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Gender Divides in the ASEAN Payment Eco-system

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Gender Divides in the ASEAN Payment Eco-system*

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July 2, 2021

Abstract

Financial services, particularly payments, have significantly transformed over the years due to rapid changes in technology. ASEAN has witnessed changing consumer behaviour towards e-commerce and e-payments. With an upsurge of e-wallet providers in the Asia Pacific region, digital payments using mobile money has witnessed a surge in ASEAN. Does the digital payment usage in ASEAN reflect equally for all sections of the population, particularly along gender divides? We investigate this question using the 2017 Global Findex Database survey data. Key findings from our empirical results show that a) women are more likely than men to use traditional payment methods like cash, b) the gender gap persists in more digital payment modes like mobile money, c) age exacerbates the gender divide in the usage of financial institutions for payments, and d) the gender divide in mobile money usage is larger for more developed ASEAN countries like Singapore and Malaysia.

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1 Introduction

The Coronavirus 2019 (COVID-19) pandemic has accelerated the adoption of digital payments. While such technological advancement is welcomed as it improves transaction efficiency, it is also possible that certain groups of consumers are left behind, resulting in what is commonly known as a digital divide. Among these consumer groups, women are usually thought to be disadvantaged to men, due to historical and cultural reasons. In this paper, we examine the gender divide in digital payments in the member states of the Association of Southeast Asian Nations (ASEAN).

The ASEAN region, with its unique cultural and historical background, serves as an interesting and novel platform to study gender gaps in payment channels. Southeast Asia is home to numerous matrilineal societies, in which women take the dominant role in household finances and decision-making, and land ownership. The women of the Minangkabau - the largest matrilineal society globally - and the Javanese societies of Indonesia and Malaysia play a central role in their households and wider economies. Within their communities, women are believed to have thrift and foresight in handling money which men generally lack (Papanek and Schwede, 1988). Meanwhile, the Cham people of Vietnam prioritise women's access to land and are notable for their customary inheritance hierarchy along the female line (Phan, 2019). Pre-colonial Filipino women could own or inherit family property and engage in trade, in which this matriarchial tradition remains generally intact despite being challenged by centuries of patriarchal-oriented colonial rule (Daniels, 2017).

Today, women of Southeast Asia are largely geographically mobile, necessitating and expediting financial account ownership for storing and remitting money back home. Since 1970, most female migrants originated from the Philippines and Indonesia, where women comprise between 60 to 80 percent of migrants legally deployed yearly (Asis, 2003). Domestically, women's participation in education attainment and employment has been accelerating in Southeast Asia in recent years, contributing to greater financial activity among women (Llanto and Rosellon, 2017).

In light of the interesting gender context of ASEAN, our main contribution to the literature lies in examining the existence of gender divides in the ASEAN payment eco-system. We investigate different payment channels that encompass traditional and digitised forms by constructing a cross-sectional dataset on individual payment usages in the ASEAN member states using the World Bank's 2017 Global Findex Database. We consider the usage of cash and financial institutions as traditional payment channels. In comparison, the usage of credit/debit cards and mobile money are treated as digitised channels. Further, we analyse the scale of the gender divide in using payment channels for day-to-day transactions at both the region-level (ASEAN) and country-level (each ASEAN country). Our methodological framework using a logit model closely follows Fungáčová and Weill (2015) who analysed the extent of the financial

inclusion gender divide in the context of China using the 2015 Global Findex Database. Our study differs from Fungáčová and Weill (2015) as a) our dependant variable is payment channel usage that encompasses both traditional and digital means, b) our geographical interest pertains to ASEAN countries, and c) we use the latest available survey data from Global Findex Database (2017-early 2018). Our study also analyses the effect of age on the gender divide across the payment channels in ASEAN. Finally, we adopt a variety of methodological robustness checks to verify the validity of our results.

Our study is closely related to two strands of literature. First, our study aligns with the vast literature that studies the economics of the gender divide. Studies like Arrondel et al. (2014); Ke (2020); Guiso et al. (2021) examine gender imbalances in the realm of household financial decision making. Other studies like Stephan and El-Ganainy (2007); Croson and Gneezy (2009); Fossen (2012); Hechavarria and Ingram (2016) examine the role of behavioural factors such as entrepreneurial affinity, risk aversion, or discrimination in explaining the disadvantageous status of women. Second, our study is closely related to the burgeoning literature on digital payments. Ouma et al. (2017); Bachas et al. (2017) examine the role of digital payment methods in encouraging savings. Our study ties with studies such as Hilbert (2011); Suri and Jack (2016); Shin et al. (2021) that examine the presence of gender gaps in fintech and mobile money, and Liébana-Cabanillas et al. (2014); Lwoga and Lwoga (2017) that evaluate the relevance of gender in the acceptance of mobile payment systems.

We find strong evidence in favour of the hypothesis that women in ASEAN use the traditional payment mode of cash more than men. Further, we also find evidence that a gender divide exists in the usage of the more digitised payment mode of mobile money. Additionally, our results demonstrate that age plays a complementary role in expanding the gender divide in large transactions that involve the usage of traditional payment channels of financial institutions. Finally, the gender divides present in the usages of financial institutions and mobile money are both larger for more developed ASEAN countries like Singapore and Malaysia.

