

Exploring the Impact of Debit Card Ownership on Financial Inclusion in ASEAN+6 Countries

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Abstract

This study examined the impact of debit card ownership on financial inclusion across ASEAN+6 countries. Using panel data from the Global Financial Inclusion Index (Global Findex) spanning multiple years, the research employed panel regression analysis to examine the relationship between debit card ownership and key financial inclusion indicators. Specifically, the study assessed whether debit card ownership influences the likelihood of owning a formal bank account, accessing formal credit, engaging in financial transactions through regulated institutions, owning a mobile money account, and possessing a mobile phone. The findings reveal that debit card ownership significantly increases the likelihood of having a formal bank account, accessing credit, and engaging in financial transactions through regulated financial institutions. However, while mobile money account ownership and mobile phone ownership show positive associations with financial inclusion, their effects are not statistically significant. These results suggest that debit cards remain an important gateway to formal financial services despite the rapid expansion of digital financial technologies in the region. The study highlights the role of debit cards as an accessible and cost-effective financial instrument that lowers transaction costs, reduces dependence on cash-based transactions, and facilitates broader financial participation. The findings also underscore the importance of financial literacy, supportive regulatory frameworks, and banking infrastructure in ensuring that debit card usage translates into meaningful financial engagement. The policy implications suggest that expanding access to debit card, particularly among underserved and

rural communities, can be an effective strategy to strengthen financial inclusion and promote inclusive economic development across ASEAN+6 countries.

Keywords: Financial inclusion, account ownership, debit card, digital finance, ASEAN+6

Introduction

ASEAN+6 countries continue to face significant challenges in promoting financial inclusion, particularly among low-income populations and underserved communities. A significant portion of the population, particularly low-income individuals, minority communities, and migrants relocating to urban areas, remains excluded from formal financial services. This financial exclusion often results from structural barriers, including limited access to banking infrastructure and a lack of tailored financial products (Djalante et al., 2020). Recognizing the importance of financial inclusion, policymakers across ASEAN+6 economies have implemented various initiatives to expand access to formal financial services. However, these initiatives have yet to be formally integrated as explicit policy objectives (Ishikawa, 2021). The absence of a unified policy approach suggests that while financial inclusion is acknowledged as a priority, comprehensive strategies are still evolving. Lee et al. (2022) further emphasize that strengthening financial policies and regulatory frameworks will be crucial in ensuring the success of these initiatives. Given the pressing need for inclusive financial systems, the growing commitment of ASEAN+6 countries presents a critical opportunity for policymakers to enhance financial services. By developing targeted interventions, such as improving digital banking access and expanding financial literacy programs, these nations can pave the way for a more inclusive financial landscape that benefits all segments of society.

This study focuses on ASEAN+6 economies, which include the ten ASEAN member states Indonesia, Malaysia, Thailand, the Philippines, Vietnam, Singapore, Brunei Darussalam, Cambodia, Laos, and Myanmar – together with six key regional partners: China, Japan, South Korea, India, Australia, and New Zealand. These countries are increasingly interconnected through regional economic cooperation frameworks, trade agreements, and financial integration initiatives. Understanding financial inclusion dynamics in ASEAN+6 is particularly important for societal development, as access to financial services supports poverty reduction, enhances household resilience to economic shocks, promotes entrepreneurship, and facilitates participation in digital economic. In emerging economies within the region, improved access to finance can contribute to more equitable income distribution and sustainable economic growth.

Furthermore, the study adopts an ASEAN+6 framework to capture broader dynamics of regional financial integration. These economies are closely linked through regional financial cooperation mechanisms, trade agreements, and digital payment system development initiatives. Examining financial inclusion across this integrated regional

grouping provides deeper insights into structural differences in financial access and financial infrastructure development.

Expanding access to financial services, particularly for previously unbanked individuals, is a crucial step toward fostering economic stability and inclusive growth. As Chen et al. (2023) argue, financial access allows individuals to better absorb economic shocks, thereby enhancing financial security at both the household and societal levels. Additionally, Ratnawati (2020) and Hasan et al. (2021) highlight that financial inclusion contributes to broader economic development by facilitating income redistribution and enabling greater participation in formal financial systems. A key area of synergy in the ASEAN+6 region is the growing role of debit card usage in enhancing financial access. However, as financial services expand, an essential question emerges: Is opening a bank account to obtain a debit card merely a theoretical concept that still requires practical validation? If empirical research confirms the effectiveness of debit cards in improving financial inclusion, policymakers can design targeted interventions to promote debit card adoption based on key determinants such as financial literacy, credit affordability, and regulatory support (Erlando et al., 2020).

ASEAN countries have been actively working to expand access to affordable, secure, and reliable financial services. Since 2016, financial inclusion has remained a key priority for Asian leaders, as demonstrated by commitments made in three consecutive ASEAN+3 summits. Erlando et al. (2020) emphasize that financial inclusion plays a crucial role in reducing poverty, increasing food production, and fostering youth development, while Ratnawati (2020) highlights its importance in strengthening financial sector stability and driving overall economic growth. Despite these efforts, achieving full financial inclusion remains challenging for certain segments of the population. Traditionally, individuals were required to open bank accounts to access essential financial services such as credit and money transfers. However, while bank account ownership is often used as a macro-indicator of financial access, its effectiveness as a metric is debatable, given that individuals may hold multiple accounts across different institutions or maintain accounts that are significantly underutilized (Omar & Inaba, 2020). With the widespread availability of ATMs and interbank services, Vo et al. (2021) note that the banking industry has increasingly integrated debit cards into everyday transactions, making them a vital tool in advancing financial inclusion.

Over the last three decades, the global finance sector has witnessed significant advancements in digital finance, particularly with the increasing prevalence of plastic cash, most notably debit, travel, and credit cards, as a core component of retail banking. Nguyen and Ha (2021) highlight that even minor financial transactions can now be completed without a physical visit to a bank, a shift that is particularly beneficial for individuals in rural areas where saving money often comes with higher costs. Traditionally, financial services have been associated with high transaction fees, which have restricted consumer access. However, as Pham & Doan (2020) observe, digital finance trends are gaining momentum, particularly in developing nations, as the global financial landscape transitions from traditional to digital economies. ASEAN, with its diverse and expansive population, holds significant potential to capitalize on these digital finance trends and unlock new economic opportunities, even though the region is still in the early stages of this transformation (Raimi et al., 2021). In the

broader context of the Knowledge Economy and the Information Society, Bui & Luong (2023) emphasize the need for empirical research on the barriers influencing community adoption and ownership of debit cards to inform effective policy design and implementation.

As Pandhit (2020) highlights, empirical research on this issue remains particularly scarce in developing countries. The need for further investigation is especially evident in ASEAN+6 nations, where comprehensive studies on financial inclusion and debit card usage are still lacking (Raimi et al., 2021). To bridge this gap, this study employs a panel data regression approach to assess the relationship between debit card ownership and financial inclusion across multiple countries. Furthermore, a country-specific analysis, it explores potential variations in this relationship across ASEAN+6 nations.

The findings aim to offer valuable insights for policymakers and stakeholders in developing economies, helping them design strategies to enhance financial inclusion and drive economic growth. This study addresses this gap through three main objectives. First, it empirically examines the impact of debit card ownership on formal account ownership as a proxy for financial inclusion. Second, it evaluates the roles of other digital access variables, including mobile money accounts and mobile phone ownership. Third, it compares financial inclusion dynamics across countries and over time to identify structural heterogeneity in financial access determinants. These objectives guide the empirical analysis presented in the results section and are further discussed in the policy implications and conclusions.

