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DIGITAL PAYMENTS, FINTECH TRENDS AND SHADOW ECONOMY IN SOUTH EAST ASIA SOCIO-ECONOMIC REALITIES AND SUGGESTIONS FOR FURTHER RESEARCH

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The advancement of Fintech technological progress in emerging countries has accelerated the role of digital finance in economic development. Digital finance assists in financial inclusion, although emerging countries remain in the clutches of an informal and shadow economy which reduces the official GDP and the taxable income revenue, creating pressure on inclusion prospects. Using different contributions, the current study attempts to analyze the impact of digital finance on the shadow economy among selected South East Asian countries. It appears that digital payments can significantly reduce the size of the informal and shadow economy and are now an essential component in the public policies governments can implement to increase the official GDP, boost the tax revenue and finally to stimulate a real, balanced and sustainable development.

Keywords: *Fintech, digital finance, informal economy, shadow economy, financial inclusion, Asian countries.*

JEL Classifications: *C26, F26, 033, G29, L96, E62, H21, H26, H30, H62, J46*

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1. Introduction

The bank of the future will have different manifestations, with the impact of financial technology and the internet on the nature of banking. Digital finance involves the unification of financial services and digital technologies. The advancement in big data analysis, artificial intelligence, and information technology has made a remarkable contribution toward digitalization. Digitalization in finance means the increased use of digital technologies in the working and product development of the banking and finance sector. Digital finance provides individuals and firms with a wide array of sustainable financial services, for instance digital services such as online payments, credits, investments, remittances, and savings. Individuals and firms use these digital services through digital channels of the banks like mobile applications, automatic teller machines, point of sales terminals, etc. New Fintech services are also included apart from the above-established services in digital payments, such as cryptocurrency, peer-to- peer application, and digital ledger technologies. During the last three years, according to the report of the International Monetary Fund, there is an unprecedented increase in digital mobile payment, but the number of users has also increased. For instance, the mobile payment users have increased from 3.3 billion in 2017 to 4 billion in 2019, which is approximately 64% of the population (World Bank-2019). Thus, it can be inferred from the above data that technological advancement in financial services leads to financial inclusion.

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Financial inclusion refers to the ability of financial services to reach out to a distant population. The technological spillover theory states that financial inclusion results from reaching out to people through the internet and Fintech technologies. Financial inclusion is also one of the prime tenets of the sustainable development goal of 2030 (Ferrata-2019; Agur, Peria & Rochon-2020). Therefore, most of the developing countries are trying to convert their non-banking populations into banking populations. Developing countries are resorting to excessive use of the Fintech revolution and digital finance to increase financial inclusion. However, most developing countries still have insufficient infrastructure and available resources to expedite the process of financial inclusion. For instance, according to the report of the McKinsey Global Institute (2021), 59 % of the population is financially excluded in the emerging countries of South East Asia, whereas this is only 23% in China, 48% in Latin America, and 39% in Eastern Europe and Central Asia.

The lack of adequate infrastructure and unavailability of resources creates another problem, that of the shadow economy, among developing countries. The shadow economy refers to the growth of the parallel economy or the informal economy. It includes not only illegal business transactions but also legal activities which are not under countries' formal tax brackets. The informal economy reduces the taxable income of the country and hampers economic development in the long run. The proportion held by the shadow economy among the developing countries is in average more than 30% (Medina & Schneider-2018). The lack of access to banking services is the major determinant of the shadow economy. Globally, around 70% of the population does not have access to banking services for their financial needs. In developing countries, 50% of the population has no access to financial services. However, in this strenuous situation, the growth in digital finance is the only hope of increasing financial inclusion and restricting the growth of shadow economies among developing countries. Nevertheless, although digital finance may help control the shadow economy through financial inclusion, some recent studies have emphasized that digital finance may promote financial sector instability through systematic risk. The excessive use of digital payments and digital platforms may increase unethical activities and create financial sector instability (Risman, Mulyana, Silvatika & Sulaeman-2021; Banna & Alam – 2022).

This study contributes to the extant literature investigating the impact of digital finance on the shadow economy among selected South East Asian countries,, adding a new paradigm in the context of the consequences of increasing digital payments in emerging economies.. Furthermore, to estimate this trend, two hypothesis are formulated:

- Hypothesis 1: Digital finance has a significant negative impact on the growth of the informal and shadow economy.

- Hypothesis 2: Digital finance has a significant positive impact on growth, tax revenue and probably on macroeconomic stability.

The paper proceeds as follows: -a) section 2 covers the Fintech and digital banking in emerging Asia-b) Section 3 focuses on the complex relationship between shadow economy and banking activity-c) Section 4 analyzes the fostering impacts of increasing digital finance considering the informal activities, the growth of official GDP and the tax revenue; and d) section 5 includes some concluding remarks and discussion.

2. Fintech and Digital Banking Trends in Emerging Asia

The Asian banking sectors have gone through an eventful 2021-2022 and watershed moments characterized by the evolution of COVID-19. The first half was dominated by a devastating COVID wave that challenged growth and eroded banks' assets quality. However, the second half witnessed the sector come round along with the resumption of production and recovery in consumer spending. The pandemic somehow motivated banks to become more proactive, adaptive and innovative. Although risks and uncertainty remain persistent, the worst is over, the sector is set to benefit from the economic recovery, government supportive policies and the fruit of digital transformation promises to thrive the coming years (Bank for International Settlements – 2022).

