



# THAILAND

## SELECTED ISSUES

February 2026

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## SELECTED ISSUES

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Department**

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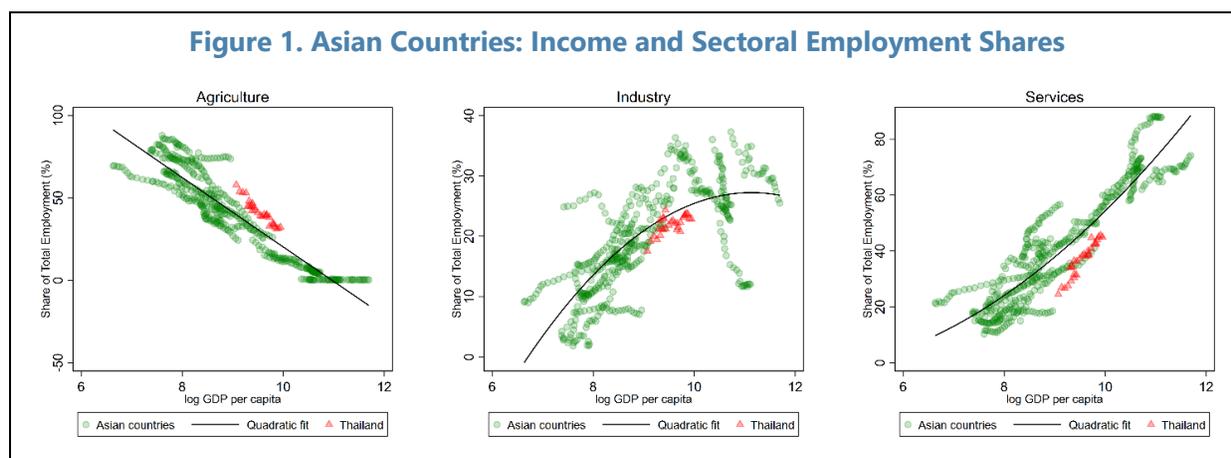
# REINVIGORATING THAILAND'S STRUCTURAL TRANSFORMATION

This chapter reviews Thailand's progress in structural transformation and its recent slowdown. It examines the empirical drivers of structural transformation and quantifies their contributions, with the objective of informing policies to reinvigorate the process.

## A. Background

**1. Structural transformation, the reallocation of labor from lower- to higher-productivity sectors, is a well-documented feature of economic development.**<sup>1</sup> While the pace and pattern vary across countries and regions, broad trends have been identified. As economies grow and incomes rise, the share of agricultural employment typically declines, the share of industry increases and then stabilizes, and the services sector expands steadily throughout the development process (Bah, 2011; Dabla-Norris et al., 2013; Herrendorf et al., 2013; IMF, 2024).<sup>2</sup>

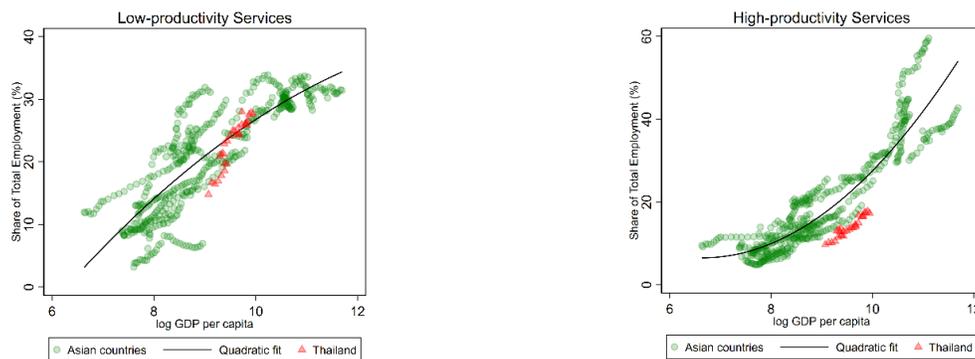
**2. Thailand has largely followed this trajectory, albeit with notable idiosyncrasies.** The share of employment in agriculture remains persistently high relative to countries at similar income levels. Although on a declining trend, approximately one-third of Thai workers are still employed in agriculture. Consequently, employment in industry and services is relatively low for Thailand's income level. Within the services sector, a disproportionately large share of workers are employed in low-productivity services (i.e., trade services and other services), while employment in high-productivity services including finance and business services remains relatively low (Figure 1).



<sup>1</sup> This chapter focuses on sectoral labor reallocation as the primary lens for analyzing structural transformation, although it can be examined through other dimensions such as shifts in value-added or non-labor resources.

<sup>2</sup> Although this pattern is relatively well established among advanced economies, developing countries exhibit substantial heterogeneity in their structural transformation paths. Notably, Asian countries have followed a trajectory similar to that of advanced economies (Bah, 2011).

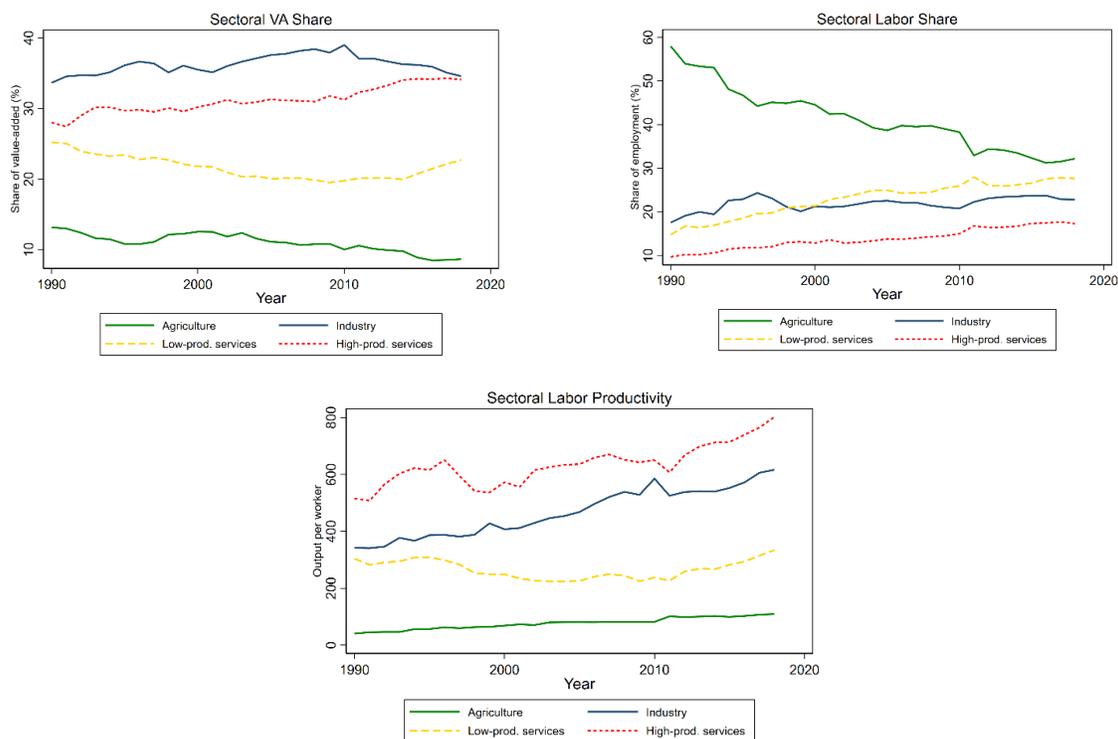
**Figure 1. Asian Countries: Income and Sectoral Employment Shares (Continued)**



Note: Each marker indicates a country's sectoral employment share and its income level at a given year from 1990 to 2018. Source: UNU-Wider Economic Transformation Database, IMF staff calculation.

**3. More generally, there is a notable imbalance between sectoral labor and output shares in Thailand.** Industry and high-productivity services account for the majority of value-added, whereas low-productivity services and agriculture contribute substantially less. However, the distribution of employment is the reverse: agriculture, though declining over time, continues to employ the largest share of workers, followed by low-productivity services, whereas industry and high-productivity services employ a smaller portion of the labor force. This dichotomy has resulted in a wide and growing labor productivity gap across sectors in Thailand (Figure 2).

**Figure 2. Thailand: Sectoral Value-Added, Employment Shares, and Productivity**



Source: IMF staff calculation.

**4. Although this implies an inefficient labor allocation in Thailand, it also suggests potential scope for productivity gains.** Facilitating the reallocation of workers to higher productive sectors would enhance overall labor productivity, thereby enabling Thailand’s economy to achieve stronger growth. In this context, the following sections assess Thailand’s progress in structural transformation, identify the key drivers, and suggest policies to support the reallocation of labor toward higher-productivity sectors.<sup>3</sup>

## B. Assessing Thailand’s Structural Transformation

### *Measuring Structural Transformation*

**5. Following IMF (2013) and Klyuev (2015), the covariance between sectoral employment share and labor productivity is calculated to quantify structural transformation.** Rather than focusing on individual sectors, this indicator provides a snapshot of the overall efficiency of labor allocation of an economy at a given point in time.<sup>4</sup>

Formally, the covariance term is defined as:

$$Covariance = \sum_i^n (s_i - \bar{s})(p_i - \bar{p})$$

where  $s_i$  is the employment share of sector  $i$ ,  $p_i$  is the sector’s labor productivity (i.e., value-added per worker), and  $n$  is the number of sectors. Intuitively, the covariance is positive when more productive sectors employ a larger share of labor, and negative when less productive sectors employ a larger share of labor. Thus, it serves as a measure of the efficiency of labor allocation across all sectors. The term can be simplified as:

$$\sum_i^n (s_i - \bar{s})(p_i - \bar{p}) = \sum_i^n s_i (p_i - \bar{p}) - \bar{s} \sum_i^n (p_i - \bar{p}) = \sum_i^n s_i p_i - \sum_i^n s_i \bar{p} = P - \bar{P}$$

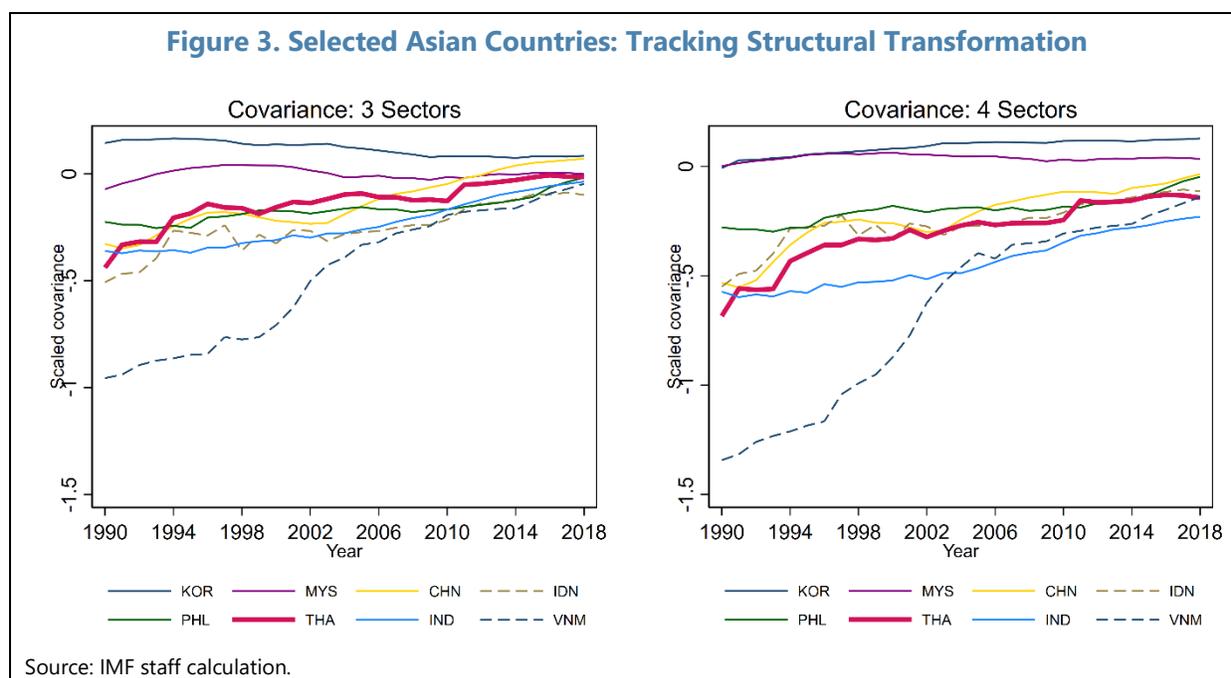
where  $P$  is aggregate labor productivity and  $\bar{P}$  is the simple average of sectoral productivity. This shows that the overall efficiency of sectoral labor allocation (covariance) can be expressed as the difference between the economy-wide productivity ( $P$ ) and the average productivity of individual sectors ( $\bar{P}$ ). This is consistent with the decomposition of productivity growth into within-sector productivity gains and between-sector labor reallocation effects (McMillan, Rodrik, and Gallo, 2013).