This study aims to achieve three primary objectives. First, it investigates the extent to which debit card ownership influences financial inclusion, particularly in its role in expanding access to formal financial services (Koomson et al., 2020). Second, it examines the decision-making process behind obtaining a debit card, emphasizing how individuals' intentions to safeguard their economic interests influence their financial behaviors, as explored by Hasan et al. (2021). Third, while prior research has primarily focused on the short-term marginal effects of debit card usage, this study takes a broader approach by incorporating multi-year panel data and country-level observations, an approach supported by Ahmad et al. (2020).

Despite significant progress in expanding digital financial infrastructure, financial inclusion outcomes remain uneven across ASEAN+6 countries. While access to payment instruments such as debit cards has increased, empirical evidence on their effectiveness in promoting formal financial participation remains limited and inconclusive. This study addresses this gap by examining the relationship between debit card ownership and financial inclusion across ASEAN+6 economies. It contributes to the growing literature on financial inclusion by providing empirical evidence on how debit card ownership influences access to formal financial accounts and financial services, thereby extending previous studies on financial access and economic empowerment (Coffie et al., 2020). The findings also provide a foundation for future research on financial literacy and the adoption of technology-driven financial products, as emphasized by Ozili (2021).

From a policy perspective, the findings offer practical implications for governments and financial institutions seeking to strengthen financial inclusion through accessible and affordable payment instruments. Expanding debit card ownership, supported by financial

literacy initiatives and enabling regulatory frameworks, can improve access to formal financial services, particularly in underserved communities. This study also contributes to an underexplored area of financial inclusion research in developing and emerging economies, where evidence remains relatively scarce (Erlando et al., 2020; Ahmad et al., 2020). As ASEAN countries continue integrating their financial sectors and promoting digital finance, understanding the role of debit cards in facilitating financial participation is essential for designing effective and inclusive financial policies.

This study offers several novel contributions to the financial inclusion literature. First, it provides a comparative panel data analysis across ASEAN+6 economies, a regional grouping that has received limited empirical attention in previous research. Second, the study conceptualizes debit card ownership as an enabling financial infrastructure variable rather than merely an indicator of financial inclusion, thereby offering a more nuanced understanding of how payment instruments facilitate formal financial participation. Third, the inclusion of multiple digital access variables within a unified empirical framework allows the study to identify regional heterogeneity in financial inclusion drivers. These contributions provide new insights for policymakers seeking to design targeted strategies to enhance financial inclusion in rapidly digitizing economies.

Literature Review/Analytical Framework

Financial inclusion requires the development of financial systems that effectively deliver high-quality and affordable services to all individuals, ensuring accessibility across diverse socioeconomic groups. As Ozili (2020) explains, an inclusive financial system is not solely defined by access but also by the presence of well-functioning financial markets, institutions, and regulatory frameworks, both public and private. Buckley et al. (2019) further emphasize that such systems must exhibit three essential attributes. First, financial products must be tailored to meet a broad spectrum of needs, varying in maturity, costs, and risk levels. This flexibility allows individuals and households to manage unexpected financial shocks while also supporting long-term financial planning, a necessity outlined by Hasan et al. (2021). Second, secure formal payment channels play a pivotal role in ensuring seamless transactions, enabling both deposits and commercial exchanges to occur with minimal risk, as Javaid et al. (2022) highlight. Lastly, financial inclusion must provide diverse savings mechanisms and lump-sum transaction options that cater to individuals across different income and wealth brackets, thereby promoting broader participation in the financial ecosystem. More importantly, as observe, financial inclusion extends beyond individual financial stability by enabling greater social, physical, and human capital accumulation, ultimately driving economic participation at a macro level (Chang et al., 2020; Ozili, 2021).

Numerous theories have been developed to explain the relationship between financial inclusion and economic development, each offering distinct perspectives on how financial access influences economic growth. Among the most widely recognized models are the Kalecki Model, Harrod Model, Lewis Model, Vogel Model, New York Model, McKinnon-Shaw Hypothesis, Government Hypothesis, Maximizing Shareholder Wealth Model, Agency

Model, and Income Maximization Model. Of particular relevance, the McKinnon-Shaw Hypothesis highlights the pivotal role of formal credit markets and financial institutions in fostering economic participation. Obinna (2020) explains that access to formal financial services allows low-income individuals to invest in critical areas such as education, healthcare, and productive sectors. This, in turn, facilitates long-term income growth, overcoming financial constraints that previously hindered economic advancement.

Within this context, debit cards play a crucial role in advancing financial inclusion by reducing both time and financial burdens for users. By eliminating the need to travel to distant payment terminals, they provide a cost-effective service while enhancing the security of cash holdings, as noted by Bachas et al. (2021). However, despite these advantages in facilitating access to bank accounts, several factors continue to shape their widespread adoption. Wong et al. (2020) highlight the role of private retailers in the distribution process, particularly the impact of profit margins and commission structures within the retail sector. Furthermore, as T. T. H. Nguyen (2020) observes, debit card usage in developing countries remains a relatively new phenomenon, with limited comprehensive research addressing the challenges associated with adoption. Nonetheless, Abdelghaffar et al. (2023) suggest that expanding debit card distribution among low-income populations could offer substantial benefits, reinforcing their role as efficient bank account-based payment tools that hold significant potential for both policy implementation and practical applications.

The growing relevance of debit cards is also evident in their increasing use across ASEAN+6 countries over the past decade, reflecting broader digital financial transformation. The expansion of automated teller machines (ATMs), point-of-sale (POS) infrastructure, and mobile banking services has contributed to higher debit card penetration rates. In several countries, government initiatives promoting cashless transactions and financial inclusion strategies have accelerated the adoption of debit cards as a primary payment instrument. This trend highlights the growing importance of transaction-enabling financial products in supporting formal financial participation and deepening financial systems.

At the same time, financial inclusion is a multidimensional concept encompassing accessibility, affordability, usability, and the quality of financial services (Kling et al., 2022; Hasan et al., 2021). These dimensions are closely interconnected and jointly determine the extent to which individuals can meaningfully participate in the formal financial system. Financial literacy further shapes this process, particularly in developing economies where limited knowledge, low trust in financial institutions, and behavioral constraints may hinder the effective use of financial services. As a result, increased access to financial infrastructure does not automatically translate into sustained financial engagement.

Although a growing body of literature highlights the role of digital financial services in promoting financial inclusion, empirical evidence remains mixed and, in some cases, contradictory. Several studies document a positive relationship between electronic payment adoption, including debit cards, and financial inclusion outcomes such as account ownership and savings behavior (Ahmad et al., 2020; Liu et al., 2022; Siano et al., 2020). Conversely, other studies find that debit card ownership does not always lead to increased financial

participation, particularly in contexts where institutional and behavioral barriers persist (Carpio-Pinedo et al., 2022; Le & Ngo, 2020).

Similarly, while mobile financial services and digital technologies are often regarded as key drivers of financial inclusion, their effects are not consistently observed across countries. In some cases, access to mobile money accounts or mobile phones does not result in active use of formal financial services due to limited interoperability, regulatory constraints, or low levels of financial literacy (Nurhayati et al., 2022). These inconsistencies point to an important gap in the literature: the relative effectiveness of different financial access channels, such as debit cards, mobile money, and mobile infrastructure, remains unclear, particularly in the ASEAN+6 context, where institutional and structural conditions vary significantly.

