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Financial deepening and fiscal capacity: new empirical evidence from the association of Southeast Asian nations

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Abstract: The current study examines the long-term effects of financial sector development (FSD) on the amount of tax collected (TAX). The study uses annual panel data from eight ASEAN nations between 2000 and 2023. The analysis was conducted by using the CS-ARDL model, and robustness was performed by alternative estimation techniques, i.e., FMOLS and DOLS estimators. The findings demonstrate that the growth of the financial sector has a long-term, statistically significant, and favourable impact on the mobilisation

of tax revenue. By expanding the tax base, increasing activity in the formal sector, and decreasing opportunities for evasion, a healthy financial system increases tax collection. While inflation has a negative effect on fiscal performance, economic growth, sound governance, and FDI inflows positively contribute to revenue. The results imply that ASEAN governments ought to incorporate financial development tactics like enhancing credit availability, growing digital finance, and fortifying banking establishments into their more comprehensive budgetary plans.

Keywords: ASEAN; CS-ARDL; fiscal policy; financial sector development; FSD; fiscal revenue.

JEL codes: E62, O16, G21.

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1 Introduction

To ensure the economic progress and fiscal stability, it is vital to ensure effective mobilisation of domestic resources. Due to discrepancy between tax potential and actual tax revenue which is one of the biggest problems facing developing economies, various components like public investment, social welfare and economic infrastructure are all hampered (Wiafe et al., 2024). The growth of the financial sector is seen in this context as a key facilitator of better tax compliance, collection and overall fiscal performance. In order to increase the tax base and promote a tax-compliance culture, financial sector development (FSD) which is defined by deepening financial institutions, expanding access to banking and non-banking financial services, improving regulatory frameworks and increasing financial inclusion is essential (Lompo, 2024). With a focus on the ways that FSD influences tax administration and policy, this study examines how a more developed and inclusive financial sector can enhance tax revenue generation.

Tax money continues to be essential to the operation of the state. In many low- and middle-income nations, however tax-to-GDP ratios continue to be stubbornly low. The International Monetary Fund (IMF) claims that many developing nations have tax-to-GDP ratios below 15% which is the bare minimum required to meet the Sustainable Development Goals (SDGs). However, these nations frequently have a comparatively underdeveloped financial sector with little access to formal financial services, a sizable informal economy and poor transaction traceability. The issue of tax evasion is made worse by this institutional weakness which also leads to ineffective revenue mobilisation (Safuan et al., 2022). As a result, bolstering the financial sector has gained more recognition as a way to increase fiscal capacity as well as an objective in and of itself. Through a number of interconnected channels, the growth of the financial sector affects tax revenue. To begin with the growth of digital payment methods, financial institutions make financial transactions more transparent. An increased use of bank accounts, digital wallets and online payment platforms by people and businesses creates a traceable digital footprint that facilitates the assessment of assets income and consumption by tax authorities. This openness increases the accuracy of tax reporting and decreases opportunities for tax evasion (Mader et al., 2022).

In another way, integrating the underbanked and unbanked into the formal economy, a strong financial sector promotes financial inclusion. Households and small businesses can grow their operations, boost productivity and produce taxable income by having access to credit insurance and savings services. In turn, the tax base is strengthened by the inclusion of these actors in the formal economy particularly in nations where a sizable portion of economic activity is conducted in the unorganised sector (Raouf, 2022). Moreover, FSD makes tax administration more efficient. Tax payments can be made more easily and effectively by integrating banking systems with government revenue collection platforms, especially when it comes to electronic filing and real-time transaction monitoring. For instance, the effectiveness of revenue collection and tax compliance rates have increased in nations that have implemented digital taxation systems linked to banking networks (The et al., 2025). Furthermore, contemporary financial institutions can help tax authorities by supplying third-party data for auditing, enhancing their capacity to enforce laws.

Additionally, by increasing taxable financial assets and investments, the growth of the capital markets, insurance industry and non-bank financial institutions also helps to raise tax revenue. For example, as financial markets get deeper taxes on capital gains,

dividends, interest income and insurance premiums become more important. Similarly, as the financial sector grows larger and more active taxing financial transactions and instruments becomes more practical and profitable. A developed financial system essentially broadens the range of economic activity that is subject to taxes (Alinaghi and Reed, 2020). Formal employment is a significant additional way that FSD increases tax revenue. Financial development promotes capital allocation, entrepreneurship and business expansion, all of which increase the number of formal jobs created. Formal sector employees are more likely than those in informal employment to be eligible for social contributions and income tax deductions (Bastidas, 2023). Consequently, an increased formalisation of labour markets which is fuelled by financial accessibility directly contributes to higher personal income tax revenue. At the macroeconomic level, financial development helps the economy grow, which in turn helps the government collect more taxes. Several studies demonstrate that GDP growth and financial sector maturity are positively correlated (Oktavia et al., 2019; Cheng et al., 2021; Osuma, 2025). Given that tax revenue frequently depends on economic performance, it stands to reason that a growing economy supported by easily accessible financing would result in higher tax collections. However, the effectiveness of tax institutions and the elasticity of tax structures are prerequisites for this indirect effect.