All over Asia, and especially in Vietnam, digital transformation continues to be the backbone of most local banks' long-term strategies to increase their

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target consumer base, improve the costumer experience, and optimize their end-to-end business operations. The recent notable digital transformation initiatives by commercial banks included the adoption of e-KYC digital lending scoring and cloud computing that allowed for their complete and efficient front-and-back office operations.

Let us resume the main characteristics of the recent Fintech trends in Asia and especially in the ASEAN countries.

- As we can notice in Table 1, the media digital sentiment index reveals ASEAN is not a monolithic block, with significant variations across devices, networks and applications in digital landscape.

- In spite of the COVID-19 crisis, ASEAN banks benefit from adequate buffers and manageable assets quality concerns. Nevertheless, some ASEAN countries (Cambodia, Lao, Myanmar and even Philippines, Thailand and Vietnam) remain still in the nascent stage of evolution in digital banking. Parabolic growth in mobile and internet banking platforms is hindered by lack of trust in sharing information online.

- In this context, Singapore Fintech companies, followed by Malaysia and far behind Indonesia, continue to dominate the ASEAN Fintech landscape.

- With only a 34% of bank account penetration, Vietnam is clearly late in the banking process…

- Nevertheless, concerted efforts underway to by ASEAN banks to indigenize digital banking and margin compression has led ASEAN banks to refocus on fee-income, chiefly e-banked related.

In this context, several indicators witness the fast soaring of digital banking in emerging and its promising future, illustrated in the preceding data and following graphs.

Evolution of Fixed-Broadband Penetration: 2000-2030 Evolution of Mobile Broadband Penetration 2007-2030 In percentage of population > 15 years in million population > 15 years

3. Informality, Shadow Economy and Payment

In recent decades, much research has been devoted to understanding the determinants of informal economic activity, including the role of financial development, in the context of Fintech and digital finance soaring (Loayza-2018; Ulyssea -2020). Financial development can influence firms and individuals choices to engage in informal activity and also be affected by the level of informality. Clearly, easier access to non-cash-based-payments-whether via mobile phones, cards, or online-can

Table 1: *Relative Comparison of Digital Landscape across Selected Asian Countries 2020- 2021*

	Indonesia	Malaysia	Philippines	Singapore	Taiwan	Thailand	Vietnam
Population (mn)	275.5	33.9	115.6	5.9	23.9	71.7	**98.2**
Online Population (mn)	104.7	24.9	56.3	4.5	17.1	26.7	**53.4**
Population Online %	38 %	73.6 %	48.7 %	76.3 %	71.6 %	37.3 %	**54.4 %**
Broadband subscriptions per 100 inhabitants	17.1 %	15.4 %	8.4 %	33.4 %	25.7 %	18.4 %	**19.7 %**
Bank Account Penetration	38 %	87 %	37 %	97 %	76 %	82 %	**34 %**
Credit Card Penetration	3.9 %	23.4 %	3.4 %	49.1 %	41.0 %	9.9 %	**6.9 %**
Smartphone Penetration	27.4 %	57.5 %	44.9 %	88.3 %	61.1 %	37.7 %	**36.9 %**

Source: World Bank for ASEAN countries; National Statistics Republic of China for Taiwan.

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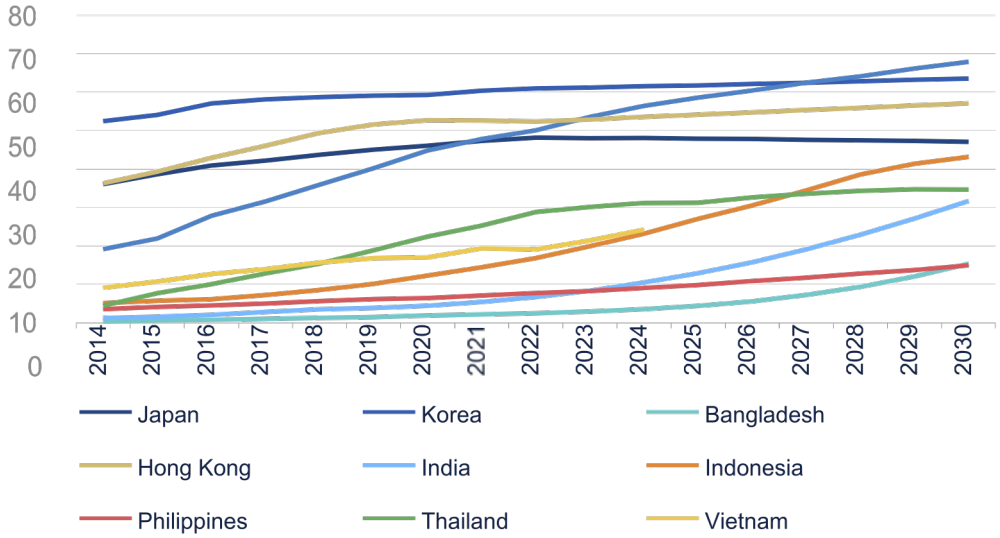
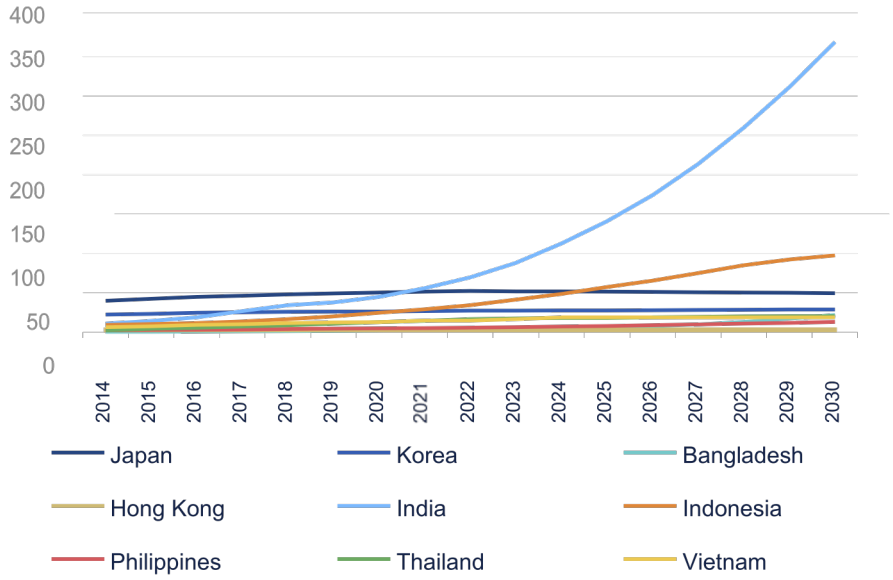


