Labour Productivity while Working from Home during the COVID-19 Pandemic

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Abstract

This study aims to determine how the implementation of WFH (Work From Home) affects individual work productivity during the COVID-19 pandemic in Indonesia. National Labour Force Survey (Survei Angkatan Kerja Nasional/Sakernas) data for February 2021 were used in this study. In February 2021, the Sakernas questionnaire was added with questions related to the impact of COVID-19 on employment. This study used the instrumental variable analysis method, which accommodates the issue of endogeneity in the model and working in a crowded place (*work_crowded*) used as the instrument variable. The estimation results obtained through IV regression show that WFH significantly has a positive effect on work productivity. The group of respondents who implemented WFH in their work system, on average, has statistically higher productivity when compared to the group of respondents who did not implement WFH.

Keywords: COVID-19, Pandemic, WFH, Productivity, Instrumental Variable

JEL Classification: J0, J3, J6, D2, I1

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I. Introduction

1.1 Background

The COVID-19 pandemic that occurred and began spreading almost around the world in early 2020 has given a huge shock and enormous impact on human civilization globally, including in Indonesia. The rapid spread of COVID-19, which occurred so quickly beyond expectations, forced the Government to follow WHO (World Health Organization) recommendations, by issuing regulations for the implementation of the COVID-19 health protocol as an effort to minimize the surge in positive COVID-19 cases. One of the policies issued as part of the COVID-19 health protocol and to limit people's movements is the implementation of Work From Home (WFH).

Restrictions are highly necessary considering that Indonesia has experienced several instances where the daily count of positive COVID-19 cases has become the highest in the world. According to the Worldometers report, as of July 13, 2021, Indonesia recorded a daily increase of 47,899 cases, not only the highest in Asia but also globally (Shalihah, 2021). The following is depicted in Figure 1, illustrating the progression of daily COVID-19 cases in Indonesia.

Figure 1. Daily progression of COVID-19 cases in Indonesia

Source: Tempo, 2022

The government, through the Ministry of State Apparatus Empowerment and Bureaucratic Reforms, issued Circular Letter Number 19 of 2020 on the Adjustment of the Civil Servant Work System in an Effort to Prevent the Spread of COVID-19 in Government Institutions on March 16, 2020, as the initial basis for implementing the Work From Home (WFH) system for employees in government institutions. However, the implementation of WFH is not limited to government employees only. It is also implemented for workers in private companies, and it is possible for entrepreneurs in both formal and informal sectors. As an

illustration, based on data from the Manpower Office of DKI Jakarta Province in April 2020, the number of private companies implementing the WFH policy within the scope of DKI Jakarta Province alone as of April 20, 2020, was 3,725 companies, with a total of 1,026,875 employees (Lokadata, 2022), as shown in Figure 2.

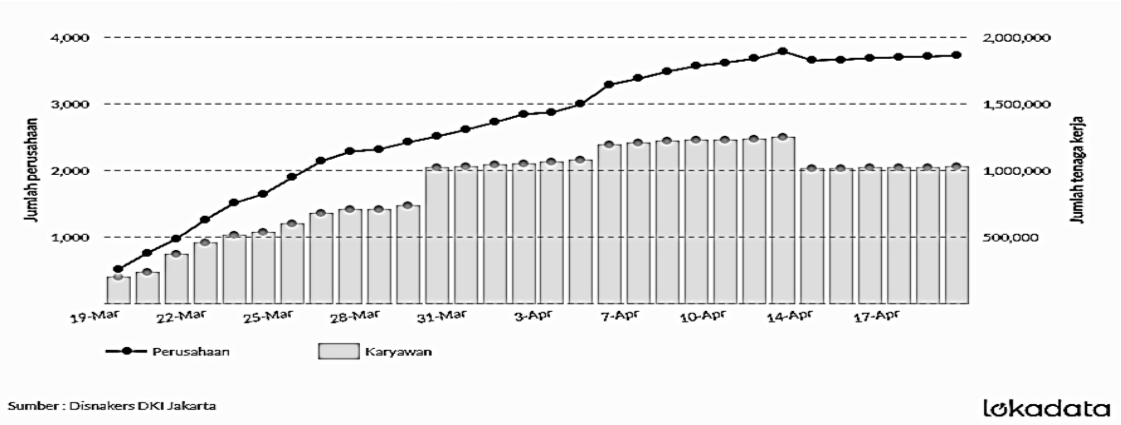

Figure 2. Graph of Companies Implementing WFH in DKI Jakarta
Source: Lokadata, 2022