By leaning on the aforementioned notions, the current study strives to explore the linkage between FSD and tax collection volume (TAX). The empirical testing of the study was conducted on ASEN nations over the period 2000 to 2023, which is the most recent data available at WDI, The World Bank. The regression among variables was checked by employing a CS-ARDL model, and the consistency of analysis was tested by FMOLS and DOLS models. The empirical outcomes of some pre-estimation techniques like cross-section dependence (CD), stationarity analysis, and cointegration informed us about selecting the suitable techniques. Furthermore, these pre-estimation techniques validate that the selected models are not biased for any econometric issue. The findings indicate that FSD positively influences the TAX, supporting the modelled intuition of the current study. A developed financial sector boosts the TAX in various ways, such as enhancing tax compliance, expanding the formal economy, and making financial transactions more transparent in order to increase tax revenue. The tax base is expanded, and revenue collection is improved as more people and businesses use digital platforms and formal banking, making their economic activities traceable and taxable. In addition to FSD, the analysis reveals the noteworthy impact of various control variables like economic growth, inflation rates, government effectiveness, FDI inflow, and corruption control.

The contribution of current study can be marked in the following ways: Theoretically, by fusing the ideas of fiscal capacity and financial development, this study offers a conceptual framework that connects an increased tax revenue mobilisation with the growth of the financial sector. In contrast to earlier research which frequently views FSD and tax performance as separate development outcomes, this study makes the case that an increase in financial depth, accessibility and efficiency can have a direct impact on tax collection through improved formalisation, transparency and compliance. It goes beyond current theories of public finance and development by putting forth the idea that FSD is a key facilitator of fiscal capacity in emerging economies as well as a growth engine. On empirical ground, this is one of the first empirical studies to use recent World Bank data (2000–2023) to thoroughly evaluate the effect of FSD on tax revenue in the ASEAN

region. The study addresses CD, cointegration and endogeneity concerns, problems that are frequently disregarded in comparable studies, by utilising sophisticated econometric techniques like CS-ARDL, FMOLS and DOLS. The result's generalisability and dependability are enhanced by the application of panel-based methodologies designed for diverse national contexts. Furthermore, a more comprehensive understanding of the complex factors influencing tax revenue performance is made possible by the inclusion of important macroeconomic and institutional control variables such as economic growth, inflation, and FDI inflow, etc.

This study's direct relevance to policymaking, especially with regard to strengthening domestic resource mobilisation in ASEAN nations constitutes its practical contribution. According to empirical data, a strong financial sector can greatly increase tax revenue through enhancing tax compliance, growing the formal economy and enhancing financial transaction transparency. These revelations offer a compelling case for combining tax administration tactics with financial sector reforms. By encouraging the use of formal banking channels for both personal and business transactions, digitising financial services, bolstering regulatory frameworks and promoting financial inclusion, policymakers can capitalise on the positive relationship between FSD and tax collection. Furthermore, the results imply that focusing on the unorganised sector via digital platforms and financial access can facilitate the entry of unorganised economic activity into the tax system. Therefore, the study provides a useful road map for governments looking to enhance fiscal performance through systemic advancements in financial inclusion and infrastructure rather than just raising tax rates.

The rest of the paper carries the discussion on the following components: Section 2 provides a review of empirical studies that led to the development of the hypothesis of the study, Section 3 presents of data and methods settings, Section 4 presents of results and discussion, and Section 5 provides the conclusion and policies.

2 Empirical review and hypothesis

In literature, some studies are exploring the role of the financial sector and its development on tax revenue and tax collection, offering insights on how a developed financial sector facilitates enhancing tax revenue. For instance, Chen et al. (2019) investigated how financial development influences government expenditure composition using an endogenous growth model and data from 105 countries (1984–2009). The findings revealed that higher financial development is associated with reduced productive public spending, as governments rely less on it when private investment is less constrained. Using panel data from 137 countries between 2011 and 2017 and the Global Findex database, Yalaman (2019) explored the link between financial inclusion and tax revenues. The findings confirmed a significant positive relationship across various tax types, suggesting that enhancing financial inclusion can be a strategic tool for boosting government revenue globally. Alinaghi and Reed (2020) conducted a meta-analysis that examined how taxes affect economic growth in OECD countries by analysing 979 estimates from 49 studies using a taxonomy that accounts for tax-spending-deficit combinations. The results showed that tax impacts on GDP growth vary by fiscal context, with tax increases reducing growth under negative packages and enhancing it under positive ones.

Hacievliyagil and Eksi (2019) investigated how bank credit and loan rates affect the performance and growth of manufacturing sub-sectors using the Industrial Production Index. Results from ARDL and Toda-Yamamoto tests showed that an increased bank credit generally boosts industrial production, supporting the supply-leading hypothesis, though effects vary by sub-sector, with machinery showing no significant impact. Ekşi and Başar (2020) analysed the impact of corruption perception, government size, openness, and GDP on financial development in 19 Eastern European and Central Asian countries (2012–2017) using GMM. The empirical results indicated that perceived corruption does not significantly affect financial development in these countries.