<sup>3</sup> While this chapter focuses on sectoral labor allocation, other factors such as capital resource allocation could also affect overall productivity. See for example, IMF (2025a).

<sup>4</sup> Compared to more conventional approaches that focus on sectoral labor shares, this approach offers a more comprehensive perspective covering labor allocation across all sectors, focusing on the mismatch between sectoral productivity and labor distribution. Additionally, the indicator remains agnostic about which sector employs larger share of labor—an advantage given that the path of structural transformation can vary across countries (IMF 2024).

## Evolution of the Covariance Term

**6. The evolution of the covariance term demonstrates progress in structural transformation.** Following Klyuev (2015), Figure 3 plots evolution of the covariance term for selected Asian countries using the latest data from the UNU-Wider Economic Transformation Database (ETD). For cross-country comparability, the covariance is scaled by aggregate labor productivity. Covariance is computed using both 3-sector and 4-sector classifications, with the latter distinguishing between low- and high-productivity services. The charts show that most countries exhibit negative values of covariance, indicating that less productive sectors attract a disproportionately large share of employment. However, these values have improved significantly over time. This pattern is consistent with the broader trend of structural transformation in Asia, where labor shifts out of agriculture and into industry and services as economies develop.



**7. The extent and pace of improvement vary across economies and over time.** Korea and Malaysia have consistently recorded covariance close to or above zero during the period, indicating labor allocation patterns that are more favorable to aggregate productivity. The Chinese mainland has experienced substantial improvement, with its covariance term now approaching the levels observed in Korea and Malaysia. Vietnam has registered the most dramatic gains, suggesting significant productivity improvements driven by structural transformation.<sup>5</sup> In contrast, Thailand experienced notable progress in the early 1990s, but the momentum has since slowed. Since the mid-2010s, Thailand's covariance term has plateaued and even declined slightly in recent years, indicating possible stagnation in structural transformation.

<sup>5</sup> While Vietnam experienced productivity gains from sectoral labor reallocation, its TFP growth has been negative over the last two decades with large dispersion of productivity across firms and resource misallocation (IMF, 2025).

**8. The covariance metric also depends on the level of sectoral disaggregation.** When using a 3-sector classification, Thailand’s covariance term appears relatively high—comparable to Malaysia’s. However, a more granular 4-sector analysis reveals a different picture. Thailand’s labor allocation efficiency is significantly lower, falling below that of the Philippines and Indonesia, and close to Vietnam’s level. This divergence reflects a substantial imbalance within Thailand’s services sector, where high-productivity services employ a relatively small share of labor, while low-productivity services absorb a much larger share of labor—a pattern that is masked in the 3-sector analysis.

## C. Drivers of Structural Transformation

### *Empirical Approach and Data*

**9. To investigate the determinants of structural transformation, a cross-country panel regression model is estimated.** The dependent variable is the scaled covariance term, as described above. Independent variables are grouped into country fundamentals and policy-related factors, encompassing a broad set of potential determinants of labor reallocation. A fixed-effects estimator is employed to control for unobserved, time-invariant country characteristics, and year dummies are included to account for common macroeconomic shocks. The model is specified as:

$$s_{it} = F'_{it}\gamma + X'_{it}\beta + \alpha_i + \delta_i + \varepsilon_i$$

where  $s_{it}$  is the scaled covariance for country  $i$  in year  $t$ ,  $F_{it}$  and  $X_{it}$  denote country fundamentals and policy-related variables that potentially affect labor reallocation, and  $\alpha_i$  and  $\delta_i$  are country and year fixed effects.

**10. Covariance terms are calculated using data from the ETD.** The ETD provides annual data on sectoral employment and value-added for 12 disaggregated sectors across 51 economies from 1990 and 2018. For each country-year, sectoral labor productivity is measured as value-added per worker, and sectoral employment and value-added shares are computed as each sector’s share of total employment and total value-added, respectively. These series are combined to construct the covariance term, which is then scaled by aggregate productivity for comparability across countries and over time. Covariance terms are constructed for both 3-sector classification (agriculture, industry, services) and 4 –sector classification (agriculture, industry, low-productivity services, and high-productivity services).

**11. For the independent variable, a comprehensive set of determinants is used in the baseline model.** Country fundamentals include log GDP per capita (constant PPP, World Development Indicators database (WDI)) and its square term (to capture non-linear effects), log population size, and old-age dependency ratio (both from WDI). Policy variables that could potentially affect labor reallocation are also included. To capture the role of human capital, average years of schooling (UNDP Human Development Index Database) and the Human capital Index (Penn World Tables) are included, which together reflect the quantity and quality of educational attainment. Trade and investment variables include trade-to-GDP ratio and foreign direct investment

(FDI) flows as a percentage of GDP (WDI), terms of trade index (WDI), and real effective exchange rate (REER) (World Economic Outlook Database). To capture agricultural policy orientation, given the lack of data on direct subsidies, agricultural raw materials exports as a share of merchandise exports (WDI) is included. Vulnerable employment as a share of total employment (WDI) is included as a proxy for labor market informality, and domestic credit to the private sector as a percentage of GDP (WDI) as a proxy for financial access. Finally, to capture potential effects of governance quality, the Political Corruption Index (V-Dem Core Indicators) is included. To address potential endogeneity, one-year lagged values are used for policy-related explanatory variables, while contemporaneous values are retained for GDP per capita, population, and the old-age dependency ratio. For ease of interpretation, the Political Corruption Index is rescaled by multiplying its original values by 100.

**12. To assess robustness, baseline specification is augmented with additional policy-related drivers.** One specification adds the Labor Market Regulations index from the 2024 Fraiser Economic Freedom of the World Dataset to capture the effect of regulations on labor movement. Another includes the Gini Index from the World Income Inequality Database (WIID) to account for potential effects of income inequality. A third model incorporates measures of digital infrastructure, proxied by the share of population with internet access (WDI). The fourth model replaces average years of schooling with more granular educational attainment—enrollment ratios of primary secondary education; and tertiary education (UNESCO). The final specification replaces the Political Corruption Index with the Rule of Law indicator (World Bank World Governance Indicators) to gauge different aspects of governance.

### **Regression Results**

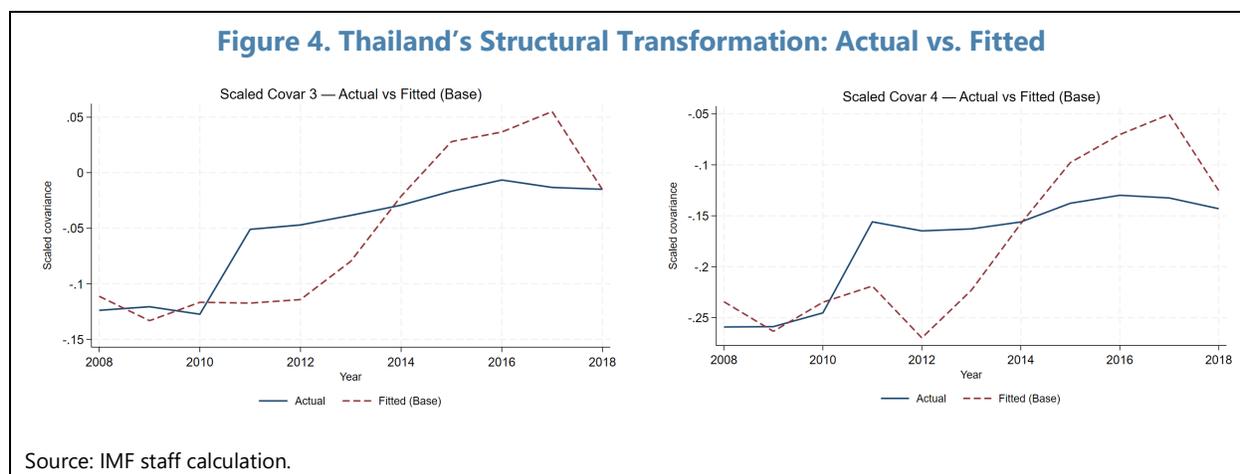
**13. The results confirm that structural transformation is closely linked to income and development levels.** Log GDP per capita is strongly and positively correlated with the covariance term, while the quadratic term is negatively correlated across all model specifications. This indicates that labor allocation efficiency improves as income rises, but at a diminishing rate. Log population also exhibits a strong positive coefficient, suggesting that larger population is associated with greater labor allocation efficiency. Although seemingly counterintuitive, the positive correlation of the old-age dependency ratio is consistent with previous findings that population aging is associated with lower agriculture value-added share and higher services value-added share (Dabla-Norris et al., 2013). The regression results are included in the Appendix.

**14. Policy-related factors influence structural transformation in various ways.** Among trade and investment variables, terms of trade and trade openness contribute to higher covariance, consistent with the literature that finds international trade integration as a key driver of structural transformation (IMF, 2024). Conversely, REER appreciation is associated with lower covariance, likely reflecting reduced competitiveness that hampers the development of tradable sectors. Interestingly, FDI inflows do not exhibit a statistically significant effect—which may be due to their heterogeneous effect across industry and service sectors depending on their levels (Dabla-Norris et al., 2013). Consistent with expectations, average years of schooling is positively and significantly correlated with covariance across all model specifications, although the Human Capital Index does not show statistical significance. Employment informality, proxied by the share of vulnerable employment, is

negatively correlated with the covariance term, though statistical significance appears only in the second and sixth specifications. The share of agricultural exports is also negatively associated with the covariance term, likely reflecting that greater reliance on agriculture impedes labor transition to higher-productivity sectors. Credit access, measured by the private credit-to-GDP ratio, is positively correlated, suggesting that improved credit access may facilitate more efficient labor allocation.<sup>6</sup> The results also show that governance matters. Corruption is negatively associated with covariance across all specifications, supporting the view that government failures impede labor reallocation toward higher-productivity sectors (Sen, 2016). In alternative specifications, improved labor market regulation is associated with higher covariance. Among education variables, primary and secondary education enrollment is more strongly correlated with covariance than tertiary education enrollment. The coefficient for internet access is positive but not statistically significant. Stronger rule of law is positively associated with structural transformation, reinforcing the important role of governance.

