The Role of Internet Utilization Among SMEs on Household Welfare in Indonesia

Ariska N. Rini[a,*], & Lienggar Rahadiantino[b]

[a]Faculty of Economics and Business, Universitas Diponegoro, Semarang, Indonesia
[b]Faculty of Business and Technology Management, Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia

Abstract

The Internet has a significant influence on poverty alleviation and economic growth. Internet involvement in small-medium enterprises (SMEs) has the opportunity to create a better level of welfare. Using data from the fifth wave of the Indonesian Family Life Survey (IFLS), this study aims to analyze the impact of internet utilization on household welfare among two groups, household enterprises with internet use for business and without internet use for business. The results of the Propensity Score Matching (PSM) method mention that household enterprises with internet for business purposes have higher household per capita expenditure, food consumption, and non-food expenditure than household enterprises without internet use. Another interesting result finds that household enterprises are likely to use the internet only if household heads at a young age and business establish less than one year.

Keywords: internet utilization; SMEs; household welfare; household per capita expenditure; e-commerce.
JEL Classification: I3; L81; O30

_____

*Corresponding Author: Jln. Prof. H. Soedarto, S.H. – Tembalang Semarang, Indonesia 50275.
E-mail: ariskanurfajarrini@lecturer.undip.ac.id.

1. Introduction

In recent studies, there is no doubt that SMEs have an important role in economic growth in Indonesia. There are 114.14 million workforces that contribute to GDP (based on the constant price of 2000) around 1,526,918.8 billion, IDR341,341.6 billion investment Indonesia has a large number of Small Medium Enterprises (SMEs) (Kartika, 2019).

SMEs have rapid growth in five years recently. Data from The Ministry of Co-operatives and SMEs in 2014, there were 59.3 million SMEs in Indonesia: 98.7 percent are micro-enterprises, 1.15 percent were small-enterprises, and 0,1 percent were medium-enterprises. On the other hand, OECD (2018) reported that SMEs in Indonesia have special characteristics. In the majority of SMEs, they are still stuck in the informal sector business, low productivity, and capital. Indonesia SMEs are dominantly in the form of the family firm or household enterprise with self-employed and unpaid workers. However, ease of doing business and internet utilization has a great impact on developing the growth of Indonesian SMEs.

According to Deloitte (2015), only 18 percent of Indonesian SMEs are currently engaged in e-commerce through website use or social media, while only around 9 percent adopt more sophisticated e-commerce strategies. The same study found that intensive use of digital technologies (including social media, broadband, and e-commerce) would help SMEs increase their revenues by up to 80 percent, become 17 times more likely to introduce innovations, and become one-and-a-half times more likely for creating jobs. Regarding that, internet users in Indonesia up to 105 million in 2017, was predicted to increase to 140 million by 2022, digitalization strategies can help local SMEs to scale up and more productive.

As OECD (2018) reported, SMEs are dominantly in household enterprise format. Internet use gives the advantage to household welfare directly and indirectly effects. Direct effects come from the supply side, while indirect effects emerge from internet use (Kpodar & Andrianaivo, 2011). It provides employment opportunities to bridge network and access information. The use of the internet as indirect effects will boost the economy through the improvement of productivity gains, reduce transaction costs, and creating financial inclusion among households.

Welfens (2008) argues that the internet enables improvement in the process of product innovation, trade, and facilitates faster diffusion and distribution of knowledge. Internet use can also affect people's productivity due to its ability to provide entertainment. A study by Lesiuk (2005) established that an employee who was listening to music had altered mood to a more positive one. Further, this will increase the quality of work and shorten the time required to finish the job. This impact can finally increase enterprise revenue and labor income. Greenberg (2005) found that appropriate use of Information and communication technology (ICT) help households to collect market price information of commodities. This will eliminate intermediaries and increase household revenue. The

use of the internet also creates an opportunity to expand sales by enabling people to engage in an online transaction. In the case of Indonesia, the promotion of internet coverage has a positive impact on the monthly household income. This finding provides evidence of a new pathway to get out of poverty in rural areas (Ariansyah, 2018).

