses in Israel during the Coronavirus Crisis;
3. The Labor Force Survey.

In Israel, the proportion of employees who generally or customarily work from home has been growing consistently over the years, reaching 4.5% in 2019. This figure is considerably lower than corresponding rates in other developed countries such as the Netherlands (14.4%) and Austria (9.9%).

The spread of the virus and the government-imposed restrictions prompted businesses to adopt and implement WFH policies. According to CBS estimates,[[1]](#footnote-1) the average WFH rate in Israel in 2020 was 17.8%, with substantial variations between lockdown periods and times of eased restrictions.

**Figure 1. International comparison of WFH rates in 2020**

In Figure 1, we see that Israel’s annual average WFH implementation rate (including months without restrictions) increased to 17.8% in 2020, representing a sharp increase compared to 2019. It also shows that other developed countries with high WFH rates before the crisis achieved impressive rates of more than 30% in 2020.

**3. Literature review**

**WFH and firms’ performance before the COVID-19 crisis**

Most of the pre-pandemic economic literature concerning WFH practices primarily addressed human-resources questions or analyzed case studies. For example, Timothy D (2006) examined the impact of telework on job satisfaction, identifying a positive correlation. Bloom et al. (2015) conducted an experimental study within one of China’s largest firms, where participants were randomly assigned to two groups: one engaged in a hybrid work arrangement (one WFH day per week) and another working exclusively at the office. According to the findings, the hybrid group demonstrated significantly higher performance and took fewer sick days than their counterparts, prompting the firm to implement a hybrid work policy for all employees.

In contrast, an important study by Natalie P et al. (2019) scrutinized the effects of remote work on a representative sample of companies in Portugal’s business sector from 2011 to 2016. Interestingly, they found a negative relationship between WFH adoption and firm productivity. The overall adverse effect originated primarily from smaller firms that did not engage in foreign trade, while companies involved in foreign trade and research-and-development activities experienced increased productivity due to WFH implementation.

In contrast to these observed harmful effects of WFH on productivity, Gajendran and Harrison (2007), focusing on widely recognized research on employees’ benefits, observed a positive impact on workers’ perceptions of work/family conflict with no discernable impact on workplace relationships. Through a meta-analysis involving more than 12,000 employees, they identified additional positive effects of WFH on factors such as job satisfaction and role stress.

**The economic literature on WFH in the wake of the COVID-19 outbreak**

The COVID-19 crisis, which swiftly and dramatically altered the global landscape, posed significant challenges to businesses, necessitating rapid decision-making and innovation to mitigate the adverse effects of the shock. The characteristics of the crisis highlighted the advantages of WFH practices, making them a primary strategy for firms to trying to comply with government restrictions while maintaining operations during lockdowns. These circumstances led to a substantial increase in the economic literature on the effects of WFH on organizations and individuals.

One area that gained particular attention at the onset of the crisis, due to its relevance for policymakers in 2020, was the estimation of WFH capacity across diverse industries and countries. Possibly the most prominent index of WFH capacity is the Dingel and Neiman (2020) index (DN), which categorizes occupations based on whether employees can perform their tasks entirely from home. The DN indicator, developed using data from the United States Bureau of Labor Statistics Occupational Information Network (ONET), incorporates information from fifteen items across ONET’s Work Context and Generalized Work Activities Questionnaires. If any one of the fifteen conditions is met, the DN index indicates that the occupation cannot be practiced remotely.

Beyond the United States, the DN index has been applied to other countries. Employing the DN index, Beland et al. (2020b) estimated that 37.5% of Canadian jobs could be performed remotely. The striking similarity to the DN estimate for the United States suggests a strong correlation in the occupational distribution of jobs between the two countries. Using the DN index, variations in the overall proportion of WFH-capable jobs arise from differences between the countries in the occupational share of employment. This presumes that production technologies are highly similar, if not identical, in both countries, and that a given occupation entails the same work tasks and activities in both economies. While this assumption is justifiable in the Canadian context, it may not be relevant when evaluating WFH capability in other nations. Nevertheless, the absence of an O\*NET-type database in numerous countries leaves researchers seeking alternative methods for developing a WFH index.

