COVID 19, Information and Communication Technology (ICT), and Digital Banking Effect on Entrepreneur Performance: Evidence from Indonesia Household Survey

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Abstraksi

Tujuan dari penelitian ini adalah untuk melihat bagaimana pengaruh kelimpahan teknologi informasi dan komunikasi (TIK) dan layanan perbankan digital terhadap produktivitas atau kesejahteraan wirausaha sebelum Pandemi (Maret 2020) dan Maret 2021 selama Pandemi. Penelitian ini menggunakan data SUSENAS dalam dua periode yaitu Maret 2020 dan SUSENAS Maret 2021. Dengan menggunakan beberapa teknik estimasi yaitu Generalized Method of Moment (GMM), 2 Stage Least Square (2SLS), dan Limited Information Maximum Likelihood (LIML), berdasarkan Variabel Instrumental (IV). Kami juga mencoba mengestimasi 2SLS dengan regresi Tobit pada Variabel Instrumental pada langkah estimasi tahap pertama. Hasil estimasi menunjukkan bahwa akses ICT dan digital banking berpengaruh positif dan signifikan terhadap peningkatan kinerja pengusaha dan pekerja. Secara spesifik menunjukkan bahwa peningkatan penggunaan TIK dan perbankan digital meningkatkan kesejahteraan pengusaha sebesar 4,24 persen pada masa prapandemi, dan pada masa pandemi sebesar 9,21 persen. Selain itu, pengaruh TIK dan perbankan digital terhadap kinerja pekerja sedikit lebih rendah dibandingkan dengan pengaruh TIK dan perbankan digital terhadap Wirausaha. Di masa pandemi, kebijakan pembatasan pergerakan penduduk diterapkan, dan para pengusaha, khususnya, dapat bertahan atau bahkan berkinerja lebih baik dengan mengoptimalkan ICT dan perbankan digital untuk mengembangkan bisnisnya melalui pasar dan transaksi digital.

Kata Kunci : Teknologi Informasi dan Komunikasi, Variabel Instrumen, Kesejahteraan rumah tangga wirausaha
JEL : C31, C36, D14, D10, D83

Abstract

The purpose of this study is to see how the influence of the abundance of information and communication technology (ICT) and digital banking services on entrepreneurial productivity or welfare before the Pandemic (March 2020) and March 2021 during the Pandemic. This study uses SUSENAS data in two periods, namely March 2020 and SUSENAS March 2021. By using several estimation techniques, Generalized Method of Moment (GMM), 2 Stage Least Square (2SLS), and Limited Information Maximum Likelihood (LIML), based on Instrumental Variable (IV). We also try to estimate 2SLS with Tobit regression on the Instrumented variable at the first stage estimation step. The estimation results show that access to ICT and digital banking has a positive and significant impact on improving the performance of entrepreneurs and workers. Specifically, it shows that the increased use of ICT and digital banking increased entrepreneurs' welfare by 4.24 percent in the pre-pandemic period, and during the pandemic by 9.21 percent. Moreover, the effect of ICT and digital banking on workers' performance is slightly lower compared to the effect of ICT and digital banking on entrepreneurs. During the pandemic period, the restriction policy of population movement was implemented, and entrepreneurs, especially, can survive or even perform better by optimizing ICT and digital banking to expand their business through digital markets and transactions.

Keywords : Information Communication Technology, Instrumental Variable, Household entrepreneurs productivity
JEL : C31, C36, D14, D10, D83

I. Introduction

Covid 19 pandemic has deteriorated most countries' economic performance including Indonesia. Growth performance, according to Badan Pusat Statistik (BPS), decreased from 5,02 percent in 2019 to -2,07 percent in 2020, and unemployment increased from 5,23 percent and 4,94 percent in August 2019 and February 2020 to 7,07 percent in August 2020. International trade also experienced a large contraction where export volume decreased from 654474,4 thousand tons in 2019 while in 2020 to 579678,2 thousand tons or decreased by 11,4 percent where which linearly lowered the total export value from 167683.0 million USD in 2019 and in 2017. 2020 to 163191,8 million USD or decreased by about 2,7 percent. This economic performance is certainly related to the existence of restrictions in interaction and the fear of the community to be free in economic activities, especially the type of economic activity that requires direct interaction between economic actors. Government policies that are in a dilemma between the choice of maintaining economic conditions and the level of risk of Covid-19 transmission are considered in overcoming this pandemic.

Every country is looking for gaps and sources of productive economic activity during the pandemic so that it becomes an engine of growth during the health and economic crisis in 2020. Every economic crisis is a test for economic actors whether they are able to withstand negative economic shocks and survive and even take profits during the crisis. The company, as an economic institution that carries out the process of producing and distributing goods during the pandemic, is certainly disturbed while operating during the pandemic due to the policy of limiting activity and mobility. Many studies have shown that during a pandemic, company performance declines, including Alsamhi et al., (2022); Fang et al., (2022); Hu & Zhang, (2021); Shen et al., (2020). However, these studies also state that the effect of the pandemic on company performance is influenced by many factors, including the condition of the country's health system, restriction policies, corporate governance, and commodity market conditions during the pandemic. Activity and interaction restriction policies implemented by all countries make companies have to try to operate by minimizing interaction, especially for activities that can be done from home. Promotions, administration, communication, complaints, ordering goods, and payments, as well as digital banking, are various activities that can be done online. This online work activity certainly requires the support of mastery of technology, both equipment, and related technical knowledge. Theoretically, firms that have information and communication technology endowment and literacy may have a higher probability of surviving during the restriction policy. Companies that are intensive in the use of online or internet-based communication and information facilities that are used in their routine activities have a lower probability of contraction, especially if the basis of economic transactions, types of business, and trade is online. Doerr et al., (2021) show that during the pandemic shock period, firms organized in regions with better digital infrastructure generated relatively higher revenue than firms organized in less-developed regions. Offices in a better digital infrastructure produced more increased earnings during the shock period

The study aims to identify the effects of the COVID-19 pandemic on entrepreneurial performance and analyze the role of access to information and communication technology including digital banking in determining entrepreneurial performance. The welfare of this entrepreneurial family is what is expected in the face of a pandemic and limited interaction. The drastic increase in unemployment during the pandemic requires the type of business that is expected to absorb this unemployment. This study focuses on entrepreneurial households either self-employed without workers, self-employed with unpaid workers and self-employed with paid workers. the contribution of access to technology and information as well as digital banking was investigated in this study in two periods, namely March 2020 and March 2021.