There are a few studies in the field which deliberate the impact of internet utilization among SMEs on household welfare. It might be an indirect impact, but still, SMEs have a relationship in household welfare, especially in poverty alleviation. Based on this background, this study aims to compare household welfare among two different groups of household enterprises with and without internet utilization. Household welfare is measured with per capita expenditure, household food consumption, and non-food consumption. PSM method is employed in this study to reduce endogeneity issues, especially different characteristics between treatment and control groups. With Indonesia Family Life Survey (IFLS) 2014 data, this study also considering gender household head due to different behavior among women and men to treat their business.

The paper proceeds as follows. Section 2 presents the literature review; section 3 offers data and methodology. Section 4 is our results and discussion. Finally, section 5 of this paper sets concluding remarks. The result shows that internet utilization has significant impacts on household welfare. Using three proxies to declare household welfare, internet utilization can increase household welfare in per capita expenditure, food expenditure, and non-food expenditure.

2. Literature Review

This section reviews the previous internet utilization studies on SMEs and household welfare. Many studies declared that the internet has a role in household welfare. The promotion of internet coverage has a positive impact on monthly household income (Ariansyah, 2018). Through the internet, entrepreneurs have the advantage of accessing the information resources needed to identify new business opportunities. East Asian SME entrepreneurs, find openness to people of all social classes, geographical locations, and network stability. Access to information provides benefits to a market expansion that has an impact on improving people's welfare (Kantis et al., 2002). Not only household welfare SMEs and the family firm also got the benefit of using appropriate Information and Communication Technology (ICT). It helps households to collect market price information of commodities, Greenberg (2005) found that intensive use of digital technologies (including social media, broadband, and e-commerce) would help SMEs increase their revenues by up to 80 percent (Deloitte, 2015).

Using the mobile phone had a positive and significant impact of around 5.6% until 15.3% on per capita household consumption during the period of 2006–2008 (Arifin, 2011). French et al. (2020) using RCT design to test the role of an app to educated SMEs to increase revenue. For those receiving the apps (the treatment group), statistically, significant improvements were found in a

number of measures designed to gauge 'financial knowledge, understanding and basic skills' and 'attitudes and motivations.' Blauw and Franses (2016) found that the duration of mobile phone ownership of the head of the household significantly impacts household development. M-banking and mobile browsing use are positively correlated with economic development. This may be because access to financial services is associated with a higher probability of being a business household. The Internet has benefits extending beyond higher market efficiency.

3. Data and Method

3.1. Data

This study uses household survey data originating from the fifth wave of the Indonesia Family Life Survey (IFLS) conducted in 2014. IFLS is a longitudinal data obtained from households in Indonesia. This survey was first carried out in 1993 and in subsequent years 1997, 2000, 2007, and 2014. The IFLS data provides information on demographics, socio-economic conditions, and respondent behavior at the individual, household, and community levels. The sample selection focuses on micro, small, and medium enterprises. The reason for selecting the sample is due to the low access to information in developing countries, such as Indonesia (Fletschner & Mesbah, 2011). The selection of the 2014 IFLS data was due to the use of internet utilization for business purposes only provided in that period. By considering various characteristics and information, we obtained a sample of 7,196. Due to this study aim to investigate the impact of internet utilization in household enterprises, the unit of analysis of this study is household.

3.2. Method

This study uses a matching method to get an estimate of the average treatment effect in the absence of selection bias or participation based on unobserved characteristics. Although a randomized control trial (RCT) is still considered the best standard approach to estimate the impact of treatment, intervention, and exposures (Austin, 2011). Therefore, the best experiments were carried out involving randomized mimics. Based on observations from a randomized control trial, the matching method tries to develop a counterfactual (control) group that is as similar as possible to the treatment group of the observed observational characteristics.