Gnangnon and Brun (2020) examined the impact of tax reform on fiscal space using panel data from 99 developing countries (1980–2015), including 37 LDCs. The results showed that tax reform significantly expands fiscal space, especially in LDCs, and that trade openness amplifies this positive effect, highlighting the role of global cooperation in fiscal policy. Mader et al. (2022) explored the politics behind mobile money taxation in Kenya, Uganda, and Malawi, framing it as a political rather than purely technical issue. Drawing on political economy literature, the study revealed how tax decisions are shaped by state-business relations and the contested narratives surrounding financial inclusion. Raouf (2022) examined the impact of financial inclusion (FIC) on tax revenue using data from 45 countries across Europe, the Middle East, and Africa between 2008 and 2019 through panel threshold and GMM models. The results revealed a nonlinear relationship, where low financial inclusion hinders tax collection, while higher inclusion significantly boosts revenue. Safuan et al. (2022) analysed tax evasion in Indonesia from 1980 to 2019 using the modified cash-deposit ratio and multiple econometric methods, including ARDL and DOLS. Results indicate an inverted U-shaped relationship, where higher levels of financial development reduce tax evasion, highlighting the role of financial inclusion and digital finance in improving tax compliance.

Ariff et al. (2023) studied the link between financial distress and tax avoidance using firm-level data from 32 countries between 2015 and 2020, with a focus on the COVID-19 period. Results of study showed that while distressed firms generally avoid less tax, the pandemic intensified this negative association, offering key insights for policymakers during economic crises. Chebochok and Bayale (2023) analysed panel data from WAEMU countries (2006–2019) to assess how financial inclusion affects tax revenue mobilisation. The results show that financial inclusion particularly through access, usage, and affordability significantly boosts tax revenues, with a stronger effect on indirect taxes, supporting the case for targeted financial inclusion policies. Lompo (2024) investigated how financial development affects tax revenue in developing countries using panel data from 1995 to 2017 and a composite index capturing financial depth, access, and efficiency. The findings revealed that a more advanced financial sector significantly enhances tax mobilisation, particularly direct taxes, with results varying by economic development, financial openness, and fiscal policy conditions. Ullah et al. (2024) explored how digital inclusion and environmental taxes influence the energy transition in the top five greenest economies from 2001 to 2021, using MMQR and wavelet techniques. Their findings revealed that both digital inclusion and environmental taxes positively impact energy transition across quantiles and time scales, offering policy insights aligned with SDGs 7 and 13.

Brockmeyer and Somarriba (2025) used administrative data from Uruguay to assess whether financial incentives for electronic payments improve tax compliance. While

VAT rebates boost card transactions significantly, they do not enhance overall tax compliance, likely due to limited adoption of card machines and their minor role in total reported sales. The et al. (2025) inspected the nonlinear impact of FIC on tax revenue in 43 countries from 2004 to 2020, using Bayesian methods to address small sample concerns. The findings revealed that FIC (financial inclusion) positively influences tax revenue only below specific thresholds in both low and high financial development countries, beyond which its effect turns negative.

Although a lot of related topics have been covered in the literature currently in publication including financial inclusion (Yalaman, 2019; Raouf, 2022; Chebochok and Bayale, 2023), tax evasion and avoidance (Safuan et al., 2022; Gnangnon and Brun, 2020), the expansion of fiscal space through tax reform and even the political economy of tax compliance), few studies examine directly how the effectiveness of financial institutions and markets as well as the broader FSD affect the actual amount of tax revenue collected in developing or emerging nations. While the role of FSD in tax mobilisation is examined by Lompo (2024), the main emphasis is on disaggregated components and their impact on direct vs. indirect taxes without separating out the effect on total tax revenue or taking into account dynamic macroeconomic factors that could mitigate this correlation. Additionally, a large portion of recent research focuses on tax compliance, financial inclusion or the results of tax reform (The et al., 2025; Brockmeyer and Somarriba, 2025), but not the way in which a developed financial sector consistently affects government's ability to increase overall tax revenue. The empirical evaluation of how FSD, beyond just inclusion, drives total tax collection volumes across nations is thus critically lacking especially with regard to recent data and sophisticated econometric techniques. To fill this gap in literature, the study suggests the following hypothesis

H1 FSD has a positive significant impact on tax collection.

3 Data and methods

3.1 Sample and data

In the current discourse of study, we aim to explore the potential role of FSD in enhancing the tax collection volume. In essence, the analysis was conducted on the ASEAN Nations, including Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam, over the period from 2000 to 2023 (24 years of data). This time frame provides a comprehensive background for achieving the underlying objective. To ensure the consistency of estimation, we exclude two countries, Brunei Darussalam and Vietnam, due to missing information on taxation in the WDI. Similarly, data were limited to the year 2023 because of missing data for 2024. The region's dynamic economic transformation and continuous efforts to fortify fiscal frameworks and financial systems served as strategic drivers for the selection of ASEAN nations as the study's sample. ASEAN countries offer a wide range of FSD stages and tax mobilisation capabilities which make them a perfect place to examine the relationship between FSD and tax collection volume.

The region's dedication to digital finance, public finance reforms and regional financial integration makes this investigation even more pertinent. A strong longitudinal perspective is provided by the years 2000–2023 which include the months leading up to

and following the global financial crisis, tax reform programs, the growth of digital finance and the economic shocks brought on by the COVID-19 pandemic. In many ASEAN economies, structural fiscal reforms and financial inclusion are becoming increasingly important during these years. Due to incomplete and erratic tax data from the WDI, Brunei Darussalam and Vietnam had to be removed from the final sample. Additionally, 2024 was disqualified due to missing observations on a number of important indicators. For a solid empirical analysis, this refined sample guarantees the datasets consistency dependability and comparability. Data of all variables were sourced from WDI, The World Bank.