March 2020 as the starting point before the restriction policy and the Covid 19 case had not received the attention of many people. While March 2021 is taken as a year of turbulence where economic conditions are at stake after a one-year pandemic. The expectation from this study is that these household entrepreneurs have economic resilience in the face of the pandemic and the accessibility of information and communication technology plays a role in fighting economic contraction.

The next part of this paper is organized as the followings: First, section two describes the objectives of the study while section 2 provides a literature review of existing studies on how ICT plays a role to increase the productivity of firms. Section 3 describes the data used and analysis techniques employed to answer the research objectives. Section 4 examines the results and discussions, and Section 5 is the conclusion and policy recommendations.

II. Literature Review

1. To investigate the impact of the Covid-19 Pandemic on family entrepreneur performance. The entrepreneur is indicated as the person who is self-employed with or without workers both paid and unpaid workers.
2. To identify the role of information and communication technology (ICT) in determining the entrepreneur's performance during the Pandemic. Whether the abundance of accessibility of ICT may help the entrepreneur in dealing with the limitations of movement during the pandemic.
3. To identify the effect of digital banking access and access to finance on entrepreneur performance during the pandemic of Covid-19

III. Literature Review

This literature study section provides an overview of existing empirical studies on how the influence of financial digitization, and information and communication technology in supporting the resilience of entrepreneurs and provides some empirical evidence on how ICT supports firms during the economic crisis due to the COVID 19 pandemic. There are many studies proving the importance of ICT on firm performance here are some examples. Ahnert et al., (2021) prove that IT accessibility for entrepreneurs is important. Initial businesses that have access to IT are proven to be stronger and IT in banking boosts startup activity without lowering startup quality, and it also lessens the significance of distance from a location. Gërguri-Rashiti et al., (2017) show that the probability of firms undertaking innovation activities is higher with the increase in ICT usage while Arvanitis & Loukis (2009) found that there is a significant effect of ICT capital on firm productivity, and it is consistent with Gal et al., (2019). Theoretically, Other economic advantages of ICT from its use by homes and individuals according to OECD, (2011) as follows: firstly, household demand for ICT goods and services is a significant determinant of total demand, which may trigger the growth of the ICT sector and industries that rely heavily on ICT, such as media and entertainment, second, the spread of ICTs among households may result in a critical mass, allowing firms to reap the full benefits of switching to ICT, such as in product delivery. Third, the use of various ICTs at home may enable businesses to implement teleworking, which may benefit economically, socially, and environmentally.

During the COVID-19 pandemic, almost all countries implemented restriction policies for population movement and many activities were carried out from home so that it had an impact on many places where goods and services production activities could not operate temporarily. Communication, payment transactions, and communication and business

information are mostly done online, so the use of communication and information technology is very massive. This condition makes companies experience difficult conditions, especially companies that are not designed to interact online and prioritize direct transactions. Shen et al., (2020) show that companies are experiencing contraction due to COVID 19, in addition, Fang et al., (2022) find that firms with certain characteristics such as larger firms, firms with foreign or state ownership, and subsidiary companies performed better during the pandemic by more effectively stabilizing supply, managing liquidity, and generating new product development. CEOs with longer tenure have a higher chance of survival. Firms in wealthier countries have fared better in the face of the pandemic, thanks to more stringent government regulations. COVID-19 control policies have a history of undermining firm performance. However, Bai et al., (2021) show that firms with higher digital resilience, as measured by our pre-pandemic WFH index, generally performed better, especially in non-essential industries where WFH feasibility was required to continue operations. The ability to work remotely using digital technologies was also more important in non-high-tech industries than that in high-tech based. Moreover, Pierri & Timmer, (2020) find that in a location where firms applied more information technology, the unemployed workers due to social distancing are less responsive. Local IT adoption preserves the pandemic's labor market shocks for all individuals, regardless of gender or race, except for those with the lowest level of educational attainment.

IV. Data and Methodology

IV.1. Data

The data used in this research is SUSENAS (National Socio-Economic Survey) conducted by the Badan Pusat Statistik (BPS). This survey is conducted routinely twice a year, namely in March and September. This study uses 2 periods, namely March 2020 and March 2021. March 2020 is the time when the first cases of COVID-19 sufferers in Indonesia were found and there is no restriction policy on community activities, while March 2021 is a period where the pandemic has lasted one year, and no vaccine has been used in Indonesia massively by the community so this is a period that is still quite difficult for the economy even though it has started to improve compared to the whole of 2020. These two survey periods were chosen close together to avoid the possibility that more other unobserved factors could influence the outcome of the study. This can lead to a causal relationship being biased in the measurement. However, this study also uses the techniques described in the next section on how to better identify these causal relationships between interventions and outcomes. SUSENAS data is a survey of households and individuals covering many aspects of life, including household characteristics such as location, education, age, housing conditions, health, and consumption, as well as financial aspects such as income, investment, and savings covering all districts and cities in Indonesia. Indonesia. This study uses household and individual level microdata representing Indonesia.

Table 1. Operational Definition of Variables

No	Variable	Definition
1	Lnexp	The total value of consumption per month in one household. This variable is used as a proxy for the level of household welfare because the SUSENAS data set cannot access income. Total expenditure is also a basis for measuring and assessing poverty levels in Indonesia.
2	WH (Working Hours)	Weekly Working Hours

3	Noeduc	Dummy variable, where 1 if never attended at school, 0 otherwise
4	sd	Dummy variable, the value is 1 if the highest level of education is elementary, and 0 otherwise
5	smp	Dummy variable, the value is 1 if the highest level of education in junior high school, and 0 otherwise
6	sma	Dummy variable, the value is 1 if the highest level of education in senior high school, and 0 otherwise
7	univ	Dummy variable, the value is 1 if the highest level of education in a university degree, and 0 otherwise
8	Age	Age of household head
9	Age2	Age square of household head
10	HM (Household member)	Number of a household member
11	Mar	Marital status of household head
12	ICT*ebanking	The ICT variable is formed in several stages, including 1) Assessing ownership of communication and information facilities such as cellphones, computers, laptops, and tablets, or not having them. The score value of this variable is 1 for each equipment owned and 0 if it does not have any of the tools seen. So that from this stage this count is obtained between 0 to 4, 2) Assessing ownership of internet access which is worth 1 if it has an internet connection and 0 if it doesn't, 3) Assessing how location access is to the internet, such as in the office, home, public place, or in a mobile condition, which is also a dummy variable with a value of 1 to 7, 4) Measuring internet usage whether it is used for searching for information, learning, purchasing, selling, and digital banking. After these 4 stages are carried out, each measure is multiplied to find the interaction between ownership, information and communication equipment, access to the internet, and usage. The final score of this variable is between 0 to 224 which is the result of multiplying the score of ownership of ICT equipment and its utilization.
13	ebanking (Digital Finance)	This variable is the digital finance dummy variable which is worth 1 if you use internet access for digital finance and 0 if other and the dummy value so that this digifin score is between 0 to 4
14	Atbc (access to bank credit)	This variable is a dummy variable that shows access to financing or credit which is worth 1 if the respondent has good credit, people's business credit, credit from commercial banks other than KUR, and credit from People