To address these gaps and inconsistencies, this study adopts a structured analytical approach that distinguishes between financial inclusion outcomes and access-enabling factors. Financial inclusion is proxied by formal account ownership, reflecting participation in the formal financial system. Debit card ownership is conceptualized as the primary explanatory variable, representing a transaction-enabling financial infrastructure that facilitates access, reduces costs, and increases convenience. In addition, mobile money account ownership and mobile phone ownership are included as control variables capturing broader dimensions of digital access. This framework assumes a unidirectional relationship in which access to financial tools and infrastructure influences financial inclusion outcomes, while also allowing for cross-country heterogeneity shaped by institutional and behavioral factors.

Building on the theoretical arguments and empirical evidence, this study proposes several hypotheses.

H1: Debit card ownership has a positive and significant effect on financial inclusion.

H2: Mobile money account ownership has a positive effect on financial inclusion.

H3: Mobile phone ownership has a positive effect on financial inclusion.

These hypotheses aim to clarify the roles of financial infrastructure and digital access in shaping financial inclusion outcomes within the ASEAN+6 context.

Research Method

This study employs a research design that draws on data from the Findex, a widely recognized source for evaluating financial access and usage (Bachas et al., 2021). To comprehensively assess the financial inclusion landscape in ASEAN+6 countries, key variables and indicators have been carefully selected. It is to ensure a robust evaluation of financial accessibility across the region. Among the various demographic factors considered H. V. Nguyen et al. (2022) emphasize the proportion of adults who own debit cards as a crucial explanatory variable, given its significant role in expanding financial participation. Furthermore, the proportion of banked individuals is designated as the dependent variable, offering a measure of financial inclusion across these nations. By employing an empirical regression model, this study provides critical insights into the relationship between debit card

ownership, banking participation, and the broader financial inclusion framework within ASEAN+6 economies.

In this study, financial inclusion is proxied by formal account ownership, defined as percentage of the population aged 15 and above who own an account at a formal financial institution. Debit card ownership is treated as a primary explanatory variable representing access to transaction-enabling financial infrastructure. This distinction reflects the conceptual understanding that payment instruments such as debit cards facilitate participation in the formal financial system but do not constitute financial inclusion *per se*. Additional control variables include mobile money account ownership and mobile phone ownership, which capture broader dimensions of digital financial access.

To provide a comprehensive discussion, this study adopts a structured research design that begins by assessing the nature and quality of the data, recognizing that the reliability of financial inclusion data is fundamental to drawing meaningful conclusions (T. T. H. Nguyen, 2020). The dataset is then systematically presented and described, with careful selection of key indicators to examine financial inclusion levels across ASEAN+6 countries. Identifying the primary determinants of financial inclusion, enables a more nuanced understanding of disparities both within and across regions (Koomson et al., 2020). The empirical analysis employs a panel data regression model, ensuring a robust framework for addressing key empirical considerations (Ratnawati, 2020). In line with best practices outlined by Omar and Inaba (2020), the study further enhances methodological rigor by detailing sample selection criteria, the time range covered, and panel data diagnostic tests. Additionally, the study critically evaluates the chosen empirical technique, acknowledges potential limitations, and explores alternative data sources to reinforce the validity of its findings.

The analysis utilizes secondary data from Findex, which provides comprehensive insights into financial inclusion trends across ASEAN+6 countries for 2011, 2014, 2017, and 2021. These years correspond to the official survey waves conducted by the World Bank, ensuring methodological consistency and cross-country comparability. The use of three-year intervals reflects data availability rather than arbitrary selection and is consistent with established empirical studies on financial inclusion. This dataset offers key financial access metrics, with debit card ownership serving as a crucial indicator of financial participation (M.-L. T. Nguyen & Bui, 2021). Given the regional scope, most data are specific to ASEAN+6 countries. They are cross-verified against national banking and financial statistics, including bank account ownership, deposit levels, and access to financial services (Darusalam et al., 2021).

Recognizing that financial inclusion is shaped by both structural and behavioral factors, Thach and Ngoc (2021) highlight the importance of selecting diverse indicators that reflect its multifaceted nature. Accordingly, this study carefully selects variables based on their availability and relevance to effectively capture regional financial inclusion patterns. In addition to the previously discussed indicators, this study incorporates key economic measures such as account ownership, debit card possession, mobile money account ownership, and mobile phone ownership. These data points, sourced from credible

institutions, provide a comprehensive analysis of financial inclusion. However, data limitations and gaps persist in certain countries due to variations in the availability and scope of these secondary indicators (Janssens et al., 2021). The study's coverage period aligns with existing research on financial inclusion in ASEAN and globally, with several key indicators being published around the same timeframe (Papageorge et al., 2021). While statistical data collection methods ensure accuracy and consistency, specific case-based limitations have emerged in individual components, requiring careful interpretation of the findings.

To estimate the relationship between financial infrastructure and financial inclusion, this study employs panel data regression techniques, specifically fixed effects (FE) and random effects (RE), which differ in how they account for unobserved heterogeneity. The key distinction lies in whether these effects are treated as constant parameters or as arising from random variation. In this study, the choice between FE and RE models is guided by empirical considerations, where an RE model is particularly useful when the estimated effects stem from a random process rather than being strictly determined by observed factors (Baetschmann et al., 2020). Additionally, this approach allows for potential associations between estimated effects and other relevant aspects of the financial inclusion process.

The RE model has several advantages, as it accounts for differences in indicators over time and across cross-sections while providing robust estimations. Unlike the pooled ordinary least squares (OLS) approach, which does not differentiate between time periods and cross-sectional units, the RE model leverages both sources of variation, yielding more efficient estimates. However, when addressing individual-specific effects, the FE approach is generally preferred, particularly when individual and temporal fixed effects are not independent. The FE model treats individual effects as parameters to be estimated, ensuring they are not correlated with independent variables. In contrast, the RE model captures cross-country heterogeneity by pooling random samples and estimating a regression that allows for broader generalizations. This study employs both approaches to assess the impact of debit card ownership on financial inclusion, using two distinct RE model equations. To ensure the robustness of the panel data regression model, multiple diagnostic tests were conducted to detect potential violations of underlying statistical assumptions (Breuer & deHaan, 2024; Su et al., 2021).

In this study, financial inclusion is proxied by formal account ownership, while debit card ownership is treated as a key explanatory variable reflecting access to payment infrastructure. First, the study used debit card ownership as a proxy for financial inclusion. Second, the study used panel data regression. The FE and RE models are used to calculate the relationship between X and Y (see Equation 1 and Equation 2). The conceptual framework illustrates the hypothesized relationship between access to financial infrastructure and financial inclusion outcomes. Debit card ownership, mobile money account ownership, and mobile phone ownership are treated as explanatory variables influencing formal account ownership, which serves as a proxy for financial inclusion. The framework follows a conventional econometric structure, with independent variables on the left and the dependent variable on the right, and directional arrows indicating the expected causal relationships.