## D. Understanding the Recent Slowdown

**15. Applying the estimated model, we examine how the identified drivers have contributed to the recent slowdown in Thailand’s structural transformation.** Plotting the actual covariance terms along with the fitted values from the model demonstrates increasing downward pressures since the mid-2010s (Figure 4). To identify the sources of this headwind, contributions of individual drivers are examined. Specifically, for each driver, changes in their values between 2010-2014 and 2014-2018 are computed. These changes are then multiplied by the estimated coefficients from the model to assess their impact.



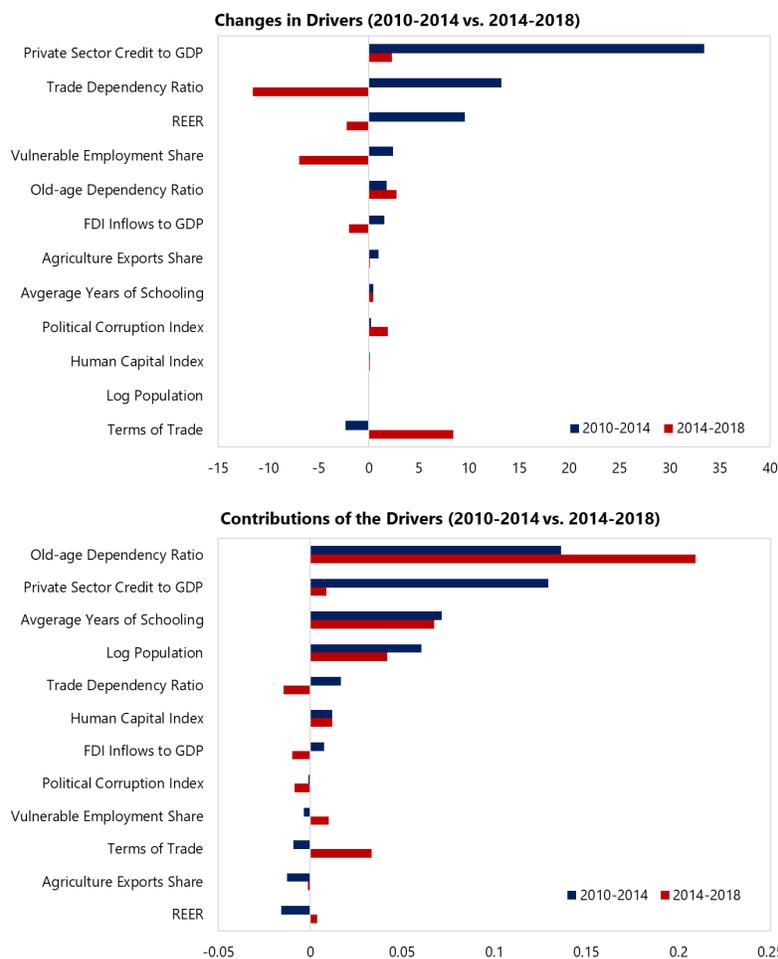
**16. The comparison of the two periods shows substantial shifts in drivers.** Private sector credit growth slowed markedly in the latter period, and progress in trade openness reversed. The REER depreciated, the share of vulnerable employment declined, and terms of trade improved—all in contrast with the preceding period. Other changes include an acceleration in the old-age-dependency ratio, a reversal in FDI growth, slower growth in agriculture export share, a

<sup>6</sup> That said, high household debt could potentially impede structural transformation by constraining disposable household income and resources needed for investment in human capital.

more moderate increase in average years of schooling, deterioration in governance (higher corruption), and slower population growth (Figure 5, upper panel).

**17. These factors collectively influenced Thailand’s structural transformation.** Beyond income growth, slower private sector credit expansion, a weaker rise in average years of schooling, decelerating population growth, reduced trade openness, and deteriorating governance all contributed to a lower covariance term, thereby slowing structural transformation relative to the previous period. In contrast, population aging, a decline in vulnerable employment, improved terms of trade, and REER depreciation had a mitigating effect, supporting Thailand’s structural transformation. The agricultural export share continued to exert a negative impact, though its drag diminished, resulting in a modest reduction in its effect (Figure 5, lower panel).

**Figure 5. Thailand: Changes in Drivers of Structural Transformation and Their Contributions**



Source: IMF staff calculation.

Notes: Both charts exclude log GDP per capita and its square term.

## E. Policy Implications

### 18. The analysis highlights several policy priorities to promote structural transformation.

Accelerating trade liberalization, including deeper integration into global and regional markets, can facilitate the reallocation of labor toward more productive sectors. Investing in education, particularly at the primary and secondary levels, is essential for building a workforce capable of transitioning to higher-productivity employment. Enhancing financial inclusion and expanding access to credit for productive investments can broaden opportunities to improve labor allocation efficiency. Reducing corruption and enhancing the rule of law could create a predictable environment conducive to efficient labor reallocation. Reducing informality through expanded social insurance coverage would support the integration of informal workers and their transition to formal, higher-productivity sectors. Improving labor market flexibility—by streamlining hiring and dismissal procedures and clarifying labor regulations—can lower barriers to formal employment growth. Furthermore, reinforcing these reforms with complementary measures to broaden financial access for firms and foster a more diversified financial structure could improve capital allocation efficiency,<sup>7</sup> thereby further boosting productivity gains.

**19. Thailand can draw valuable lessons from regional peers.** East Asian economies such as Korea, and other ASEAN countries including Malaysia, have implemented effective strategies to help advance structural transformation. These experiences offer useful benchmarks:

- **Korea—Human capital investment underpinning the growth strategy.** Korea’s economic development has been strongly driven by sustained investment in human capital (World Bank, 2023). Average years of schooling increased from 5.4 in 1970 to 12.7 in 2023, supported by consistent public financing and ongoing efforts to align human resource development policies with evolving industrial needs. STEM capabilities were enhanced through the establishment of flagship research institutions and targeted R&D initiatives, such as the Brain Korea 21 program. To address skills mismatches, vocational training was strengthened through Meister high schools,<sup>8</sup> co-designed with industry partners. Support for workers adapting to technological change and industrial restructuring was reinforced through the Employment Insurance System.
- **Malaysia—Inclusive finance creating an enabling environment.** Bank Negara Malaysia has adopted multi-year strategic frameworks to promote financial inclusion, with clear objectives and measurable targets. Under the current Financial Inclusion Framework (2023–2026), key goals include expanding financial access to all subdistricts, increasing e-payment transactions,

<sup>7</sup> Investment efficiency declined in Thailand after the global financial crisis, similar to other countries in the region, reflected in the high and rising incremental capital–output ratio (IMF, 2025a).

<sup>8</sup> Meister high schools are a new vocational education model introduced by the Korean Ministry of Education to develop a skilled workforce for emerging industries. They recruit talented middle-school graduates from across the country through a rigorous selection process. The curriculum is tailored to specific skill requirements of participating industries, which actively contribute to both its design and implementation. This industry-driven approach has resulted in notably high employment rates with longer job duration among graduates (World Bank 2023).

enhance SME financing ecosystem, doubling microinsurance/microtakaful<sup>9</sup> subscriptions, and raising insurance/takaful penetration. As a result, nearly all subdistricts now have access to basic financial services via agent banking and mobile banks. The operationalization of digital banks and the launch of the DuitNow real-time retail payment platform have further broadened financial access, particularly for low-income households and micro-enterprises. The framework also emphasizes financial literacy, digital onboarding, and inclusive product innovation, with a focus on vulnerable groups and gender equity.

- **Vietnam—Continued progress in trade integration and government reform.** Vietnam’s structural transformation has historically been propelled by strong integration into global trade. Following the Đổi Mới reforms, the government enacted the Foreign Investment Law to attract FDI, joined the WTO, and signed 17 Free Trade Agreements in effect, which enabled strong participation in global value chains and sustained investment inflows. Recently, the authorities have launched an ambitious reform agenda that includes significant restructuring of government organizations to streamline operations and enhance efficiency—though implementation remains key (IMF, 2025). These efforts have been complemented by continued efforts in basic education to build human capital. However, persistent skill mismatches constrain productivity gains and underscore the need for better vocational training and upskilling of labor to support labor productivity growth.

## F. Conclusion

**20. This chapter examines the drivers of structural transformation and identifies key factors behind its recent slowdown in Thailand.** While structural transformation is closely associated with structural factors such as income levels and demographic trends, policy-related factors—particularly in trade, education, credit access, governance, and labor markets—also play a critical role. In Thailand’s case, a decline in informal employment and more favorable terms of trade have supported labor reallocation toward more productive sectors in recent years. However, the deceleration in credit provision, limited progress in educational attainment, reversal in trade liberalization, and deterioration in governance have all contributed to the slower pace of structural transformation.

**21. The analysis highlights several policy measures that could help reinvigorate Thailand’s structural transformation.** Advancing trade liberalization, investing in education and skills development, enhancing financial inclusion, and improving access to credit are key policy priorities. In addition, continued efforts to reduce labor informality and improve labor market flexibility can further facilitate productive labor reallocation. Lessons from regional peers offer valuable insights for effective policy design and implementation.

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<sup>9</sup> Microtakaful is a form of Islamic microinsurance designed to provide affordable risk protection to low-income individuals and communities, in line with Shariah principles. Instead of paying premiums to a commercial insurer, participants contribute to a common fund used to support members in need.

**22. Thailand's structural transformation has slowed but remains incomplete.** With targeted and well-coordinated policies that promote labor movement toward its most productive uses, Thailand can unlock substantial productivity gains—which would provide a much-needed boost to its economic growth.