Source: European Central Bank anh author's calculate

Graph 1: *Digital banking in ASEAN: Recent Growth and Prospects (Percentage of Population > 15 years old)*



Source: Ibid

Graph 2: *Digital Banking Prospects in ASEAN: Past and Future (In million population > 15 years old)*

improve the government's ability to reach and support informal participants during a recession like COVID-19 (Fang, Kennedy & Resnick-2020; World Bank-2021).

We try now to examine the nexus between financial development and informality, both theoretically and empirically.

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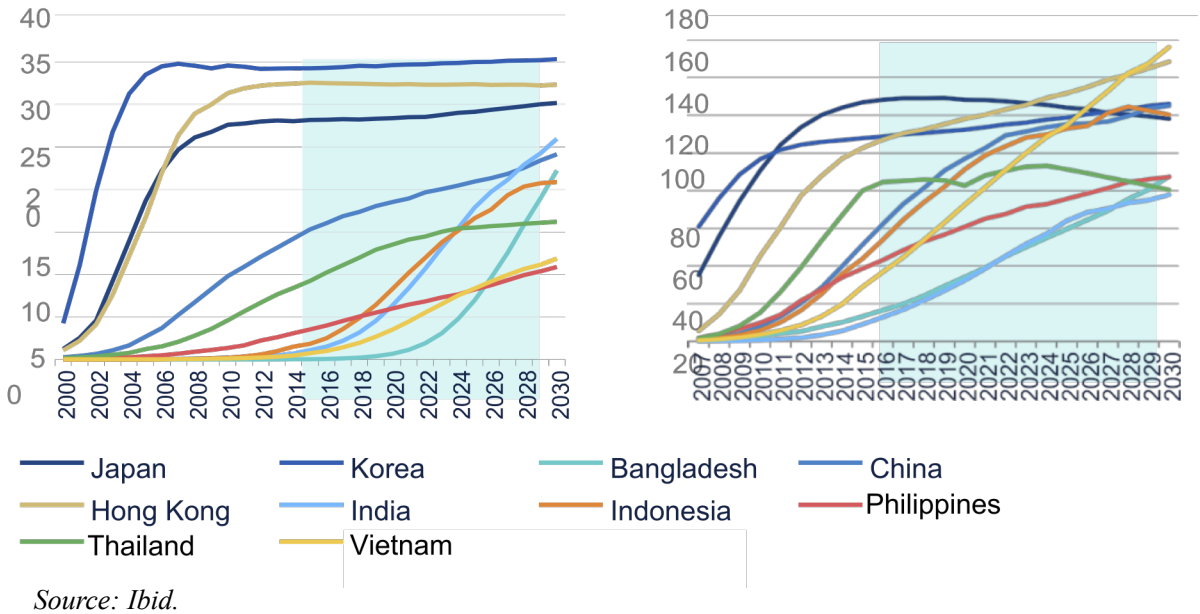

Source: Ibid.

Graph 3: *Fixed and Mobile Broadband Adoption Rates across ASEAN Countries: Past and Future*

3.1. Informality, Shadow Economy and Development

The informal economy (often at around 35 % of GDP) is often seen as an obstacle to development in emerging developing countries insofar as it may introduce significant microeconomic distortions (competition, sectoral capital allocation, etc.), and macroeconomic losses in efficiency (lower productivity of labor and capital, disincentive to innovate and to scale up, increase in income inequality and poverty). A larger share of the informal sector is also associated with insufficient domestic resource mobilization and public spending to finance access to basic services (health, education), which are essential to reach sustainable development goals, or investment, notably in infrastructure, to facilitate economic diversification and integration in global value chains.

For the purpose of this study, the global informal economy is made up of legal income-generating activities conducted out of the sight of the government and tax authorities. In every corner of the world, the informal economy is having profound negative impacts, limiting government ability to provide services, damaging competition, fostering unfair labor practices, and leaving workers vulnerable in an unregulated economy. Despite being largely invisible, the informal economy does damage in a variety of ways, synthetized in the following table.

Buehn and Schneider (2012) define the informal sector as all market-based legal production of goods and services that escape inclusion in official account, taking aside illicit activities. It is expressed as a share of overall GDP. As discussed in Dell'anno (2016), based on this definition, the terms "informal, shadow, underground, hidden,unofficial" are often used synonymously and associated with terms such as economy, sectors, market or GDP or size.