The remainder of the paper is organised as follow: Section 2 provides a brief background into financial inclusion and digital finance in ASEAN, Section 3 elaborates on the empirical framework to study the existence of gender divides in the ASEAN payment eco-system using the 2017 Global Findex Database, Section 4 provides the empirical results with robustness checks, and Section 5 concludes.

2 Background

According to the World Bank, financial inclusion entails individuals and businesses having access to useful and affordable financial products and services that meet their needs – transactions, payments, savings, credit, and insurance – delivered in a responsible and sustainable way. Digital financial inclusion

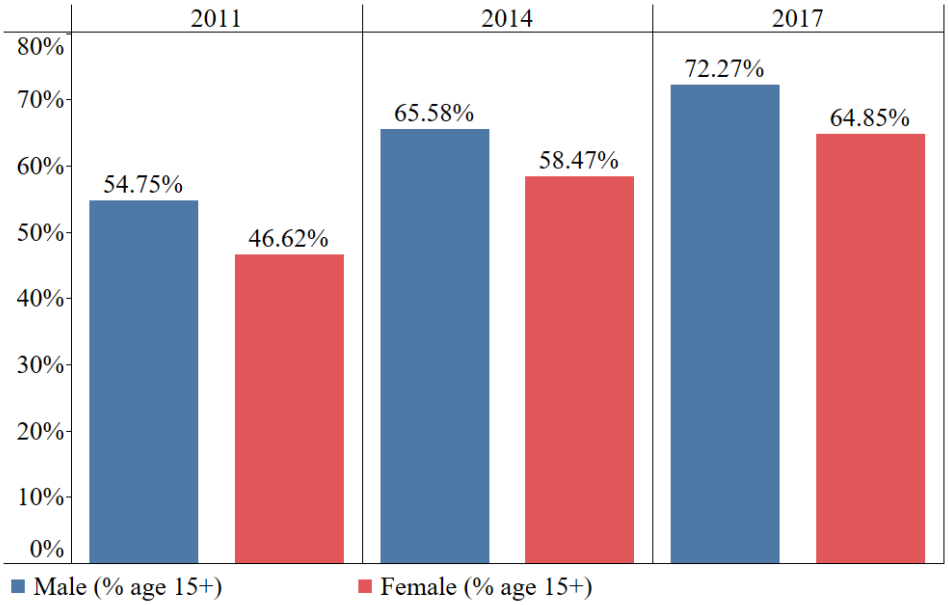


Figure 1: Global Financial Account Ownership (%)
Source: 2017 Global Findex Database, author's calculations

involves the deployment of the cost-saving digital means to reach currently financially excluded and underserved populations with formal financial services suited to their needs. Empirical evidence suggests that developments in financial inclusion improve human development index (Anand and Chhikara, 2013), real per capita gross domestic product (Van et al., 2021), and employment (Mehry et al., 2021). Financial development induces incomes of the poor to grow, income inequality to fall more rapidly, and poverty rates to decrease (Beck et al., 2004). Ma'ruf and Aryani (2019) echo this, arguing that the availability of financial services helps the poor get access to education, health, and other needs that will improve their quality of life. Additionally, financial inclusion can ease credit constraints on poor individuals via reducing information asymmetry and transaction costs, thus stimulating the formation of entrepreneurs (Fan and Zhang, 2017).

Despite universal benefits of financial inclusion, 31% of the global population is unbanked with women accounting for 56% of them (Demirguc-Kunt et al., 2018). Barriers limiting women's access to finance hampers the poverty-reducing and growth-promoting aspects of finance, nullifying any development or macroeconomic gains (Narain, 2009). From Fig. 1, global account ownership rates have steadily increased for both genders, but there is still a notable gap that does not show any signs of narrowing. Fig. 2 shows account ownership among women globally. In ASEAN, only Singapore, Malaysia, and Thailand recorded female account ownership rates over the global average rate of 69%, while their regional peers even fell behind the global lower-middle income countries average rate of 58% (Demirguc-Kunt et al., 2018).

Insufficient funds to open and maintain accounts is a major factor contributing to low account own-