   The matching method, commonly known as Propensity Score Matching (PSM), is defined as a non-parametric approach used to find a comparison group from a non-treat selection group so that the characteristics observed from the selected group are similar to the treatment group. Groups are then matched based on propensity scores. PSM is useful when only the observed characteristics affect

Table 1: Variables Descriptions

Variable	Definition
Profit	Natural logarithm amount of total profit of household enterprise
Food expenditure	Natural logarithm amount of food expenditure of household
Non-food expenditure	Natural logarithm amount of non-food expenditure of household
Per capita expenditure	Natural logarithm per capita expenditure of household
Enterprise Characteristics	
Total paid workers	Total paid worker for the business
Mobile phone function	Dummy that takes the value of 1 using a mobile phone for business; 0 otherwise
Business over 1-year	Dummy takes 1 if business over than 1 year, and 0 otherwise
Food and beverages business	Dummy takes 1 if the type of business is food and beverages, and 0 otherwise
Having store	Dummy takes 1 if having a store, and 0 otherwise
Internet use for business	Dummy that takes 1 if internet use for business and 0 otherwise
Business assets	Natural logarithm quintiles of the respondent business assets: Poorest (20 percent), Second (20 percent), Third (20 percent), Fourth (20 percent) and Richest (20 percent)
Household characteristics	
Household size	The number of household size
Marital status	Dummy takes 1 if the respondent is married and 0 otherwise
Having a private toilet	Dummy takes 1 if the household of the respondent has a private toilet, and 0 otherwise
Age	Age of respondent
Education	Year of education of household head
Household head	Dummy takes 1 if household head is male, 0 otherwise
Community characteristics	
Urban	Dummy that takes the value of 1 if the respondent lives in a rural area and 0 otherwise.

Source: Indonesia Family Life Survey (IFLS) 2014

program participation (Khandker et al., 2010). This study, leaving only the difference between the two groups that use the internet for business purposes. The results of the control group are the right sample to provide missing information from the estimated treatment group results.

Tendency scores are an appropriate method for matching variables using balancing counts (Rosenbaum & Rubin, 1983). Caliendo and Kopeinig (2008) also explained that PSM could be done when observing treatment groups and non-treatment groups with the same propensity score values having an equal density score distribution. Therefore, PSM treat and untreated observation match the estimated probability of being treated.

This study uses PSM estimation to estimate the average treatment effect on the problem of the degree of selection bias on unobserved characteristics. PSM requires selection on observables assumptions when conditions on an appropriate set of observable attributes. Therefore, the existence of variability in range will automatically affect the selection process between treatment groups and control

groups. In this condition, the use of the internet for business purposes generally occurs in households.

3.2.1. The PSM Model

The main subject of the model consists of treating the outcome and controlling the outcome of the respondent. The results of the respondents' observations can be written as follows:

$$Y_i = D_i Y_{1i} + (1 + D_i) Y_{0i} \tag{1}$$

The equation above shows $D_i \in \{0, 1\}$ is a treatment indicator. D_i is 1 for the treatment group, i.e., if a household enterprise uses the internet for business purposes, while 0 is another. Y_i is the potential outcome of the household enterprise i. $Y_{1i} = 1$ is the potential outcome of the treatment group for the household enterprise, which uses the internet for business purposes. Conversely, $Y_{0i} = 0$ is a potential outcome of the control group for household enterprise i without internet use. Treatment effects on the treat (TOT) for household enterprise can also be written as follows:

$$\Delta_I 1 = Y_{1i} - Y_{0i} \tag{2}$$

The fundamental problem of causing counterfactual problems is that it is impossible to observe the potential outcomes of the treatment group (Y_{1i}) and the control group (Y_{0i}) at the same time. Therefore, there is only one potential outcome for each household enterprise that is observed, so the estimated effect of the treatment effect is considered impossible. This study, using the average treatment effect on the treat (ATET) to estimate the average household enterprise with internet use for business needs. ATET can be written as follows (Cameron & Trivedi, 2005):

$$ATET = E[\Delta | D_i = 1] \tag{3}$$

$$ATET = Y_{1i} - Y_{0i} + E[Y_1 - Y_0], D_i = 1 \tag{4}$$

$E[Y_{1i}, D_i = 1]$ is a potential result of household enterprise with internet use for business purposes and is considered as potentially observable. Observation $E[Y_{0i}, D_i = 1]$ is a potential result for those who do not use the internet and cannot be observed because it is a missing counterfactual. To calculate ATET, we must find a substitution for $E[Y_{1i}, D_i = 1]$. One thing that might be done is to use the potential outcomes of a household enterprise without internet use for business needs $E[Y_{0i}, D_i = 0]$. Because of the potential outcome of household enterprise with internet use for business need is $[Y_{0i}, D_i = 1]$ which is not observed in the same period when the respondent receives treatment, ATET can be assumed to be:

$$ATET = E[Y_{1i}, D_i = 1] - E[Y_{0i}, D_i = 0] \tag{5}$$

At this stage, ATET is the result of average selection bias, which is the difference between the potential outcomes of household enterprises that use the internet $[Y_{1i}, D_i = 1]$ and the potential outcomes of household enterprises that

use the internet $[Y_{0i}, D_i = 0]$.