Various questions arose related to the impact of implementing WFH during the COVID-19 pandemic, one of them is its influence on work productivity. Productivity is a crucial aspect of achieving well-being through development processes. While WFH is considered an important strategy to maintain production during a crisis like the COVID-19 pandemic, its effects on productivity and other indicators is still not clearly understood (OECD, 2020). The widespread implementation of remote work practices, including WFH, during this pandemic, if proven to yield positive results, may lead organizations and workers worldwide to reconsider their ways of working. This could potentially trigger a broader and more permanent adoption of WFH after the crisis subsides.

Experimental research related to Work From Home (WFH) conducted by Bloom et al. (2013) in China found that WFH had a positive influence on employee productivity/performance. Similarly, Rupietta and Beckmann (2016) conducted a study in Germany regarding the effect of WFH on employee work effort and found that WFH also had a significant positive impact on employee work effort. In line with these two research findings, according to Westfall (2020), based on a survey conducted by a company based in California, United States, there was a 47% increase in employee productivity when implementing WFH, and the company benefited greatly from having their employees work from home.

However, in contrast to the previous researches and findings, a study conducted by Gibbs, Mengel, and Siemroth (2021) on over 1,000 employees of a large information technology services company in Asia found that WFH had a negative impact on employee work productivity. Similarly, a study by Farooq and Sultana (2021) conducted in New Delhi and Punjab, India, found that WFH had a negative impact on employee productivity due to the lack of communication and supervision of employees.

Furthermore, a survey conducted by LinkedIn and the Mental Health Foundation among 2,000 employees in the UK who practiced WFH during the lockdown period in March 2020 revealed that 44% of the surveyed employees enjoyed their remote work arrangement/WFH due to having more time for their

families or loved ones. However, on the other hand, 56% of the surveyed employees experienced increased stress when working from home compared to working in the office. This was because they felt that their working hours were extended, starting work earlier but taking more time to complete the tasks (Chamberlin, 2020).

According to the International Labour Organization (2020), Work From Home (WFH) is a working arrangement in which a worker fulfills the essential responsibilities of his/her job while remaining at home, using information and communications technology. The concept of WFH, which is a part of telecommuting or teleworking, has existed in the labour sector for quite some time but was not widely used. Before 2020, as Mungkasa (2020) explains, the implementation of WFH was more voluntary. However, when the COVID-19 pandemic occurred, WFH became a necessity implemented in many countries.

Productivity is a concept that is often considered important in economics. Harmadi and Antarwati (2018) explain that economists mostly define productivity as the ratio of output to input in an activity or an economic sector. Productivity can be measured both physically and economically (in terms of value). Riyanto (1986, as cited in Subandowo, 2017) explains that technically, productivity is a comparison between the achieved results (output) and the total resources required (input). Therefore, productivity involves comparing the achieved results with the role of labour per unit of time.

According to the OECD (Organization for Economic Co-operation and Development) in the journal "The Productivity Inclusiveness Nexus" (2016), there are still challenges in accurately measuring productivity, and there is no general agreement on how to measure it. However, it is explained that productivity is actually related to "working smarter" rather than "working harder." This is in line with Sukirno's (1999, as cited in Dwijatenaya, 2018) statement that productivity can be defined as the production created by a worker in a certain period of time. An increase in productivity means that the worker can produce more in the same time frame, or a certain level of production can be achieved in a shorter time.

The OECD (2016) further explains that labour productivity at the aggregate scale can be measured by comparing the GDP (Gross Domestic Product) with the total hours of work of the entire workforce. This aligns with Manning and Purnagunawan (2012) who state that labour productivity is a measure of the efficiency of labour utilization in producing goods and services. Labour productivity can be calculated in several ways, but the general form is a measurement of output per worker. The measurement of output can include GDP, value-added, and the volume of goods. Meanwhile, the measurement of labour can include the number of workers or the total hours worked by all employees. According to Harmadi and Antarwati (2018), wages/salaries and working hours are indicators of productivity.