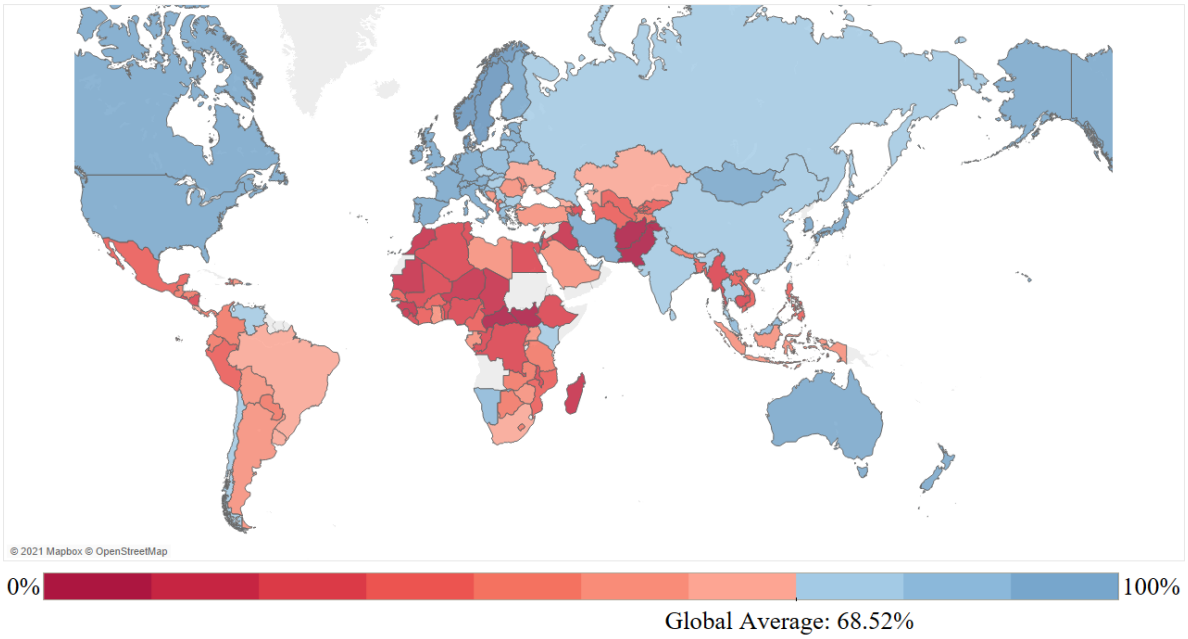


Figure 2: Female Financial Account Ownership (%)
Source: 2017 Global Findex Database, author's calculations

ership rates, whereby financial institutions which require a minimum deposit may intimidate potential clients. Consequently, high costs to access financial services may present an opportunity cost too great for the unbanked, especially women who may lack secure and consistent income sources. Also, strict requirements for identification may discourage women from opening accounts (Sioson and Kim, 2019). This is particularly relevant in developing countries that lack inclusive and comprehensive national identification databases. Globally, one in six women cited documentation issues as a barrier to account ownership (Hanmer and Dahan, 2019). Additionally, women are more likely than men to cite the presence of an account owned by another family member as a reason for a lack of account ownership, signifying that this is another manifestation of the gender gap in financial inclusion (Demirgüç-Kunt et al., 2013).

However, the exponential development of information technology in the past decade has catalysed the evolution of digital finance, roping in new users who were previously unbanked (Evstratov, 2021). New technologies such as artificial intelligence, machine learning, cloud computing, and big data analytics, as well as the increasing affordability of smartphones and personal computers, have stimulated innovations in financial technologies. ASEAN is well-placed to leverage and capitalise on these technologies. An integrated approach to the region's digital economy is estimated to inject US$1 trillion into regional GDP by 2025 (A.T. Kearney and Group, 2015). The expanding penetration of internet and mobile networks in ASEAN has facilitated the boom in e-commerce in both domestic and cross-border markets, evidenced by the growth of online marketplaces such as Shopee and Lazada. The region also boasts the fastest-growing internet market in the world, with approximately 125,000 new users joining the internet

each day (WEF, 2021).

Additionally, the COVID-19 pandemic has accelerated the adoption of digital technologies, including digital money which is poised to take prominence in the post-pandemic world (Pandey et al., 2020). The use of digital payments and transfers has surged on a global scale, as population segments that had so far lagged in this market have been forced to transition to these systems out of necessity. Government relief programmes to millions of vulnerable residents, safe-distancing and home confinement measures, as well as the rise of digital remittance services for migrants sending money home, have necessitated the usage of digital payment methods (Benni, 2021).

The ease of access and use provided by digital financial innovations can increase the formalization of women's transactions and empower them by making them agents of their own financial futures (Sioson and Kim, 2019). Nevertheless, the gender gap in mobile ownership and access to digital financial services is a significant barrier to close the digital divide. Women in lower-middle income countries are 8% less likely than men to own a mobile phone and are 20% less likely to access the internet through a phone (Benni, 2021). Barriers preventing women from accessing the internet include poor technological infrastructure in the area, lack of educational opportunity among young women which hinders digital skills, and hesitation to participate in the internet due to ingrained gender stereotypes (Singh, 2017). These barriers impede their employment and educational opportunities, leading many women to end up as unpaid family workers, consequently being trapped in traditional family roles and limiting their potential (Antonio and Tuffley, 2014). Thus, access to transactions and payments is a key pillar of financial inclusion, and digital modes could be leveraged to bridge the gender gap in financial inclusion, further empowering and incorporating women into the digital revolution.

3 Empirical framework

In this section, we empirically test the hypothesis of whether gender divides exist in the ASEAN payment eco-system (both digital and traditional). In line with the existing literature, our empirical framework employs a logit model as it does not face drawbacks like fitted probabilities being less than zero or greater than one. The below equation is estimated using a logit framework:

$$y_{ic}^{p} = \alpha_0 + \alpha_1 female_{ic} + \alpha_2 age_{ic} + \alpha_3 age_{ic}^2 + \kappa^l inc_{ic}^l + \delta^e edu_{ic}^e + \gamma_c + \epsilon_{ic} \tag{1}$$

where,

- Dependent variable y_{ic}^{p} is a dummy variable that takes the value 1 if individual i in country c used payment mode p in the past 12 months where $p \in$\{Cash, Financial Institution, Credit/Debit Cards,

Mobile Money}. Hence, we consider four dependant variables for our analysis.