3.2 Research models and variables discussion

The econometric link between the variables can be established as follows:

$$\begin{aligned} TAX_{it} = {} & \beta_0 + \sum_{i=1}^{p} \alpha_1 \Delta TAX_{it-1} + \sum_{i=1}^{p} \beta_1 \Delta FSD_{it-1} + \sum_{i=1}^{p} \gamma_1 \Delta INF_{it-1} \\ & + \sum_{i=1}^{p} \gamma_2 \Delta GOE_{it-1} + \sum_{i=1}^{p} \gamma_3 \Delta FDI_{it-1} + \sum_{i=1}^{p} \gamma_4 \Delta COC_{it-1} \\ & + \varphi_1 TAX_{it-1} + \varphi_2 FSD_{it-1} + \varphi_3 INF_{it-1} + \varphi_4 GOE_{it-1} + \varphi_5 FDI_{it-1} \\ & + \varphi_6 COC_{it-1} + \varepsilon_{it} \end{aligned} \tag{1}$$

Equation (1) shows both long-term and short-term impacts of *FSD* which is the key independent variable of study. The equation further includes the control variables like *INF* (inflation rates), *GOE* (government effectiveness), *FDI* (FDI Inflow), and *COC* (corruption control). To further validate the implication of FMOLS and DOLS model, Equation (1) further can be modified as follows:

$$\begin{aligned} TAX_{it} = {} & \beta_0 + \alpha_1 FSD_{it} + \beta_1 ECG_{it} + \beta_2 INF_{it} + \beta_3 GOE_{it} + \beta_4 FDI_{it} \\ & + \beta_5 COC_{it} + \varepsilon_{it} \end{aligned} \tag{2}$$

Equation (2) mainly exhibits the long-term impact of variables on *TAX* (tax revenue). Explaining the variables of study, tax revenue expressed as a percentage of GDP is the study's dependent variable. This variable shows how well the government can use taxes to raise domestic resources which are essential for funding public goods, lowering inequality and maintaining fiscal sustainability. Tax revenue as a percentage of GDP standardises revenue performance and enables cross-country comparability irrespective of the size of the economy. An important gauge of fiscal performance in ASEAN countries, this metric captures the effectiveness and reach of a nation's tax administration. The growth of the financial sector as measured by domestic credit to the private sector as a percentage of GDP is the independent variable. This metric gauges how much money financial institutions give to the private sector, which is a reflection of the financial system's accessibility depth and effectiveness. By expanding the taxable base, increasing the formalisation of economic activities and improving transparency, a robust financial sector is anticipated to improve tax compliance and collection. Because of this, it is a useful metric for assessing the potential effects of enhanced financial intermediation on government tax receipts.

This study isolates the specific impact of FSD by incorporating a set of control variables to account for the larger macroeconomic and institutional factors that may influence tax revenue collection. The expansion of economic activity and income levels

within a nation is reflected in economic growth (ECG) which is calculated as GDP per capita growth (annual percent). A deeper and wider tax base is a result of higher economic growth which is generally linked to higher income consumption and corporate profits. The ability and responsibility of individuals and corporations to pay taxes increases with their income which could result in increased tax revenue. The real value of tax revenues and the need for public spending can all be impacted by inflation (INF) which is measured by the annual percentage change in consumer prices. While moderate inflation could have a positive impact on nominal tax revenues, high inflation could reduce the real value of taxes collected and make tax administration more difficult. A governance indicator known as government effectiveness (GOE) measures how well public services are perceived, how well policies are formulated and carried out and how credible the government's commitment to policies is. Governments with greater effectiveness are typically better able to enforce compliance administer tax systems and carry out reforms, all of which improve revenue performance.

Table 1 Detail on selected variables

Acronym	*Variable*	*Measurement*	*Role*	*Expected sign*
TAX	Tax revenue	Tax revenue (% of GDP)	Dependent	
FSD	Financial sector development	Domestic credit to private sector (% of GDP)	Independent	Positive
ECG	Economic growth	GDP per capita growth (annual %)	Control	Positive
INF	Inflation rates	Inflation, consumer prices (annual %)	Control	Negative
GOE	Government effectiveness	Government effectiveness: estimate	Control	Positive
FDI	FDI inflow	Foreign direct investment, net inflows (% of GDP)	Control	Positive
COC	Corruption control	Control of corruption: estimate	Control	Positive

Source: Previous studies

In order to capture the international investment climate and its impact on corporate tax contributions, foreign direct investment (FDI) represented as net inflows as a percentage of GDP is included. While aggressive tax planning by multinational corporations may partially offset these gains, high FDI inflows may indicate an increased business activity and profitability which can broaden the tax base. The degree to which public power is used for private benefit including both major and minor forms of corruption is measured by the control of corruption (COC) which is another crucial institutional variable. Poor corruption can result in revenue leaks through bribery and informal tax settlements, lower taxpayer compliance and seriously damage tax morale. The inclusion of these control variables is intended to ensure that the results are not skewed by the effects of omitted variables and to provide a more accurate estimation of the relationship between tax collection volume and FSD. A brief overview of these variables is given in Table 1 which demonstrates the overall reflection of variables.