The choice to conduct economic activities in the informal sector is driven by a wide set of economic, financial and institutional motives. The first one may be a desire to avoid tax and social contributions (Goel and Nelson -2016; Mitra- 2017). Low financial development and in particular poor access to credit may also favor remaining in the informal sector (Berdiev and Saunoris- 2016). The attractiveness of the shadow economy may also be affected by the business cycle and the opportunities it creates in the formal sector (Schneider and Ensten- 2000). International constraints, such as openness to politi-

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Table 2: *Negative Impacts of the Informal Economy on Society*

Individuals	Unfavorable working conditions, lower wages, exploitation. -Difficulty integrating into the formal economy and financial institutions. -No quality guarantees and no legal way.
Business	Unfair competition -Degrading effects on the economy and unfair competition.
Governments	Lower tax revenues (income tax, sales tax, or duties- Distorted view of actual activity.- Less money to invest in program. Lower investment in social programs.

Source: A. T. Kearny Analysis (2022)

cal, social and economic globalization (Pham -2017; Berdiev and Saunoris- 2018), as well as regulatory and institutional quality (administrative bureaucracy, corruption or quality of governmental or political institutions) may also drive the appetite for informal activities (Goel and Saurinos- 2014; Elbahnasawy et al. -2016).

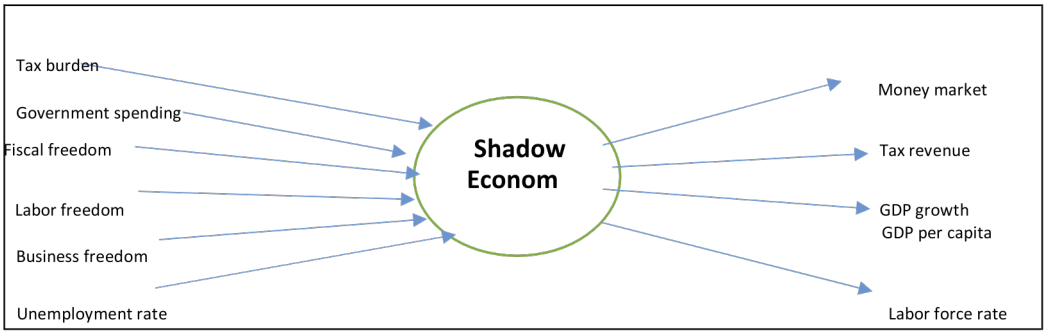
Nevertheless, given the diversity of informal activities, the formalization process associated with economic growth is multifaceted and the efficiency of corrective policies to promote the formal sector remain a matter of debate (La Porta and Shleifer- 2014). One of the significant dilemma faced by policy makers is that the informal economy has also been shown to generate a significant source of income and economic inclusion to vulnerable segments of the population (women, ethnic minorities, migrants and refugees, poor). Public action is also hindered by poor quality data and studies on this topic have so far been plagued by complex national accountings measurement issues.

3.2. Contributions of the Informal and Shadow Economies to GDPs in Asia The MIMIC Model

Estimating the size of the informal economy is a difficult task given its underground nature. The size of the informal economy is unknown by definition and to get a latent figure it is necessary to define an estimation technique. Let us consider the process of estimation of the MIMIC Model (Dynamic Multiple- Indicators and Multiple-Causes) to test whether the theoretical relationship between the latent variable, i.e. the informal economy, and its causes and indicators is supported. For that, we refer to the methodology defined by Schneider & Buehn (2013) and Hassan & Schneider (2016), completing the empirical results of their studies.

The first part of using the MIMIC model involves establishing a hypothesized relationship between the exogenous variables and latent variables, as defined in the following figure.

Formally, the MIMIC model consists of two components:



Source: Bayar, Y. & Ozturk, M. (2016) – Financial Development and Shadow Economy in European Union Transition Countries. Ideas Repec.

Figure 1: *A model for estimating the shadow economy - MIMIC Approach*

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(1) $\gamma = \lambda\eta t + \epsilon t$
(2) $\eta = \gamma,\chi t + \varsigma t$

Is the measurement model linking indicators (γt) and hidden variable(ηt).

Is the structural model examining the relationships between the latent variable (ηt) and the causes (χt).

The MIMIC model takes into account simultaneously different causes and indicators that directly influence the development of the size of the informal economy over time. Tax burden, regulatory burden, unemployment rate are the most important causes leading to the proliferation of the informal economy.

After considering the different causes that affect the size of the informal economy, the MIMIC model requires the specification of indicators reflecting the existence of the shadow economy. For example, GDP growth used as a proxy of formal economy, currency in circulation and the economic environment.

As we can notice, there are sometimes important differences between the macroeconomic valuations settled by different authors using the MIMIC approach. Let us consider the two follwing examples refering to Asia.

60 countries, developed and emerging, all over the world, and including 30 observed variables

3.3. Correlation Analysis: Cash Enables the Informal Economy

Mobile financial services and digital payment have been spreading rapidly in developing countries with large informal financial sectors and low formal financial deepening and inclusion. But, as documented by Guerineau and Jacolin (2014), these countries remain characterized by a strong preference for cash transactions over other means of payment, low access to financial services for large segments of their populations and recourse to informal credit (and self-insurance) to finance consumption and investment project instead of credit by formal banks and insurance. Several studies settle a clear inverse relationship between the size of the informal economy (as a share of official GDP) and the penetration of digital payments. It is easy to notice this reality in Asia, with countries like Indonesia, Philippines, Thailand and Vietnam having a high level of informality and a comparative low level of digital payments

Table 3: *Shadow economy (% GDP) of selected Asian countries*

Countries	Vo Duc Hong & Ly Thanh Hung 2014	Schneider & Kearney 2018	Vo Duc Hong & Ly Thanh Hung 2014	Vo Duc Hong & Ly Thanh Hung 2014	Schneider & Kearney 2018
China	-----	14.5	Singapore	----	8.6
Hong Kong	------	12.0	South Korea	-----	18.4
Indonesia	23.5	28.7	Taiwan	------	28.0
Malaysia	39.6	25.3	Thailand	50.2	45.2
Philippines	50.3	27.6	**Vietnam**	**27.4**	**22.9**

Source: Schneider & Kearney op.cit. Duc Hong Vo & Thanh Hung Ly op.cit.