The indicator "Debit-card ownership (percentage of age 15+)" captures the prevalence of various types of debit cards among individuals aged 15 and above, including ATM cards, VISA and MasterCard prepaid cards, as well as Islamic and conventional banking cards. These financial instruments play a crucial role in enhancing financial security by reducing risks associated with cash transactions, such as theft, fraud, and robbery (Wang et al., 2022). Furthermore, debit cards serve as a key enabler of financial inclusion by facilitating access to essential banking services. They improve accessibility to cash withdrawals and electronic payment systems, thereby lowering barriers to financial participation (Alabdulatif et al., 2023). In this study, the term "account" refers to financial facilities managed by banks, securities exchanges, cooperatives, or other financial institutions, providing individuals with a formal mechanism for managing funds. The relationship between debit card ownership and financial inclusion has been widely discussed, with existing literature suggesting a strong positive association. By empirically examining this link across ASEAN+6 countries, this study aims to build on previous research and offer new insights into the role of debit cards in expanding financial access.

$$Y_{it} = \alpha_{oi} + \beta_1 x_{1it} + \beta_2 x_{2it} + \beta_3 x_{3it} + \varepsilon_{it} \dots \quad (1)$$

$$\text{Account ownership} = \alpha_{oi} + \text{Debit card ownership} + \text{Mobile money account} + \text{Mobile phone ownership} + \varepsilon_{it} \dots \quad (2)$$

Y_{it} represents the dependent variable (financial inclusion indicator) for country i in year t . i denotes the cross-sectional unit (ASEAN+6 countries), while t denotes the time period. α_o is the intercept (constant term). x_{1it} represents debit card ownership (% of population aged 15+). x_{2it} represents mobile money account ownership (% of population aged 15+). x_{3it} represents mobile phone ownership (% of population aged 15+). β_1, β_2 , and β_3 are the estimated regression coefficients that measure the effect of each independent variable on the dependent variable. ε_{it} the error term, capturing unobserved factors affecting financial inclusion.

Equation 1 and Equation 2 are the hypothesized direction of influence from the independent variables (X) to the dependent variable (Y). Specifically, debit card ownership, mobile money account ownership, and mobile phone ownership are treated as independent variables that are expected to influence the dependent variable, account ownership as an indicator of financial inclusion.

Analysis

By analyzing how debit card possession corresponds with bank account ownership, the study provides critical insights into the mechanisms that facilitate broader financial access, as highlighted by Koomson et al. (2020). The significance of these findings is twofold. First, they are assessed in relation to the study's objectives to determine the extent to which debit card ownership influences financial inclusion, a relationship previously explored by T. T. H.

Nguyen (2020). Second, the results are contextualized within the broader empirical literature and theoretical frameworks that shape financial inclusion research, including those discussed by Erlando et al. (2020) and Vo et al. (2021). From a policy perspective, these findings offer valuable empirical evidence on financial behaviors, particularly the role of debit cards in reducing financial exclusion. As Omar and Inaba (2020) suggest, understanding these dynamics can inform strategies to bridge financial gaps. Moreover, the inclusion of control variables strengthens the robustness of the results, enhancing the study's overall reliability and validity.

Financial inclusion extends beyond the mere ownership or use of debit cards, encompassing sustained engagement with formal financial services. However, the extent of debit card usage varies significantly based on factors such as age, income, and education (Daragmeh et al., 2021). While debit cards are widely accessible in countries undergoing economic transformation, cultural and behavioral barriers often hinder their adoption (Kokorović Jukan et al., 2020). Moreover, despite high ownership rates, Midões & Seré (2022) and Hasan et al. (2021) emphasize that actual usage does not always align with engagement in formal banking services, suggesting that financial inclusion extends beyond mere access to financial tools.

Prior to conducting the panel regression analysis, descriptive statistics were examined to understand the distribution and variation of the key variables across ASEAN+6 countries. The descriptive results indicate substantial cross-country variation in financial inclusion levels. On average, formal account ownership shows an increasing trend over the study period, reflecting improvements in financial access in the region. Debit card ownership exhibits considerable variation, suggesting differences in financial infrastructure development and digital payment adoption among countries. Similarly, mobile phone ownership demonstrates relatively high average values, although its variability indicates uneven digital penetration across economies. These descriptive insights provide an important empirical foundation for interpreting the regression results, as they highlight structural differences in the determinants of financial inclusion within ASEAN+6 countries.

The panel data regression analyzes the indicators of account ownership which is measured by debit card ownership, mobile money account ownership, and mobile phone ownership. Table 1 displays the results of a common effect regression on panel data. Table 1 also presents the effects of debit card ownership, mobile money account ownership, and mobile phone ownership on formal account ownership. Debit card ownership, mobile money account ownership, mobile phone ownership when control variables and time common effects are present. Debit card ownership has a positive and statistically significant effect on formal account ownership across ASEAN+6 countries. Table 1 shows that debit card ownership has a positive and statistically significant effect on formal account ownership ($p < 0.01$)

Table 1. Panel Least Squares (common effect)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.241	0.035	6.744	0.000
Debit card ownership	0.875	0.064	13.596	0.000
Mobile money account ownership	0.151	0.238	0.634	0.528
Mobile phone ownership	-0.043	0.063	-0.685	0.496
R-squared	0.777			
F-statistic	65.180			

Note: C represents the regression constant (intercept).

Table 2 displays the results of the panel data fixed effect regression. It shows that debit card ownership has a positive and significant impact on the account ownership when control variables and time-fixed effects are included. ASEAN+6's account ownership is positively impacted by mobile money account ownership and mobile phone ownership, but not statistically significant ($p > 0.01$).

Table 2. Panel Least Squares (fixed effect)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.528	0.042	12.580	0.000
Debit card ownership	0.185	0.095	1.947	0.058
Mobile money account ownership	0.292	0.177	1.643	0.107
Mobile phone ownership	0.067	0.041	1.622	1.112
R-squared	0.940			
F-statistic	39.235			

Note: C represents the regression constant (intercept).

To determine which of the common effect and fixed effect models better fits the data, a Chow test is conducted. As indicated by the Chow test's Cross-section Chi-square result with $p < 0.01$ (see Table 3), the best model is fixed effect. Therefore, next analysis and comparison with random effect are necessary.

Table 3. Redundant Fixed Effects Tests (Chow test)

Effects test	Statistic	d.f.	Prob.
Cross-section F	8.274	(14,42)	0.000
Cross-section Chi-square	79.436	14	0.000

Note: df denotes the degrees of freedom. For the Cross-section F test, the degrees of freedom are (14, 42), where 14 is the numerator degree of freedom and 42 is the denominator degree of freedom. For the Cross-section Chi-square test, the degree of freedom is 14.

The outcomes of a random effect regression on panel data are shown in Table 4. When control factors and time random effects are included, Table 4 illustrates the impact debit card

ownership, mobile money account ownership, mobile phone ownership on the account ownership. It shows that debit card ownership have a positive and significant impact on the account ownership in ASEAN+6 ($p < 0.01$)

Table 4. Panel EGLS (Cross-section random effects)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.332	0.035	9.303	0.000
Debit card ownership	0.659	0.061	10.650	0.000
Mobile money account ownership	0.120	0.164	0.736	0.464
Mobile phone ownership	0.003	0.040	0.091	0.927
Weighted statistics				
R-squared	0.585			
F-statistic	26.395			

Note: C represents the regression constant (intercept).

To determine which fixed effect and random effect models best fits the data, a Hausman test is conducted. The fixed effect model is the best one, according to the cross-section random outcome of the Hausman test with $p < 0.01$ (see Table 5).