4. Result and Discussion

4.1. Descriptive Analysis

Due to this study aim to investigate the impact of internet utilization in household enterprises, the unit of analysis of this study is household. Table 2 reports summary statistics for 7,196 households in the survey, compared to all of the Indonesia population. The average of total paid workers is one for our samples study. Meanwhile, the average of the business asset of our sample is IDR37.8 million. These two criteria imply that most of our sample study are classified as micro-enterprises.

This study is also regarding household characteristics as the background of each enterprise. The main characteristics of our samples are household size. The average of our samples has four household members. This will impact of household welfare, especially household's per capita expenditures. The average of per capita expenditure of our sample is Rp938,464 per month.

The average education years of household head are 7.9 years. Moreover, the average of the sample is completed elementary school and stop education in the second grade of junior high school. IFLS classified the resident area into two groups, urban and rural areas. Most of our samples are living in an urban area. Compare to the rural area, the differentiation of urban and rural areas is not significant.

Table 3 summarizes total enterprises based on two criteria: total asset and total paid workers. Consistent with Table 2, most of our samples classified as micro-enterprises based on two criteria.

Table 4 provides household enterprise characteristics. The data distributed by internet use for business, column (1) shows the percentage of total businesses that use the internet in their operational activities. Based on total paid workers, enterprises without workers dominate internet users in each category. It implies that the internet in their operational activities is helping them to substitute workers. It is evident that enterprises with internet use are more efficient than enterprises without internet use.

Moreover, the internet also could cut other costs, such as having a store. Enterprises with internet use, dominated by enterprises without having a store. In this case, the internet is used for them to sell products and online transactions. According to business profit, enterprises with internet uses are more profitable than enterprises without internet use.

4.2. Propensity Score Matching Analysis

This study applied Propensity Score Matching (PSM) to compare the performance of household enterprise which use the internet and without internet for their

Table 2: Descriptive Statistics

	Observation	Mean	Std. dev	Min.	Max.
Enterprise Characteristics					
Profit (ln)	6,998	15.690	2.635	0	20.849
Mobile phone use for business	7,196	0.499	0.500	0	1
Internet use for business	7,196	0.065	0.246	0	1
Business asset	7,196	IDR37,800,000	14,100,000	0	2,210,000,000
Total paid workers	7,178	0.865	10.552	0	560
Age of business:					
Business over 1 year	7,196	0.827	0.377	0	1
Food and beverages business	7,196	0.428	0.494	0	1
Having store	7,196	0.214	0.410	0	1
Household Characteristics					
Household size	7,196	4.249	1.780	1	15
Per capita expenditure (ln)	6,638	13.752	0.633	11.553	16.329
Urban	7,196	0.623	0.484	0	1
Having private toilet	7,196	0.871	0.334	0	1
Marital status	7,196	0.915	0.277	0	1
Age of household head	7,195	45.610	12.727	15	101
Year of education of household head	7,196	7.911	4.340	0	22
Male household head	7,196	0.464	0.498	0	1

Source: Authors' calculations based on IFLS data (2014)

Table 3: Household Enterprises Classification Based on Size

Business Size	Total Enterprises
Micro:	
0–4 workers	6,951
Business asset < IDR50,000,000	6,235
Small:	
5–19 workers	196
Business asset IDR50,000,001–IDR500,000,000	836
Medium:	
20–99 workers	27
Business asset IDR500,000,000–IDR10,000,000,000	126

Source: Authors' calculations based on IFLS data (2014)

operational activities. Measured in terms of household welfare proxied by per capita expenditure, food expenditures, non-food expenditure. PSM provides an effective way to disentangle whether any internet user and non-internet user variations in performance are a reflection of differences in the specific in terms of business type, ages, and sizes, or some features of the circumstances of using the internet in their operational activities.