3.3 Estimation methodology

This study uses a multi-step econometric approach that addresses important issues related to cross-sectional dependence (CD), non-stationarity, and long-run equilibrium relationships in order to empirically investigate the impact of FSD on tax collection volume (TAX) in ASEAN countries over the period 2000–2023. For robustness checks, the fully modified ordinary least squares (FMOLS) and dynamic OLS (DOLS) models are utilised while the cross-sectionally augmented autoregressive distributed lag (CS-ARDL) model serves as the basic estimation method. Every technique is chosen according to particular econometric difficulties that arise in the data, guaranteeing accurate and consistent outcomes. Our first step is to check for CD using the Pesaran CD test and the Breusch-Pagan LM test as indicated in Table 2. With highly significant p-values (0.000) for both tests, the results clearly reject the null hypothesis of CD for all variables, indicating the existence of interdependencies among ASEAN nations. This is probably because of regional economic integration, trade connections and coordinated policy responses. By combining the cross-section averages of the dependent and independent variables, CS-ARDL is specifically made to handle models with CD, and this evidence supports its use. Then as shown in Table 3, we use the cross-sectionally augmented IPS (CIPS) and cross-sectionally augmented Dickey-Fuller (CADF) panel unit root tests to investigate the stationarity characteristics of every variable. Indicating that they are integrated of order one ($I(1)$), the results demonstrate that the majority of variables are non-stationary at level but become stationary after first differencing.

For both tests, FSD and GOE are non-stationary at level but become stationary at first difference. The appropriateness of cointegration approaches for simulating long-term relationships is supported by these findings. The Kao residual cointegration test is suitable for panel data with homogeneous slopes and is used to test panel cointegration after unit root testing. The null hypothesis that there is no cointegration is rejected by the ADF test statistic of –2.678 and p-value of 0.003 as shown in Table 4. The use of long-run estimation techniques like CS-ARDL is justified by the compelling evidence of a long-run equilibrium relationship between tax revenue and the explanatory variables. The short and long-term dynamics between FSD and tax revenue are then investigated using the CS-ARDL model as the primary estimation technique. Because it takes into account CD, country-specific heterogeneity and the mixed integration order of variables. Furthermore, CS-ARDL generates estimators that are reliable and effective even when serial correlation and small sample sizes are present. The model is therefore perfect for panel datasets like ours particularly when examining nations that are interdependent like ASEAN members. Using the FMOLS and DOLS estimators, we further verify the robustness of the CS-ARDL results. FMOLS is appropriate for cointegrated panels since it uses semi-parametric adjustments to modify the OLS estimator to account for serial correlation and endogeneity. By adding lead and lag differences of the regressors to the cointegration regression DOLS on the other hand parametrically addresses serial correlation and possible endogeneity.

In order to cross-validate the long-run coefficients obtained from the CS-ARDL model, FMOLS and DOLS are both utilised. Both are well known for their dependability in estimating long-run relationships in panel data settings. The methodological approach in summary combines a series of exacting econometric tests and estimators driven by the characteristics of the data and the structure of the ASEAN economies to guarantee a solid

consistent and policy-relevant analysis of the relationship between tax collection volume and the development of the financial sector.

Table 2 Cross-section dependence (CD) analysis

Variables	*Breusch-Pagan LM*		*Pesaran CD*	
	Statistic	*Probability*	*Statistic*	*Probability*
TAX	175.066	0.000	4.367	0.000
FSD	393.060	0.000	19.048	0.000
ECG	224.022	0.000	25.125	0.000
INF	121.834	0.000	8.673	0.000
GOE	90.921	0.000	7.165	0.000
FDI	87.455	0.000	6.874	0.000
COC	138.775	0.000	1.440	0.000

Note: The acronyms can be seen in Table 1.

Source: Self-estimation

Table 3 Analysis of stationarity-unit root testing

Variables	*CIPS*		*CADF*	
	At level (0)	*At first difference (1)*	*(0)*	*(1)*
TAX	(–1.125) 0.104	(–7.236) 0.000	(21.247) 0.162	(79.820) 0.000
FSD	(1.658) 0.935	(–3.239) 0.000	(8.403) 0.922	(38.308) 0.001
ECG	(–4.751) 0.000	–	(56.716) 0.000	–
INF	(–2.787) 0.002	–	(36.363) 0.002	–
GOE	(0.629) 0.735	(–59.177) 0.000	(22.237) 0.135	(–5.416) 0.000
FDI	(–2.866) 0.002	–	(38.138) 0.001	–
COC	(–2.568) 0.005	–	(33.799) 0.005	–

Note: The acronyms can be seen in Table 1.

Source: Self-analysis

Table 4 Cointegration analysis

Cointegration test of Kao residual		
Test name	*t-statistics*	*Probability*
ADF	–2.678	0.003
Residual variance	0.766	-
HAC variance	0.515	-

Source: Self-estimation

4 Results and discussion

4.1 Descriptive analysis

The descriptive statistics which provide information on distributional dispersion and central tendencies of variables are shown in Table 5. The average behaviour of each variable across ASEAN nations during the study period from 2000 to 2023 can be understood by concentrating on the mean values. On average ASEAN nations collect approximately 11.8% of their GDP in tax revenue according to the mean value of TAX which is 11.8%. The region's ability to mobilise taxes is reflected in this comparatively moderate level which differs by nation based on institutional strength, economic structure and the effectiveness of tax policies. The average value of FSD is 62.36%. Although the high variance (as indicated by the maximum value) suggests differences in financial intermediation between nations, this points to a fairly active financial sector in the region. In terms of economic growth or ECG, the ASEAN region has seen moderate to strong economic expansion during the sample period with some fluctuations as evidenced by the mean annual per capita growth rate of 4.0%. The region's average inflation rate or INF is 5%, which indicates that prices are largely stable despite the existence of outliers (e.g., maximum of more than 57%), which suggests that some economies have been subject to inflationary pressures at particular times.