		Credit Banks (BPR) and is 0 if other. The total score of this variable is 0 for the minimum and 3 for the maximum score
15	Gender	A dummy variable that shows the gender of the head of the household which is worth 1 if it is male and 0 if female
16	Sector	This variable is a variable where the respondent's business sector is worth 0 if the main occupation is agriculture, plantation, forestry, horticulture, fisheries, mining, and quarrying and is worth 1 if other
17	Loc	Dummy variable where 1 if you live in a rural location and 0 if other
18	Jaw	A dummy variable where 1 if you live outside Java island and 0 if other
19	Infokom	A dummy variable where the value is 1 if you work in the information and communication sector and 0 if you work in the other sectors
20	banking	Variable dummy where 1 if respondent work at banking and financial sector, and 0 otherwise

Table 2. Descriptive Statistics of Variables, the Year 2020

Variable	Obs	Mean	Std. Dev.	Min	Max	Frequency (Percentage)			
						Categories			
						0	1	2	3
Lnexp	585.643	1.568.875	.7053548	1.204.762	1.981.764				
age	585.643	41.63	13.86	10	97				
age2	585.643	1925.44	1227.49	100	9409				
work_hour	585.643	39.353	17.919	0	97				
hhsize	585.643	4.248.674	1.815.267	1	26				
tik	585.643	4.162.789	9.153.987	0	224				
marstat	585.643	0.8321	0.3738	0	1	98337 (16.79%)	487306 (83.21%)		
sd	559.308	0.2688	0.4433	0	1	408953 (73.12%)	150355 (26.88)		
smp	559.308	0.1706	0.3762	0	1	463881 (82.94%)	95427 (17.06%)		
sma	559.308	0.2972	0.4570	0	1	393099 (70.28%)	166209 (29.72%)		
univ	559.308	0.1243	0.3299	0	1	489792 (87.57%)	69516 (12.43%)		
gender	585.643	0.3838	0.4863	0	1	360844 (61.62%)	224799 (38.38%)		
sector	585.643	0.3771	0.4847	0	1	364797 (62.29%)	220846 (37.71%)		
ebanking	585.643	0.0460	0.2095	0	1	558692 (95.40%)	26951 (4.60%)		
infokom	585.643	0.0039	0.0622	0	1	583368 (99.61%)	2275 (0.39%)		
location	585.643	0.5998	0.4899	0	1	234368 (40.02%)	351275 (59.98%)		
jawa	585.643	0.2978	0.4573	0	1	411265 (70.22%)	174378 (29.78%)		
banking	585.643	0.0096	0.0977	0	1	580002 (99.04%)	5641 (0.96%)		
atbc	585.643	0.1510	0.3681	0	3	499,263 (85.25%)	84,422 (14.42%)	1,870 (0.32%)	88 (0.02%)

This table is the 2020 year's statistical descriptive table for all variables and all respondents included in the model analysis. This table does not separate entrepreneur respondents and worker respondents. The total number of observations is the total number of entrepreneurs and workers in the observation but in the estimation of the econometric model, these respondents are separated.

Table 3. Descriptive Statistics of Variables, the Year 2021

Variable	Obs	Mean	Std. Dev.	Min	Max	Frequency (Percentage)			
						Categories			
						0	1	2	3
Lnexp	588.187	15.695	0.695049	11.682	19.811				
age	588.187	41.31	13.918	10	97				
age2	588.187	1899.85	1229.19	100	9409				
work_hour	588.187	39.03	17.954	0	97				
hhsize	588.187	4.2373	1.8139	1	29				
tik	588.187	4.3299	8.7529	0	224				
marstat	588.187	0.8292	0.376316	0	1	100.450 (17.08%)	487.737 (82.92%)		
sd	563.893	0.2718	0.4449	0	1	410,647 (72.82%)	153,246 (27.18)		
smp	563.893	0.1835	0.3870	0	1	460,442 (81.65%)	103,451 (18.35)		
sma	563.893	0.2931	0.4552	0	1	398,604 (70.69%)	165,289 (29.31%)		
univ	563.893	0.1235	0.3290	0	1	494,25 (87.65%)	69,643 (12.35%)		
gender	588.187	0.3756	0.4843	0	1	367,245 (62.44%)	220,942 (37.56%)		
sector	588.187	0.4165	0.4930	0	1	343,21 (58.35%)	244,977 (41.65%)		
ebanking	588.187	0.0559	0.2297	0	1	555,308 (94.41%)	32,879 (5.59%)		
infokom	588.187	0.0040	0.0633	0	1	585,824 (99.60%)	2,363 (0.40%)		
location	588.187	0.5974	0.4904	0	1	236,789 (40.26%)	351,398 (59.74%)		
jawa	588.187	0.2980	0.4574	0	1	412,936 (70.20%)	175,251 (29.80%)		
banking	588.187	0.0089	0.0941	0	1	582,93 (99.11%)	5,257 (0.89%)		
atbc	588.187	0.1521	0.3687	0	3	500,696 (85.13%)	85,609 (14.55%)	1,797 (0.31%)	85 (0.01%)

This table is the 2021 year's statistical descriptive table for all variables and all respondents included in the model analysis. This table does not separate entrepreneur respondents and worker respondents. The total number of observations is the total number of entrepreneurs and workers in the observation but in the estimation of the econometric model these respondents are separated.