## Appendix I. Tables

Table 1. Thailand: Regression Results for 4-Sector Covariance

	(1)	(2)	(3)	(4)	(5)	(6)
	Base	Spec 2	Spec 3	Spec 4	Spec 5	Spec 6
Log GDP per capita	7.7069*** (1.4912)	4.2247*** (0.3778)	7.5886*** (1.4734)	8.1503*** (1.8815)	4.6009*** (0.7451)	7.4166*** (1.3609)
Square of Log GDP per capita	-0.4075*** (0.0783)	-0.2257*** (0.0202)	-0.4016*** (0.0775)	-0.4294*** (0.0999)	-0.2476*** (0.0388)	-0.3959*** (0.0744)
Log population	2.5526*** (0.2912)	2.8893*** (0.2687)	2.5212*** (0.2715)	2.5537*** (0.3038)	2.9342*** (0.4475)	2.4946*** (0.3157)
Old-age dependency ratio	0.0768*** (0.0142)	0.0536*** (0.0068)	0.0756*** (0.0138)	0.0747*** (0.0122)	0.0607*** (0.0088)	0.0598*** (0.0088)
Terms of trade (lagged)	0.0039*** (0.0008)	0.0027*** (0.0004)	0.0040*** (0.0008)	0.0042*** (0.0008)	0.0031*** (0.0006)	0.0034*** (0.0009)
Trade dependency ratio (lagged)	0.0013*** (0.0004)	0.0017*** (0.0004)	0.0013*** (0.0004)	0.0012** (0.0005)	0.0007 (0.0010)	0.0010* (0.0005)
FDI inflows to GDP (lagged)	0.0050 (0.0032)	-0.0004 (0.0017)	0.0046 (0.0032)	0.0050 (0.0035)	-0.0047 (0.0031)	-0.0008 (0.0016)
REER (lagged)	-0.0017** (0.0007)	-0.0008** (0.0003)	-0.0016** (0.0007)	-0.0025*** (0.0006)	-0.0013 (0.0012)	-0.0018*** (0.0006)
Average years of schooling (lagged)	0.1549*** (0.0390)	0.0822*** (0.0248)	0.1523*** (0.0384)	0.1370*** (0.0315)		0.1321*** (0.0378)
Human capital index (lagged)	0.1068 (0.1091)	-0.1336 (0.0928)	0.1140 (0.1079)	0.1650 (0.1380)	-0.1084 (0.1297)	-0.0254 (0.1067)
Share of vulnerable employment (lagged)	-0.0014 (0.0038)	-0.0088*** (0.0020)	-0.0016 (0.0039)	-0.0020 (0.0049)	-0.0067 (0.0043)	-0.0040* (0.0021)
Share of agricultural raw material exports (lagged)	-0.0132** (0.0063)	-0.0094* (0.0054)	-0.0131** (0.0063)	-0.0130** (0.0058)	-0.0077* (0.0042)	-0.0133** (0.0060)
Domestic credit to the private sector to GDP (lagged)	0.0039*** (0.0010)	0.0038*** (0.0008)	0.0037*** (0.0009)	0.0039*** (0.0009)	0.0044*** (0.0011)	0.0037*** (0.0006)
Political corruption index (lagged)	-0.0045*** (0.0014)	-0.0020*** (0.0005)	-0.0047*** (0.0013)	-0.0037*** (0.0011)	-0.0059*** (0.0012)	
Labor market regulation index (lagged)		0.0287* (0.0140)				
Gini index (lagged)			0.0046 (0.0033)			
Share of population with internet access (lagged)				0.0012 (0.0017)		
Primary and secondary enrollment ratio (lagged)					0.0124*** (0.0036)	
Tertiary enrollment ratio (lagged)					0.0007 (0.0021)	
Rule of law (lagged)						0.2912** (0.1220)
Obs.	865	688	865	828	509	691
Countries	44	44	44	44	41	44
Within R <sup>2</sup>	0.624	0.626	0.625	0.642	0.724	0.674
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Driscoll–Kraay Standard errors in parentheses (\* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01)

Table 2. Thailand: Regression Results for 3-Sector Covariance

	(1)	(2)	(3)	(4)	(5)	(6)
	Base	Spec 2	Spec 3	Spec 4	Spec 5	Spec 6
Log GDP per capita	6.5674*** (1.3976)	3.4181*** (0.5063)	6.5922*** (1.3770)	6.9032*** (1.6514)	4.0609*** (0.6913)	6.0828*** (1.3761)
Square of Log GDP per capita	-0.3408*** (0.0727)	-0.1738*** (0.0255)	-0.3420*** (0.0718)	-0.3562*** (0.0877)	-0.2166*** (0.0362)	-0.3174*** (0.0741)
Log population	1.7690*** (0.2358)	1.7324*** (0.2893)	1.7756*** (0.2309)	1.7420*** (0.2636)	1.6982*** (0.3559)	1.4211*** (0.3128)
Old-age dependency ratio	0.0597*** (0.0128)	0.0348*** (0.0080)	0.0599*** (0.0126)	0.0576*** (0.0113)	0.0400*** (0.0078)	0.0393*** (0.0103)
Terms of trade (lagged)	0.0028*** (0.0007)	0.0018*** (0.0003)	0.0028*** (0.0007)	0.0030*** (0.0006)	0.0023*** (0.0005)	0.0023*** (0.0007)
Trade dependency ratio (lagged)	0.0012*** (0.0004)	0.0013*** (0.0003)	0.0012*** (0.0004)	0.0011*** (0.0004)	0.0000 (0.0007)	0.0006 (0.0005)
FDI inflows to GDP (lagged)	0.0015 (0.0033)	-0.0035 (0.0021)	0.0016 (0.0034)	0.0017 (0.0035)	-0.0068** (0.0031)	-0.0039* (0.0021)
REER (lagged)	-0.0009 (0.0008)	-0.0008 (0.0005)	-0.0010 (0.0008)	-0.0017*** (0.0006)	-0.0006 (0.0009)	-0.0014* (0.0007)
Average years of schooling (lagged)	0.1293*** (0.0316)	0.0683*** (0.0201)	0.1299*** (0.0310)	0.1193*** (0.0261)		0.1103*** (0.0315)
Human capital index (lagged)	0.1792* (0.0909)	-0.0149 (0.0391)	0.1776* (0.0907)	0.2149** (0.1029)	0.0478 (0.1089)	0.0519 (0.0738)
Share of vulnerable employment (lagged)	0.0032 (0.0038)	-0.0042** (0.0019)	0.0032 (0.0037)	0.0025 (0.0044)	-0.0049 (0.0042)	-0.0002 (0.0023)
Share of agricultural raw material exports (lagged)	-0.0115** (0.0042)	-0.0102** (0.0039)	-0.0115** (0.0042)	-0.0121*** (0.0039)	-0.0142*** (0.0045)	-0.0130*** (0.0043)
Domestic credit to the private sector to GDP (lagged)	0.0028*** (0.0006)	0.0026*** (0.0005)	0.0028*** (0.0007)	0.0027*** (0.0006)	0.0032*** (0.0008)	0.0024*** (0.0003)
Political corruption index (lagged)	-0.0030** (0.0011)	-0.0010** (0.0004)	-0.0029** (0.0011)	-0.0023*** (0.0008)	-0.0028*** (0.0009)	
Labor market regulation index (lagged)		0.0361*** (0.0117)				
Gini index (lagged)			-0.0010 (0.0029)			
Share of population with internet access (lagged)				0.0011 (0.0012)		
Primary and secondary enrollment ratio (lagged)					0.0088*** (0.0027)	
Tertiary enrollment ratio (lagged)					0.0005 (0.0016)	
Rule of law (lagged)						0.2987*** (0.0948)
Obs.	865	688	865	828	509	691
Countries	44	44	44	44	41	44
Within R <sup>2</sup>	0.624	0.626	0.625	0.642	0.724	0.674
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Driscoll–Kraay Standard errors in parentheses (\* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01)

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# ASEAN'S DIGITAL PAYMENT REVOLUTION: A NEW FRONTIER FOR REGIONAL INTEGRATION

## A. Introduction

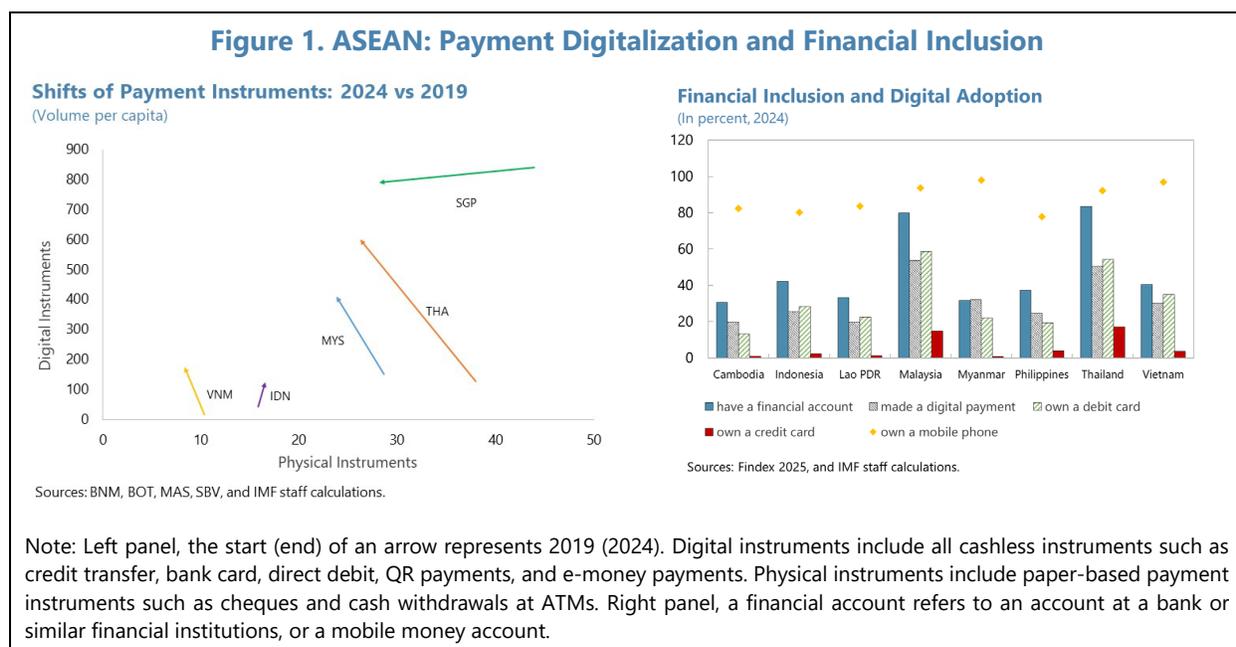
**1. Digitalization has been reshaping the payment infrastructure and supporting productivity by enhancing its efficiency and inclusiveness, while also introducing new challenges to financial sector stability in ASEAN.** By enabling faster, cheaper, and more secure transfers, digital payments lower frictions, supporting the growth of e-commerce and small enterprises (Patnam and Yao, 2020). Digitization can enhance tax compliance and transparency, strengthening public revenues. Further, digital payments can foster financial inclusion by expanding access to financial services for underserved populations, promoting inclusive growth, and supporting the transition towards a more productive economy (Demirgüç-Kunt et al., 2022). Increased reliance on digital platforms, however, also introduces operational and cyber risks. While a system with multiple providers creates fragmentation and raises concerns of interoperability, the concentration of payment services among dominant providers could pose systemic risks (Copestake et al., 2025). Understanding these dynamics is essential for designing policies that harness efficiency gains without compromising stability in countries like Thailand.

**2. Cross-border digital payments can promote local currency usage and facilitate regional trade and financial integration among ASEAN countries.** Studies show that digitalization helps improve the efficiency of cross-border payments (He, 2021) and thus increases international trade (Cortes et al., 2024). The currency of cross-border payments has implications for international trade and financial stability. The value of services trade is more closely associated with US dollar exchange rates than with other bilateral exchange rates, as the use of the dominant currency pricing (such as the US dollar) is more extensive compared with local currency pricing, similar to what is observed in goods exports, though to a lesser extent (Li and Meleshchuk, 2024). Therefore, Thailand, whose service exports contribute significantly to economic growth, faces risks from US dollar exchange rate fluctuations. Although cross-border payments are currently dominated by the U.S. dollar and the euro (Perez-Saiz et al., 2023), there is increasing attention from policymakers on the potential for alternative currencies to play a role in a more fragmented world (Koosakul et al., 2024). Therefore, some new initiatives to use local currency for cross-border payments based on digital payment technology have been on the top list of the policy agenda in ASEAN countries. This study assesses the implications of digital retail local currency cross-border payments and presents some preliminary evidence of a reduction in vulnerabilities to external exchange rate shocks, supporting financial stability.