This pivotal research and methodology, published during the early stages of the crisis, helped researchers worldwide estimate WFH capacity at the inception of the pandemic. By the end of 2020, national statistical offices (NSOs) adjusted their surveys and released official estimates of WFH rates, rendering this area less pertinent.

**WFH and firms’ performance**

The field of WFH adoption and its impact on firm performance and productivity also experienced a substantial surge in interest in the economic literature and is also the focus of the current research.

Daniel. E analyzed an employer expectations survey that was conducted in Germany three times during 2020 (June, September, and December) among managers in the manufacturing sector and in information-intensive services. He found that more than 30% of the managers expected their WFH rate to increase. Larger firms and those that previously implemented WFH measures before the pandemic were found more likely to expect a persistent shift toward WFH. This suggests that these firms successfully transitioned to remote operation during the lockdowns.

This key finding was integrated into the current research by examining firms’ WFH rates during a period without restrictions. This represented part of the methodology used to identify firms with pre-pandemic WFH feasibility.

Masayuki (2021), examining employees’ productivity based on business and household surveys in Japan, found that average productivity decreased to 70% of the usual in workplace employment, with great variation among different characteristics of employees and firms. His research showed that firms that implemented WFH practices before the crisis sustained a smaller declines in productivity. This supports this study’s initial hypothesis regarding the difference between these two groups of firms.

A primary challenge in assessing the impact of obstacles in evaluating WFH at the organizational level is the lack of pertinent pre-crisis data. The proportion of firms allowing WFH practices was not a focal point in official statistics or economic research before the pandemic spread. Consequently, most NSOs based their estimates of the prevalence of WFH among individuals on household surveys.

When the crisis began and governments imposed stringent restrictions on both the public and the private sectors, assessing businesses’ WFH capabilities became crucial for economic policymakers. These assessments aimed to comprehend the anticipated adverse effect of lockdowns and other social gathering restrictions on the labor market. The lack of pre-pandemic WFH feasibility data for businesses led researchers to rely on various sources to monitor and measure and monitor enterprises that had implemented this practice before the crisis. Additionally, it also became crucial to estimate the impact of this knowledge and practice on these businesses compared to those compelled to adopt WFH measures in order to sustain their operations during lockdowns.

For example, Bai et al. (2020) employed data from job postings by occupation between 2011 and 2019 and merged it with firm-level panel data, using Dingell and Neiman’s well-established occupational classification methodology. The resulting dataset was used to estimate which firms had implemented WFH practices before the crisis. The researchers found that firms in non-essential industries with pre-pandemic WFH feasibility experienced less pronounced adverse effects during the crisis and demonstrated superior performance across various metrics such as income, sales, and stock returns.

Utilizing the DN methodology presents a challenge due to its assumption of uniformity among employees in the same occupation. Several scholars have identified significant disparities in the varied tasks and skills of employees categorized within the same occupation. In Dingell and Neiman’s research that they presented a classification approach utilizing flash surveys. This made it possible to identify companies with pre-pandemic WFH capability without making the assumption of uniformity.

An important study conducted by Alipour et al. (2021) examined the relationship between the adoption of WFH practices during Germany’s first COVID-19 lockdown and the likelihood of firms participating in that country’s Short-Time Work (STW) program. This government-support initiative aims to prevent job losses during economic downturns by providing financial assistance to companies facing temporary reductions in working hours.

To mitigate endogeneity concerns between firms’ responses to the pandemic and WFH adoption, the authors used a Two-Stage Least Squares (2SLS) approach. This method helped them obtain more reliable estimates of the causal impact of WFH adoption on firms’ likelihood of participating in the STW scheme. They found that firms with a substantial share of remotely working labor force were significantly less likely to apply for and require government support through the STW program than were firms without WFH adoption. This suggests that firms that successfully adopted WFH practices during the pandemic may have been more resilient and better able to adapt to the challenges posed by the COVID-19 crisis, thus reducing their need for government assistance. This finding highlights the potential benefits of flexible work arrangements, such as teleworking, in mitigating the adverse economic impacts of unforeseen shocks like the COVID-19 pandemic.