Table 5 summaries comparisons of treatment and control groups in this study. According to the t-test, on mean differences show that outcomes variables in the

Table 4: Household Enterprises Characteristics Based On Internet Usage for Business

Business Profile	Businesses in each category	
	Internet User (1)	Non Internet User (2)
Size		
Without workers	50.67%	80.97%
Micro (1-9 workers)	41.54%	18.32%
Small (10-49 workers)	6.85%	0.55%
Medium (50-249 workers)	0.42%	0.08%
Business Asset		
<IDR50,000,000	67.80%	11.78%
IDR50,000,001–IDR500,000,000	26.01%	10.36%
IDR500,000,001–IDR10,000,000,000	6.20%	1.42%
Type of Business		
Food and Beverages	10.44%	45.11%
Non-Food and Beverages	89.55%	54.88%
Age of Business		
>1 year	78.67%	83.08%
Average Profit	IDR18.762.110.59	IDR6.627.511
Owning Store		
Having store	33.90%	20.63%
Does not have a store	66.09%	79.36%

Source: Authors' calculations based on IFLS data (2014)

two groups are significantly different. It implies that we can use those outcomes to distinguish the impacts of internet utilization on household welfare. Meanwhile, some covariate variables are not significantly different among the two groups; they are household size, marital status, and business assets in the third group.

4.2.1. The Likelihood of Household Enterprises Using Internet

Table 6 is the result of probit regression models concerning the probability of a household enterprise to use the internet. Probabilities of internet use in household enterprises are affected by residence area, household size, age of household head, marital status, mobile phone use, type of business, age of business, and business assets. An interesting result found that household enterprises are likely to use the internet if the household head at a young age. The less age of household head, the more probabilities of household enterprises use the internet in their business. Diao et al. (2018) explain that younger household heads are more educated than the older ones. Another interesting result that household enterprises tend to use the internet in business under one year. It implies that start-up businesses are more engaged in e-commerce through website use or social media than a business which exists for more than one year.

As we declared before, this study also considering gender household head to predicts probabilities internet use to their household enterprises. Table 5 shows that gender is not a significant impact on internet use for their business. It implies that either man or woman's household head is open to using the internet as their medium to increase their revenue.

Table 5: Comparisons Between Treated and the Matched Control Group

Variables	Mean		t-test on mean differences	
	Internet User	Non Internet User	t-stat	p>t
Outcomes				
Per capita expenditure	14.184	13.725	-14.059	0.000
Food expenditure	14.574	14.132	-11.759	0.000
Non-food expenditure	14.866	14.265	-14.488	0.000
Profit	16.719	15.618	-8.696	0.000
Covariates				
Household head	0.501	0.461	-1.658	0.097
Household size	4.313	4.245	-0.803	0.421
Education year	11.829	7.638	-20.817	0.000
Marital status	0.918	0.915	-0.246	0.805
Age of household head	40.68	45.96	8.735	0.000
Urban	0.778	0.612	-7.188	0.000
Having store	0.339	0.206	-6.783	0.000
Business over one year	0.786	0.83	2.444	0.014
Mobile phone use	0.955	0.467	-21.053	0.000
Dummy food and beverages business	0.104	0.451	14.891	0.000
Business asset quintile-1	0.136	0.256	5.843	0.000
Business asset quintile-2	0.155	0.248	4.531	0.000
Business asset quintile-3	0.257	0.258	0.024	0.980

Source: Authors' calculations based on IFLS data (2014)

Table 6: Internet Utilization Probit Model

Dependent Variable: Internet utilization	Parameter Estimates	
	Coeff	SE
Gender household head	0.028	0.060
Urban	0.267***	0.067
Household size	0.033*	0.018
Age	-0.006**	0.002
Marital status	-0.328**	0.114
Mobile phone use	1.049***	0.093
Having store	0.029	0.067
Food and beverages business	-0.788***	0.086
Business over one year	-0.379***	0.076
Business asset quintile-1	-0.258**	0.060
Business asset quintile-2	-0.234**	0.090
Business asset quintile-3	-0.153**	0.074

Note: the dependent variable is internet utilization
where 1 is for user and 0 otherwise.
*Significant at 10 percent, **significant at 5 percent,
***significant at 1 percent.