- $female_{ic}$ takes the value 1 if individual i from country c is female, and 0 otherwise. A finding of $\alpha_1 < 0$ indicates that women, on average, have used the specific payment channel p less than men.
- age_{ic} pertains to the age of individual i of country c in years. To account for the possible non-linear relationship between individual i's age and choice of payment mode, age-squared is also included as an explanatory variable.
- inc_{ic}^{l} is a dummy variable that takes the value 1 if the income bracket of individual i from country c is in quintile l and 0 otherwise. The elements of l comprise $poorest - 20\%$ income quintile, $second - 20\%$ income quintile, $third - 20\%$ income quintile, and $fourth - 20\%$ income quintile. Hence there are four categorical variables with respect to income, with the fifth income quintile $richest - 20\%$ as the benchmark.
- edu_{ic}^{e} takes the value 1 if individual i from country c has e as the highest education level. e consists of *secondary* and *tertiary* education levels. This implies that there are two categorical variables in the context of education variable with *primary* education as the benchmark.
- γ_c denote country fixed effects which absorb any observable and unobservable differences across countries

3.1 Data

We use the 2017 Global Findex Database (Demirguc-Kunt et al., 2018) from the World Bank for data on the usage of different payment modes by individuals across ASEAN member states. The 2017 Global Findex Database is the world's most comprehensive data set on how adults save, borrow, make payments, and manage risk. The data are collected through randomly selected, nationally representative samples of more than 150,000 adults in 144 economies, representing over 97% of the global population. The data from the 2017 Global Findex Database are mainly collected through face-to-face interviews. With the primary sampling units stratified by population size, geography, or both, the data achieves clustering through one or more stages of sampling. In economies where telephone interviewing is employed, random digit dialling from a nationally representative list of phone numbers was employed. The surveys were carried out throughout the 2017 calendar year up to early 2018.

The data used in our study constitute survey data from Cambodia, Lao PDR, Indonesia, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam. Table 1 shows the number of respondents from each ASEAN country. The survey data were obtained through interviews conducted in the national language and/or major languages in the respective economies. Except in Malaysia where telephone

interviews were conducted, the data were collected via face-to-face interviews in each economy. The sample from Vietnam excludes 11 provinces which account for around 19% of the population.

Table 1: Country-level FINDEX data respondents in ASEAN

Country	Number of respondents
Cambodia	1552
Indonesia	1000
Lao PDR	998
Singapore	998
Thailand	998
Vietnam	981

Our study utilised the survey data concerning the use of cash, financial institutions, credit or debit cards, and mobile money for transactions. The survey questions entail whether the individual used the respective payment mode for sending or receiving domestic remittances and utility bill payments in the past 12 months. An exception lies with the data on debit/credit card usage for payments, as the survey question alludes to *any* form of transaction in the past 12 months. We assume that using cash and financial institutions as payment modes constitute traditional payment methods. On the other hand, using cards (debit and credit) and mobile money represent digital payments. Data points on respondents who refused to answer or did not know whether they had used the respective payment method were dropped from the study.

Apart from data pertaining to payments, we also utilised the individual responses concerning socio-economic questions on gender, age, income level, and education level. As described earlier in Eq. (1), all variables apart from age considered in the study are binary. Table 2 shows the summary statistics of the variables used in our analysis.

Table 3 shows the correlation between the main regressors used in the estimation. Our interest variable $female$ exhibits a low correlation with most covariates. The generally low correlation among the co-variates suggests that multicollinearity is unlikely an issue in empirical results.

4 Results

Before proceeding to the empirical results, we show the average usage of different payments modes by gender in ASEAN. The red and blue dots in Fig. 3 show country-specific average use of payment modes by females and males respectively. The red and blue vertical lines represent the average usage of the respective payment mode by females and males respectively in the region. We find that gender gaps exist on average in ASEAN for all types of payment mode usage except for the case of cash (see panel a). Females dominate cash usage in all ASEAN countries except for Singapore. Within the small percentage

Table 2: Summary statistics

Variable	Obs.	Mean	Std. dev.
Cash	10041	0.5394	0.4985
Financial Institution	10010	0.2547	0.4357
Credit/Debit Card	3261	0.5136	0.4999
Mobile Money	9992	0.0599	0.2374
Female	10045	0.5968	0.4906
Age	10045	41.60	16.58
Income			
- Poorest 20%	10045	0.1885	0.3911
- Second 20%	10045	0.1844	0.3878
- Third 20%	10045	0.1937	0.3952
- Fourth 20%	10045	0.2027	0.4020
- Richest 20%	10045	0.2308	0.4213
Education			
- Secondary	10045	0.3922	0.4883
- Tertiary	10045	0.1165	0.3208

of the population that uses cash in Singapore, men use cash more than women for payments.

Among the digitised modes of payment, the average usage of cards is considerably larger than mobile money for more developed countries like Malaysia and Singapore (see panels c and d). A small gender gap persists in the regional usage of cards for payments, largely driven by Malaysia. It is interesting to note that the gender gap in mobile money payments is relatively more vivid in more developed countries in ASEAN (Malaysia and Singapore).