The use of the 2SLS method allowed the researchers to establish a causal link between WFH adoption and STW program participation, as the instrumental variable used in the analysis (industry-level WFH potential) is assumed to be orthogonal to firms’ idiosyncratic COVID-19 shocks. By accounting for potential endogeneity, their study yields valuable insights into the role of WFH policies in mitigating the negative economic impact of the pandemic on businesses and potentially reducing the burden on government support programs.

The current study tested this model by running an Ordinary Least Squares (OLS) model with the percentage of furloughed workers as the dependent variable and found that pre-pandemic WFH feasibility negatively affects this share.

**4. Data sources and statistics for the second quarter of 2020**

**The CBS Survey of Businesses in Israel during the coronavirus crisis**

Labor markets across the globe experienced significant disruptions in 2020 due to the outbreak of the coronavirus pandemic. Social distancing measures, implemented to control the spread of the virus, severely restricted economic activities.

Under normal circumstances, NSOs release estimates of employment and unemployment fluctuations with a forty-five-day lag. The extraordinary economic conditions and fluctuations during the crisis, however, rendered these estimates obsolete. Thus, NSOs worldwide initiated special surveys targeting businesses and households to provide timely and relevant data for policymakers.

In Israel, the CBS launched a unique survey of businesses in mid-March 2020 to assess the impact of various restrictions on employment and economic activity. Conducted monthly, the Survey of Businesses in Israel during the Coronavirus Crisis based itself on questions formulated in collaboration with key economic decision-makers including the Ministry of Finance and the Bank of Israel. The results of the survey served as a foundation for policy decisions and evaluation throughout the various stages of the crisis. During the second quarter of 2020, it was the primary data source for employment changes, businesses’ responses to government health policies, and substantial fluctuations in public mobility. By the third quarter of 2020, the CBS Labor Force Survey adjusted its publications and began to estimate the employment situation biweekly.

The survey questions addressed various workforce changes, such as layoffs, furloughs, and new hires. It examined the capability of businesses to cope with multiple restrictions and estimated revenue declines during distinct periods of the crisis. The CBS formulated these questions in order to generate estimates for the proportion of employees working remotely by industry and the percentage of businesses using WFH practices during the crisis.

One critical question that the CBS survey asked at the onset of the crisis concerned the minimum number of employees required to be physically present at a company’s workplace to maintain operations at the business’s physical workplace. During the early phase of the crisis (second quarter of 2020), other relevant questions in the survey items focused on WFH policies. Managers were asked about their firms’ provisions for employees to work remotely and, if applicable, the number of employees who utilized these provisions as of the survey date.

This study concentrates on the second quarter of 2020 because it was then that the social and movement restrictions were the most severe. During this tumultuous period, the CBS conducted three iterations of its specialized survey (Waves 3–6). The third wave took place in mid-April 2020, representing the peak of the crisis, a time marked by heightened restrictions and considerable uncertainty. In contrast, the sixth wave occurred in June 2020, a period marked by reduced restrictions after most businesses and schools were reopened sat the beginning of the month. I used firms’ reports from these distinct periods and data on economic situations to facilitate the development of a methodology for identifying companies with pre-pandemic WFH feasibility.

**Fluctuations during the second quarter of 2020—estimates from the CBS Survey of Businesses in Israel during the coronavirus crisis**

This section describes the official estimates derived from the CBS business survey for various periods within the second quarter of 2020. While April 2020 is considered the worst economic month in the recent decades, June 2020 saw increased economic activity and minimal government restrictions on economic operations and social gatherings.

**Figure 2. Comparison of monthly indices, April 2020 vs. June 2020**

Figure 2 presents the significant variation in the economic climate across different months of the second quarter. It reveals a 25% decrease for the wider business sector in April compared to the average index for 2019. Notably, the same index indicates a 5% increase, possibly reflecting the release of pent-up demand during the lockdown.

April was also characterized by the lowest level for the number of vacancies and the lowest Bank of Israel’s composite index.[[2]](#footnote-2)

Figures 3 and 4 show the percentage of firms permitting WFH and the percentage of employees working remotely during the first lockdown (April) relative to June. It is evident that more than 80% of firms in the service and finance sectors suffered sharp declines. The pronounced contraction of WFH practice in June suggests that many companies opted to abstain from utilizing WFH measures when not required by government restrictions.