IV. 2. Econometric Model

Estimating the influence of ICT and digital financial accessibility and credit access to entrepreneurial business productivity is not easy to do with a direct estimate, this is because the three variables are not independent or random but theoretically interact with the level of individual welfare. The causal relationship between these variables is that families who have welfare can have information and communication equipment including the internet and can have access to bank credit, on the other hand, these variables have a positive impact on the welfare of household respondents. This endogeneity nature results in unclear interactions in the model estimation and results in a bias of the parameters (Wooldridge, 2020). One of the solutions offered in general is an experimental design research approach with random intervention. The SUSENAS data and this study were not designed specifically for the experimental study framework. The basic idea of this research requires an analysis of a causal relationship where variable x affects variable Y directly by ignoring the indirect effect of variable x on Y through other factors that cannot be observed in this study. This is the condition under which x can be considered exogenous; otherwise, it is said to be "endogenously determined" and traditional estimation through most Ordinary Least Square (OLS) techniques which certainly produces biased parameters (Cerulli, 2015).

The treatment effect approach used in this study is basically designed based on Instrumental Variable (IV) and estimated using three estimation techniques which are Generalized Method of Moment (GMM), Two Stage Least Square (2SLS), and Limited Information Maximum Likelihood (LIML). The generalized method of moments (GMM) estimation is a great work of advanced econometrics and is covered in most advanced econometric textbooks including Hamilton (1994); Hayashi (2000); Davidson & MacKinnon (2004); Greene (2012) and Wooldridge (2010). We briefly examine the GMM estimation a brief overview of the methodology and emphasize how the various GMM options are used.

The analogy principle, which states that we can estimate a parameter by changing a population moment condition with the sample analog, is the initial point for the generalized method of moments (GMM) estimation. The average of an independent and identically distributed (i.i.d.) population, for example, is formalized as the value written below:

$$E(y-u)=0 \rightarrow \frac{1}{N}\sum_{i=1}^{N}(y-\hat{u})=0 \rightarrow \hat{u}=\frac{1}{N}\sum_{i=1}^{N}y_i \qquad (1)$$

where N is the number of samples and yi is the ith y observation or respondents in our dataset. The estimator $\hat{u}$ is identified as the method of moments (MM) estimator because we began with a population moment condition and then used the analogy principle to get an estimator that is dependent on the observed value of the observation.

The general equation can be written as follow:

$$y_i=\alpha+\beta ICT*ebanking_i+\delta_i\sum_{i=1}^{n}X_i+\varepsilon_i \qquad (2)$$

Where y is the outcome of ICT, namely the welfare indicator with a measure of total consumption (Lnexp) and ICT is the ICT score and X is the variable of respondent's characteristics and ε_i is the error in equation 1. Equation 1 is derived to accommodate the possibility of bias in the estimation of the influence of ICT, so it is derived into a step equation to be estimated as in equation 2 as follows:

$$ICT * ebanking_i = \gamma + \theta_1 infokom_i + \theta_2 Loc_i + \theta_3 Jaw_i + \theta_4 banking_i + \mu_i \quad (3)$$

Equation 2 shows the estimation of stage 1 where the ICT*ebanking variable is determined by the infokom, loc, Jaw, and banking variables. These three variables are assumed to affect ICT and not vice versa. People who work in the infocom sector generally have ICT facilities, so it is not determined by the ability to buy independently, while urban and Java locations show higher accessibility in Java and urban geographic areas. Equation 2 model is fixed effect for ICT. The standard analysis of equation 2 generally uses a binary model because the treatment variables are binary, while in this study where the treatment variables are multi-level and not sequential between respondents, it is important to use a multinomial dependent variable analysis technique, namely Tobit regression. The Tobit model can generally be written as follows:

$$ICT * ebanking *= \beta_0 + x\beta + u, u|x \sim Normal(0, \sigma^2) \quad (4)$$

$$y = max(0, y*) \quad (5)$$

ICT*ebanking is the latent variable that fulfil the linear regression assumption especially normality, homoscedasticity, and linear conditional average. Equation 4 indicated variable y equals to variable y* at y*>0 and y=0 if y*<0. Because the continuously observed y is distributed as a positive value. In particular, the conditional y density on x is the same as the conditional y* density on x for positive values which can be formally written as:

$$\begin{aligned}(Py = 0|x) &= P(y *< 0|x) = P(u < -x\beta|x) \\ &= P(u/\sigma < -x\beta/\sigma|x) = \phi(-x\beta/\sigma) = 1 - \phi(x\beta/\sigma)\end{aligned} \quad (6)$$

The model in equation (6) is the main equation analyzed. This equation accommodates the influence of the abundance of information and communication technology owned by entrepreneurs on welfare.

$$Lnexp = \alpha + \beta \widehat{ICTebanking_i} + \delta_1 sd_i + \delta_2 smp_i + \delta_3 sma_i^2 + \delta_4 univ_i + \delta_5 Mar_i \quad (7)$$

$$+\delta_6 age_i + \delta_7 age_i^2 + \delta_8 wh_i + \delta_9 atbc_i + \delta_{10} sector_i + \delta_{11} wh_i + \delta_{12} gender_i + u_i$$

where $ICTebanking$ is the predicted value of interaction variable between ICT tools and access as well as the ebanking facilities and other variables are described in Table 1. The equation 7 is estimated by three methods to show the robustness of the results.

V. Analysis

The estimation results of the stages 1 and 2 models were carried out in several ways to see the results of several different methods. GMM, 2SLS, and LIML techniques are used in the estimation process. In addition, one of the methods we use is to estimate the main model using the Tobit regression estimation technique in stage 1 and 2SLS in the second stage. Estimates were also made of worker or non-entrepreneur respondents to compare how the impact of ICT and e-banking affects the productivity of the two different groups of respondents. The workers in question are workers in all sectors including government or private and the position of these workers is the main job and the main income contributor in the family. the results of the estimates in the last two years, namely March 2020 and March 2021, are shown in tables 6 to 9. The estimation of the econometric model is also followed by several post-estimation tests to consider its performance.

Tables 6 to 9 summarize the estimation results of instrumental variables with GMM, 2SLS and LIML but do not show the first stage of estimation or the results of equation 2 but for alternative methods with Tobit regression techniques are summarized in the table. this is only to streamline the tables and information to be analyzed. The estimation stage of equation 2 for the three GMM, 2SLS, and LIML methods shows significant results in the proposed exogenous variables, namely infocom, banking, and location. Consistent with the estimation results using Tobit. This shows that people who live on the island of Java, work in the information and telecommunications sector, and work in the banking and finance sector have access to an abundance of information and telecommunications technology and higher use of digital finance compared to other categories, both in the case of entrepreneurs and in the case of workers. and also happens for both 2020 and 2021. Stage 2 estimation results show satisfactory results in terms of the significance of each variable in the model, especially for the ICT*ebanking variable which is the center of our analysis. The predicted value of the ICT*ebanking variable in all models is significant and has a positive value, which means that access to information technology and the use of digital banking increases both the productivity of entrepreneurs and workers before and during the COVID-19 pandemic.