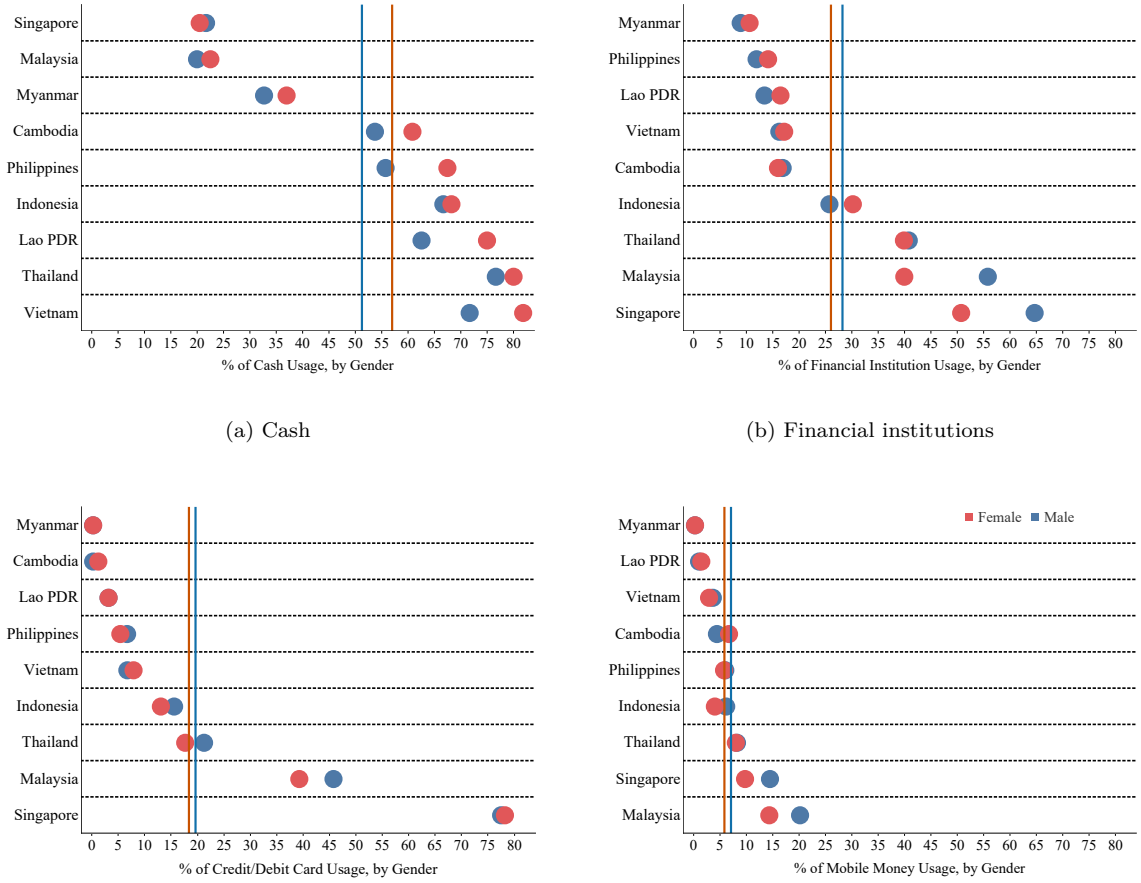
We investigate the degree of the gender gap in ASEAN in Section 4.1 by estimating Eq. (1). Section 4.2 examines the robustness of our empirical results. Section 4.3 considers an extension of the baseline empirical model to evaluate the effect of age on the gender divide in payment usage. Finally, Section 4.4 examines the degree of the gender gap in payment channels for each individual country of ASEAN.

4.1 Baseline Estimates

The results from the logit estimation of Eq. (1) are shown in Table 4. Column (1) shows the results from the estimation of Eq. (1) with the probability of using cash for payments as the dependant variable. The female coefficient is positive and statistically significant, re-iterating the fact the women on average, make payments via traditional payment methods i.e. cash at a significantly higher rate compared to men. Other things equal, the probability of using cash by females for payments is 5.89 percentage points more than males. Women are more likely to conduct low-value transactions which are predominantly via cash and in-person (Arango et al., 2016), and are arguably less likely to conduct high-value transactions via financial institutions or credit/debit cards. This is consistent with the results on other payment modes as the negative female coefficients in columns (2), (3) and (4) indicate gender gaps i.e. males are

Table 3: Correlation matrix

	Female	Age	Income - 1st 20%	Income - 2nd 20%	Income - 3rd 20%	Income - 4th 20%	Income - 5th 20%	Education - Secondary	Education - Tertiary
Female	1								
Age	-0.0283	1							
Income - 1st 20%	0.0161	0.1648	1						
Income - 2nd 20%	0.0157	0.0394	-0.1675	1					
Income - 3rd 20%	-0.0199	-0.0301	-0.1869	-0.1972	1				
Income - 4th 20%	-0.0175	-0.0555	-0.2143	-0.2261	-0.2523	1			
Income - 5th 20%	0.0083	-0.0780	-0.2658	-0.2805	-0.3130	-0.3589	1		
Education - Secondary	-0.0371	-0.1005	-0.0490	0.0155	0.0740	0.0274	-0.0618	1	
Education - Tertiary	-0.0398	-0.2055	-0.1246	-0.0850	-0.0757	0.0248	0.1992	-0.6557	1



(a) Cash

(b) Financial institutions

(c) Credit/Debit Cards

(d) Mobile money

Figure 3: Usage of payment modes
Source: 2017 Global Findex Database, author's calculations

more likely than females to use such modes of payment. We observe that the gender gap is statistically significant at 10% for mobile money. On average, females are less likely to use mobile money than men by 0.76 percentage points.