4.2.2. The Effects of Internet Utilization on Household Enterprises

Table 7 presents the average treatment effects of the PSM method. This study employs three matching techniques: Nearest-Neighbour, Stratification, and Ker-

nel matching technique. As the following output shows, internet utilization for business does have significant impacts on household welfare in three outcomes (ln per capita expenditures, ln food expenditures, and ln non-food expenditures). Using nearest-neighbor matching, internet utilization for business increases ln per capita expenditure by 19.2 percent. With stratification matching, internet utilization on household enterprises increases ln per capita expenditure by 25.7 percent. Consistent with Nearest-neighbour and stratifications matching, using Kernel matching internet utilization for business will increase 27.1 percent ln per capita expenditure. The impact is significant at 5 percent level.

Consistent with Deloitte's report (2015), internet use gives SMEs, including household enterprise effects, to increase their revenues by up to 80 percent. This revenue indirectly would increase household welfare, such as per capita expenditure, food, and non-food per capita expenditures. Internet as their medium to a promotion, transaction, improvement in the process of product innovation, trade, and expand sales. Meanwhile, using three matching methods, internet utilization for business is not a significant impact on ln profit of household enterprises. However, using the average treatment on treated group internet utilization has a positive and significant impact on the 5 percent level. It implies that a business which has been using the internet for their operational activities get high profit, however, it cannot be ascertained that business without the internet has a lower profit.

Table 7: The Effects of Internet Utilization on Outcome Variables

Matching Technique	Ln per capita expenditures (SE)	Ln food expenditures (SE)	Ln non-food expenditures (SE)	Ln profit (SE)
PSM (ATET)	0.231***	0.209***	0.286***	0.321**
	(0.045)	(0.046)	(0.055)	(0.161)
Nearest-Neighbour	0.192*	0.236**	0.251*	0.43
	(0.051)	(0.052)	(0.059)	(0.182)
Stratification	0.257**	0.240**	0.282**	0.471
	(0.034)	(0.034)	(0.043)	(0.124)
Kernel	0.271**	0.264**	0.302**	0.608
	(0.034)	(0.031)	(0.045)	(0.132)

Note: *Significant at 10 percent, **significant at 5 percent, ***significant at 1 percent SE is the standard error.
ATET is the average treatment effect on the treated.

According to Khandker et al. (2010), there are several ways to check the robustness of findings using the PSM method. One approach is to use different matching methods to compare the results. This study's results with three matching techniques are quite consistent.

5. Conclusion

In this study, we examine the impacts of internet utilization on household enterprises on household welfare. This study provides more depth result in the impact of household enterprises, which have been facilitated internet connection to their household welfare. We use per capita expenditure, food expenditure, and non-food expenditure as proxies of household welfare. By using data from the Indonesian Family Life Survey (IFLS) for the 2014 period, we involved 7,169 households in Indonesia. PSM method with probit regression was employed to match business characteristics and household characteristics to decrease the issue of the degree of selection bias on unobserved characteristics.

The results show that the likelihood of household enterprise using the internet is affected by residence area, household size, age of household head, marital status, mobile phone use, type of business, age of business, and business assets. This finding further strengthens the evidence that household enterprises are likely to use the internet if the household head at a young age and if business establishes less than one year. It implies that start-up businesses are more engaged in e-commerce through website use or social media than the business which exists for more than one year.

Our findings also found that internet utilization for business has positive impacts on household welfare. Internet as their medium to a promotion, transaction, improvement in the process of product innovation, trade, and expand sales. Internet use gives SMEs, including household enterprise effects, to increase their household welfare by up to 30 percent.

Since this study only focuses on household welfare outcomes, the impact of internet utilization on to profit of household enterprise is not further explained. To future research, our study is encouraging to analyze the impact of internet engagement on household enterprise performance, including profit.

References

[1] Ariansyah, K. (2018). The Importance of the internet on improving economic welfare: An empirical evidence from Indonesian rural household. In *2018 International Conference on ICT for Rural Development (IC-ICTRuDev)* (pp. 118-123), Badung Regency, Indonesia. doi: https://doi.org/10.1109/ICICTR.2018.8706868.

[2] Arifin, Z. (2011). *The impact of mobile phones on household welfare in Indonesia: Evidence and implications* (Doctoral dissertation, University of Pittsburgh). https://core.ac.uk/download/pdf/12210477.pdf.