Those differences are obviously the consequences of structural difficulties of estimation of an informal economy, which is by definition an activity partially hidden, undeclared and even underground. Nevertheless, whatever could be the results, it is obvious that informal or shadow economy is a crucial socio-economic reality in emerging Asia and especially in Vietnam.

In our contribution, we consider and use mainly the result of the recent and reliable exhaustive study lead by Schneider and Kearney (2022) concerning

In this context, it appears that digital payments help reduce the size of the informal economy. Indeed, because cash makes it easier to hide informal activities from authorities, the informal economy will weaken as digital payments become more common and displace cash. For this reason, digital payments can significantly reduce the size of informal economy and are now an essential component of the public policies governments can implement.

In the following table, we try to summarize all types of variables used for the estimation of the

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Table 4: *Informal economy and penetration of digital payments*

Countries	Informaeconomy % GDP 2018	Average number of cashless payments per inhabitant 2020
China	14.6	243
Hong Kong	12.2	651
Indonesia	28.3	47
Malaysia	25.2	131
Philippines	27.7	41
Singapore	8.5	661
South Korea	18.5	621
Taiwan	12.2	127
Thailand	44.4	115
Vietnam	**22.8**	**44**

Sources: BIS; WB; National Statistics Offices; Schneider & Kearney, opacity.

informal economy and their possible consequences on the digital payments.

Table 5: *Variables used in the MIMIC estimation of the informal economy*

Type	Indicators	Sources
Digital payments	Causal negative relationship between use of digital payments to assumed indicators such as the number of digital payments per capita, card payments volume per capita, POS penetration per 100.000 inhabitants, or number of ATM transactions per capita are used.	Bank for International Settlements, European central Bank, World Bank, Countries national statistical offices

Source: Schneider & Kearney op. cit.

Nevertheless, over the past decade, the countries that have been the most successful in reducing the size of the informal economy are focusing on reducing the use of cash and improving the acceptance and adoption of digital payments. All over the world, policymakers have access to an array of digital payment measures, from discouraging the use of cash to broadening the infrastructure for accepting cards and digital payments.

Another noteworthy development has been the trend towards diversification of financial services offered by a growing array of providers (telecom operators, Fintech startups, banks themselves). From its initial focus on transactions as a means of payment, i.e. mobile money, mobile phone services are increasingly offering credit services, and more recently, insurance services. Financial digitalization is but one form of a towards economic digitalization, a fast-growing and multifaceted economic transformation driven by large network effects that affect both the business models of banks, telecom operators and other financial intermediaries and their relationship with the real sector of the economy.

4. Fostering Impact Analysis of Fintech and Digital Payments

Assessing the impact of digital banking and payments on the informal economy therefore represents a research question of growing and significant interest, one that has received little attention so far. In accordance with the method defined by several scholars, and especially by Schneider & Kearney (2017), and using the available data, recent studies try to quantify impact of selected digital payment measures on the informal economy, GDP, and tax revenue.

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4.1. Valuing the Impact on the Informal Economy of Increasing Digital Payments

Our research goal is to determine the net effect of digital payments adoption on the overall size of the informal sector and analyze some of its transmission channels.

In accordance with several authors, it is relevant to consider that there is an inverse relationship between digital payments and the informal economy. The inverse relationship between digital payments and the informal economy means that for example a 10% to 20% increase in digital payments per year for five consecutive years could reduce significantly the size of the informal economy and thus increase the size of the official GDP in the selected Asian countries.

All estimates are ceteris paribus, that is assuming all factors remain unchanged except the number of digital payments per capita and ranges are used to interpret the results.

In this context, transaction method is an indirect way to estimate underground activities from trails that it leaves behind the official economy. We follow Feige's methodology in our analysis, assuming that there is a constant relationship (denoted by K) between the money supply related to economic transactions and total value added measured by GDP. Feige's transaction method starts with Fisher's equation of exchange, where M represents the money in circulation (sum of currency in circulation and demand deposits), V is velocity of money (rate at which money circulated or turn over in an economy at a given time period), P the price level and T the level of transaction.

$M*V = P * T$ (4.1)

Following assumption of constant relationship between money flows related to transactions and total value added, we can therefore write:

$P*T = K*(Y_T)$

Where Y_T is the sum of official value added and underground value added. In other words, it is the sum of the total output of an economy considering both formal and informal segments. Hence:

$P*T = K * (Y_0 + Y_u)$ (4.2)

Where Y_u is the value added in underground economy and Y_0 is the value added in official sector.