The panel design of the survey sample and the pronounced disparity between these periods enabled me to differentiate between firms compelled to adopt WFH practices due to government restrictions, despite a lack of technological capacity and experience with them, and those with pre-existing WFH capabilities feasibility prior to the pandemic.

The hypothesis is that firms without pre-pandemic WFH capabilities experienced reduced productivity during the first lockdown and opted to forgo this practice in June 2020 government restrictions on on-site work were lifted.

**Figure 3. Share of firms that employed remote work by industry, April vs. June**

**Figure 4. WFH employment rate by industry, April vs. June**

The significant decrease in the percentage of WFH employment among the surveyed population suggests that a substantial number of businesses experienced reduced productivity when implementing WFH practices. The high-tech industry, however, which has higher digital intensity, experienced a less drastic decline than did other industries. This supports our hypothesis WFH productivity is related to the effectiveness of information and communications technology (ICT) systems.

**5. Identification strategy/methodology**

The preceding sections addressed the relatively small proportion of businesses employing WFH practices prior to the COVID-19 crisis and the significant increase in remote work adoption by firms and employees during the first lockdown (April 2020). The hypothesis is that these firms may be classified into two distinct groups that exhibited considerable differences in performance and productivity during the lockdown.

To explore the hypothesis regarding firms with pre-pandemic WFH feasibility, I devised a structured methodology that leverages the varying infection rates and restriction levels during the second quarter of 2020, in conjunction with the panel design of the special survey carried out by the CBS.

Using this methodology should lead to a deeper understanding of the relationship between pre-pandemic WFH feasibility and firms’ performance during the COVID-19 crisis. This analysis may yield valuable insights into the role of WFH practices in enhancing firms’ resilience during the pandemic and offer policy recommendations for businesses and governments facing future crises or lockdown situations.

Here a graph with the time and restriction will be presented

This approach relies on two main assumptions. The first is that companies lacking pre-pandemic WFH capabilities will choose to have their employees work entirely on site during periods of low morbidity and fewer restrictions. The second posits that firms with pre-established systems and ICT support will need to retain only a minimal portion of their workforce on site in order to maintain business operations.

Utilizing a combined dataset from the special business survey conducted in April and June, the panel sample was sorted into three distinct firm types:

1. Firms that did not adopt any WFH practices during the lockdown period.
2. Firms that implemented WFH measures solely during the lockdown and ceased to do so by June.
3. Firms that maintained WFH policies both during the lockdown and in June, requiring less than 40% of their workforce to be physically present in the office to maintain operations.[[3]](#footnote-3)

**Figure 5. Classification of firms by WFH practice**

In Figure 5, it is evident that 35% of businesses implemented remote working practices during the initial lockdown. Based on our categorization, however, fewer than half of them utilized supplementary ICT systems. The survey indicates that out of a total firm population of some 31,000, merely 15% (4,852) demonstrated WFH feasibility before the pandemic. Furthermore, over 65% of the firms refrained from implementing remote work practices even under the most stringent lockdown conditions.

**Robustness tests for identification of pre-pandemic WFH firms based on the special CBS business survey**

To validate the assumptions and ensure the reliability of the WFH classifications, robustness tests were conducted on the estimates for our two WFH groups with additional variables from the special business survey. The comprehensive dataset utilized encompasses a range of questions that probe various aspects of firms’ performance and capabilities.

One such question, included in the third wave of the business survey (April 2020), asked about the effectiveness of WFH within each firm, measured on an ordinal scale:

1. Very effective;
2. Effective;
3. Not so effective;
4. Not effective at all.

To evaluate the identification of firms with pre-pandemic WFH feasibility, a logistic model was devised after combining Responses 1 and 2 and defining them as efficient WFH. The model includes only firms that employed WFH during the initial lockdown, using the following equation:

$y\_{if}=α+WFH\\_feas\_{i}$+$industry\\_wfh\\_share\_{f}+ln⁡\\_emp\\_size\_{i}+prod\\_quantile\_{if}+ε\_{if}$

where $y\_{if}$ equals 1 if Firm I in Industry f reported efficient WFH and 0 otherwise.