To analyze the exogeneity in the model against the selected instrument, this study uses a test developed theoretically by Lochner & Moretti (2015) and accommodated by Babington & Cano-Urbina (2016) for its application. A brand-new exogeneity test has been created by Lochner & Moretti (2015), and it is resistant to nonlinearities in the relationship between the outcome variable and a discrete putative endogenous variable. In many economic cases, nonlinear correlations naturally occur, like in the case of schooling and incomes, where it may be possible to identify sheepskin impacts of education on earnings. Even if the potentially endogenous variable enters the relationship nonlinearly in these circumstances, the estimating approach frequently assumes it does so linearly and uses the Hausman test. However, the Hausman test is useless for determining the exogeneity of the potentially endogenous variable when there are certain nonlinearities. The results of the three tests are consistent where the LM Wald, Naive Test, and DWH test show rejection of the exogeneity assumption and the estimate with IV shows a greater magnitude than OLS or Reweighted OLS (RWOLS). These results indicate that the selection of the Instrumental Variable technique is a good choice to accommodate the endogeneity of the ICT*ebanking variable. In addition, the three tests also consider non-linearity problems that may arise from the relationship between ICT*ebanking and respondents' welfare.

The three estimation techniques used in IV used by GMM, 2SLS, and LIML show that the instrument used is an instrument that is not strong enough based on the Sargan and Basmann test, which is significant below 1 percent. This condition can be caused by instruments that are not strong enough or heteroscedasticity conditions in the distribution of observations. However, each instrument used in this model is quite strong in its influence on endogenous variables which are estimated to be below 1 percent significance. This condition makes the need for alternative optimization procedures. Due to the condition of the data that is not designed for self-study but rather a routine survey conducted twice a year by BPS, there are limitations in developing options for instrument variables. Tobit Regression technique is needed for the estimation of stage 1 because the variation in numbers is between 0-224 if the maximum is used, the Tobit regression technique is used to produce a probability value from the ICT*ebanking score.

Based on the 2SLS estimation technique with Tobit regression in stage 1 it can be seen that the results that are quite significantly different are the coefficients but not in terms of significance which is the same as the previous estimate which produces significance in all

independent variables. Some conclusions related to the purpose of this study include. First, the ICT*ebanking variable has a significant positive value, which means that if respondents have access to information and communication technology and digital banking services, they can improve their welfare. In 2020, an increase in one unit of ICT*Banking scores increases the welfare of entrepreneurs by 4,24 percent. On the other hand, access to ICT*ebanking also increases the welfare of workers by 3,38 percent, which is slightly lower than the effect of ICT*ebanking on the welfare of entrepreneurs. Of course, this is easy to understand because ICT*banking does not have a direct impact on the workers where they work with the system implemented by the company, how much salary they will receive, and what their obligations are even though there are several types of workers whose productivity is directly affected by access to ICT and digital banking facilities. The contribution of ICT and online transactions to the productivity of the economy are investigated in many studies, Table 4 below gives some of them

Table 4. Studies of Internet Use Impact on Economy

1	Koutroumpis, (2009)	Investigate the effect of Broadband on growth, and the result finds that broadband has a positive effect on growth
2	Najarzadeh et al., (2014)	The study shows that the internet has a positive effect on labor productivity
3	Hsieh & Goel, (2019)	The results find that there is a positive causal relationship between internet usage and labor quality
4	Hagsten (2015)	Most findings show that there is a positive relationship between the proportion of broadband internet-accessed employees and labour productivity.
5	Navarro (2010)	The results imply that there is a large effect of internet use on individual income for both self-employed and salaried workers
6	Rohman & Bohlin (2013)	The study provides evidence that there is a minimum internet connection speed to get benefit from the access which is 2 Mbps to 4 Mbps

Sharing knowledge is the most important benefit of having access to an internet connection because it creates an information supply chain. Reduced production costs and information transfer increase availability and accessibility, which can reduce business uncertainty. As a result, lower uncertainty leads to more effective and efficient decision-making. The basic idea behind economic digitalization is that value-added is becoming increasingly concentrated in the current system.

Table 6. Estimation Results Year 2020 (Entrepreneur's Case)

Dependent Variable: lnexp	GMM		2SLS		LIML		2SLS with Tobit At the First Stage			
	Coefficient	Std. err.	Coefficient	Std. err.	Coefficient	Std. err.	Coefficient	Std. err.	Coefficient	Std. err.
ICT*ebanking	0,1779***	0,0070	0,1153***	0,0042	0,5617***	0,0320			0,0424***	0,0005
mar	0,0278**	0,0113	0,0285***	0,0066	0,1999***	0,0244			-0,0330	0,0027
age	0,0291***	0,0009	0,0286***	0,0007	0,0395***	0,0024			0,0168***	0,0004
age2	-0,0003***	0,0000	-0,0003***	0,0000	-0,0003***	0,0000			-0,0002***	0,0000
wh	0,0023***	0,0001	0,0023***	0,0001	0,0019***	0,0003			0,0027***	0,0000
sd	0,1057***	0,0037	0,1025***	0,0042	0,1365***	0,0140			0,0749***	0,0026
smp	0,2285***	0,0047	0,2253***	0,0050	0,2685***	0,0167			0,1848***	0,0029
sma	0,2755***	0,0054	0,2958***	0,0049	0,1176***	0,0198			0,3350***	0,0027
univ	0,0836***	0,0270	0,2897***	0,0168	-1,3210***	0,1180			0,7107***	0,0034
hhsize	0,1213***	0,0010	0,1198***	0,0008	0,1343***	0,0029			0,1119***	0,0005
gender	-0,0166***	0,0043	-0,0261***	0,0034	0,0725***	0,0127			-0,0264***	0,0016
sector	-0,2424***	0,0046	-0,2706***	0,0040	-0,0275	0,0204			-0,2469***	0,0018
atbc	0,1822***	0,0054	0,1891***	0,0039	0,1597***	0,0128			0,1764***	0,0021
infokom							9,929***	0,2408		
banking							5,707***	0,3900		
jawa							-2,387***	0,0243		
location							1,049***	0,0260		
Constant	14,145***	0,0252	14,200***	0,0176	13,434***	0,0760	3,340***	0,0221	14.413***	0,0139
var.e(tik)							3,068***	0,0870		
obs	234.511		234.511		234.511		248.953		234.511	
Wald Chi	42672.09		68624		6673.52					
Root MSE	0.86274		0.69435		2.267				0.57483	
Anderson-Rubin chi2			1415.79***							
Basmann F			471.897***							
LR Chi							15936.08			
R Square /Pseudo R Square							0.0101		0.3018	