On a scale that normally runs from –2.5 (weak governance) to +2.5 (strong governance), the average score for GOE (government effectiveness) is 0.039 which is near zero. This average points to a regionally uneven degree of public service quality and policy implementation effectiveness. The ASEAN region is generally attractive to foreign investors as evidenced by the mean value of FDI of 5.70% of GDP, though this varies greatly between nations and over time. Lastly, a moderate degree of perceived corruption in the area is indicated by the average value of COC which is –0.344. The indicator's negative mean suggests that corruption is still a problem in many ASEAN economies as it ranges from –2.5 (high corruption) to +2.5 (low corruption). The mean values in Table 5 demonstrate in summary that ASEAN nations perform moderately in terms of tax collection and financial development with significant variation in macroeconomic stability and institutional quality. These factors are crucial to the study's examination of how the growth of the financial sector affects tax revenue.

Table 5 Estimation of descriptive statistics

Variable	*Mean*	*Median*	*Maximum*	*Minimum*	*Std. dev.*	*Skewness*	*Kurtosis*
TAX	11.800	12.936	17.794	2.001	3.466	–1.110	3.569
FSD	62.356	38.705	164.075	3.121	48.828	0.408	1.584
ECG	4.055	4.217	14.361	–12.627	3.880	–0.872	3.391
INF	5.050	3.350	57.074	–1.241	6.953	1.949	3.360
GOE	0.039	–0.027	2.469	–1.752	1.073	0.649	2.689
FDI	5.702	3.077	34.948	–2.757	6.888	1.196	4.450
COC	–0.344	–0.583	2.356	–1.672	1.056	1.451	4.167

Note: The acronyms can be seen in Table 1.

Source: Self-analysis

4.2 Correlation analysis

The correlation values between tax revenue (TAX) and other explanatory variables in the study are shown in Table 6. Although these numbers do not necessarily indicate causation, they do offer a preliminary understanding of the direction and magnitude of linear relationships among variables. With a correlation of 0.645, FSD are strongly and favourably correlated. It would appear from this that tax revenue tends to increase as the financial sector develops as indicated by increased credit to the private sector. The study's hypothesis is that a more advanced financial system improves transparency, financial transactions and formal sector activity is supported by this. Economic growth and taxation have a moderately positive correlation of 0.376, this suggests that higher economic growth is typically linked to higher tax revenue. Given that rising production and income generally widens the tax base and raises the number of taxable transactions, this makes intuitive sense. TAX and INF (inflation) on the other hand have a negative correlation of –0.486 indicating that higher inflation tends to lower tax revenue. The tax base may be weakened by inflation which could reduce the actual value of taxes collected or interfere with official economic activity.

With a correlation of 0.611 between tax and government effectiveness, this shows a very strong positive relationship. It follows that nations with more effective governments as indicated by better policy implementation and public service delivery also typically have higher tax collections, most likely as a result of stronger tax administration and enforcement capabilities. There is very little correlation between taxes and FDI as evidenced by the weak positive correlation of 0.086. Although FDI might boost economic activity, this dataset shows that it has little direct impact on tax revenue perhaps as a result of tax breaks or profit-shifting tactics employed by multinational corporations. Finally, a moderately positive correlation of 0.396 exists between tax and COC, suggesting that higher tax revenues are linked to more robust anti-corruption measures. In general, Table 6's correlation values provide preliminary support for the inclusion of financial development, government effectiveness and good governance in the econometric models by confirming the theoretical expectation that these factors have a positive impact on tax revenue while inflation has a negative one.

Table 6 Correlation trend among the variables

Variable	*TAX*	*FSD*	*ECG*	*INF*	*GOE*	*FDI*	*COC*
TAX	1.000						
FSD	0.645	1.000					
ECG	0.376	0.359	1.000				
INF	–0.486	–0.411	0.272	1.000			
GOE	0.611	0.705	–0.293	–0.391	1.000		
FDI	0.086	0.335	–0.001	–0.153	0.601	1.000	
COC	0.396	0.607	–0.241	–0.319	0.706	0.716	1.000

Note: The acronyms can be seen in Table 1.