Based on the theoretical foundation mentioned above, the authors will proceed to measure individual-level work productivity using a proxy, which is the monthly income divided by the number of working hours per month. However, it is important to note that Manning and Purnagunawan (2012) also explain that there are differences in labour productivity across sectors in Indonesia, mainly due to variations of working hours in different sectors. For instance, the agricultural sector is relatively labour-intensive and tends to involve more family workers with fewer working hours, which affects the calculation of labour productivity. According to Purwantini and Supriyati (2015), at the household level, labour productivity in

the agricultural sector is measured by the total income earned from all types of activities performed by household members divided by the number of working household members.

Family and work are two distinct entities, yet they can be interconnected. WFH can lead to conflict between family and work domains. Border theory can be used to explain how an employee manages and negotiates to achieve a balance between the work and family domains. According to Clark (2000, as cited in Handayani, 2013), the "border" in this theory refers to a demarcation line that separates the family and work domains. This border consists of three types: first, the physical boundaries such as office walls or home structures, the second is the temporal boundaries such as work schedules or determination of time allocation for the family, and third is the psychological boundaries that encompass individual rules in determining appropriate behaviors, actions, emotions, and thought patterns or mindsets within a particular domain. When WFH is implemented, the boundaries between the office and family tend to weaken or even disappear. This is because the house, which is the family's living space, suddenly also becomes the place to complete tasks or works that have migrated from the office, particularly during the COVID-19 pandemic.

The weakening or disappearance of boundaries during WFH often leads to a dual-edged situation or contradictory impacts (Asyari, 2021). On one hand, the worker may become more productive in completing tasks and responsibilities since they don't need to spend time commuting to the office. However, on the other hand, it can be counterproductive due to the lack or absence of direct supervision from superiors. Additionally, for workers who have families, especially women who are also mothers, the temporal boundaries may change. Family time tends to be prioritized over work, which can lead to a decrease in productivity.

1.2 Research Purpose

The Work From Home (WFH) system remains a controversial and interesting issue to discuss in the labour sector. Initially, WFH was an uncommon work system in Indonesia. Only then it gained widespread popularity and became a phenomenon when it suddenly implemented in response to the COVID-19 pandemic as a part of health protocols. Due to the contrasting results regarding the impact or influence of WFH implementation, the authors are motivated in researching the effects of WFH on work productivity during the COVID-19 pandemic in Indonesia, utilizing data from National Labour Force Survey (Survei Angkatan Kerja Nasional/Sakernas) conducted by the Indonesian Central Statistics Agency (Badan Pusat Statistik/BPS) in February 2021. Based on the availability of data, this study focuses on work productivity at individual level (in terms of income and working hours).

The academic benefit expected from this research is to serve as an additional reference and insight for future studies on WFH or remote work, particularly related to work productivity. The practical benefit anticipated from this research is to provide inputs and evaluations for the government and organizations or companies in formulating policies regarding work systems or methods.

II. Research Methods

In this research, the analysis used to estimate the impact or influence of Work From Home (WFH) on productivity is the instrumental variable (IV) method, which serves as a mitigation strategy for potential endogeneity issues in the equation model which is adopted from the Mincerian earnings function.

Additionally, endogeneity can arise from the non-exogenous nature of the decision-making process regarding WFH implementation (Deole, Deter, & Huang, 2022). Endogeneity issues can occur when variables that should be included in the model are omitted due to data limitations, resulting in omitted variable bias (OVB).

The data used in this research is cross-sectional data obtained from the National Labour Force Survey (Survei Angkatan Kerja Nasional/Sakernas) conducted by the Indonesian Central Statistics Agency (Badan Pusat Statistik/BPS) in February 2021. The Sakernas data for February 2021 has a target sample size of approximately 75,000 households, distributed proportionally at the provincial level, resulting in a total of 203,464 observations. After data cleaning for the purpose of this research to estimate the impact of WFH on work productivity, a total of 73,850 observations met the sample criteria. The formation of the sample data set in this study follows the process outlined in Figure 4 below.