**3. Recent developments in digital cross-border payments in ASEAN have aligned with global and regional initiatives.** The G20 Roadmap for Enhancing Cross-border Payments serves as a framework to address long-standing frictions such as high costs, slow transaction speeds, limited accessibility, and a lack of transparency. In parallel with this global effort, the ASEAN region is at the forefront of implementing a regional response through its strategic initiatives, particularly the

ASEAN Regional Payment Connectivity (RPC) and the ASEAN Local Currency Transaction Framework (LCTF). The RPC aims to link national payment systems seamlessly, thereby creating a more integrated, efficient, and user-friendly cross-border payment ecosystem. Complementing this, the LCTF serves as an important pillar by promoting the use of local currencies for cross-border transactions, which contributes to the RPC's goals of reducing costs and speeding up transactions by eliminating reliance on third-party currencies and strengthens financial resilience.

**4. Within ASEAN, Thailand has been leading the transition towards cashless and digital payments both domestically and across borders.** The use of digital payment methods, such as bank cards, credit transfers, direct debits, and e-money, has increased and the number of payments made in cash and by cheque has declined throughout most ASEAN countries. While mobile phone ownership is generally high in ASEAN countries (over 80 percent), only about 20 percent have an e-money account<sup>1</sup>. In Thailand close to half of the adult population owns an e-money account<sup>2</sup>, outperforming its regional peers. In Thailand, the use of non-physical payments increased annually by more than 75 percent on average during 2019-24, including through the rapid adoption of digital platforms like PromptPay (Figure 1). About 80 percent of adults in Thailand own financial accounts, 55 percent own a debit card, and 50 percent have made digital payments.<sup>3</sup> Thailand has also been leading the progress in establishing bilateral and multilateral cross-border fast payment linkages with its regional counterparts (see Section B for more details).



**5. This study takes stock of recent developments on digital payments in Thailand and ASEAN more broadly, explores the drivers and the potential benefits, analyzes the factors**

<sup>1</sup> Source: World Bank Global Findex 2025 Database.

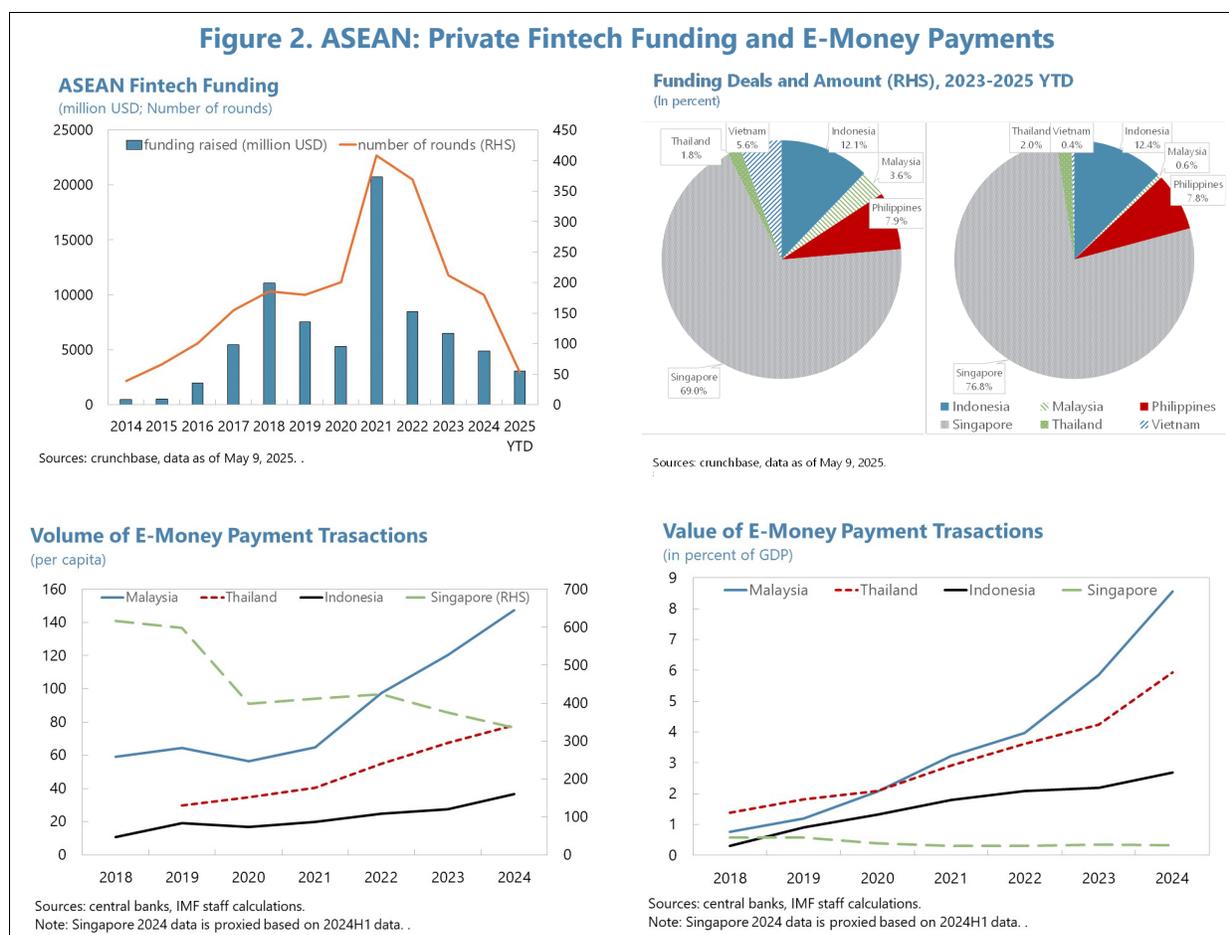
<sup>2</sup> Source: Ibid

<sup>3</sup> Source: Ibid

**underlying the frequency of digital payment usage and discusses some policy considerations.** The paper is structured as follows. Section B provides an overview and key developments of ASEAN digital payments, as well as risks. Section C explores potential drivers of local currency cross-border Quick Response (QR) payments in Thailand. Section D concludes with a discussion of policy considerations.

## B. Digital Payments in ASEAN

**6. Private sector fintech investments were at the forefront of the growth in digital payment services.** Fintech funding<sup>4</sup> to ASEAN countries surged since 2014, but has declined after peaking in 2021, partly driven by the Federal Reserve rate cycle as the cost of financing increased. Singapore is a key hub for private investment funding in the region, followed by the Philippines and Indonesia (Figure 2). Many startup companies in ASEAN have expanded their business to the fintech sector and provide digital payment options. As a result, e-money payments have grown remarkably in the past decade. For example, in Malaysia, the total value of the e-money payments accounted for more than 8 percent of the annual GDP. In Singapore, each person made about 300 transactions through e-money in 2024.



<sup>4</sup> Including but not limited to angel, pre-seed, seed, venture capital, private equity, debt financing, Initial Coin Offerings (ICO), and other types of private funding to fintech companies.

**7. Central banks and monetary authorities play a crucial role in shaping the domestic digital payment landscape.** By developing fast payment systems<sup>5</sup> and establishing QR payment standards<sup>6</sup> to ensure interoperability, central banks provide catalysts for innovation and motivate the widespread adoption of digital payments. While all countries share the common objective of improving payment infrastructure, they have adopted different approaches. The Bank of Thailand launched PromptPay, a universal and low-cost real-time payment system that links bank accounts to national IDs or mobile phone numbers. The simplification in transaction processes has significantly boosted digital transactions. In addition, by building its own infrastructure, it can bypass traditional, more expensive payment channels, such as credit card networks. Similarly, Bank Indonesia introduced QRIS as a single national QR standard, to eliminate fragmentation and ensure all payment service providers and merchants could interoperate seamlessly, which has been crucial for widespread domestic adoption. By contrast, Vietnam has taken a more decentralized approach. While the State Bank of Vietnam supports the development of the national QR standard, VietQR, it has not mandated its use nationwide. This variation in approach reflects each nation's unique market structure and regulatory approach. Still, the overarching goal remains the same: to promote financial inclusion, enhance payment system efficiency, and reduce costs.

**Table 1. ASEAN: National Fast Payment Systems and QR Payment Standards**

	 Brunei Darussalam	 Cambodia	 Indonesia	 Lao P.D.R.	 Malaysia	 Myanmar	 Philippines	 Singapore	 Thailand	 Vietnam
<b>Fast Payment</b>	tarus	Bakong	BI-FAST	LAPNet	RPP (DuitNow)	CBM-NET2	InstaPay	FAST (PayNow)	PromptPay	NAPAS FastFund 247
<b>Year of launch</b>	2025	2020	2021	2019	2018	2020	2018	2017	2016	2021
<b>Transaction value as % GDP (2024)</b>	-	330%	40%	-	152	-	28%	14% (2023)	278%	27% (2023)
<b>Transaction volume per capita (2024)</b>	-	35	12	-	104	-	12	-	346	2 (2023)
<b>QR Standard</b>	tarusQR	KH QR	QRIS	Lao QR	DuitNowQR	MMQR	QR Ph	SGQR	Thai QR	VietQR
<b>Year of launch</b>	(pilot phase)	2022	2019	2020	2018	2025	2019	2018	2017	2021
<b>Transaction value as % GDP (2024)</b>	-	116%	3%	-	2%	-	1%	0.1%	0.5% (2020)	4%
<b>Transaction volume per capita (2024)</b>	-	37	22	-	26	-	2	15	0.5 (2020)	6

Source: Central Banks and IMF staff calculations

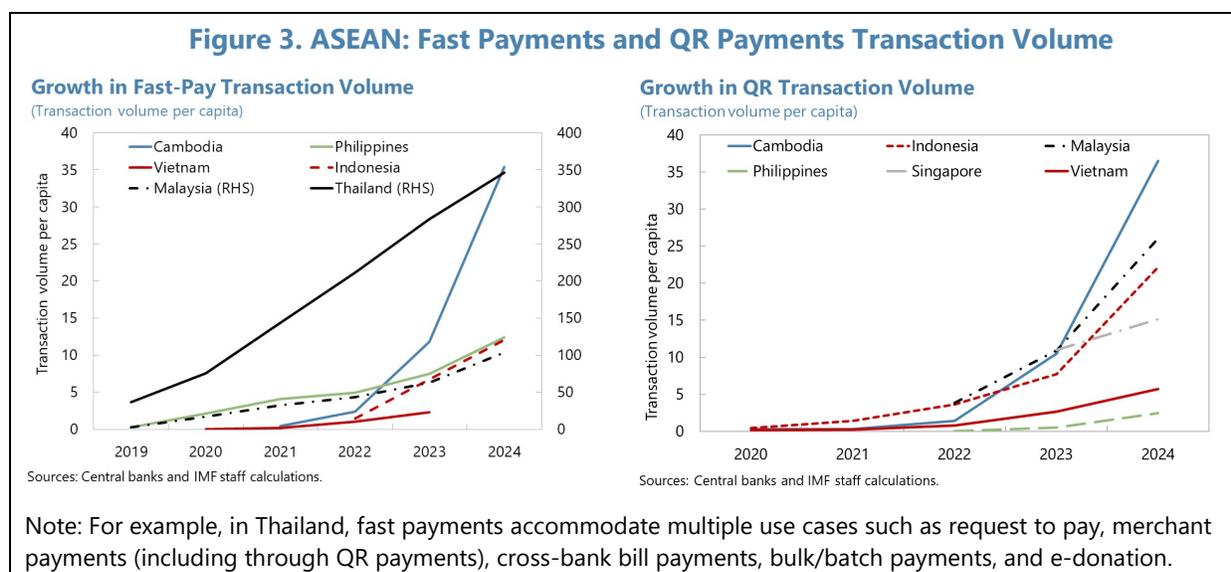
**8. The transformation of the digital payment landscape across ASEAN countries highlights the importance of striking a balance between allowing the private sector to innovate and finding an appropriate regulatory approach.** The active involvement of central

<sup>5</sup> Fast payment systems are digital infrastructures that enable instant fund transfers and settlements between accounts at any time.