Source: Self-analysis

4.3 Regression analysis

To check the regression among variables, we mainly employ the CS-ARDL model and report the statistics in Table 7. The analysis shows that FSD has a positive and statistically significant coefficient of 0.072. This suggests that long-term gains in the financial sector are linked to higher tax collection volumes. A significant positive effect is also seen in ECG which indicates that rising per capita income leads to higher tax revenue (coefficient of 0.476). Likewise, both FDI and GOE show positive and significant coefficients of 0.426 and 1.124 respectively, suggesting that international investment inflows and institutional strength improve tax mobilisation. On the other hand, INF has a negative correlation with tax revenue (a coefficient of –0.201), meaning that higher inflation reduces tax collection. Although positive, the COC coefficient is only marginally significant at the 10% level (3.712). The consistency of the main conclusions is confirmed by the robustness checks performed using the DOLS and FMOLS models as shown in Table 8. Both the FSD coefficients in the FMOLS and DOLS models are positive and statistically significant at 0.040 and 0.061 respectively, supporting the validity of the primary CS-ARDL findings. With coefficients of 0.119 (FMOLS) and 0.125 (DOLS), ECG and tax volume continue to be positively correlated in both models. Inflation (INF) still has a negative impact in DOLS and FMOLS, its coefficients are –0.071 and –0.080 respectively. These coefficient values from both tables offer a strong basis for analysing the long-term relationships between tax collection and the growth of the financial sector which will be thoroughly examined in the discussion chapter that follows.

Table 7 Effect of FSD on tax volume

Variable	*Tax volume as a dependent*			
	CS-ARDL model			
	Coefficient	*Std. error*	*t-statistic*	*Probability*
	Long run equation			
FSD	0.072[a]	0.012	5.918	0.000
ECG	0.476[a]	0.121	3.936	0.000
INF	–0.201[b]	0.093	2.161	0.032
GOE	0.426[a]	0.109	3.916	0.000
FDI	1.124[a]	0.263	4.262	0.000
COC	3.712[c]	2.192	–1.692	0.093
	Short run equation			
COINTEQ01	–0.091[a]	0.031	–3.035	0.000
D(FSD)	–0.008	0.029	–0.281	0.778
D(ECG)	–0.006	0.075	–0.087	0.930
D(INF)	–0.047[c]	0.026	–1.812	0.072
D(GOE)	–0.674	1.344	–0.501	0.616
D(FDI)	0.026	0.040	0.643	0.520
D(COC)	2.077[c]	1.094	1.898	0.060
C	–0.103	0.202	–0.513	0.608

Notes: The acronyms can be seen in Table 1. *, **, and *** are indicating significance level at 10%, 5%, and 1% level relatively.

Source: Self-analysis

Table 8 Robustness check

Variable	*Tax volume as a dependent*			
	DOLS		*FMOLS*	
	Coefficient	*Probability*	*Coefficient*	*Probability*
FSD	0.040[a]	0.000	0.061[a]	0.015
ECG	0.125[b]	0.048	0.119[b]	0.049
INF	–0.071[a]	0.000	–0.080[b]	0.040
GOE	1.333[c]	0.081	4.961[a]	0.007
FDI	0.005[c]	0.090	0.458[b]	0.046
COC	–0.579	0.410	1.057[a]	0.006
Adjusted R-squared		0.477	0.481	
SE of regression		0.781	0.791	
Long-run variance		0.021	0.033	

Notes: The acronyms can be seen in Table 1. *, **, and *** are indicating significance level at 10%, 5%, and 1% level relatively.

Source: Self-analysis

4.4 Discussion on findings

In current study, the analysis was conducted on ASEAN nations and CS-ARDL, FMOLS, and DOLS models were employed for regression analysis. The findings infer that FSD has a positive effect on TAX (tax revenue). A healthy financial system is essential to bolstering a nation's fiscal capacity. More formalisation of economic activity, better financial transparency and improved documentation of income and transactions are all results of growing financial development as indicated by rising domestic credit to the private sector. By decreasing opportunities for tax evasion and enhancing the effectiveness of tax administration, these factors raise tax compliance and expand the tax base. In economies with better access to banking and credit facilities, people and businesses are more likely to be part of formal financial systems which makes it easier for tax authorities to track their financial activities. Additionally, advanced financial systems enable electronic recordkeeping and digital payments which make it easier to identify taxable activities. These findings support the underlying logic of study which is supposed in H1 of the study. In literature, the studies of Yalaman (2019), Chebochok and Bayale (2023) and Lompo (2024) support the positive effect of FSD on TAX.

For control variables, the study concludes that economic growth is positively correlated with TAX revenue which is in line with both previous empirical research and economic theory. This can be explained as income levels rise, business activity expands and consumption rises as economies grow, these factors all add to a more expansive and dynamic tax base. Additionally, formal employment and corporate profits rise as a result of economic expansion, increasing direct and indirect tax revenues (Paramaduhita and Mustikasari, 2018). Tax revenue is positively impacted by government effectiveness as well. Credible policy execution, robust institutional frameworks and excellent public service delivery are characteristics of effective governments. These qualities improve the effectiveness of tax collection systems, boost taxpayer confidence and lessen corruption and administrative inefficiencies in revenue collection. Strong governance is associated

with lower compliance costs, stronger enforcement and higher voluntary tax compliance. Therefore, through strengthening the institutional and administrative underpinnings of a robust tax system, government effectiveness directly leads to improved fiscal outcomes (Wen et al., 2021).