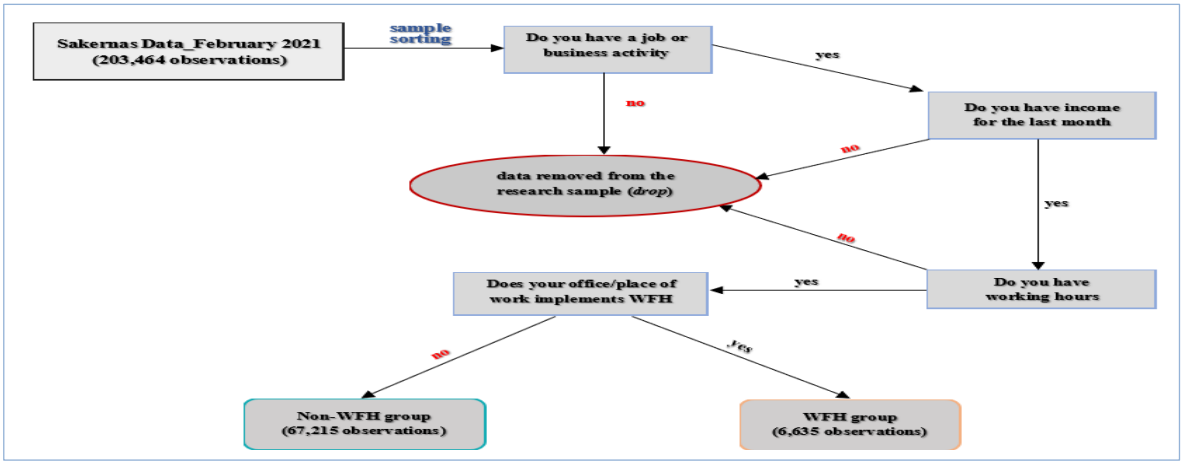

Figure 4. The Flow of Forming the Research Sample Data Set

Source : February 2021 Sakernas Data (author's calculation)

The dependent variable in this study is productivity (*productive*), which is obtained by proxy monthly income divided by monthly working hours. The main independent variable or variable of interest is Work From Home (WFH), represented as a dummy variable. The WFH variable takes a value of 1 if an individual is engaged in WFH and 0 if they are not. Additionally, other independent variables are included as control variables. The instrumental variable chosen for this study is working in a crowded place (*work_crowded*), also represented as a dummy variable. The *work_crowded* variable takes a value of 1 if an individual works in a crowded place on a daily basis and 0 if they do not.

The selection of the variable "working in a crowded place" (*work_crowded*) is based on three assumptions that must be fulfilled by an instrumental variable. The first assumption is relevance, which means that the instrumental variable, working in a crowded place, is relevant in explaining the WFH variable. There should be a strong correlation between these two variables, which can be verified through regression analysis. The second assumption is exogeneity, which means that the instrumental variable, working in a crowded place, is not correlated with unobserved factors and does not have a direct effect on the dependent variable, productivity, its influence can only be observed through the WFH variable. The third assumption is validity, which is supported by theoretical reasoning and arguments. It suggests that the variable working in a crowded place is valid to be an instrument for the WFH variable. Considering the

purpose of implementing WFH is to reduce direct social contact and minimize the spread of COVID-19, it is expected that the daily conditions of individuals working in a crowded place or not, will directly influence their decision to engage in WFH. If the instrumental variable chosen satisfies these three assumptions, it will be a strong instrument, and the estimated parameters will be consistent and more robust compared to the results obtained from the OLS method.

It is also necessary to note, that in a causality analysis, the estimation results obtained from the regression using the IV method cannot be directly identified as the Average Treatment Effect (ATE) on the population, as can be identified through the OLS method in randomized controlled trials (RCT). The estimation typically identified from regression using the IV method is the Local Average Treatment Effect (LATE), which can be interpreted as the average treatment effect within a specific subpopulation (Becker, 2016).

The Mincer equation model, which is commonly used in research related to workers' income or wages, will be adopted and modified to become a specification model in this study. The empirical strategy applied in this study to examine the impacts or influences of WFH implementation on individual work productivity (in terms of income and working hours) is through Two-Stage Least Squares (2SLS) IV regression. The regression model used in this study is as follows.