Table 5. Correlated Random Effects – Hausman Test

Test summary	Chi-Sq. Statistic	Chi-Sq. d. f.	Prob.
Cross-section random	45.563	3	0.000

Panel data fixed effect regression as a best fit model for account ownership, debit card ownership, mobile money account ownership, and mobile phone ownership in ASEAN+6. Account ownership is positively and significantly impacted by debit card ownership ($p < 0.1$). Then, although not statistically significant, mobile money account ownership and mobile phone ownership have a positive effect on the account ownership ($p > 0.01$). With a positive constant of 0.528, the R-squared result is 94%. This indicates a relationship between debit card ownership and the success of financial inclusion.

The regression results indicate that debit card ownership has a positive and statistically significant effect on formal account ownership across ASEAN+6 countries. The magnitude of the estimated coefficient suggests that improvements in access to debit card services are associated with substantial increases in the likelihood of individuals participating in the formal financial system. This relationship may reflect the role of debit cards in reducing transaction costs, improving accessibility to financial services, and facilitating routine financial transactions. By enabling easier withdrawals, electronic payments, and account management, debit cards may strengthen incentives for individuals to open and maintain formal financial accounts.

The positive association between debit card ownership and financial inclusion outcomes may operate through several transmission channels. First, debit cards expand access to financial infrastructure by connecting individuals to automated teller machines, point-of-sale terminals, and digital payment networks. Second, the convenience and perceived security of card-based transactions may encourage individuals to shift from informal cash-based practices to formal banking services. Third, debit card usage may improve financial awareness and engagement, particularly in economies undergoing digital financial transformation. However, the extent of these mechanisms likely varies across countries depending on institutional quality, financial literacy, and the maturity of payment systems.

Beyond merely reflecting each country's financial landscape, this study provides empirical evidence of the impact of debit card usage on financial inclusion. The findings indicate that debit card use has a significant and positive effect on bank account ownership, underscoring its role in expanding financial access, as demonstrated by Bachas et al. (2021). While mobile money account ownerships and mobile phone ownership also exhibit a positive correlation with account ownership, Aracil et al. (2022), Xu et al. (2018), and Zheng et al. (2023) suggest that their effects are not statistically significant.

The empirical findings provide important insights into the determinants of financial inclusion across ASEAN+6 countries. The positive and statistically significant relationship between debit card ownership and formal account ownership supports the argument that access to transaction-enabling financial instruments plays a critical role in facilitating participation in the formal financial system. This finding is consistent with financial intermediation theory, which emphasizes the importance of financial infrastructure in reducing transaction costs and enhancing access to financial services.

However, the insignificant effects of mobile money account ownership and mobile phone ownership highlight the complexity of digital financial inclusion dynamics. While digital access has expanded rapidly in many ASEAN+6 economies, technological availability alone does not guarantee active engagement with formal financial services. Structural constraints such as limited financial literacy, regulatory fragmentation, uneven interoperability of digital payment, and persistent reliance on cash-based transactions may reduce the effectiveness of digital access variables in promoting financial inclusion outcomes.

These findings also reflect regional heterogeneity in financial development. In more advanced economies within ASEAN+6, debit cards are deeply integrated into payment systems and daily financial transactions, thereby strengthening their impact on financial participation. In contrast, in developing economies, digital infrastructure gaps and institutional barriers may limit the effectiveness of mobile financial services.

From a policy perspective, the results suggest that financial inclusion strategies should not focus solely on expanding access to digital devices or mobile financial platforms. Instead, policymakers should prioritize strengthening payment system infrastructure, improving financial literacy, enhancing consumer protection frameworks, and promoting interoperability across financial service providers. Such integrated policy approaches are

essential for ensuring that increased access to financial technology translates into meaningful and sustained financial inclusion.

Discussion

Beyond reflecting each country's financial landscape, this study provides empirical evidence that debit card usage positively influences financial inclusion. Debit card ownership shows a significant association with bank account ownership, highlighting its role in expanding access to formal financial services, consistent with Bachas et al. (2021). However, the coefficient declines substantially from the common effects model (0.875) to the preferred fixed-effects model (0.185), indicating that cross-country heterogeneity strongly influences this relationship.

Two mechanisms could explain this effect. First, debit cards increase the usability of bank accounts. By enabling access to ATMs, point-of-sale terminals, and digital payment systems, they allow individuals to withdraw cash, make payments, and conduct routine transactions without visiting bank branches. This reduces practical barriers to using formal financial services and encourages both account opening and active use, lowering the likelihood of dormant accounts. Second, debit cards enhance convenience and liquidity. Immediate access to funds and the ability to conduct frequent transactions create tangible benefits for account holders, encouraging regular deposits and reliance on formal banking for daily financial activities. Over time, repeated use may strengthen trust in financial institutions and deepen engagement with the formal system. In this sense, debit cards not only reflect financial inclusion but may also reinforce it by increasing the practical value of account ownership.

Nevertheless, the analysis captures primarily access rather than the depth of financial inclusion. The dataset does not measure broader financial behaviors like regular saving, formal borrowing, digital transfers, or investment activities. Therefore, the results should be interpreted as evidence of improved financial access rather than comprehensive financial participation.

The empirical results strongly support H1. Across all model specifications, particularly in the preferred fixed-effects model, debit card ownership exhibits a positive and statistically significant effect on formal account ownership. This finding confirms that debit cards play a critical role as an enabling financial infrastructure, facilitating access to the formal banking system.

From a theoretical perspective, this finding is consistent with financial intermediation theory, which emphasizes the importance of transaction instruments in reducing access barriers and transaction costs. Debit cards enhance the usability of bank accounts by enabling withdrawals, payments, and participation in digital transaction networks. As a result, individuals are more likely not only to open accounts but also to actively use them. However, the coefficient magnitude declines when controlling for country-specific effects, suggesting that institutional and structural factors, such as financial literacy, banking infrastructure, and

regulatory quality, moderate the strength of this relationship. This indicates that while debit cards are effective drivers of financial inclusion, their impact is context-dependent across ASEAN+6 countries.

The results do not provide statistical support for H2, although the estimated coefficients remain positive. This suggests that while mobile money accounts may contribute to financial inclusion in theory, their impact is not sufficiently strong or consistent across the ASEAN+6 sample. One plausible explanation is the functional substitution effect. In several countries, mobile money platforms operate as parallel financial systems rather than gateways to formal banking. Individuals may use mobile wallets for payments and transfers without necessarily opening a formal bank account. As a result, mobile money expands financial activity but does not always translate into higher formal account ownership.

Additionally, the effectiveness of mobile money in promoting financial inclusion depends on institutional integration, particularly interoperability between mobile platforms and banking systems. In contexts where such integration is weak, the contribution of mobile money to formal financial inclusion becomes limited.

The empirical findings do not support H3, as mobile phone ownership shows no statistically significant relationship with financial inclusion. Although mobile phone penetration is generally high across ASEAN+6 countries, this variable does not directly translate into increased participation in formal financial systems.

This result highlights an important distinction between access to technology and the use of financial services. While mobile phones provide the necessary infrastructure for digital finance, they do not guarantee engagement with formal financial institutions. Factors such as financial literacy, trust in banking systems, and regulatory frameworks play a more decisive role in determining whether individuals utilize financial services. Moreover, this finding reinforces the argument that digital access alone is insufficient to drive financial inclusion. Without supportive ecosystems, such as user-friendly financial products, consumer protection, and financial education, technology adoption may not lead to meaningful financial participation.

These findings suggest that traditional banking instruments remain more effective than purely digital access variables in promoting formal financial inclusion within the region. While digital finance continues to expand, its impact appears to depend heavily on institutional readiness and integration with the formal banking sector.