Endogeneity Test of ICT*ebanking

LM Wald		Naïve Wald		DWH Test	
Test	P-Value	Test	P-Value	Test	P-Value
173,51206	1.265E-36	190,092353	2.00E-40	811,1187	4.18E-178

Table 7. Estimation Results Year 2021 (Entrepreneur's Case)

Dependent Variable: lnexp	GMM		2SLS		LIML		2SLS with Tobit At the First Stage			
	Coefficient	Std. err.	Coefficient	Std. err.	Coefficient	Std. err.	Coefficient	Std. err.	Coefficient	Std. err.
ICT*ebanking	0,1002***	0,0040	0,0794***	0,0033	0,4979***	0,0304			0,0921***	0,0022
mar	0,0353***	0,0075	0,0258***	0,0059	0,2759***	0,0259			-0,0137**	0,0052
age	0,0255***	0,0007	0,0248***	0,0006	0,0322***	0,0020			0,0228***	0,0005
age2	-0,0003***	0,0000	-0,0002***	0,0000	-0,0003***	0,0000			-0,0002***	0,0000
wh	0,0022***	0,0001	0,0022***	0,0001	0,0019***	0,0002			0,0021***	0,0001
sd	0,1010***	0,0036	0,1022***	0,0038	0,1193***	0,0128			0,0946***	0,0036
smp	0,2130***	0,0042	0,2134***	0,0045	0,2154***	0,0148			0,2034***	0,0041
sma	0,2971***	0,0046	0,3075***	0,0046	0,0787***	0,0217			0,3324***	0,0039
univ	0,3025***	0,0156	0,3681***	0,0129	-1,0690***	0,1066			0,6126***	0,0059
hhsize	0,1180***	0,0008	0,1169***	0,0007	0,1349***	0,0027			0,1147***	0,0007
gender	-0,0331***	0,0032	-0,0391***	0,0030	0,0597***	0,0119			-0,0586***	0,0027
sector	-0,2282***	0,0036	-0,2376***	0,0035	0,0263	0,0214			-0,2465***	0,0028
atbc	0,1784***	0,0039	0,1801***	0,0034	0,1380***	0,0118			0,1846***	0,0032
infokom							3,9062***	0,1774		
banking							-0,9625***	0,0179		
jawa							0,4102***	0,0190		
location							4,2545***	0,2874		
Constant	14,309***	0,0175	14,350***	0,0150	13,583***	0,0721	1,0019***	0,0163	14,462***	0,0127
var.e(tik)							16,8306	0.0474525		
obs	239,071		239,071		239,071		251,601		239,071	
Wald Chi	62546.68		80152.8		7511.09					
Root MSE	0.657		0.61838		2.094				0.57122	
Anderson-Rubin chi2			1874.94***							
Basmann F			624.937***							
LR Chi							15936.08			
Pseudo R Square							0.0101		0.2842	

Endogeneity Test of ICT*ebanking

LM Wald		Naïve Wald		DWH Test	
Test	P-Value	Test	P-Value	Test	P-Value
184,4484	4.24E-39	254,366	2.90E-54	402,983	1.46E-86

Table 8. Estimation Results Year 2020 (Worker's Case)

Dependent Variable: lnexp	GMM		2SLS		LIML		2SLS with Tobit At the First Stage			
	Coefficient	Std. err.	Coefficient	Std. err.	Coefficient	Std. err.	Coefficient	Std. err.	Coefficient	Std. err.
ICT*ebanking	0,0749***	0,0016	0,0578***	0,0011	0,1360***	0,0029			0,0338***	0,0004
mar	-0,0276***	0,0045	-0,0278***	0,0037	-0,0138**	0,0064			-0,0252***	0,0032
age	0,0092***	0,0006	0,0097***	0,0006	0,0074***	0,0010			0,0108***	0,0005
age2	-0,0001***	0,0000	-0,0001***	0,0000	0,0000***	0,0000			-0,0001***	0,0000
wh	0,0029***	0,0001	0,0030***	0,0001	0,0021***	0,0001			0,0031***	0,0001
sd	0,0718***	0,0038	0,0710***	0,0044	0,0860***	0,0075			0,0596***	0,0037
smp	0,1827***	0,0041	0,1835***	0,0048	0,1933***	0,0081			0,1686***	0,0040
sma	0,2976***	0,0042	0,3139***	0,0045	0,2514***	0,0079			0,3369***	0,0038
univ	0,3359***	0,0100	0,4235***	0,0077	-0,0186	0,0186			0,7215***	0,0043
hhsize	0,1177***	0,0008	0,1152***	0,0007	0,1276***	0,0012			0,1072***	0,0006
gender	-0,0142***	0,0029	-0,0151***	0,0025	-0,0116**	0,0042			-0,0179***	0,0021
sector	-0,2324***	0,0027	-0,2417***	0,0030	-0,2004***	0,0052			-0,2090***	0,0025
atbc	0,1463***	0,0041	0,1506***	0,0032	0,1444***	0,0054			0,1609***	0,0027
infokom							9,768***	0,2498		
banking							10,158***	0,1425		
jawa							-4,426***	0,0372		
location							0,492***	0,0394		
Constant	14,666***	0,0121	14,673***	0,0116	14,629***	0,0197	7,789***	0,0322	14,535***	0,0105
var,e(tik)							107,98	0,2632		
obs	324.797		324.797		324.797		336.690		324.797	
Wald Chi	87031,99		115995,22		41347,34					
Root MSE	0,7488		0,6662		1,131				0,57483	
Anderson-Rubin chi2			4025,43***							
Basmann F			1341,74***							
LR Chi							23687,52			
R Square /Pseudo R Square							0,0093		0,3388	