$WFH\\_feas\_{i}$ is a dummy for firms with pre-pandemic WFH capability.

To account for effects concomitant with industry demand shock and digital usage, the aggregate WFH employment share for each respective industry was incorporated. Furthermore, firms’ employment size and pre-crisis productivity quantile was controlled.

**Table 1. Logistic regression results for WFH efficiency during the first lockdown**



\*The dependent variable is a binary report on WFH efficiency that equals 1 if the manager evaluates WFH in the firm as very effective/effective.

Table 1 presents the results of the logistic regression analysis conducted on a subset of businesses (those that adopted WFH arrangements in April 2020). The analysis yielded a significant and positive coefficient for companies that had viable WFH arrangements in place prior to the pandemic. The average marginal effect indicates a substantial (34%) increase in the probability of these firms’ viewing WFH as an effective work method for them, compared to firms that initiated WFH measures only during the lockdown period.

**Robustness test of the WFH employment rate**

An additional robustness test evaluated the impact of WFH arrangements on the employment share during the initial lockdown period. The hypothesis was that companies with pre-existing WFH capabilities before the pandemic were able to employ a larger percentage of their staff remotely aided by their ICT support systems.

As illustrated in Figure 6, firms that implemented WFH measures solely during the lockdown saw only 14% of their employees working remotely. In contrast, companies with pre-pandemic WFH capabilities had 54% of their workforce operating from home. The t-test performed confirmed that this disparity was statistically significant.

This analysis underscores the importance of preparedness for remote work. Businesses with established WFH systems were better equipped to adapt during the lockdown and to employ a larger percentage of their workforce remotely.

**Figure 6. Average share of WFH employees, April 2020**

**Robustness test of survival situation according to managers’ reports**

Another important test was conducted to strengthen the classification methodology on the basis of the subjective estimate of the firm’s manager regarding the number of months the firm could operate under the prevailing level of restrictions. (The estimates are from April 2020, during the first lockdown.) Managers were prompted to assess their companies’ endurance within current constraints as follows:

1. Up to one month;
2. Between one month and three months;
3. Between three months and half a year;
4. Over half a year.

The assumption was that firms with pre-existing WFH capabilities could operate more effectively and sustain operations for longer than firms that employed WFH without technological capability, and that this would be reflected in their managers’ assessments.

Figure 7 depicts the distribution of businesses by industry and WFH classification, which, based on their managers’ assessments, could continue operating during a severe lockdown for an extended period. The proportion of firms with pre-pandemic WFH capabilities that demonstrate resilience is significantly higher, primarily within the Manufacturing and Services sectors, compared to firms that presumably were compelled to adopt WFH practices during the lockdown.

This finding for Manufacturing and Services is consistent with Bai et al. (2020), who found a greater effect of pre-pandemic WFH feasibility in the non-high-tech industries.

**Figure 7. Proportion of businesses capable of long-term operation during lockdown, categorized by WFH classification**

**Robustness test based on WFH status in 2023**

In 2023, the CBS conducted a business survey to determine which companies were continuing with WFH arrangements in a post-COVID period with no significant disease incidence.

I hypothesized that the proportion of businesses that had pre-existing WFH capabilities before the pandemic and that continued to support WFH policies would be considerably larger than that of businesses that introduced WFH measures during the initial lockdown without adequate technological support. The expectation was that some of the latter businesses, which had lacked the necessary technology in 2020, would have since adopted relevant technologies and would thus now to allow WFH measures.

To investigate this hypothesis, the research panel was integrated with the survey panel conducted out in 2023. The resulting merged panel encompasses 348 businesses and the findings in Figure 8 reveal notable differences between the classifications of WFH measures. Another noteworthy insight derived from these results is the proportion of WFH adoption due to the pandemic crisis and the subsequent shift in the labor market’s perception of WFH measures.

Interestingly, 18% of businesses that avoided remote-work practices even during strict lockdowns now allow them on a weekly basis. Furthermore, 48% of businesses in the second group, those that implemented WFH practices during the lockdown only, now enable WFH practices every week, presumably after adopting the necessary technology. This assumption is based on the idea that current WFH practices are technologically driven.