A notable finding is the absence of a statistically significant relationship between mobile-based indicators, like mobile money accounts and mobile phone ownership, and account ownership in the ASEAN+6 sample. This contrasts with many prior studies (e.g., Koomson et al., 2020; Aracil et al., 2020; T. T. H. Nguyen, 2020; Zheng et al., 2023) that identify digital financial services as key drivers of inclusion. One explanation is functional substitution. In some countries, mobile money systems operate as alternative financial ecosystems rather than complements to traditional banking. Individuals may rely on mobile wallets for payments and transfers without opening or maintaining formal bank accounts. In

such cases, digital finance facilitates financial activity while weakening the statistical link between technology adoption and bank account ownership. Institutional and regulatory conditions may further shape these outcomes. Differences in regulatory frameworks, interoperability between digital platforms and banks, and the integration of fintech services into the broader financial system can determine whether digital technologies promote formal financial participation. Where interoperability is limited or regulatory fragmentation persists, digital services may remain disconnected from the banking sector.

These findings suggest that the drivers of financial inclusion are highly context-dependent. In the ASEAN+6 region, traditional banking instruments, particularly debit cards, remain more consistent predictors of formal account ownership. Despite rapid digitalization, foundational banking infrastructure continues to play a central role in expanding financial inclusion.

Policy Recommendations for ASEAN+6

The results carry important policy implications. Strengthening basic banking access should remain a priority, as the strong association between debit card ownership and formal account ownership indicates that foundational financial tools continue to underpin inclusion outcomes. Expanding access to low-cost bank accounts bundled with debit cards should remain a priority, particularly for low-income, rural, and migrant populations. The effectiveness of such accounts depends on usability. Therefore, maintaining adequate ATM and point-of-sale networks is essential. Linking debit card-based payments to government transfers, public wages, and subsidies can further accelerate account adoption by creating routine transaction needs.

At the same time, digital financial services should be better integrated with the formal banking sector. The weak relationship between mobile money and account ownership suggests that mobile platforms often function as parallel systems. Enhancing interoperability between mobile wallets and bank accounts, introducing tiered regulatory pathways from basic wallets to full banking services. Furthermore, promoting bank-fintech partnerships can help transform digital users into formal banking clients. Third, structural and behavioral barriers must be addressed through context-specific policies. Financial literacy programs that promote effective use of accounts and digital tools, strong consumer protection frameworks, and improved regulatory coordination across countries are essential for building trust and sustaining participation.

Overall, a dual-track approach is required. Strengthening traditional banking foundations, particularly debit card usage, while integrating digital innovations into the formal financial system. This strategy offers the most viable path toward broad, sustainable financial inclusion in ASEAN+6.

Conclusions

This article explores how debit card ownership affects financial inclusion in ASEAN+6 nations. Empirical studies show that owning a debit card considerably enhances the likelihood of opening a bank account, acquiring formal loans, saving for business, and transferring money through a financial institution. Debit cards play a critical role in enhancing financial accessibility by lowering transaction costs and facilitating participation in formal payment systems and increasing access to financial services. Financial products like debit cards help reduce dependence on cash-based transactions, thereby promoting improved financial stability. Aside from basic account ownership, this study discovers that debit card usage is associated with better financial behaviors, such as greater savings and credit availability. These findings are consistent with prior research, indicating that debit card ownership promotes formal financial engagement and economic participation. Furthermore, the shift to digital financial services is especially important in emerging nations where informal banking systems remain prominent.

This study provides empirical evidence that debit card ownership plays a significant role in promoting formal account ownership in ASEAN+6 countries. However, the analysis does not directly examine other financial behaviors such as borrowing, business savings, or remittance transfers. These dimensions represent important avenues for future research aimed at developing a more comprehensive understanding of financial inclusion dynamics. This study examines the relationship between debit card ownership and financial inclusion in ASEAN+6 countries using Global Findex panel data (2011–2021). The results show that debit card ownership has a positive and statistically significant effect on formal account ownership. After controlling for country-specific differences using a fixed-effects model, a one-unit increase in debit card ownership is associated with a 0.185-unit rise in account ownership, confirming the important role of debit cards in expanding access to formal financial services. However, the strength of this effect varies across countries, indicating that national characteristics, like financial infrastructure, regulatory frameworks, and institutional quality, influence financial inclusion outcomes. In contrast, mobile money accounts and mobile phone ownership do not show a significant relationship with formal account ownership, suggesting that digital finance in this region may function as a parallel system rather than a gateway to traditional banking.

From a theoretical perspective, the findings underscore that access to usable banking instruments reduces transaction costs and encourages sustained participation in the formal financial system. At the same time, the results challenge technology-centric views of financial inclusion by demonstrating that digital adoption alone does not guarantee integration into formal finance. Institutional and behavioral conditions remain decisive in determining whether individuals move beyond access to active participation.

The policy implications are clear. Expanding affordable bank accounts linked to debit cards should remain a priority, particularly for underserved populations. Effectiveness, however, depends on complementary investments in ATM networks, payment infrastructure, and interoperable systems. Digital financial services should be integrated into the banking

sector rather than allowed to operate in isolation, and policy design must be tailored to each country's institutional capacity and financial landscape. Linking government transfers and public payments to debit-card-based accounts may further accelerate inclusion by promoting regular account use.

This study contributes to the literature by providing region-specific evidence for ASEAN+6 and highlighting the continued relevance of traditional financial instruments in an era of rapid digitalization. Nonetheless, the analysis focuses primarily on access indicators, relies on aggregated national data that may mask within-country disparities, and covers a limited time span. Future research should incorporate micro-level data, broader measures of financial usage, and longer time horizons to better understand distributional effects and the interaction between digital finance and formal banking. Overall, the findings indicate that debit cards remain a key driver of financial inclusion in ASEAN+6, and that sustainable progress will require coordinated development of both traditional banking infrastructure and digital financial systems within supportive institutional frameworks.

Promoting debit card ownership is an important policy step toward increasing financial inclusion. In nations where informal financial services are prevalent, activities focused on encouraging financial card adoption may encourage households to shift to digital banking alternatives. However, financial inclusion policies should be supplemented by initiatives to promote financial literacy to ensure that debit card possession leads to meaningful financial engagement. Finally, by affecting important financial behaviors such as transaction patterns, savings habits, and credit availability, debit cards have the potential to form an inclusive and fair digital financial ecosystem in ASEAN+6 countries. Given the importance of financial products in fostering economic participation, additional investment in financial infrastructure and literacy initiatives is required to realize the benefits of debit card use fully.

On the supply side, the government and relevant authorities in financial institutions should collaborate to develop policies for establishing solid regulatory frameworks that foster an inclusive financial ecosystem. To ensure the effectiveness of financial inclusion, the government can implement a financial literacy program in conjunction with the expansion of debit card ownership among people with low incomes. The syllabus is planned to include some local content to help existing and potential cardholders understand the different types of accounts and the actions involved in opening one. It is believed that with the knowledge and skills learned, households will be able to choose the most cost-effective service accounts. This policy specifically encourages regulatory improvements to remove barriers to owning ATM cards and Visa/Mastercard debit cards, while promoting close collaboration between financial service provider and the needs and willingness of those they seek to introduce to the service. By highlighting the differentiated roles of transaction instruments and digital access variables, this study contributes to a deeper understanding of financial inclusion dynamics in integrated regional economies.