The signs of the other control variables in Table 4 are consistent with previous empirical studies. The age of the individual is a positive and statistically significant determinant of the decision concerning the usage of all payment methods. As people get older, their incomes increase and hence engage in more transactions (Foster, 2015). However, the negative and statistical coefficient of Age^2 indicates this relationship to taper off as age increases. The magnitude of the age coefficient is found to be largest for cash and smallest for mobile money. The lower magnitude of the age coefficient in the mobile money payment mode (column (4)) is intuitive since the older population may not be able to adapt to mobile money as easy as their younger counterparts (Li et al., 2020).

With regard to the income divide co-variates, the richest 20% of the sample (richest quintile) is

the benchmark. In column (1), the coefficient of the poorest 20% implies that the poorest quintile is less likely to use cash as payment mode than the richest quintile by 5.22 percentage points on average. The negative and statistically significant coefficient associated with the poorest quintile coefficient exists across all payment modes. With respect to slightly more affluent income groups (third and fourth quintile), the income divide in comparison to the richest 20% of the population becomes statistically insignificant in the usage of cash and mobile money (see column (1) and column (4)). This suggests the possibility that the middle-income population is not significantly worse off than the richest individuals in using more traditional (cash) and more digitised modes of payment (mobile money).

In the context of the education variables, the benchmark pertains to individuals with primary education. In column (1), the positive and significant secondary education coefficient implies that an individual with secondary education is more likely to use cash for payments than individuals with primary education. However, the gap between individuals with tertiary and primary education (indicated by the tertiary education coefficient) is not significant for payments using cash. In contrast, this gap is large and significant for digital payment modes with tertiary-educated individuals more likely to engage in mobile money payments than primary educated people by 7.35 percentage points (see column (4)).

4.2 Methodological Robustness

In this section, we conduct robustness checks with regard to baseline results in Section 4.1. We employ other variants of binary dependant variable models like the probit and the linear probability model to re-estimate the baseline framework in Eq. (1). Table 5 shows the coefficient estimates of our key variable of interest $female$ separately on the probability of using cash, financial institutions, credit/debit cards, and mobile money separately. Column (1) shows the baseline logit results as depicted in Table 4 whereas columns (2) and (3) show the probit and LPM estimates of Eq. (1). Part A shows female to be a positive and significant determinant of cash usage across all variants of robustness checks, validating the fact that women are more likely than men in using cash for payments. Although insignificant, the sign of the female coefficient is similar across all models with respect to the usage of financial institutions (Part B) and cards (Part C) for payments. Finally, the robust evidence of the gender gap in mobile money usage for payments is indicated by the negative and significant female coefficient in the logit and LPM frameworks. However, we note here that the robustness of the female coefficient in the context of mobile money is not evident with the probit framework.

Table 4: Baseline results

	Cash	Financial Institution	Credit/Debit Card	Mobile Money
	(1)	(2)	(3)	(4)
Female	0.0589***	-0.0104	-0.0066	-0.0076*
	(0.0091)	(0.0080)	(0.0149)	(0.0045)
Age	0.0190***	0.0101***	0.0126***	0.0038***
	(0.0014)	(0.0013)	(0.0025)	(0.0010)
Age^2	-0.0002***	-0.0001***	-0.0002***	-0.0001***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Income				
- Poorest 20%	-0.0522***	-0.1104***	-0.1409***	-0.0298***
	(0.0142)	(0.0129)	(0.0258)	(0.0083)
- Second 20%	-0.0254*	-0.1015***	-0.1564***	-0.0239***
	(0.0141)	(0.0125)	(0.0242)	(0.0076)
- Third 20%	-0.0121	-0.0647***	-0.0523**	-0.0039
	(0.0139)	(0.0120)	(0.0221)	(0.0066)
- Fourth 20%	-0.0082	-0.0488***	-0.0615***	-0.0020
	(0.0138)	(0.0116)	(0.0202)	(0.0061)
Education				
- Secondary	0.0528***	0.1074***	0.1115***	0.0310***
	(0.0117)	(0.0105)	(0.0235)	(0.0069)
- Tertiary	0.0027	0.1916***	0.2456***	0.0735***
	(0.0179)	(0.0139)	(0.0266)	(0.0081)
Country FE	Yes	Yes	Yes	Yes
Observations	10,041	10,010	3,261	9,992
Pseudo R-squared	0.1598	0.1570	0.2613	0.1722

Note: *, **, and *** indicate significance levels at 1%, 5%, and 10% respectively. The values in the parentheses are robust standard errors. The dependent variable is indicated at the top of each column. The estimates show the marginal effects of the variables in the logit model using the margins command in Stata.