**Figure 8. Share of business that employ WFH in 2023 by WFH classification**

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**6. Findings**

After validating the methodology for identifying firms with pre-pandemic WFH feasibility this section presents estimates for different types of firms across different industries.

The research panel comprises 637 businesses representing about 1,000,000 employees. It can be seen that most firms and employees in High-Tech industry had pre-

**Table 2. Sample statistics by WFH type and industry**



The question examined here is whether firms with pre-pandemic WFH feasibility outperformed others (in terms of revenue and employment) during the initial stages of the COVID-19 crisis. The primary variable of interest is the firm’s WFH classification, with a focus on comparing the outcomes of firms with pre-existing ICT capabilities supporting WFH practices prior to the pandemic with those of firms that implemented remote work practices without the assistance of ICT systems.

In this examination, two specifications were made. The first aimed to assess the firm’s performance in terms of monthly revenue in April 2020, as reported by managers to the CBS survey. The dependent variable, an ordinal scale, addresses the range of revenue decline experienced by the firm during the most challenging month of the COVID-19 crisis.

To investigate the impact of pre-pandemic WFH feasibility, an ordered logit regression was performed using the following model:

$$income\_{i}^{\*}=βx^{'}+E\_{i}$$

Income=1 {if $income^{\*}<income^{1}$}

Income=2 {if $income^{1}<income^{\*}>income^{3}$

Income=3 {if $income^{\*}\geq income^{3}$}.

The dependent variable in this study is derived from the managers’ estimates of the estimated monthly revenue decline in April 2020. The original five-point scale was transformed into a three-point ordinal scale for analysis purposes. In Table 3, the results indicate the likelihood of observing a significant reduction in monthly revenue, considering the following explanatory variables:

1. Employment size—represented by the natural logarithm of the number of employees within a firm. This metric accounts for the varying degrees of economic impact between large and small businesses.
2. WFH classification dummy variables, based on the parameters established in this study.
3. For each firm in Industry J, incorporation of the aggregate WFH employment share in order to capture the unique COVID-19 shocks experienced by individual firms.

The ordinal regression model employed in this study allows for a robust examination of the relationship between the aforementioned explanatory variables and the likelihood of reporting a sharp/moderate/small decrease in monthly revenue.

Table 3. Ordinal regression results

Table 3 displays the results of the ordered logit regression, with the dependent variable representing the income change category in April 2020. The table also presents the marginal effects for each income change category. The first column shows the coefficients derived from the ordinal regression, and the panel represents the business sector. Consequently, the constant coefficients suggest that, within the survey population, there is a higher probability of reporting a moderate decrease in monthly revenue than of reporting no decrease or a sharp (50% or more) loss of income.

Following Alipour et al. (2020), the average WFH rate per industry was added as a fixed [a fixed effect? A constant?] This assists in accounting for industry-specific factors and in isolating firms’ idiosyncratic COVID-19 shocks.

The results point to a significantly lower probability of firms with pre-existing WFH practices prior to the pandemic reporting a sharp decrease in monthly revenue during the first lockdown.

Notably, the coefficient for businesses that hastily adopted WFH without the necessary technological infrastructure is found to be statistically insignificant. This unexpected finding suggests that businesses that swiftly adapted to government regulations and allowed remote work during the lockdown despite lacking established ICT systems, did not experience any noticeable advantage in revenue compared to those did not adopt WFH practices.

Columns 2–3 present the marginal effects of each explanatory variable on the probability of experiencing each level of the dependent variable.

The primary findings indicate a 22% reduction in the likelihood of firms with pre-existing WFH capabilities prior to the pandemic experiencing a sharp decrease in monthly revenue after controlling for firm and industry determinants. Moreover, there is a 14% increase in the likelihood of these firms navigating the worst economic month without any decline in revenue. This outcome [These outcomes?], combined with the negligible impact of implementing WFH measures without prior experience and ICT system assistance, underscores [underscore?] the significance of firms’ digital intensity as a critical capability for navigating business cycles.

**Model 2 specification: The effect on employment**

The early adoption of WFH practices during the initial stages of the pandemic enabled companies to avoid placing their employees on unpaid leave. Following the findings of Alipour et al. (2020) regarding the correlation between a company’s WFH capability and participation in the STW program, the relationship between a company’s WFH categorization and the percentage of its workforce that was furloughed during the first lockdown was examined, using an OLS regression.