This study provides a more conceptually consistent and empirically grounded assessment of financial inclusion dynamics in ASEAN+6 economies. By clarifying the role of debit card ownership as a financial infrastructure variable and strengthening the theoretical

and analytical discussion, the paper contributes to a deeper understanding of how access to transaction-enabling instruments influences formal financial participation in integrated regional contexts. This study has several limitations that should be acknowledged. First, the analysis relies on macro-level panel data from the Global Findex database, which may not fully capture individual behavioral aspects of financial inclusion, such as transaction frequency, savings patterns, or borrowing decisions. Second, financial inclusion is proxied by formal account ownership, which may not reflect the quality or intensity of financial service usage. Third, variations in data availability across countries and survey years may affect the comparability of certain indicators. These limitations suggest that the findings should be interpreted with caution, particularly when generalizing across diverse institutional and socio-economic contexts within ASEAN+6 economies.

Future research could address these limitations by incorporating micro-level household or individual survey data to better understand financial behavior and usage patterns. Longitudinal studies with a longer time horizon may provide deeper insights into the dynamic relationship between digital financial infrastructure and financial inclusion. Additionally, further research could explore the roles of financial literacy, regulatory quality, and fintech innovation in shaping inclusive financial ecosystems across integrated regional economies.

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References

- Abdelghaffar, R. A., Emam, H. A., & Samak, N. A. (2023). Financial inclusion and human development: Is there a nexus? *Journal of Humanities and Applied Social Sciences*, 5(3), 163–177. <https://doi.org/10.1108/jhass-11-2021-0178>
- Ahmad, A. H., Green, C., & Jiang, F. (2020). Mobile money, financial inclusion and development: A review with reference to African experience. *Journal of Economic Surveys*, 34(4), 753–792. <https://doi.org/10.1111/joes.12372>
- Alabdulatif, A., Samarasinghe, R., & Thilakarathne, N. N. (2023). A novel robust geolocation-based multi-factor authentication method for securing ATM payment transactions. *Applied Sciences*, 13(19). <https://doi.org/10.3390/app131910743>
- Aracil, E., Gómez-Bengoechea, G., & Moreno-de-Tejada, O. (2022). Institutional quality and the financial inclusion-poverty alleviation link: Empirical evidence across countries. *Borsa Istanbul Review*, 22(1), 179–188. <https://doi.org/10.1016/j.bir.2021.03.006>
- Bachas, P., Gertler, P., Higgins, S., & Seira, E. (2021). How debit cards enable the poor to save more. *The Journal of Finance*, 76(4), 1913–1957. <https://doi.org/10.1111/jofi.13021>
- Baetschmann, G., Ballantyne, A., Staub, K. E., & Winkelmann, R. (2020). feologit: A new command for fitting fixed-effects ordered logit models. *Stata Journal*, 20(2), 253–275. <https://doi.org/10.1177/1536867X20930984>
- Breuer, M., & deHaan, E. (2024). Using and interpreting fixed effects models. *Journal of Accounting Research*, 62(4), 1183–1226. <https://doi.org/10.1111/1475-679X.12559>
- Buckley, R. P., Arner, D. W., Zetsche, D. A., Lu, D. Z., & Veidt, R. (2019, May 16). *Sustainability, fintech and financial inclusion*. <https://ssrn.com/abstract=3387359>
- Bui, M. T. T., & Luong, T. N. O. (2023). Financial inclusion for the elderly in Thailand and the role of information communication technology. *Borsa Istanbul Review*, 23(4), 818–833. <https://doi.org/10.1016/j.bir.2023.02.003>
- Carpio-Pinedo, J., Romanillos, G., Aparicio, D., Martín-Caro, M. S. H., García-Palomares, J. C., & Gutiérrez, J. (2022). Towards a new urban geography of expenditure: Using bank card transactions data to analyze multi-sector spatiotemporal distributions. *Cities*, 131. <https://doi.org/10.1016/j.cities.2022.103894>
- Chang, V., Baudier, P., Zhang, H., Xu, Q., Zhang, J., & Arami, M. (2020). How Blockchain can impact financial services – The overview, challenges and recommendations from expert interviewees. *Technological Forecasting and Social Change*, 158. <https://doi.org/10.1016/j.techfore.2020.120166>

- Chen, Y., kumara, E. K., & Sivakumar, V. (2023). Investigation of finance industry on risk awareness model and digital economic growth. *Annals of Operations Research*, 326, 15. <https://doi.org/10.1007/s10479-021-04287-7>
- Coffie, C. P. K., Zhao, H., & Mensah, I. A. (2020). Panel econometric analysis on mobile payment transactions and traditional banks effort toward financial accessibility in sub-Saharan Africa. *Sustainability*, 12(3), 895. <https://doi.org/10.3390/su12030895>
- Daragmeh, A., Lentner, C., & Sági, J. (2021). FinTech payments in the era of COVID-19: Factors influencing behavioral intentions of “Generation X” in Hungary to use mobile payment. *Journal of Behavioral and Experimental Finance*, 32. <https://doi.org/10.1016/j.jbef.2021.100574>
- Darusalam, D., Janssen, M., Sohag, K., Omar, N., & Said, J. (2021). The Influence of ICT on the control of corruption: A study using panel data from ASEAN countries. *International Journal of Public Administration in the Digital Age (IJPADA)*, 8(1). <https://doi.org/10.4018/IJPADA.20210101.oa2>
- Demirgüç-Kunt, A., Klapper, L., Singer, D., Ansar, S., & Hess, J. (2020). The global index database 2017: Measuring financial inclusion and opportunities to expand access to and use of financial services. *The World Bank Economic Review*, 34, S2–S8. <https://doi.org/10.1093/wber/lhz013>
- Djalante, R., Nurhidayah, L., Van Minh, H., Phuong, N. T. N., Mahendradhata, Y., Trias, A., Lassa, J., & Miller, M. A. (2020). COVID-19 and ASEAN responses: Comparative policy analysis. *Progress in Disaster Science*, 8. <https://doi.org/10.1016/j.pdisas.2020.100129>
- Erlando, A., Riyanto, F. D., & Masakazu, S. (2020). Financial inclusion, economic growth, and poverty alleviation: evidence from eastern Indonesia. *Heliyon*, 6(10). <https://doi.org/10.1016/j.heliyon.2020.e05235>
- Hasan, M., Le, T., & Hoque, A. (2021). How does financial literacy impact on inclusive finance? *Financial Innovation*, 7(1). <https://doi.org/10.1186/s40854-021-00259-9>
- Ishikawa, K. (2021). The ASEAN Economic Community and ASEAN economic integration. *Journal of Contemporary East Asia Studies*, 10(1), 24–41. <https://doi.org/10.1080/24761028.2021.1891702>
- Janssens, W., Pradhan, M., de Groot, R., Sidze, E., Donfouet, H. P. P., & Abajobir, A. (2021). The short-term economic effects of COVID-19 on low-income households in rural Kenya: An analysis using weekly financial household data. *World Development*, 138. <https://doi.org/10.1016/j.worlddev.2020.105280>
- Javaid, M., Haleem, A., Singh, R. P., Suman, R., & Khan, S. (2022). A review of Blockchain Technology applications for financial services. *BenchCouncil Transactions on Benchmarks, Standards and Evaluations*, 2(3), 100073. <https://doi.org/10.1016/j.tbench.2022.100073>
- Kling, G., Pesqué-Cela, V., Tian, L., & Luo, D. (2022). A theory of financial inclusion and income inequality. *The European Journal of Finance*, 28(1), 137–157. <https://doi.org/10.1080/1351847X.2020.1792960>
- Kokorović Jukan, M., Okičić, J., & Hopić, D. (2020). Remittances as an opportunity to increase savings and financial inclusion of youth in South East Europe. *Economic Research-Ekonomska Istrazivanja*, 33(1), 2606–2619. <https://doi.org/10.1080/1331677X.2020.1749104>