OLS Model :

$$\boldsymbol{productiv_i = \beta_0 + \beta_1\, WFH_i + \beta_2 X_i + u_i} \quad \textbf{(1)}$$

IV Model :

1st stage :

$$\widehat{WFH_i} = \boldsymbol{\alpha_0 + \alpha_1\, work\_crowded + \alpha_2\, X_i + u_i} \quad \textbf{(2)}$$

2nd stage :

$$\widehat{productiv_i} = \boldsymbol{\beta_0 + \beta_1\, \widehat{WFH_i} + \beta_2\, edu_i + \beta_3\, age_i + \beta_4\, exper_i + \beta_5\, d\_entrep_i + \beta_6\, d\_male_i + \beta_7\, d\_urban_i + \beta_8\, d\_marr_i + \beta_9\, d\_headHH_i + \beta_{10}\, toddler_i + \beta_{11}\, d\_course_i + \beta_{12}\, d\_net + \beta_{13}\, d\_sidejob_i + \beta_{14}\, d\_careHH_i + \beta_{15}\, position_i + \beta_{16}\, sector_i + u_i} \quad \textbf{(3)}$$

Information :

productiv	:	the dependent or outcome variable, proxied through dividing monthly income by monthly working hours of individuals, measured in thousands of rupiah per hour.
WFH	:	variable of interest, a binary dummy variable, taking a value of 1 if WFH is implemented and 0 if WFH is not implemented.
work_crowded	:	instrument variables a binary dummy variable, taking a value of 1 if the individual works in a crowded place (crowded if there are 5 or more people within a distance of less than 1 meter at the workplace) and value 0 if the individual does not work in a crowded place.
X		The vector of control variables includes individual characteristics.
edu	:	control variable, years of education completed by individuals, measured in years.
age	:	control variable, the age of individuals, measured in years
exper	:	control variable, represents the number of years of experience individuals have in their current job, measured in years
d_entrep	:	control variable, the employment status of the individual, a binary dummy variable, taking a value of 1 if the individual is an entrepreneur (self-employed) and 0 if the individual is an employee or worker.
d_male	:	control variable, gender, a binary dummy variable, taking a value of 1 if the individual is male and 0 if the individual is female.

d_urban : control variable, domicile residential administrative area, a binary dummy variable, taking a value of 1 if the individual's domicile is in an urban area (city) and 0 if the domicile is in a rural area (village).

d_marr : control variable, marital status of the individual, a binary dummy variable, taking a value of 1 if the individual is married and 0 if the individual is not married

d_headHH : control variable, the position of the individual in the household, a binary dummy variable, taking a value of 1 if the individual is the head of the household and 0 if the individual is a household member.

toddler : control variable, the number of children aged 5 years and below, living in the individual's household, measured in person.

d_course : control variable, certified job training/specific skills, a binary dummy variable, taking a value of 1 if the individual has undergone certified job training or specific skills, and 0 if the individual has not undergone such training

d_net : control variable, internet usage for work, a binary dummy variable, taking a value of 1 if the individual uses the internet for work purposes and 0 if not.

d_sidejob : control variables, side job, a binary dummy variable, taking a value of 1 if the individual has a side job or additional employment, and 0 if not.

d_careHH : control variable, taking care of the household, a binary dummy variable, taking a value of 1 if the individual performs household chores and 0 if the individual does not perform household chores.

position : control variable, the job position of the individual, a categorical dummy variable classified into 10 categories based on the KBJI 2014 (Klasifikasi Baku Jabatan Indonesia 2014/ Indonesian Standard Classification of Occupations 2014).

sector : control variable, the field of activity of individual work/business, a categorical dummy variable classified into 17 categories based on the KBLI 2020 (Klasifikasi Baku Lapangan Usaha Indonesia 2020/Standard Classification of Indonesian Business Fields 2020).

α, β : Coefficient parameters

u : unobserved factors (*error term*)

III. Result and Discussion

Based on the weighted statistical calculations, the data reveals a total of 79,967,807 observations in this study, only about 10.24% of respondents (8,190,806 individuals) stated that they implemented WFH, while 89.76% of respondents (71,777,001 individuals) stated that they did not practice WFH. The statistical data on respondent characteristics in this study are presented in the following Table 1.