<sup>6</sup> QR payment standards serve as common guidelines for using QR payment services.

banks and monetary authorities has fostered an environment conducive to the growth of innovative payment solutions, ensuring stability and reliability within the ecosystem. The private sector serves as the key engine for innovation, developing the applications and a wide range of services that drive consumer adoption. Building on the foundation of systems like Thailand's PromptPay and Indonesia's QRIS, private companies have developed applications that make digital payments widely accessible.<sup>7</sup> In Thailand, banks and private payment providers have utilized PromptPay's simplified ID system to develop user-friendly mobile applications that allow instant fund transfers to any bank account using just a mobile number. In Indonesia, fintech and e-commerce companies have integrated QRIS into their applications, enabling users to make seamless payments using a single standard.

**9. Domestic fast payments, including QR payments, have surged in ASEAN, especially over the past five years** (Figure 3). For example, in Thailand the average number of fast payment transactions through PromptPay rose more than eight-fold from below 40 per person per year to almost 350 during 2019-24. The usage of QR payments is relatively small as part of fast payments, but it presents huge potential given its significant growth. For example, in the Philippines, QR payments increased by 467 percent in volume and 372 percent in value in 2024 compared to 2023.

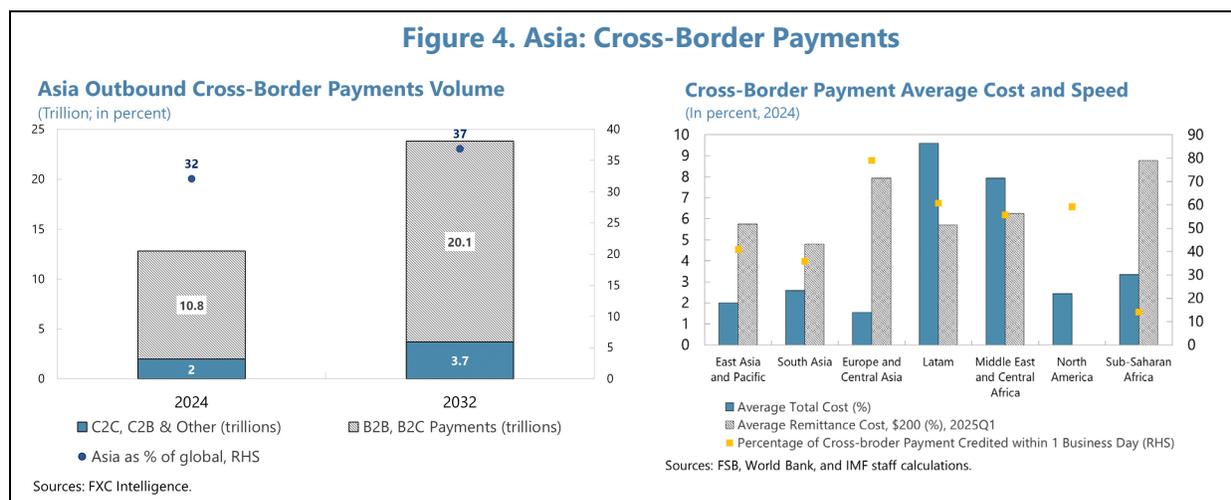


**10. Following the development in domestic payments, cross-border payments in Asia have great potential but require further improvements.** Asia accounted for 32 percent of global cross-border payments in 2024 and is expected to account for 37 percent in 2032<sup>8</sup>. During this period, the total volume of cross-border payments in Asia is expected to almost double from 12.8 billion in 2024 to 23.8 billion in 2032 (Figure 4). Compared with other regions, the average cost of cross-border payments in Asia is relatively low. Especially in East Asia and Pacific economies, the

<sup>7</sup> Please see Copestake et al (2025) for further discussion on the impact of interoperability on digital payment usage.

<sup>8</sup> Source: FXC Intelligence.

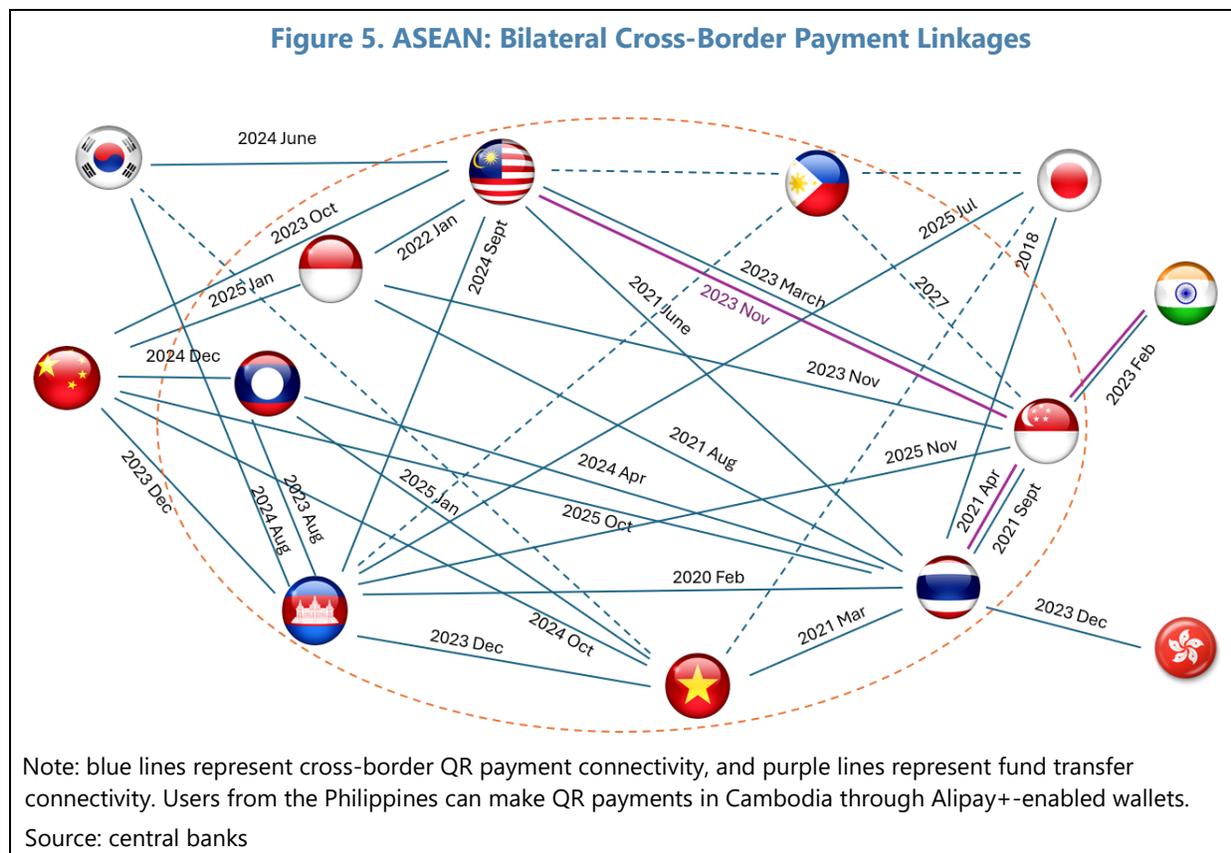
average cost of remittances declined from 6.7 percent in 2021Q1 to 5.8 percent in 2025Q1<sup>9</sup>, largely driven by the low cost of digital payments. However, the speed of payments in Asia lags behind other regions. For example, the percentage of cross-border payments credited within one business day in Asia is far below that in most other regions, likely related to reliance on multiple correspondent banks and other intermediaries, compliance checks, and other factors (FSB, 2021; Freischlad, 2025).



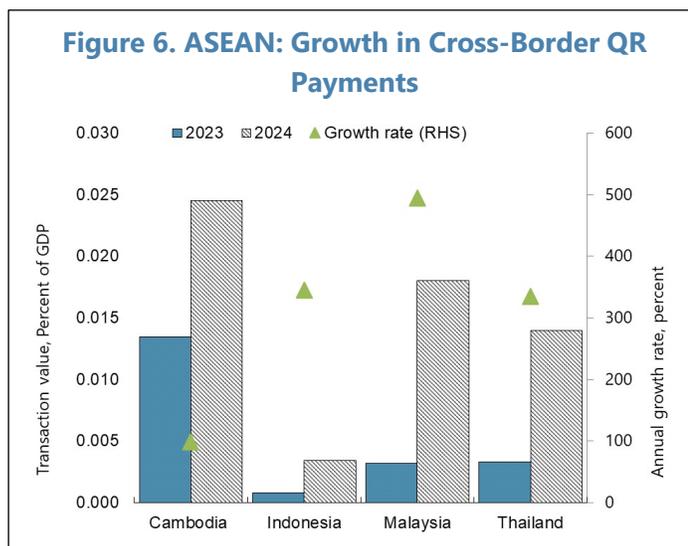
**11. To reduce costs and make payments real-time, ASEAN countries established multiple bilateral cross-border payment linkages, building on existing domestic fast payment and QR payment systems** (Figure 5). There are two types of linkages. The first and most common is the QR payment connectivity (blue lines), which allows travelers to make real-time payments to a merchant in another country by scanning a QR code. A second type is the fund transfer connectivity (purple lines), which facilitates instant remittances and fund transfers across borders between individuals using simple identifiers like a mobile phone number or a national ID. Thailand is one of the first movers in linking digital payments across borders. In 2018, Thailand established its first QR payment linkage with Japan, and later with eight other economies. In April 2021, Singapore and Thailand established the first cross-border fund transfer connectivity. Later, Singapore also established cross-border fund transfer connectivity with India and Malaysia separately. The Philippines has been behind its regional peers somewhat in establishing cross-border payment linkages, but it is planning to cooperate with Japan, Malaysia, and Singapore in the coming years.

<sup>9</sup> Cost of sending \$200, source: World Bank Remittance Prices Worldwide database.

**Figure 5. ASEAN: Bilateral Cross-Border Payment Linkages**



**12. While still small in value and volume, QR cross-border payments in ASEAN countries have shown a significant surge in growth.** Take 2024, for example, the QR payments in Thailand increased by more than 300 percent, and in Malaysia by 550 percent compared with 2023 (Figure 6). The potential for continued growth is still substantial, particularly given the increasing number of intra-ASEAN tourists, which in 2023 accounted for 42 percent of total visitors, up from 36 percent in 2019. With tourism accounting for 8 percent of the region's GDP and 12 percent of employment in 2023, the expanded use of these payment systems could have a significant positive effect on the region's economy, especially in the service sector.