Table 5: Robustness of *female* coefficient estimates

	Logit (1)	Probit (2)	LPM (3)
Part A: Cash			
Female	0.0589***	0.0586***	0.0588***
	(0.0091)	(0.0091)	(0.0092)
Pseudo/Adjusted R-squared	0.1598	0.1596	0.2057
Observations	9,992	9,992	9,992
Part B: Financial institutions			
Female	-0.0104	-0.0086	-0.0125
	(0.0080)	(0.0080)	(0.0081)
Pseudo/Adjusted R-squared	0.1570	0.1573	0.1776
Observations	9,992	9,992	9,992
Part C: Credit/Debit Cards			
Female	-0.0066	-0.0051	-0.0040
	(0.0149)	(0.0148)	(0.0150)
Pseudo/Adjusted R-squared	0.2613	0.2605	0.3084
Observations	9,992	9,992	9,992
Part D: Mobile Money			
Female	-0.0076*	-0.0063	-0.0085*
	(0.0081)	(0.0080)	(0.0115)
Pseudo/Adjusted R-squared	0.1722	0.1712	0.0767
Observations	9,992	9,992	9,992
Baseline controls	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes

Note: *, **, and *** indicate significance levels at 1%, 5%, and 10% respectively. The values in the parentheses are robust standard errors. The dependent variable is indicated at the top of each column. The estimates show the marginal effects of the variables in the logit model using the margins command in Stata.

4.3 Extension: Age and gender gap in payments

In Section 4.1, we showed the presence of a gender gap in using more digitised modes of payments. We also found age to have a positive and significant impact on the probability concerning the usage of all payment modes. In this section, we discuss the effect that age has on the gender divide in payment mode usage. To this end, we estimate the below equation using a logit framework :

$$y^p_{ic} = \alpha_0 + \alpha_1 female_{ic} + \alpha_2 age_{ic} + \alpha_3 age^2_{ic} + \alpha_4 (female_{ic} \times age_{ic}) + \kappa^l inc^l_{ic} + \delta^e edu^e_{ic} + \gamma_c + \epsilon_{ic} \quad (2)$$

where coefficient α_4 denotes the impact that age has on the gender gap in the usage of payment mode p. A finding of $\alpha_4 < 0$ would imply that age would exacerbate the gender gap in the specific payment channel. Table 6 shows the logit estimates of α_4 coefficient in the usage of different payment modes. In line with our expectations, the interaction term coefficient is negative across the usage of all payment modes. The negative interaction term coefficient is found to be significant only in the usage of financial institutions for payments. This suggests the possibility that the gender gap in the usage of financial institutions (typically used for large transactions) widens in the context of the older population.

Table 6: Effect of age on the gender gap

	Cash	Financial Institution	Credit/Debit Card	Mobile Money
	(1)	(2)	(3)	(4)
Female × Age	-0.0046	-0.0068**	-0.0057	-0.0077
	(0.0029)	(0.0033)	(0.0058)	(0.0072)
Baseline controls	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Observations	10,041	10,010	3,261	9,992
Pseudo R-squared	0.1600	0.1574	0.2616	0.1724

Note: *, **, and *** indicate significance levels at 1%, 5%, and 10% respectively. The values in the parentheses are robust standard errors. The dependent variable is indicated at the top of each column. As we are interested in the signs of the coefficients, the values stated above are the logit estimates, rather than the marginal effect of the interaction term.

4.4 ASEAN country-specific gender divides in payment usage

Next, we investigate the sensitivity of our baseline gender gap results to country heterogeneity. In other words, will there be country differences in the way the gender gaps exist in the usage of different payment methods? Or will individual countries tend to experience differences in the way their female population engages in payment methods in comparison to men? To test for the country differences, we estimated the below equation where the coefficient of the interaction between $female$ and country fixed effect γ_c depicts the country-specific gender gap in using payment mode p.