Endogeneity Test of ICT*ebanking

LM Wald		Naïve Wald		DWH Test	
Test	P-Value	Test	P-Value	Test	P-Value
841,7030	4,6E-185	1039,7232	4,17E-228	2664,1727	0

Table 9. Estimation Results Year 2021 (Worker's Case)

Dependent Variable: lnexp	GMM		2SLS		LIML		2SLS with Tobit At the First Stage			
	Coefficient	Std. err.	Coefficient	Std. err.	Coefficient	Std. err.	Coefficient	Std. err.	Coefficient	Std. err.
ICT*ebanking	0,0682***	0,0014	0,0555***	0,0010	0,1259***	0,0026			0,0362***	0,0004
mar	-0,0141**	0,0042	-0,0132***	0,0036	-0,0022	0,0058			-0,0100**	0,0032
age	0,0080***	0,0006	0,0082***	0,0006	0,0052***	0,0009			0,0095***	0,0005
age2	-0,0001***	0,0000	-0,0001***	0,0000	0,0000**	0,0000			-0,0001***	0,0000
wh	0,0026***	0,0001	0,0027***	0,0001	0,0021***	0,0001			0,0026***	0,0001
sd	0,0881***	0,0038	0,0886***	0,0044	0,0960***	0,0071			0,0792***	0,0038
smp	0,1892***	0,0041	0,1898***	0,0047	0,1913***	0,0076			0,1757***	0,0040
sma	0,3016***	0,0043	0,3146***	0,0046	0,2368***	0,0077			0,3426***	0,0039
univ	0,3421***	0,0094	0,4114***	0,0079	-0,0265	0,0180			0,7152***	0,0045
hhsize	0,1161***	0,0008	0,1132***	0,0007	0,1266***	0,0011			0,1046***	0,0006
gender	-0,0165***	0,0027	-0,0158***	0,0024	-0,0208***	0,0039			-0,0119***	0,0022
sector	-0,2043***	0,0026	-0,2123***	0,0028	-0,1574***	0,0048			-0,1861***	0,0024
atbc	0,1443***	0,0036	0,1486***	0,0031	0,1439***	0,0050			0,1564***	0,0027
infokom							8,596***	0,2308		
banking							9,020***	0,1397		
jawa							-4,675***	0,0352		
location							0,293***	0,0374		
Constant	14,712***	0,0115	14,724***	0,0111	14,689***	0,0178	8,091***	0,0304	14,575***	0,0103
var,e(tik)							9,640	0,2350		
obs	324.822		324.822		324.822		336.586		324.822	
Wald Chi	89664,70		116262,92		46174,73					
Root MSE	0,7034		0,6479		1,0409				0,5628	
Anderson-Rubin chi2			4419,08***							
Basmann F			1472,95***							
LR Chi							26168,84			
Pseudo R Square							0,0104		0,328	

Endogeneity Test of ICT*ebanking

LM Wald		Naïve Wald		DWH Test	
Test	P-Value	Test	P-Value	Test	P-Value
899,9416	1.01e-197	1.227,0047	8.25e-269	2.424,8321	0

During the COVID-19 pandemic in 2021, the influence of ICT and digital banking increased for entrepreneurs to 9,21 percent, an increase in the welfare of entrepreneurs due to the availability of access to ICT and digital banking. As for workers, the increase was smaller, from 3,38 percent to 3,36 percent during the pandemic. In addition, bank credit also had a significant impact both before and during the COVID-19 pandemic on both entrepreneurs and workers. Prior to the pandemic, bank credit had an impact of 17,64 percent on the welfare of entrepreneurs and increased to 18,46 percent during the pandemic. while for banking credit workers, the impact was 16 percent and during the pandemic, it decreased slightly to 15,64 percent. The COVID-19 pandemic, which was followed by government policies with restrictions on movement and community gathering activities, made adjustments by working at home or remotely. Entrepreneurs who need access to markets and online banking transactions provide their own benefits, especially for those who already have and are accustomed to transacting online. Of course, ICT facilities and digital banking services are crucial in conducting transactions.

VI. Conclusion and Policy Recommendation

VI. 1. Conclusion

Some points that can be concluded from this study include:

1. The ICT and digital banking variable have a significant positive effect on the welfare of entrepreneurs or workers. This means that the ownership of access to ICT and its use for useful activities such as seeking information, learning, buying and selling goods and digital banking transaction activities have an impact on increasing the welfare of entrepreneurs and workers.
2. The impact of ICT and digital banking is greater for entrepreneurs than for workers. This is understandable because of the dependence of entrepreneurs in the process of economic transactions which can be expanded and enlarged if transacting online with ICT facilities and digital banking services.
3. During the COVID-19 pandemic, the contribution of ICT and digital banking to the welfare of entrepreneurs increased compared to before the pandemic. However, the impact of ICT and online banking services on improving the welfare through the increase productivity of entrepreneurs during the pandemic is greater than the increase in the welfare of workers.

VI. 2. Policy Recommendations

1. There needs to be an increase in accessibility to information and communication technology and digital banking services for entrepreneurs. This accessibility does not only mean ownership but also literacy on the use of ICT for activities that can increase business productivity, including understanding digital banking services. Based on SUSENAS 2020 data, only 2,31 percent of entrepreneurs have access to digital banking services, while only 6,29 percent of workers have access to digital banking services. Moreover, 67 percent of entrepreneur does not access on ICT at all, while 40 percent of workers does not the access to ICT. It is necessary to expand the entrepreneurial understanding of the use of ICT and digital banking financial services.
2. Internet access, which is the main means of digital transactions, needs to be improved. These services include networks, prices and services, especially for people in rural areas to revive independent community economic activities such as entrepreneurship. Based on SUSENAS 2020 data, only about 33 percent of entrepreneurs have access to internet connection services. Other issues that must be addressed are the price and the quality (speed) of the internet connection. The price of internet connection (60 Mbps or More,

Unlimited Data, Cable/ADSL), and Utilities (Monthly) based on www.numbeo.com is ranked 2nd highest price after the Philippines in South East Asian countries, 52nd among 104 countries, and the speed is ranked 135th among 224 countries, in 2021 (https://www.cable.co.uk/broadband/speed/worldwide-speed-league/) and slower than Malaysia, Singapore, Philippines, Thailand, and Brunei. So that in terms of quantity and quality Indonesia is far more than enough.