Bringing time dimension and substituting that in equation (1), we get:

$M^*_t V_t = K^* (Y_{0t} + Y_u)$ (4.3)

Assuming zero underground economy at period t = 0, we determine K of that period and consider that period and consider that K to remain constant throughout the whole period. We calculate the constant K by simple algebraic manipulation of equation (3) above assuming Y_{ut} equal to zero. Armed with the benchmark value of K, we can calculate the value of Y_{ut} underground for subsequent periods, again using algebraic manipulation of equation (3) such that:

$$Y_{ut} = \frac{M^*_t V_t}{K} \quad Y_{0t} \qquad (4.4)$$

To determine the total money supply (M) we summed up currency in circulation and demand deposits (C + D = M). Then to get M*V, we multiplied money supply (M) with velocity of money (V). Following equation (3), our next step is to consider the value of constant variable (K). Then, using the equation (4), it becomes possible to calculate the value of underground economy. Nevertheless, each component of money has its own velocity. If money is defined as the sum of currency cash (C), demand deposits (D_1), and other deposits that can be used for payment purposes (D_2), Fisher's equation may be expressed as follows:

$$M*V = P*T = (C)(V) + (D_1)(V_{D1}) + (D_2)(V_{D2}) \quad (4.5)$$

Where V_C is the velocity (or turnover) of currency, V_{D1} the velocity of demand deposits and V_{D2} the velocity of other deposits, the latter undoubtedly being lower than the first two. The various means of payment are not perfect substitutes for each other. There are transactions that are only paid by cheque or card for the sake of convenience, while there are others usually paid in cash. Thus, each mean of payment has its own velocity and we can write, using M_2 as money supply to avoid the problem of circularity in the equation:

$V'_C = \rho Y/C \qquad V'_{M2} = pY/M_2$ (4.6)

Velocity of currency is fixed, but in various cases the value is different and when there is a decrease or increase in payment activity, it will immediately change drastically. This will continue to fluctuate depending on the monetary policy implemented by

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the government and economic conditions (Qin-2017). Nevertheless, it appears, considering several relevant studies that digital and electronic transactions are acting against the velocity of currency and have clearly a negative impact on the informal economy by extending the cash-less payments sphere ((Roy et al. - 2021).

In this framework, Schneider and Kearney (2022), with sophisticated tools, estimate the five-year cumulative effect on informal economy from increasing digital payments in some selected Asian countries.

economy also helps to meet the needs of poor consumers by providing accessible and low-priced goods and services.

To ensure a comparable approach, we can assume that around 70 of the economic output produced by the informal economy is transferable into the formal economy, an assumption derived from Mogensen (1985) and F. Schneider & Williams (2013). Part of each country's official GDP vanishes in the informal economy, meaning that there is no country in the world, and especially in Asia without a certain level of informal economy.

Table 6: *Five-Year Cumulative Effect on Informal Economy from Increasing Digital Payments in Selected Asian Countries (In percentages of Official GDP* (Period 2017- 2021)

Countries	10% increase in number of digital payment per capita	20 % increase in number of digital payment per capita
China Hong	Δ= - 2.6 %	Δ= - 3.2 %
Kong	Δ= - 2.2 %	Δ= - 2.6 %
Indonesia	Δ= - 5.2 %	Δ= - 6. 3 %
Malaysia	Δ= - 4.6 %	Δ= - 5.5 %
Philippines	Δ= - 5.0 %	Δ= - 6.0 %
Singapore	Δ= - 1.6 %	Δ= - 1.9 %
South Korea	Δ= - 3.4 %	Δ= - 4.0 %
Taiwan	Δ= - 5.1 %	Δ= - 6.2 %
Thailand	Δ= - 8.2 %	Δ= - 9.9 %
Vietnam	**Δ= - 4.2 %**	**Δ= - 5.0 %**

Source: Schneider and Kearney opacity. , and author's calculations.

Finally, we can check that extending Fintech and digital payments could generate an important decline of the shadow economy, especially in countries like Indonesia, Malaysia, Philippines and Thailand.

In Vietnam, with an increase of 20 % in number of digital payment per capita, the decline of the informal economy would reach 5 % of the official GDP.

4.2. Impact on Official GDP of Decreasing Informal Economy

Product prices differ in the formal and informal economy and not all individuals who use a product or service in the informal economy would be willing to pay a higher price in the formal economy. The informal economy provides low-cost labor, inputs, goods and services to both formal and informal enterprises and low-cost goods and services to the general public, especially poorer. The informal

This unreported GDP is a combination of the share that is transferable into the formal economy and the lowest possible theoretical level of informal economy that will continue to persist. As no country has been able to eliminate its informal economy in its entirety, a threshold of 5% of GDP is assumed as the minimum informal economy size that any given country is likely to face.

As we can check in the table 10, among the selected Asian countries, the unreported GDP differs significantly in absolute and as the share contributed to the formal economy. For this reason, the expected effects on official GPD of increasing digital payments would be unequal: rather moderate in China, Hong Kong and Singapore, but significant in all the other countries.

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Table 7: *Five-Year Cumulative Effect on official GDP from Increasing Digital in Selected Asian Countries (10% and 20% increase in number of digital payments per capita) (Period 2017-2021)*

Countries	+10 %	+ 20 %	Countries	+ 10 %	+20 %
China Hong	Δ= +2.0 %	Δ= +2.2 %	Singapore	Δ= +1.2 %	Δ= +1.5 %
Kong	Δ= +1.7 %	Δ= +2.0 %	South Korea	Δ= +2.6 %	Δ= +3.1 %
Indonesia	Δ= +4.0 %	Δ= +4.9 %	Taiwan	Δ= +3.9 %	Δ= +4.4 %
Malaysia	Δ= +3.5 %	Δ= +4.3 %	Thailand	Δ= +4.4 %	Δ= +7.8 %
Philippines	Δ= +3.9 %	Δ= +4.7 %	**Vietnam**	**Δ= +2.2 %**	**Δ= +3.9 %**

Source - Schneider and Kearney op.cit.. , and author's calculations.