[3] Austin, P. C. (2011). An introduction to propensity score methods for reducing the effects of confounding in observational studies. *Multivariate Behavioral Research, 46*(3), 399-424. doi: https://doi.org/10.1080/00273171.2011.568786.

[4] Blauw, S., & Franses, P. H. (2016). Off the hook: measuring the impact of mobile telephone use on economic development of households in Uganda using copulas. *The Journal of Development Studies, 52*(3), 315-330. doi: https://doi.org/10.1080/00220388.2015.1056783.

[5] Cameron, A. C., & Trivedi, P. K. (2005). *Microeconometrics: Methods and applications*. Cambridge: Cambridge University Press.

[6] Caliendo, M., & Kopeinig, S. (2005). Some practical guidance for the implementation of propensity score matching. *IZA Discussion Paper, 1588*. IZA Institute for the Study of Labor. https://www.iza.org/publications/dp/1588/some-practical-guidance-for-the-implementation-of-propensity-score-matching.

[7] Deloitte. (2015). *SMEs powering Indonesia's success: The connected archipelago's growth engine*. Sydney: Deloitte Access Economics.

[8] Fletschner, D., & Mesbah, D. (2011). Gender disparity in access to information: do spouses share what they know?. *World Development, 39*(8), 1422-1433. doi: https://doi.org/10.1016/j.worlddev.2010.12.014.

[9] French, D., McKillop, D., & Stewart, E. (2020). The effectiveness of smartphone apps in improving financial capability. *The European Journal of Finance, 26*(4-5), 302-318. doi: https://doi.org/10.1080/1351847X.2019.1639526.

[10] Greenberg, A. (2005, November). *ICTs for poverty alleviation: Basic tool and enabling sector*. ICT for Development Secretariat, Department for Infrastructure and Economic Cooperation. Montreal, Quebec: Sida. https://www.sida.se/contentassets/e2425616ca0542e0a55270d5087e0c3a/icts-for-poverty-alleviation_1080.pdf.

[11] Kantis, H., Ishida, M., & Komori, M. (2002). Entrepreneurship in emerging economies: The creation and development of new firms in Latin America and East Asia. Washington, DC: Inter-American Development Bank. https://publications.iadb.org/en/publication/11496/entrepreneurship-emerging-economies-creation-and-development-new-firms-latin?eloutlink=imf2adb.

[12] Kartika, M. (2019). Public service and micro-small enterprise developments in Indonesia. *Integrated Journal of Business and Economics, 3*(1), 108-115. doi: http://dx.doi.org/10.33019/ijbe.v3i1.103.

[13] Khandker, S., B. Koolwal, G., & Samad, H. (2009). *Handbook on impact evaluation: quantitative methods and practices*. The World Bank. doi: https://doi.org/10.1596/978-0-8213-8028-4.

[14] Kpodar, K., & Andrianaivo, M. (2011). ICT, financial inclusion, and growth: Evidence from African countries. *IMF Working Paper, WP/11/73*. International Monetary Fund. https://www.imf.org/en/Publications/WP/Issues/2016/12/31/ICT-Financial-Inclusion-and-Growth-Evidence-from-African-Countries-24771.

[15] Lesiuk, T. (2005). The effect of music listening on work performance. *Psychology of Music, 33*(2), 173-191. doi: https://doi.org/10.1177/2F0305735605050650.

[16] OECD. (2018). *SME and entrepreneurship policy in Indonesia 2018* (Policy highlights). OECD Studies on SMEs and Entrepre. Paris: OECD Publishing. http://www.oecd.org/publications/sme-and-entrepreneurship-policy-in-indonesia-2018-9789264306264-en.htm.

[17] Rosenbaum, P. R., & Rubin, D. B. (1983). The central role of the propensity score in observational studies for causal effects. *Biometrika, 70*(1), 41-55. doi: https://doi.org/10.1093/biomet/70.1.41.

[18] Welfens, P. J. (2008). ICT–productivity and economic growth in Europe. In P.J.J. Welfens & E. Walther-Klaus (eds), *Digital Excellence* (pp. 13-39). Springer, Berlin, Heidelberg.

this page intentionally left blank