3. The accessibility of the internet connection to support the economic development process in Indonesia is still facing challenges; disparity of access, high price, and the quality of connection must be comprehensively designed by the government in collaboration with stakeholders. The government takes several significant actions in terms of accessibility and the quality of internet connection. Every effort must be made to build an internet connection network throughout Indonesia as part of equitable development. If necessary (need research-based policy) a price subsidy for the leading, underdeveloped, and outermost regions can be designed to speed up internet access for every Indonesian citizen. This subsidy can be carried out gradually and also gradually removed for the sake of internet connection network business development and government budget sustainability

References

Ahnert, T., Doerr, S., Pierri, N., & Timmer, Y. (2021). Does IT Help? Information Technology in Banking and Entrepreneurship. *IMF Working Papers* No. 2021/214. https://doi.org/10.5089/9781513591803.001

Alsamhi, M. H., Al-Ofairi, F. A., Farhan, N. H. S., Al-ahdal, W. M., & Siddiqui, A. (2022). Impact of Covid-19 on firms' performance: Empirical evidence from India. *Cogent Business & Management*, *9*(1). https://doi.org/10.1080/23311975.2022.2044593

Arvanitis, S., & Loukis, E. N. (2009). Information and communication technologies, human capital, workplace organization and labour productivity: A comparative study based on firm-level data for Greece and Switzerland. *Information Economics and Policy*, *21*(1), 43–61. https://doi.org/10.1016/J.INFOECOPOL.2008.09.002

Babington, M. P., & Cano-Urbina, J. (2016). A test for exogeneity in the presence of nonlinearities. *The Stata Journal*, *16*(3), 761–777.

Bai, J. (Jianqiu), Brynjolfsson, E., Jin, W., Steffen, S., & Wan, C. (2021). Digital Resilience: How Work-From-Home Feasibility Affects Firm Performance. *NBER Working Paper* No. 28588 https://doi.org/10.3386/W28588

Cerulli, G. (2015). Econometric Evaluation of Socio-Economic Programs. In *Advanced Studies in Theoretical and Applied Econometrics* (Vol. 49). Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-662-46405-2

Davidson, R., & MacKinnon, J. G. (2004). *Econometric Theory and Methods*. Oxford University Press.

Doerr, S., Erdem, M., Franco, G., Gambacorta, L., & Illes, A. (2021). Technological capacity and firms' recovery from Covid-19. *Economics Letters*, *209*, 110102. https://doi.org/10.1016/J.ECONLET.2021.110102

Fang, S., Goh, C., Li, S., & Xu, L. C. (2022). Firm Resources, Strategies, and Survival and Growth during COVID-19: Evidence from Two-Wave Global Surveys. *World Bank Policy Research Working Paper* No 9997. https://openknowledge.worldbank.org/handle/10986/37294

Gal, P., Nicoletti, G., Rüden, C. von, Sorbe, S., & Renault, T. (2019). Digitalization and Productivity: In Search of the Holy Grail - Firm-level Empirical Evidence from European Countries. *International Productivity Monitor*, *37*, 39–71. https://ideas.repec.org/a/sls/ipmsls/v37y20192.html

Gërguri-Rashiti, S., Ramadani, V., Abazi-Alili, H., Dana, L. P., & Ratten, V. (2017). ICT, Innovation and Firm Performance: The Transition Economies Context. *Thunderbird International Business Review*, *59*(1), 93–102. https://doi.org/10.1002/TIE.21772

Greene, W. H. (2012). *Econometric Analysis Seventh Edition*. Upper Saddle River, New Jersey: Prentice Hall

Hagsten, E. (2015). Broadband connected employees and labour productivity: a comparative analysis of 14 European countries based on distributed Microdata access. E*conomics of Innovation and New Technology*, *25*(6), 613–629. https://doi.org/10.1080/10438599.2015.1105547

Hamilton, J. D. (1994). *Time Series Analysis*. Princeton University Press.

Hayashi, F. (2000). *Econometrics*. Princeton University Press.

Hsieh, E. W. Te, & Goel, R. K. (2019). Internet use and labor productivity growth: recent evidence from the U.S. and other OECD countries. *NETNOMICS: Economic Research and Electronic Networking*, *20*(2–3), 195–210. https://doi.org/10.1007/S11066-019-09135-2/TABLES/3

Hu, S., & Zhang, Y. (2021). COVID-19 pandemic and firm performance: Cross-country evidence. *International Review of Economics & Finance*, *74*, 365–372. https://doi.org/10.1016/J.IREF.2021.03.016

Koutroumpis, P. (2009). The economic impact of broadband on growth: A simultaneous approach. *Telecommunications Policy*, *33*(9), 471–485. https://doi.org/10.1016/J.TELPOL.2009.07.004

Lochner, L., & Moretti, E. (2015). Estimating and Testing Models with Many Treatment Levels and Limited Instruments. *The Review of Economics and Statistics*, *97*(2), 387–397. https://doi.org/10.1162/REST_A_00475

Najarzadeh, R., Rahimzadeh, F., & Reed, M. (2014). Does the Internet increase labor productivity? Evidence from a cross-country dynamic panel. *Journal of Policy Modeling*, *36*(6), 986–993. https://doi.org/10.1016/J.JPOLMOD.2014.10.003

Navarro, L. (2010). The impact of internet use on individual earnings in Latin America. *Development Research Working Paper Series*, No. 11/2010, Institute for Advanced Development Studies (INESAD), La Paz.

OECD. (2011). OECD guide to measuring the information society 2011. *OECD*. https://www.oecd.org/digital/ieconomy/oecdguidetomeasuringtheinformationsociety2011.htm

Pierri, N., & Timmer, Y. (2020). IT Shields: Technology Adoption and Economic Resilience during the COVID-19 Pandemic. *IMF Working Papers* No. 20/208.

Rohman, I. K., & Bohlin, E. (2013). Impact of broadband speed on household income: Comparing OECD and BIC. *24th European Regional Conference of the International Telecommunications Society (ITS): "Technology, Investment and Uncertainty"*, .

Shen, H., Fu, M., Pan, H., Yu, Z., & Chen, Y. (2020). The Impact of the COVID-19 Pandemic on Firm Performance. *Emerging Markets Finance and Trade*, *56*(10), 2213–2230. https://doi.org/10.1080/1540496X.2020.1785863

Wooldridge, J. M. (2010). *Econometric Analysis of Cross Section and Panel Data* (2nd ed.). MIT Press.

Wooldridge, J. M. (2020). *Introductory Econometrics: A Modern Approach* (7th ed.). Cengage Learning.