In Vietnam, with a potential gain of almost 4%, the increasing of 20% of digital payment per capita would mean a contribution of US$ 14.5 billion to the official GDP referring to 2021.

4.3. Impact of Increasing Digital and Decreasing Informal Economy on Tax Revenue

The informal sector plays an important role in the economies of the majority of developing and transitional countries, both as a result of its size and because of its particular characteristics. Neglect of the role of the informal sector in macroeconomic policy planning can lead to measures that are overly contractionary, or that have the opposite effects of those intended. Consequently, it should be included in economic models, policy planning, and empirical research. Moreover, with respect to revenue, the informal sector forms a large and growing share and thus represents a potentially significant source of tax revenue. In this section, we consider the broad barriers to more effective taxation of the informal sector, and possible approaches to identifying solutions.

A study by Johnson, Kaufman and Zoido-Lobaton (1998) indicates that an increase in the size of the informal and shadow economy will be associated with a loss of government revenue. Empirical studies indicate that a presence of a shadow economy will negatively affect tax collection for the government As such, a negative budget balance and an increasing public debt, as a necessary corollary, can be considered as a consequence of a shadow economy escaping from taxation. This reality is observable all over the ASEAN countries and especially in Vietnam, especially in the context of COVID crisis.As we can check in the following table, most of the Asian selected countries are affected by a significant fiscal deficit.

Table 8: *Public Budget Balance - 2021*

Countries	% GDP	Countries	% GDP
China	-10.79 %	Singapore	-0.19 %
Hong Kong	+0.01 %	South Korea	+0.37 %
Indonesia	-4.69 %	Taiwan	+0.21 %
Malaysia	-4.62 %	Thailand	-4.71 %
Philppines	-6.46 %	**Vietnam**	**- 3.91 %**

Source: International Monetary Fund.

To illustrate the problem of macroeconomc policy bias for an informal sector, and for that let us consider the following simple model. Suppose the true economy is modeled by:

$Y = \beta_t + 2 +$ (other variables)(5.1)

Where Y is the GDP level and t is the tax level.

Assume that $\beta > 0$ and $\varphi < 0$, so that as the tax level increases the negative effect on the GDP begin to swamp the positive effects. This produces a standard Laffer curve phenomenon. A planner who wishes to choose t to maximize Y, will do so based upon observation of the formal economy F, ignoring other variables.

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Max F = $\beta_1 + \varphi_1 t^2$ (5.2)

Where β_1 and φ_1 are the coefficients of tax effects on the formal sector. This yields the first-order condition:

$$\frac{\delta}{\delta t} = \beta_1 + \frac{2}{\varphi_1} = 0 \Longrightarrow t^* = \frac{-\beta 1}{2\varphi_1} \quad (5.3)$$

t^* is positive because φ is negative. Note that the planner has ignored the fact that Y = F + I (where F is the formal sector and I is the informal sector). A correct maximization of GDP would look like this: Max Y = F+ I = $(1 + \beta_2)\, t + (\varphi_1 + \varphi_2)\, t^2$ (5.4)

Where β_2 and φ_2 are the coefficient for the informal sector. This first-order condition of the true model yields:

$$t^* = \frac{-(1+\beta_1)}{2(\varphi_1+\varphi_2)} \quad (5.5)$$

If the coefficients for the informal sector are the same as those for the formal sector, then equations (5.3) and (5.5) yield an identical optimal tax rate. If, however, the negative effects of taxes on GDP are exaggerated in the formal sector due to spill over into informality, then $\beta_1 < \beta_2$ and $\varphi_1 < \varphi_2$. As a result, it is easy to see that t^* in the true model will be higher than in the planner's formal sector model.

How much the optimal results differ will depend upon how large the informal sector is in comparison to the formal sector and on how different the responses are. But common estimates of the size of the sector, combined with the possibility that the coefficients of government policy might not only have different magnitudes but even different signs, inspire the conclusion that ignoring the informal sector might lead to radically different optima calculations.

In this context, Fintech and digitalization, in addition to the impact on offiial GDP growth, moving individuals and business out of the informal economy, should logically increase tax revnues. A 1 percent increase in GDP could lead to a proportional increase in tax revenue.

In the specific case of Vietnam, an increase of 20 % in number of digital payment per capita could imply an increase of 2.3 % of tax revenue in terms of official GDP.

Of course, the estimated tax revenue increase varies depending on the country's tax rate, social security, contribution levels, and incidence of tax evasion, under the assumption that only digital payments change and all other factors stay thes ame, the current tax levels.

Those results are fully significant and mean that a rational management of the fiscal policy must aim a progressive integration of the informal activities in the formal sector, a parameter which guarantees a sustainable development.