Characteristics	WFH		No WFH		Total Observations
	Observations (obs)	Percentage (%)	Observations (obs)	Percentage (%)	79,967,807
	8,190,806	**10.24**	**71,777,001**	**89.76**	
Gender					
Man	4,133,005	8.01	47,481,437	91.99	51,614,442
Woman	4,057,801	14.31	24,295,564	85.69	28,353,365
Marital status					
Married	6,017,381	10.60	50,738,102	89.40	56,755,483
Not Married	2,173,425	9.36	21,038,899	90.64	23,212,324
Age (per 10 years)					
15-24 years old	793,206	7.29	10,085,412	92.71	10,878,618
25-34 years old	2,498,150	11.44	19,343,675	88.56	21,841,825
35-44 years old	2,224,998	10.89	18,198,574	89.11	20,423,572
45-54 years old	1,771,932	11.21	14,036,639	88.79	15,808,571
55 years old and over	902,520	8.19	10,112,701	91.81	11,015,221
Level of education					
Do not finish elementary school	62,288	1.01	6,105,288	98.99	6,167,576
Elementary School	222,263	1.27	17,262,855	98.73	17,485,118
Junior High School	298,680	2.12	13,803,264	97.88	14,101,944
Senior High School	1,282,769	7.92	14,920,881	92.08	16,203,650

Vocational High School	830,636	6.94	11,136,316	93.06	11,966,952
Diploma I/II/III	645,824	22.59	2,213,053	77.41	2,858,877
Diploma IV	156,386	37.78	257,562	62.22	413,948
S1/S2/S3	4,691,960	43.57	6,077,782	56.43	10,769,742
Domicile					
Urban Area	6,383,218	12.49	44,740,272	87.51	51,123,490
Rural Area	1,807,588	6.27	27,036,729	93.73	28,844,317

Table 1. Descriptive Statistics of Respondent Characteristics

Source : February 2021 Sakernas Data (author's calculation)

Furthermore, the summary of descriptive statistics for the variables in this study is presented in the following Table 2.

Variables	Number of Observations	Weighted	Means	Standard Deviation	Minimum Value	Maximum Value
productive	73,850	79,967,807	16.475	22.214	0.05	625
WFH	73,850	79,967,807	0.102	0.303	0	1
work_crowded	73,850	79,967,807	0.312	0.463	0	1
edu	73,850	79,967,807	10.401	4.290	3	18
age	73,850	79,967,807	39.203	13.052	15	98
exper	73,850	79,967,807	9.132	9.680	0	71
d_entrep	73,850	79,967,807	0.290	0.454	0	1
d_male	73,850	79,967,807	0.645	0.478	0	1
d_urban	73,850	79,967,807	0.639	0.480	0	1
d_marr	73,850	79,967,807	0.710	0.454	0	1
d_headHH	73,850	79,967,807	0.519	0.500	0	1
toddler	73,850	79,967,807	0.310	0.542	0	5
d_course	73,850	79,967,807	0.184	0.388	0	1
d_net	73,850	79,967,807	0.454	0.498	0	1
d_sidejob	73,850	79,967,807	0.122	0.328	0	1
d_careHH	73,850	79,967,807	0.838	0.369	0	1
position	73,850	79,967,807	6.032	2.406	0	9
sector	73,850	79,967,807	7.532	5.142	1	17

Table 2. Summary of Descriptive Statistics

Source: February 2021 Sakernas Data (author's calculation)

The results of the regression analysis are presented in the following Table 3.

Variables	OLS	1st Stage SLS of IV	2nd Stage SLS of IV
Independent ↓ / Dependent →	Productivity (thousand rupiah/hour)	WFH	Productivity (thousand rupiah/hour)
(1)	*(2)*	*(3)*	*(4)*
WFH *[variable of interest]*	**10.534***** (0.009)		**9.491***** (0.167)
Work in a crowded places (1 = crowded) ***[instrument variable]***		**-0.030***** (0.000)	
Control variables	YES	YES	YES
Constant	3.948*** (0.034)	-0.132*** (0.000)	3.805*** (0.041)
Number of Observations	79,967,807	79,967,807	79,967,807
R^2	21.70%	30.60%	