Likewise, it has been discovered that inflows of FDI increase tax revenue. FDI increases the formal sector and stimulates economic activity by bringing in capital technology and business expertise. When foreign companies establish operations, they create jobs, interact with local supply chains and pay taxes into a number of different channels such as consumption-based taxes, corporate taxes and employee income taxes. Even though some FDI may qualify for tax breaks, the overall economic stimulation it generates still results in net increases in tax revenue (Alshubiri, 2024). Finally, tax revenue and corruption control are positively correlated, highlighting the significance of integrity and openness in public administration. Controlling corruption reduces the likelihood that tax money will be embezzled through leaks or unofficial payments. Additionally, when taxpayers believe the system is fair and less corrupt, they are more likely to abide by tax laws. Therefore, effective anti-corruption policies not only protect public funds but also boost taxpayer satisfaction and involvement in formal economic systems. This is especially critical in areas with historically high levels of informal activity where successful revenue mobilisation depends on public trust in institutions (Bah, 2024).

In contrast, there is a negative correlation between inflation rates and tax revenue. This could be explained by the way inflation distorts economic behaviour and taxation. High inflation, especially when tax systems are not fully indexed, can reduce the actual value of tax collections. More economic informality could result from people and businesses trying to avoid the unpredictability of formal transactions. Additionally, when purchasing power declines due to inflation consumption declines and indirect tax revenues are subsequently reduced. It may also impact employment and business profitability, lowering the base for corporate and income taxes (Martell, 2024). So, keeping prices stable is crucial for ASEAN nations economic well-being as well as their ability to continue collecting taxes.

5 Conclusions and policies

This study used the CS-ARDL estimation technique to examine the relationship between FSD and tax revenue mobilisation (TAX) in ASEAN countries from 2000 to 2023. The findings were then supported by the DOLS and FMOLS models. Strong empirical support for the idea that a developed financial sector eventually boosts tax collection is provided by the findings. More specifically, improved documentation of economic transactions, greater financial transparency and eventually a larger and more effective tax base are the results of increased access to and use of formal financial services. These findings highlight the various factors that influence tax mobilisation and show how financial development can significantly improve fiscal capacity when backed by macroeconomic stability and good governance. In order to increase the transparency and traceability of economic activities, the study highlights the necessity for ASEAN policymakers to give financial sector reforms top priority, enhance financial access and inclusion and invest in strong institutions. A more robust and sustainable tax structure is

necessary to fund public services and accomplish long-term development objectives and these steps taken together can help achieve this.

5.1 Policy implications

For ASEAN economies aiming to increase tax revenue mobilisation, the study offers targeted policy guidance. In lower-income or less-developed ASEAN countries, expanding financial inclusion should be a priority, particularly in rural and underserved areas. By increasing access to formal financial services and digital financial technologies, governments can gradually bring informal economic activities under the official system, improving tax compliance and broadening the tax base. In middle- and higher-income ASEAN countries with more developed financial systems, strengthening the efficiency, depth, and reach of financial institutions is key. Better-developed financial systems not only support credit intermediation but also enable closer monitoring of financial activities, reducing tax evasion and encouraging voluntary compliance. Across all ASEAN economies, investments in formal financial institutions and enhanced financial accessibility foster a sense of economic identity among citizens, linking financial behaviour more effectively to tax obligations while supporting overall fiscal and economic development.

The role of institutional quality specifically government efficacy and corruption control in promoting increased tax revenues is another important finding. Accountability transparency and predictability in public administration are guaranteed by strong institutions. They also lessen chances for illegal leaks and rent-seeking as well as the administrative expenses associated with tax collection. Improving tax administration, filing taxes online and implementing anti-corruption policies are just a few examples of how strengthening institutional capacity can improve revenue collection results. On the other hand, an inverse relationship between tax revenue and inflation highlights how crucial macroeconomic stability is. Excessive inflation encourages unofficial transactions that avoid taxes, distorts economic behaviour and reduces the real value of tax receipts. In order to sustain stable price levels which will not only promote growth but also protect and improve the efficiency of tax systems, policymakers should coordinate their monetary and fiscal policies. Finally, the study shows that although its effect is dependent on the calibre of tax governance, FDI increases tax revenue. Although FDI frequently reaps the rewards of incentives, it also creates new taxable revenue streams through corporate profits value-added activities and employment. Governments need to make sure incentive programs are clearly focused and don't cause long-term revenue losses.

Simultaneously, combining tax and investment policy can assist in coordinating private sector growth with national revenue objectives. In summary, the results support a thorough and well-coordinated policy approach that aims to improve fiscal sustainability through the cooperation of investment strategies, macroeconomic stability, institutional reforms and financial development. In addition to being an economic priority, strengthening the financial sector is also a fiscal necessity that can enable ASEAN governments to raise the domestic funds required for resilience and long-term development.

5.2 Limitations and future research

Although this research offers significant understanding of the connection between the growth of the financial sector and the mobilisation of tax revenue in ASEAN nations, it is not without limitations. Initially, despite its widespread acceptance, the measurement of financial development through domestic credit to the private sector might not account for the multifaceted nature of financial systems including informal credit channels and digital finance. Moreover, despite being instructive institutional and governance indicators may be hampered by subjective bias and heterogeneity at the national level. Last but not least, the macro-level approach taken in this study may obscure significant micro-level behaviours and sector-specific tax dynamics. In order to investigate how financial development affects tax compliance across various economic agents; future research can build on this work by integrating firm-level or household-level data. Furthermore, analysing the function of tax administration reforms, financial literacy and digital financial services may provide more detailed insights into the ways that the growth of the financial sector influences fiscal outcomes.

Declarations

All authors declare that they have no conflicts of interest.

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