**13. The significant progress in domestic and cross-border digital payments has been a catalyst for financial inclusion, creating substantial momentum for the development of small and medium-sized enterprises (SMEs).** By moving away from cash, SMEs gain access to a range of benefits, including improved business efficiency through faster payment processing and reduced

costs. Furthermore, the adoption of digital payment allows SMEs to establish a digital financial footprint. A Bank of Thailand survey found that 96 percent of SMEs had adopted digital payments accounting for over two-thirds of their payment value. These transactions provide a valuable source of data—such as sales history and cash flow patterns—that financial institutions can use to assess creditworthiness, helping small businesses that lack traditional credit history or collateral<sup>10</sup>. Moreover, cross-border digital payment systems are directly benefiting SMEs by enabling them to expand their market reach beyond the domestic market. By utilizing the PromptPay-PayNow linkage between Thailand and Singapore, an SME in Bangkok, for instance, can sell to a customer in Singapore and receive payment almost instantly at a low cost, without needing to navigate complex international banking procedures.

**14. Despite the many advantages, the rapid adoption of digital payments in ASEAN has also introduced significant financial crime and money laundering risks.** The problem is particularly acute in cross-border transactions, where criminals exploit regulatory inconsistencies and the speed of instant payments to move funds quickly across borders, through micro-structuring (small, deliberate transactions designed to evade regulatory reporting thresholds), identity theft, and the use of mule accounts. These risks are particularly significant due to the prevalence of scam centers and other transnational criminal operations originating from high-risk countries.

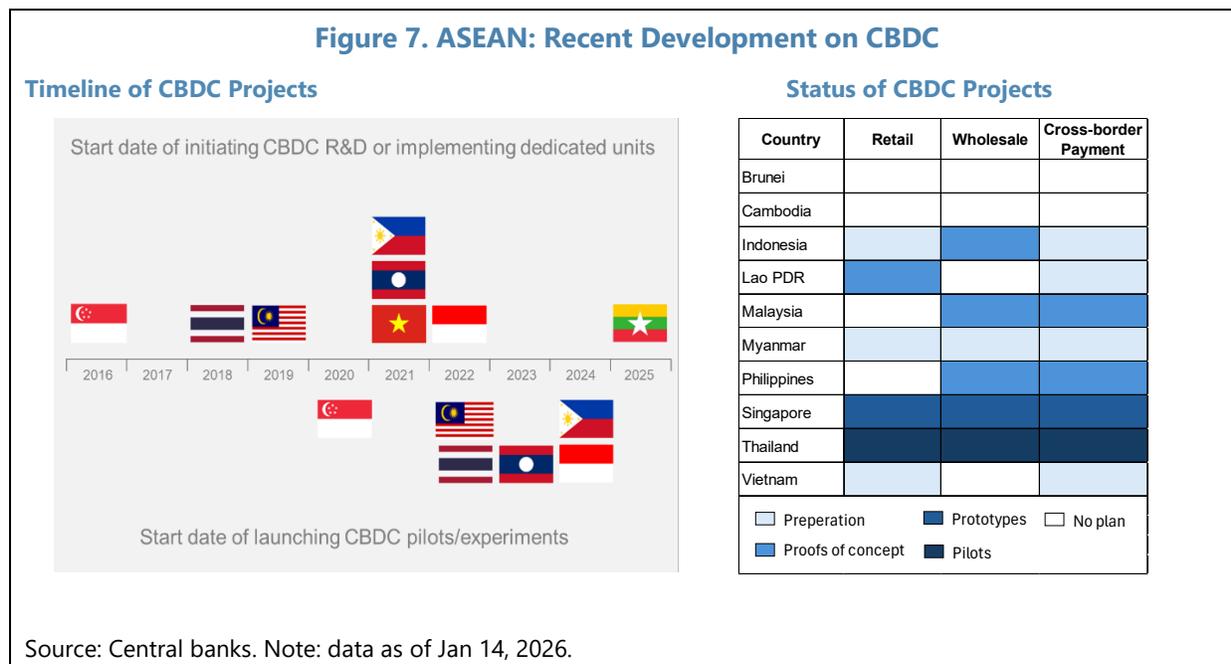
**15. In addition, the multiple linkages in the current bilateral cross-border payment arrangements resulted in a highly fragmented system, making interoperability between systems and jurisdictions difficult to achieve.** Building up bilateral linkages with each individual partner jurisdiction involves prolonged processes and replicates resource-consuming processes for each additional linkage. Efficiencies could be captured with an alternative approach to resolving interoperability issues in cross-border payments.

**16. Project Nexus is a noteworthy initiative that offers a multilateral approach to improving cross-border fast payments.** It is a collaboration among the BIS Innovation Hub and Bank of Thailand, Bank Negara Malaysia, Bangko Sentral ng Pilipinas, the Monetary Authority of Singapore, and the Reserve Bank of India. Unlike the traditional bilateral linkages, the project employs a standardized blueprint to connect multiple domestic fast payment systems through a single, central hub. This hub-and-spoke model significantly simplifies the infrastructure required for regional and global payment connections. The project had a successful proof of concept completed in 2022 and a comprehensive blueprint announced in July 2024. The recent incorporation of Nexus Global Payments in Singapore marks a significant transition towards operationalizing the scheme, which is aiming to go-live by 2027.

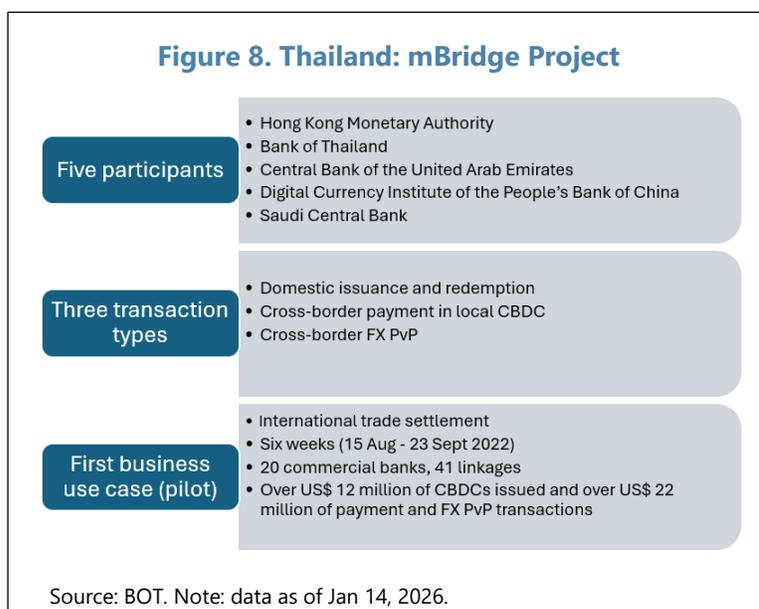
**17. Many ASEAN central banks are also exploring central bank digital currencies (CBDCs) for cross-border payments, though most initiatives are still in early stages.** Following Singapore's lead in 2016, a majority of ASEAN countries have launched their own CBDC research

<sup>10</sup> For example, in August 2023, Bank of Thailand introduced PromptBiz, which provides service to support businesses, especially SMEs to access finance by using trade transactions from the PromptBiz system as supplement documents for applying invoice factoring or other sources of financing.

over the past decade. Since 2020, several have moved beyond research to launch experiments and pilots. While no ASEAN country has yet officially launched CBDC for public use, most of these projects have considered cross-border payments as a key use case. Among ASEAN countries, Singapore and Thailand are currently the most advanced in their development stage, while other countries are still in the preparation or proof-of-concept or earlier exploratory stages.

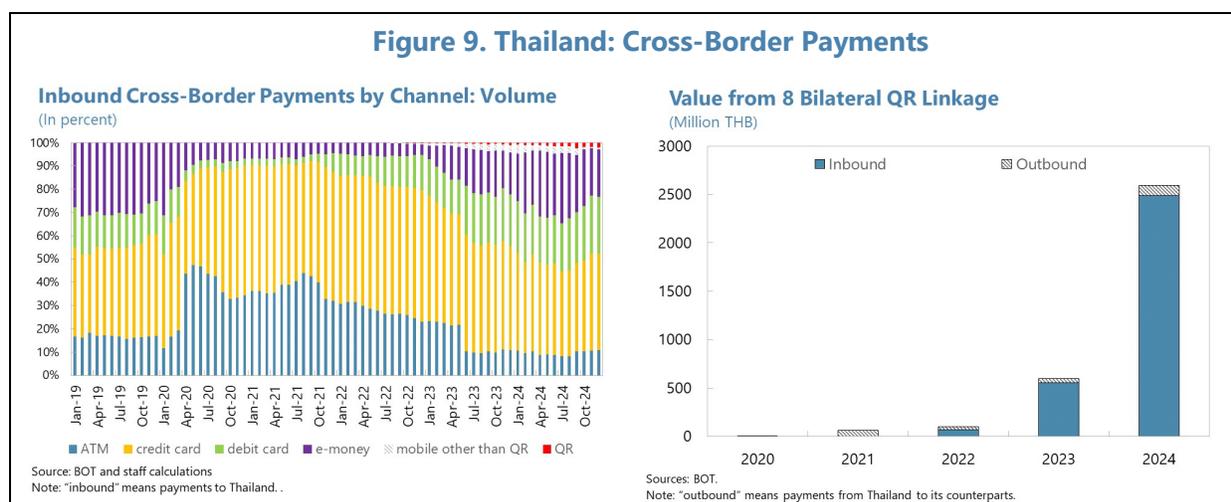


**18. Project mBridge, for example, is a multilateral initiative aimed at improving cross-border payments by utilizing wholesale CBDC.** This project is a collaboration among the Bank of Thailand, the Central Bank of the United Arab Emirates, the Digital Currency Institute of the People's Bank of China, the Saudi Central Bank, and the Hong Kong Monetary Authority. A six-week pilot conducted in 2022 involved 20 commercial banks across four jurisdictions, successfully executing over 160 real-value transactions, demonstrating the platform's ability to facilitate real-time, peer-to-peer payments and foreign exchange transactions. The project reached its Minimum Viable Product (MVP) stage in mid-2024. At this stage, ongoing development and enhancements continue while participating jurisdictions conduct the real-value transactions on mBridge platform, subject to their own condition and preparedness.