Table 3. Regression Results

standard errors is in parentheses, mark ***, **, * denote the significance level at 1%, 5%, and 10% respectively

Source: February 2021 Sakernas Data (author's calculation)

Based on the weighted regression results presented in Table 3, it can be observed that through OLS regression, the implementation of WFH has a significant positive impact on productivity. The OLS regression results can be interpreted as, on average and holding other factors constant, the group of

respondents who practiced WFH have a higher productivity, approximately Rp10,534.00 per hour compared to the group of respondents who did not practice WFH. However, it should be noted that the OLS model in this study suspected to have omitted variable bias (OVB), as the variable of interest is suspected to be correlated with unobserved factors. Therefore, it is expected that endogeneity issues that cause bias in the OLS regression estimates still exist. To address endogeneity, the next step is to conduct instrumental variable (IV) regression by including the influence of the instrumental variable "*work_crowded*" on the WFH variable.

In the first stage of IV regression, the result obtained at ceteris paribus is that the variable "working in a crowded place" has a significant impact on the decision to implement WFH at a significance level of 1%. On average, individuals who work in a crowded places have a 3% lower likelihood of adopting WFH compared to individuals who do not work in a crowded places. The significant regression result of the "working in a crowded place" variable indicates that it satisfies the relevance assumption as an instrumental variable.

Next, the second stage of IV regression is conducted, where the fitted value of the WFH variable, which is influenced by the "working in a crowded place" variable serving as an instrument, is included. The results obtained in the second-stage IV regression show a significant difference compared to the previous OLS regression. In the second-stage IV regression, it is estimated that, at ceteris paribus with a significance level of 1%, individuals who implemented WFH have a significantly higher productivity difference of Rp9,491.00 per hour on average compared to individuals who did not implement WFH within the sample. This indicates that WFH has a positive impact on individual work productivity during the COVID-19 pandemic. These findings are consistent with the research conducted by Barrero, Bloom, and Davis (2021) in the United States, which found a significant increase in worker productivity of approximately 4.6% due to WFH. Another study that aligns with the findings of this research is the study conducted by Deole, Deter, and Huang (2022) in the United Kingdom, where they found a positive impact of WFH, resulting in an approximately 8.5% increase in productivity per hour.

Indeed, the findings are in line with the expectations and goals of implementing WFH during the COVID-19 pandemic. Despite the need for social distancing, economic activities can still continue. As we are aware, at the early stages of the pandemic, many sectors experienced a significant downturn globally. In order to prevent prolonged economic stagnation, quick adaptation was necessary. As mentioned earlier, one of the adaptive measures taken in the workforce to ensure productivity during social distancing was the implementation of WFH, which had previously been an alternative working method in developed countries. However, in the context of the COVID-19 pandemic, this option suddenly became a global necessity, especially for office workers who have access to digital technology (OECD, 2020).

As previously explained, for the calculation of work productivity, Manning and Purnagunawan (2012) state that in the agricultural sector, which tends to involve more family workers with fewer working hours, the calculation of labour productivity differs slightly. In this case, productivity is measured at the household level, where it is calculated as the total income derived from all activities performed by household members divided by the number of working household members. Therefore, for the next analysis

as a robustness check, the IV regression will be conducted excluding respondents from the agricultural, forestry, and fisheries sectors. The results of this regression are presented in Table 4 below.

Variables	IV Method
Independent ↓ / Dependent	Productivity (thousand rupiah/hour)
(1)	*(2)*
WFH *[variable of interest]*	**9.691***** (0.171)
Control variables	YES
Constant	6.066*** (0.048)
Number of Observations	67,073,321

Table 4. IV Regression Results for Non-Agricultural Sector

standard errors is in parentheses, mark ***, **, * denote the significance level at 1%, 5% and 10% respectively

Source: February 2021 Sakernas Data (author's calculation)

Based on the regression results for the non-agricultural sector using the IV method, it can be concluded that, in a ceteris paribus setting and at a significance level of 1%, the *WFH* variable still has a significant positive impact on individual work productivity. On average, individuals who engaged in *WFH* in this sector have a larger difference in individual work productivity of approximately Rp9,691.00 per hour compared to those who did not engage in WFH. These results may be slightly higher compared to the IV regression results that include respondents from all sectors. However, the difference is not substantial.