The hypothesis is that the WFH capacity of a company prior to the pandemic indirectly influences the proportion of furloughed employees, given the greater capacity of such companies to employ a significant share of their workforce remotely.

$$index\\_furlogh\_{ijt}=α+wfh\\_lockdown\_{ijt}+pre\\_pandemic\\_wfh\_{ijt}+wfh\\_share\_{jt}+productivity \\_q\_{ij(t-1)}+ε\_{ijt}$$

Table 4-OLS Results Furlough Index



Table 4 presents the results of the OLS regression analysis that investigates the impact on and relationships between a firm’s WFH categorization and various firm and industry attributes on the proportion of the firm’s workforce placed on furlough. A noteworthy observation is that the presence of WFH capabilities prior to the pandemic reduced the percentage of furloughed employees by more than double compared to firms that adopted WFH without having the necessary technological capabilities. Consistent with most empirical evidence about the pandemic, both the size of the firm and its pre-pandemic productivity negatively influenced the percentage of employees on furlough.

**7. Discussion**

This study examined the impact of pre-existing work-from-home (WFH) capabilities prior to the coronavirus pandemic in firms operating in low-contact-intensive industries, focusing on several aspects of economic performance during the initial lockdown. During the first stage of the COVID-19 crisis, marked by heightened uncertainty and fear, a significant number of firms transitioned to WFH practices as a means of maintaining operations in the face of stringent social-distancing measures. My findings suggest that the aggregate estimation of the WFH implementation rate may be misleading because firms that implement remote work are not homogeneous.

Comprehensive surveys from the comprehensive special surveys that the Israel Central Bureau of Statistics conducted during the second quarter of 2020 were utilized for this study. Due to the richness of the data and the variables, it was possible to construct a methodology to identify and classify firms with pre-pandemic WFH capabilities. The variety and diversity of items in the survey questionnaire allowed for testing the robustness of this methodology in several ways and for validating the classifications.

The findings reveal that firms with pre-existing WFH capabilities prior to the pandemic were able to transition a substantial portion of their workforce to remote operations, thus placing a smaller proportion of their employees on paid leave. Notably, firms that hastily implemented WFH practices without the necessary technological infrastructure experienced reduced productivity as a result. Their declines in revenue were similar to those of firms that avoided implemented WFH practices even during the lockdown.

The results emphasize the importance of a firm’s digital tools and its workforce’s technological ability to work from home. Where these capabilities were present, firms were able to maintain their enterprise value despite of the challenges presented by the pandemic. Businesses that had greater opportunities for WFH practices offered their employees a higher level of safety , thereby bolstering the resilience of their operations.

Prior to the pandemic, scholarly interest in the relationship between WFH modalities and firm performance was relatively limited and narrow in scope. However, the global spread of the virus sparked a substantial surge in economic research focusing on WFH, predominantly centering on the distribution of WFH practices across countries, industries, and regions and the resulting implications for labor-market fluctuations. However, the lack of firm-level surveys and estimations regarding to WFH practices has limited the depth and breadth of research on this important issue.

This study enriches the limited existing literature on the effect of pre-pandemic WFH feasibility on a firm’s performance by developing a methodology to differentiate firms based on their technological capacity to rapidly implement WFH practices. This approach facilitated an assessment of the substantial positive effect of this pre-pandemic capability on firm performance during the critical juncture of the crisis. As I demonstrate elsewhere, [כך?] this performance exerted a significant influence on company performance throughout the entire period of the COVID-19 crisis and expedited [כן?] the recovery from the crisis at the end of 2021.

# 8. References

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1. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.cbs.gov.il/he/mediarelease/DocLib/2022/170/29\_22\_170b.pdf [↑](#footnote-ref-1)
2. Figure 2 presents the month-on-month change in the Bank of Israel’s composite index. [↑](#footnote-ref-2)
3. The managers were asked: “What is the minimum number of employees who need to be present at the workplace in order to keep operating?” I transformed their responses into a rate by dividing them by the firms’ employment practice before the crisis. [↑](#footnote-ref-3)