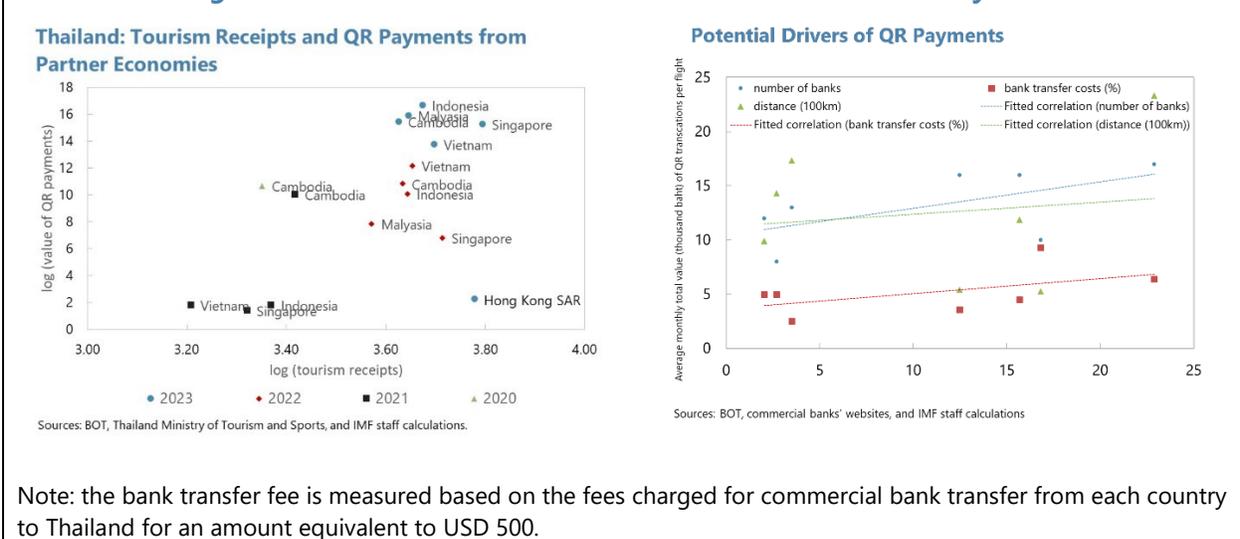


## C. Empirical Analysis: Case of Thailand

**19. In Thailand, QR payments remain a small portion of total cross-border payments, but their growth has been significant.** Among inbound cross-border payments to Thailand, the share of cross-border ATM withdrawals has been declining in recent years, suggesting a decline in cash usage, and remains lower compared with the pre-pandemic level. Credit card and debit card payments, on average, account for about 60 percent of total payments, and the rest are digital payments, including e-money, as well as the very recent emergence of QR payments through bilateral cross-border fast payment linkages. Though QR payments remain relatively small both in terms of value and volume, compared to other types of payments, their growth has been substantial. For example, the inbound payments through all seven QR linkages in 2024 were about five times that in 2023.



**20. In each bilateral linkage cross-border QR payments are positively correlated with tourism receipts, commercial bank transfer fees, and the number of banks participating in each bilateral linkage.** Increases in QR payments from partner economies are associated with an increase in tourism receipts from that specific economy. In addition, economies with higher relative transfer costs of traditional commercial bank channels have higher QR transactions as users take advantage of lower costs. The number of participating financial institutions varies across individual bilateral linkages. Data show that linkages with a higher number of participating banks are associated with higher QR transactions. Economies that are geographically further away from Thailand seem to have higher QR transactions in Thailand. Due to data availability these relationships could not be quantified in an econometric model.

**Figure 10. Thailand: Potential Drivers of Cross-Border QR Payments**

## 21. An econometric model is used to estimate the effect of FX depreciation, FX volatility and alternative channels of payments on the volume and value of cross-border QR payments.

A dataset provided by the Bank of Thailand covers payments from seven economies, including Cambodia, Hong Kong SAR, Indonesia, Laos, Malaysia, Singapore, and Vietnam, to Thailand, for the period of 2020–2024 at the monthly aggregate level, thus covering 60 months with a total of 420 observations, both by volume and value. The model explains the volume and value of cross-border QR payments at the bilateral economy pair level with a number of explanatory variables: (i) Foreign exchange risk ( $FX\_vol_{it}$ ) is measured first as the volatility of local currency<sup>11</sup> against the US dollar, and second as the volatility of local currency against the Thai Baht. This specification allows assessing the relative effects arising from cross-border payments for traditional bank cards, which use the US dollar to settle payments across local currencies, and from QR payments, which are settled directly in local currencies; (ii) Monthly depreciation of the local currency against the Dollar and the Baht ( $FX\_g_{it}$ ); (iii) Country-specific time-varying factors, including the number of tourists visiting Thailand from each of the seven economies, approximated by the number of flights in each month ( $flight_{it}$ ), and the number of months ( $Month_{it}$ ) the linkage has been established to account for its familiarity; (iv) The level of financial inclusiveness from the IMF financial access survey that includes the number of commercial bank branches ( $Commer\_bank_{iT}$ ) and the number of credit cards ( $Credit\_card_{iT}$ ) in each partner economy. Macroeconomic indicators ( $C_{iT}$ ) such as GDP and CPI from the latest IMF WEO database are included in the model below:

$$QR_{it} = \beta_1 Month_{it} + \beta_2 flight_{it} + \beta_3 FX\_vol_{it} + \beta_4 FX\_g_{it} + \beta_5 Commer\_bank_{iT} + \beta_6 Credit\_card_{iT} + C_{iT} + \varepsilon_{it}$$

where  $i$  represents the economy that has bilateral linkage with Thailand,  $t$  represents month, and  $T$  represents year as some variables only have annual frequency.

<sup>11</sup> Local currency is the payer's home currency, and in this analysis, it is limited to one of the currencies from the seven counterparts of Thailand's bilateral linkages. For example, if a tourist from Indonesia visits Thailand and uses QR payments in Thailand, the local currency this tourist will pay is Indonesia Rupiah.

**22. The empirical analysis provides preliminary evidence that higher local currency-USD volatility could lead to higher cross-border QR payments, which are settled in local currency.**

The increase in the value of QR payments resulting from increases in USD volatility is statistically significant (Table 2, columns 1 to 3)<sup>12</sup>. This effect also affects the volume of QR payments but is less statistically significant. Higher local currency-THB volatility does not appear to affect cross-border QR payments. This result suggests that QR payments help reduce FX risk and provide more transparency about the local currency cost of payments in real-time by avoiding USD fluctuations. By contrast, credit or debit cards usually take a few days to settle through the correspondent banking network. During this time the payer has to bear the FX risk, which increases when the USD volatility is higher. This analysis thus provides some preliminary evidence of potential benefits of advancing regional payment connectivity by increasing local currency usage to strengthen financial resilience and reduce vulnerabilities to external shocks.

**23. A depreciation of the local currency leads to lower QR payments, likely driven by overall lower spending.** The coefficients of the local currency depreciation against the US dollar and the Thai Baht are negative for both transaction values and volumes. When expenditures are more expensive in Thailand relatively to local currencies, payments, including QR, are reduced.

**24. The results also suggest QR payments may play a role as a substitute for traditional banking and card payments.** The estimated coefficients for the number of commercial bank branches and the number of credit cards are both negative in most regressions. This suggests that when users have less access to traditional banking services in their home country, they are more likely to make QR payments. Similarly, when users have fewer credit cards to make payments, they are more likely to pay through QR when they visit Thailand.

**Table 2. Thailand: Estimated Coefficients on the Drivers of Cross-Border QR Payments**

	(1) Log (value)	(2) Log (value)	(3) Log (value)	(4) Log (volume)	(5) Log (volume)	(6) Log (volume)
Local currency-USD volatility	82.43***	35.06*	56.25**	7.168	3.118	19.26*
Local currency- THB volatility	0.852	2.939	5.345	2.356	0.422	2.587
Local currency-USD depreciation	-0.264***	-0.317***	-0.208**	-0.126**	-0.215***	-0.133**
Local currency- THB depreciation	-0.142	-0.160	-0.179*	-0.132**	-0.107*	-0.129**
Number of commercial bank branches	0.00653	-1.966***	-1.615***	-0.0159	-0.977***	-0.771***
Number of credit card	-0.182***	0.173	0.217	-0.0989***	-0.358***	-0.292***
Month of implementation	0.111***	0.240***	0.0691*	0.0442**	0.186***	0.0689***
Log (number of flight)	0.961***	1.432***	1.062***	0.478***	0.806***	0.576***
C	4.936***	-20.71	-14.43	1.398*	-0.346	-0.614
Year FE	Y		Y	Y		Y
Country FE		Y	Y		Y	Y
N	420	420	420	420	420	420
R <sup>2</sup>	0.76	0.77	0.80	0.81	0.78	0.83

Note: Standard errors in parentheses\* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01

<sup>12</sup> Results remain robust when currency depreciations are excluded, as well as when volatilities against the USD and THB are included separately in the model.

## D. Conclusions and Policy Discussion

**25. ASEAN countries have made significant progress in developing domestic and cross-border digital payments.** This progress is aligned with global and regional initiatives and supported by coordination, supervision, and standardization from regulators, as well as investment and innovation from the private sector. The current web of bilateral cross-border arrangements is not scalable for a globally interconnected economy. As more countries join, the number of necessary connections grows exponentially. Building on its strong domestic digital payment infrastructure, Thailand, along with other ASEAN countries, is actively exploring multilateral approaches for cross-border payments. The move to a multilateral system will significantly enhance efficiency, interoperability and reduction in complexity.

**26. Leveraging digital payment data is essential for advancing financial inclusion, especially for SMEs.** In Thailand, this aligns with several ongoing initiatives, including: (i) "Your Data" project, which aims to give customers control over their data to enable them to access better financial services, (ii) the establishment of National Credit Guarantee Agency (NaCGA), an effort to overhaul the credit guarantee system by directly assessing the credit risk of borrowers using financial and non-financial data to help SMEs secure loans, and (iii) virtual banks, which are expected to use alternative data to assess creditworthiness of underserved groups. In addition, the authorities should also encourage SMEs to engage in regional trade, to utilize the existing digital cross-border payment arrangements, through awareness campaigns and incentives.

**27. Implementing robust oversight and reporting mechanisms is crucial for enhancing the trust and security of digital payments.** The authorities should ensure the risk-based application of AML/CFT measures by reporting entities, including simplified measures in lower-risk scenarios to promote financial inclusion and to allow for appropriate resource allocation to higher risk scenarios. To address the significant divergence in legal and regulatory frameworks across ASEAN, a push for greater harmonization of data protection laws is needed. Furthermore, collaboration between authorities and financial institutions is crucial for improving digital and financial literacy as well as defending against cybersecurity risks, particularly in educating the public on fraud prevention and providing comprehensive customer protection. Finally, a dedicated framework for enhancing cross-border supervisory and law enforcement and oversight coordination will facilitate rapid information sharing and help combat financial crime more effectively across the region.

**28. This analysis provides evidence of potential benefits of advancing regional payment connectivity by increasing local currency usage to strengthen financial resilience and reduce vulnerabilities to external shocks.** Although the use of cross-border QR payments still comprise a relatively small share of total cross-border payments, its significant growth in recent years stresses the importance of understanding the underlying drivers. The empirical analysis in this paper provides some preliminary evidence that the usage of cross-border QR payments is positively associated with higher volatility of the local currency against the US dollar. There is also evidence of QR payments as an alternative to traditional banking and credit card payments. In addition, there are possible positive correlations between QR payments and tourism receipts, the cost of traditional cross-border bank transfers, and the number of banks participating in the linkages.

**29. To promote trade integration through the use of cross-border QR payments, a few strategies could be used.** To take advantage of the considerable potential for further expansion in digital payments amid the rising number of intra-ASEAN tourists, governments could:

- **Provide widespread explanations to potential users of the low-cost and real-time nature of local currency settlement.** This strategy directly addresses the finding that these payments are used more frequently during periods of local currency volatility, positioning the service as a tool for financial resilience for tourists and other users. This messaging will resonate with travelers seeking to mitigate exchange rate risks and ensure transparent, predictable costs.
- **Actively encourage broader participation from banks and other financial institutions.** By expanding the network of participating banks and promoting the use of QR payments as a viable alternative to traditional banking and credit card systems, particularly for the unbanked and underbanked groups, the system's reach and utilization will increase.

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