In addition, this study also conducted a heterogeneity analysis as an additional. The heterogeneity analysis focused on the characteristics of respondents' residential areas, specifically differentiating between urban and rural areas. The regression results are as in Table 5 below.

Variables	IV Method	
	Rural	Urban
Independent ↓ / Dependent →	Productivity (thousand rupiah/hour)	Productivity (thousand rupiah/hour)
WFH *[variable of interest]*	**-25.976*** (0.377)	**12.784*** (0.206)
Control variables	YES	YES
Constant	5.221*** (0.068)	1.151*** (0.058)
Number of Observations	28,844,317	51,123,490

Table 5. Regression Results for Heterogeneity Analysis by Residential Area

standard errors is in parentheses, mark ***, **, * denote the significance level at 1%, 5%, and 10% respectively

Source: February 2021 Sakernas Data (author's calculation)

Based on the regression results presented in Table 5 above, it can be explained that for respondents residing in rural areas, the WFH variable has a significant negative impact on individual work productivity.

At a 1% significance level, on average, individuals who work from home had a lower work productivity by Rp25,976.00 per hour compared to those who did not work from home. On the other hand, for respondents residing in urban areas, the WFH variable still has a significant positive effect on individual work productivity, with an average increase of Rp12,784.00 per hour compared to those who did not engage in WFH. This finding can be understood, in the context of the COVID-19 pandemic, which has predominantly affected urban areas, in an effort to minimize the spread of COVID-19, WFH has been implemented more extensively in urban areas. In contrast, rural areas have generally experienced lower COVID-19 case numbers, leading to a less widespread adoption of WFH in these areas. Furthermore, this finding could also be influenced by various factors, such as infrastructure, work environment, and internet access, which still significantly differ between rural and urban areas. The differential impact of WFH on labour productivity between urban and rural areas highlights the importance of considering the specific context and characteristics of different regions when implementing WFH policies. It suggests that the effectiveness and relevance of WFH may vary depending on the local COVID-19 situation and the socio-economic dynamics of the area.

IV. Conclusion

Based on the analysis using the IV regression method on the Sakernas (February, 2021) data, the results show that the WFH variable has a significant positive impact on work productivity. At a 1% level of significance, individuals who engaged in WFH have a statistically significant higher productivity difference of Rp9,491.00 per hour on average compared to individuals in the sample who did not engage in WFH.

The findings of this research indicate that despite the COVID-19 pandemic situation, the implemented WFH policy can still maintain good work productivity when compared with the average between the group of workers who engage in WFH and those who do not. Although according to the border theory, the WFH system may tend to weaken or eliminate the boundaries between work and family, but based on the results of this research, the WFH method has a great chance to continue being implemented beyond the COVID-19 pandemic period, both within the private sector and government entities.

Based on surveys conducted by several institutions, a combined or hybrid Work From Home (WFH) and Work From Office (WFO) system, where employees alternate between working from home and working from the office on a weekly basis, has emerged as a popular choice among respondents. The flexibility and cost-saving benefits related to commuting of WFH has led many respondents to consider it as a viable work arrangement. However, since humans are inherently social beings, the need for interaction remains. As a result, the majority of respondents prefer a combination of WFH and WFO on certain days each week to ensure easier coordination of work. This allows for a balance between remote work and face-to-face interaction (Leprince-Ringuet, 2020).

V. Research Limitations and Suggestions

This research was conducted only by using secondary data in the form of cross-sectional data, specifically the Sakernas data for the first semester (February, 2021). The data was drawn from 75,000 households across Indonesia, selected randomly and proportionally by Central Statistics Agency (Badan Pusat

Statistik/BPS). The sample size is relatively smaller, accounting for only one-fourth compared to the Sakernas data for the second semester (August), which typically surveys 300,000 households.

The individual work productivity data in this study does not directly capture the actual output generated by workers due to limitations in the Sakernas data. Instead, productivity is proxied by dividing monthly income by monthly working hours. Therefore, for future research, it is recommended to utilize productivity data that can directly measure the output generated and the inputs used by workers. Additionally, if possible, employing panel data can provide more comprehensive insights and analysis.

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