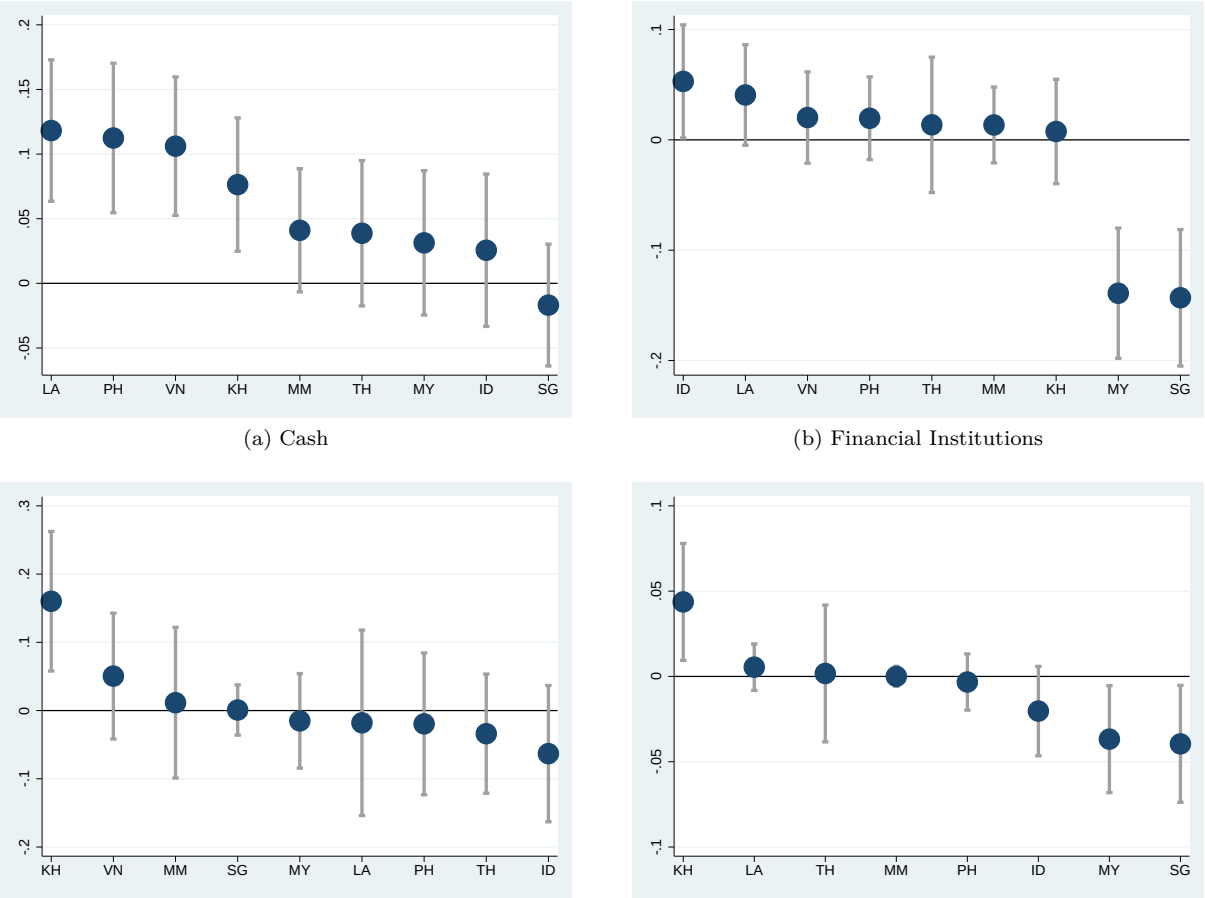
$$y_{ic}^{p} = \alpha_0 + \alpha_1 female_{ic} + \alpha_2 age_{ic} + \alpha_3 age_{ic}^2 + \alpha_4 \left(female_{ic} \times \gamma_c\right) + \kappa^l inc_{ic}^l + \delta^e edu_{ic}^e + \gamma_c + \epsilon_{ic} \quad (3)$$

Fig. 4 shows the $female_{ic} \times \gamma_c$ coefficient estimates for each payment mode. Values below the black zero line i.e. $\alpha_4 < 0$, indicate that women are less likely than men to use payment mode p, indicating the existence of a gender gap in payment mode p [1]. Interestingly, Singapore which is the most developed country in ASEAN witnesses gender gaps in the more traditional payment modes of cash and financial

[1] There is no benchmark country for estimates reported in Fig. 4. Margins command in Stata is used to estimate the $female_{ic} \times \gamma_c$ coefficient for each ASEAN country c.

institutions (see panels a and b). Singapore is the only country that faces a gender gap in cash payment usage, whereas a gender gap in payments using financial institutions exists in Malaysia and Singapore.

This trend reverses in the digitised modes of payment with respect to credit and debit cards where Singapore's gender gap is close to zero (see panel c). Emerging economies like Indonesia and Thailand experience a larger gender gap in credit/debit cards usage. In the context of mobile money which is the most digitised payment mode under consideration in our study, Singapore witnesses the largest gender gap followed by Malaysia and Indonesia (panel d). Based on our results, we reach a worrying conclusion that ASEAN countries with a more developed payment eco-system like Singapore and Malaysia (Sviry-dzenka, 2016) witness greater gender gaps in the usage of digital payments. The situation is different for developing economies like Cambodia and Lao PDR where women are more likely than men on average to use mobile money for payments.



(a) Cash

(b) Financial Institutions

(c) Credit/Debit Card

(d) Mobile Money

Figure 4: ASEAN country-specific gender gap in payment mode usage
The y-axis plots the logit estimates of the interaction term $female \times \gamma_c$ coefficient for each ASEAN country. The x-axis pertains to country names that are depicted by the respective ISO codes: Cambodia (KH), Indonesia (ID), Lao PDR (LA), Malaysia (MY), Myanmar (MM), Philippines (PH), Singapore (SG), Thailand (TH), and Vietnam (VN). The estimates show marginal effects in the logit model using the margins command in Stata.

5 Conclusion

Financial inclusion is vital to any discourse on the development of a country or region, to such an extent that the United Nations has declared financial inclusion to be a prominent enabler of eight out of seventeen 2030 Sustainable Development Goals. However, certain sections of the population can potentially be overlooked in the process. As such, it is imperative that policymakers are inclusive in their policy approaches, especially pertaining to the potential benefit gaps that arise between men and women.

Given this context, we have examined the scale of the gender divide in the ASEAN payments ecosystem. Our findings show that women are more likely than men to use the traditional payment channel of cash. In contrast, we find evidence of a gender gap in the more digitised payment channel of mobile money. We find these results robust to different variants of sensitivity checks. Our results also show the gender gap in mobile money usage to be relatively stark in the more developed ASEAN economies of Singapore and Malaysia.

It is important to note the limitations of our study as our data pertains to individual responses in the survey carried out from 2017 to early 2018. The COVID-19 pandemic has caused a major structural upheaval with regard to the adoption of digital payment methods in ASEAN. There is a dire need for future research to analyse the data on more recent usages of different payment channels and whether divides in ASEAN worsened or narrowed post-pandemic.

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