Table 9: *Five-Year Cumulative Effect on Tax Revenue from Increasing Digital in Selected Asian Countries (In percentages of GDP) (Period 2017-2021)*

	10% increase in number of digital payment per capita	20 % increase in number of digital payment per capita
China	Δ = + 0.6 %	Δ = + 0.7 %
Indonesia	Δ =+ 0.6 %	Δ =+ 1.2 %
Malaysia	Δ = + 1.0 %	Δ = + 1.2 %
Philippines	Δ = +;0.9 %	Δ = + 1.1 %
Singapore	Δ = + 0.3 %	Δ = + 0.4 %
South Korea	Δ = + 0.7 %	Δ = + 0.9 %
Taiwan	Δ =+ 1.4 %	Δ = + 1.7 %
Thailand	Δ = + 1.8 %	Δ = + 2.2 %
Vietnam	**Δ = + 1.7 %**	**Δ = + 2.3 %**

Source: Schneider and Kearney op.cit. , and author's calculations

5. Conclusion and further research

In South East Asia, the advance in technological innovation has made a significant contribution

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towards the development of different sectors of the economy. The financial sector of the concerned countries has significantly benefited from the Fintech revolution and digitalization. In this context, the current study investigates the effect of digitalization of financial services on shadow economy growth among some selected South-East Asian emerging countries and the empirical analysis concludes that digitalization assists in reducing the shadow economy percentage of GDP. Clearly, Fintech innovation helps in the development of banking infrastructure, and the efforts to increase the financial outreach by emerging Asian emerging countries. Digitalization provides the tools to tackle, at least partially, the informality and the related issues that come with it, thereby defining the pathways for those who wish to transition to the formal sector. Where the absence of collateral or banks accounts made it challenging for informal workers and firms to access loans, digital solutions have made it possible to generate alternative data for assessing loans applications.

In Vietnam, for instance, efforts to decrease the informal economy have been threefold:

- First, the authorities have focused on reducing financial exclusion with a number of initiatives. Recent policies have enabled new financial services firms to enter and serve the unbanked. The government has started to deliver benefits payments through bank accounts, and these government-to-person electronic transfers have had a major impact on the number of persons with a bank account.

- The second area of efforts is the adoption of new technologies, providing infrastructure to financial institutions to deliver mobile banking to urban and also to rural inhabitants.

- Moreover, Vietnam is acting on the frontier of innovation, while its Central Bank is actively pursuing the research and development of Central Bank Digital Currency as a mean to reduce cash usage, which will to a further decrease of the informal and shadow economy.

Nevertheless, in terms of financial stability, some empirical investigations conclude that excessive use of mobile money transactions and ATMs among emerging countries could lead to financial sector instability by increasing the percentage of non-performing loans and bank credit to deposit ratio. The growing use of mobile and internet-based transactions increases the spending rate of individuals. To meet the spending requirement, individuals resort to banking credit facilities. This excessive credit availability puts pressure on the portfolio of NPL in several emerging countries (Syed & Aydingul – 2020).

However, on the positive side, the impact of digitalization on financial sector instability is sparse as other determinants contribute excessively towards financial sector instability. Previous studies also conclude that, in the long run, Fintech innovation helps in providing a more secure banking and financial sector environment, which we can infer from the data of developed countries. Better and improved technological infrastructure helps in controlling financial fraud to an extent. Thus, based on these facts, we can infer that, although digitalization could promote financial sector instability initially, in the long- run we can assume a more stable financial sector environment based on improvement in Fintech innovations and technologies among the emerging countries.

Several implications appear for banking regulation and Fintech innovation in South East Asia:

- 1) Policymakers should encourage more digitalization of banking services in South East Asian emerging countries. Those countries require adequate resources and income to compete with the developed countries, and digitalization helps in availing those resources through inclusive growth and reduction in the informal economy.

- 2) Asian emerging countries should invest more in creating a secure and stable digital infrastructure, as unstable digital platforms promote the chances of financial risk and fraud.

- 3) Policymakers should also consider reducing

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NPLs through Fintech innovations. An adequate regulatory and supervisory framework is required to track NPLs and financial risk.

- 4) Policymakers should encourage welfare-oriented digital banking services for individuals, businesses, and households. The government should also provide some financial assistance or subsidies to individuals and banking institutions to promote digital transactions. They may also provide substantial inputs to the current debate on institutional quality and regulation of digital financial services.

Indeed, Fintech contribute to strengthen transparency of economic activity and digitization makes domestic corruption more difficult. But, like any financial innovation, Fintech with digital payments have created new types of fraud (fake currency deposits, phishing, SIM swaps, etc.). This shows that regulatory environments are important enablers of Fintech growth.

These findings lay the groundwork for the literature on the Fintech macroeconomic implications, which has received little attention so far. As financial digitalization intensifies, we expect associated macroeconomic effects to increase, calling for more research on its overall impact on inclusive economic development and domestic resource mobilization. The ongoing diversification of Fintech, combined with the digitalization of other economic transactions (tax, wages, etc.) may also entail additional cumulative cross-effects along the road. In this context, further research is needed to determine how these new financial institutions affect financial stability. The significance of this issue certainly grows as exponentially as Fintech services themselves, calling for more regulatory vigilance and monitoring to make these innovations a net contributor to sustainable development.◆

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Summary

Sự phát triển của công nghệ tài chính tại các nước mới nổi đã tăng cường vai trò của tài chính số trong phát triển kinh tế. Tài chính số hỗ trợ hoạt động tài chính toàn diện mặc dù các nước mới nổi vẫn bị chi phối bởi nền kinh tế ngầm và phi chính thức, làm giảm GDP chính thức và thu nhập tính thuế, gây áp lực cho triển vọng phát triển toàn diện. Sử dụng những dữ liệu khác nhau, nghiên cứu phân tích tác động của tài chính số đối với nền kinh tế ngầm tại một số quốc gia Đông Nam Á. Kết quả cho thấy thanh toán số có thể giúp giảm đáng kể quy mô của nền kinh tế ngầm, phi chính thức và hiện là bộ phận quan trọng trong các chính sách công mà chính phủ có thể tiến hành nhằm tăng GDP chính thức, tăng nguồn thu thuế và cuối cùng thúc đẩy sự phát triển thực tế, cân bằng, bền vững.