- Koomson, I., Villano, R. A., & Hadley, D. (2020). Effect of financial inclusion on poverty and vulnerability to poverty: Evidence using a multi-dimensional measure of financial inclusion. *Social Indicators Research*, 149, 613–639. <https://doi.org/10.1007/s1120501902263-0>.
- Le, T. D., & Ngo, T. (2020). The determinants of bank profitability: A cross-country analysis. *Central Bank Review*, 20(2), 65–73. <https://doi.org/10.1016/j.cbrev.2020.04.001>
- Lee, Y. S., Chia, M., & Komar, J. (2022). A Systematic review of physical activity intervention programs in ASEAN countries: Efficacy and future directions. *International Journal of Environmental Research and Public Health*, 19(9), 5357. <https://doi.org/10.3390/ijerph19095357>
- Liu, D., Zhang, Y., Hafeez, M., & Ullah, S. (2022). Financial inclusion and its influence on economic-environmental performance: Demand and supply perspectives. *Environmental Science and Pollution Research*, 29, 58212–58221. <https://doi.org/10.1007/s11356-022-18856-1>
- Midões, C., & Seré, M. (2022). Living with reduced income: An analysis of household financial vulnerability under COVID-19. *Social Indicators Research*, 161, 125–149. <https://doi.org/10.1007/s11205-021-02811-7>
- Nguyen, H. V., Ha, G. H., Nguyen, D. N., Doan, A. H., & Phan, H. T. (2022). Understanding financial literacy and associated factors among adult population in a low-middle income country. *Heliyon*, 8(6), 1–12. <https://doi.org/10.1016/j.heliyon.2022.e09638>
- Nguyen, M.-L. T., & Bui, T. N. (2021). Trade openness and economic growth: A study on Asean-6. *Economies*, 9(3), 113. <https://doi.org/10.3390/economies9030113>
- Nguyen, T. T. H. (2020). Measuring financial inclusion: A composite FI index for the developing countries. *Journal of Economics and Development*, 23(1), 77–99. <https://doi.org/10.1108/JED-03-2020-0027>
- Nguyen, Y. H. D., & Ha, D. T. T. (2021). The effect of institutional quality on financial inclusion in ASEAN countries. *The Journal of Asian Finance, Economics, and Business*, 8(8), 421–431. <https://doi.org/10.13106/jafeb.2021.vol8.no8.0421>
- Nurhayati, I., Endri, E., Riani, D., & Bimo, W. A. (2022). Community's potential and preferences for Islamic banking: The case of Indonesia. *WSEAS Transactions on Environment and Development*, 18, 1094–1105. <https://doi.org/10.37394/232015.2022.18.104>
- Obinna, O. (2020). Impact of interest rate deregulation on investment growth in Nigeria. *International Journal of Economics and Financial Issues*, 10(2), 170–180. <https://doi.org/10.32479/ijefi.9260>
- Omar, M. A., & Inaba, K. (2020). Does financial inclusion reduce poverty and income inequality in developing countries? A panel data analysis. *Journal of Economic Structures*, 9, 37. <https://doi.org/10.1186/s40008-020-00214-4>
- Ozili, P. K. (2020, Jan 30). *Financial inclusion research around the world: A review*. SSRN. <https://ssrn.com/abstract=3515515>
- Ozili, P. K. (2021, Mar 21). *Has financial inclusion made the financial sector riskier?* SSRN https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3768963

- Pandhit, T. S. L. (2020). Dynamic financial inclusion in ASEAN 8: Do macroeconomics and financial technology matter? *Jurnal Ekonomi & Studi Pembangunan*, 21(2), 146-160. <https://doi.org/10.18196/jesp.21.2.5037>
- Papageorge, N. W., Zahn, M. V., Belot, M., van den Broek-Altenburg, E., Choi, S., Jamison, J. C., & Tripodi, E. (2021). Socio-demographic factors associated with self-protecting behavior during the Covid-19 pandemic. *Journal of Population Economics*, 34(2), 691-738. <https://doi.org/10.1007/s00148-020-00818-x>
- Pham, M. H., & Doan, T. P. L. (2020). The impact of financial inclusion on financial stability in Asian countries. *The Journal of Asian Finance, Economics and Business*, 7(6), 47-59. <https://doi.org/10.13106/JAFEB.2020.VOL7.NO6.047>
- Raimi, L., Panait, M., & Hysa, E. (2021). Financial inclusion in ASEAN Countries – A gender gap perspective and policy prescriptions. *LUMEN Proceedings*, 15, 38-55. <https://doi.org/10.18662/lumproc/gekos2021/4>
- Ratnawati, K. (2020). The Impact of Financial Inclusion on Economic Growth, Poverty, Income Inequality, and Financial Stability in Asia. *The Journal of Asian Finance, Economics and Business*, 7(10), 73-85. <https://doi.org/10.13106/jafeb.2020.vol7.no10.073>
- Siano, A., Raimi, L., Palazzo, M., & Panait, M. C. (2020). Mobile banking: An innovative solution for increasing financial inclusion in sub-Saharan African countries: Evidence from Nigeria. *Sustainability*, 12(23), 10130. <https://doi.org/10.3390/su122310130>
- Su, J., Su, K., & Wang, S. (2021). Does the digital economy promote industrial structural upgrading? – A test of mediating effects based on heterogeneous technological innovation. *Sustainability*, 13(18), 10105. <https://doi.org/10.3390/su131810105>
- Thach, N. N., & Ngoc, B. H. (2021). Impact of economic freedom on corruption revisited in ASEAN countries: A Bayesian hierarchical mixed-effects analysis. *Economies*, 9(1), 3. <https://doi.org/10.3390/economies9010003>
- Vo, D. H., Nguyen, N. T., & Thi-Hong Van, L. (2021). Financial inclusion and stability in the Asian region using bank-level data. *Borsa Istanbul Review*, 21(1), 36-43. <https://doi.org/10.1016/j.bir.2020.06.003>
- Wang, J., Dong, K., Dong, X., & Taghizadeh-Hesary, F. (2022, Apr 11). *Assessing the digital economy and its carbon-mitigation effects: The case of China*. SSRN. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4080737
- Wong, T. L., Lau, W. Y., & Yip, T. M. (2020). Cashless payments and economic growth: Evidence from selected OECD Countries. *Journal of Central Banking Theory and Practice*, 9, 189-213. <https://doi.org/10.2478/jcbtp-2020-0028>
- Xu, Y., Ghose, A., & Xiao, B. (2018, November 12). *Mobile payment adoption: An empirical investigation of Alipay*. SSRN. <https://ssrn.com/abstract=3270523>
- Zheng, S. Y., Sheng, B., Ghafoor, A., Ashraf, A. A., & Qamri, G. M. (2023). Investigating the environmental externalities of digital financial inclusion and the COVID-19 pandemic: An environmental sustainability perspective. *Environmental Science and Pollution Research*, 30(33), 80758-80767. <https://doi.org/10.1007/s11356-023-27433-z>