Macroeconomic and Structural Determinants of Formal Business Entry in ASEAN: Evidence from a Linear Mixed-Effects Model Using World Development Indicators

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Abstract

This study examines the macroeconomic and structural determinants of formal entrepreneurial entry in ASEAN using new business density (new limited liability company registrations per 1,000 working-age people) as the dependent variable. Annual panel data were drawn from the World Development Indicators (WDI) and organized into an unbalanced country–year dataset. To account for repeated observations and persistent cross-country differences in baseline business entry, the study employed a linear mixed-effects model with a random intercept for country and fixed effects for population density, domestic credit to the private sector by banks (% of GDP), GDP per capita (constant 2015 US$), tertiary enrollment (% gross), inflation, unemployment (modeled ILO estimate), internet usage, and year. The fitted model used 95 country–year observations across 9 ASEAN country groups. Random-effects estimates indicate substantial between-country heterogeneity in formal entry (ICC = 0.346), supporting the appropriateness of a mixed-model framework. Fixed-effects results show that population density, domestic credit to the private sector by banks, and GDP per capita are positively and significantly associated with new business density, while tertiary enrollment exhibits a significant negative association. By contrast, year, inflation, internet usage, and unemployment are not statistically significant in the estimated specification. Overall, the findings suggest that formal business entry in the observed ASEAN panel is more strongly associated with structural factors—development level, banking-sector credit depth, and population concentration—than with short-run macroeconomic conditions.

Keywords: *ASEAN; new business density; entrepreneurship; domestic credit to private sector; GDP per capita; linear mixed-effects model; World Development Indicators*

1. Introduction

Entrepreneurship is widely recognized as a critical driver of economic dynamism, employment generation, and structural transformation, particularly in developing and emerging economies. New firm creation facilitates innovation, enhances market competition, and supports inclusive growth by absorbing labor and translating economic opportunities into productive activity. In the context of rapidly transforming regions such as Southeast Asia, understanding the macro-structural conditions that enable or constrain entrepreneurial activity remains a central concern for scholars and policymakers alike.

The Association of Southeast Asian Nations (ASEAN) presents a compelling empirical setting for the study of entrepreneurship. ASEAN economies exhibit substantial heterogeneity in income levels, financial system development, demographic structure, and urbanization patterns, while simultaneously pursuing regional integration through trade liberalization, investment cooperation, and coordinated development initiatives. Despite shared regional aspirations, ASEAN member states differ markedly in their rates of formal business entry, reflecting divergent institutional capacities, market structures, and development trajectories.

Existing empirical literature on entrepreneurship has emphasized a range of macro-level determinants, including access to finance, economic development, human capital, labor market conditions, infrastructure, and demographic density. Financial development, in particular, has been consistently linked to entrepreneurial activity through its role in alleviating credit constraints and facilitating firm entry. Similarly, higher levels of economic development are often associated with stronger entrepreneurial ecosystems due to improved institutions, higher purchasing power, and more sophisticated markets. Urbanization and population density may further amplify entrepreneurial activity by generating agglomeration economies, knowledge spillovers, and market proximity.

However, empirical findings across countries and regions remain mixed, especially with respect to the relative importance of macroeconomic stability, digital diffusion, labor market slack, and education. Moreover, much of the existing cross-country evidence relies on pooled regressions that implicitly assume homogeneous effects across countries, potentially obscuring important country-specific baseline differences. In regions such as ASEAN—where historical, institutional, and structural factors vary substantially across member states—failing to account for unobserved country heterogeneity may lead to biased or incomplete conclusions.

Recent methodological advances increasingly emphasize the use of panel data techniques that explicitly model both within-country variation over time and between-country differences. Linear mixed models, in particular, offer a flexible framework for analyzing unbalanced panel data by allowing country-specific random effects while estimating common structural relationships across countries. This approach is especially appropriate for ASEAN, where persistent country-level characteristics—such as institutional quality or long-standing development patterns—are likely to influence entrepreneurial outcomes alongside time-varying macroeconomic factors.

Against this backdrop, the present study investigates the macroeconomic and structural determinants of formal entrepreneurial activity in ASEAN using new business density as a proxy for new firm creation. Drawing on World Development Indicators data and employing a linear mixed modeling framework, the study seeks to identify which macro-level factors are systematically associated with higher rates of formal business entry while accounting for unobserved country-specific heterogeneity.

By focusing on ASEAN member states and adopting a mixed-effects panel approach, this study contributes to the entrepreneurship literature in three ways. First, it provides region-specific evidence on the structural drivers of new business formation in Southeast Asia. Second, it clarifies the relative roles of financial depth, economic development, agglomeration, and human capital in shaping entrepreneurial outcomes. Third, it demonstrates the importance of accounting for country-level heterogeneity when analyzing cross-national entrepreneurship dynamics.

1.1 Objectives of the Study

The primary objective of this study is to examine the macroeconomic and structural determinants of new business density in selected ASEAN countries using a panel data framework that accounts for country-specific heterogeneity. Specifically, the study aims to:

a. Assess the relationship between financial development and entrepreneurial activity in ASEAN, as measured by domestic credit to the private sector by banks as a percentage of GDP.

b. Examine the role of economic development—proxied by GDP per capita—in influencing new business density across ASEAN countries.

c. Determine whether population density is associated with variation in formal business entry as measured by new business density.

d. Evaluate whether tertiary enrollment (gross) is associated with new business density, as a proxy for human capital participation at the tertiary level.

e. Assess whether short-run macroeconomic conditions and digital diffusion—operationalized through inflation, unemployment, and internet usage—are associated with new business density after controlling for structural determinants, and whether a linear time trend (year) is detectable in the pooled panel.

f. Quantify the extent of between-country heterogeneity in baseline new business density through the random-effects output, including the intraclass correlation coefficient (ICC).

2. Review of Literature

2.1 Financial depth and formal new business creation

A central strand in macro-entrepreneurship research argues that financial depth—often operationalized through indicators of private credit expansion and broader financial development—enables formal business entry by relaxing liquidity constraints, lowering the cost of external capital, and expanding the feasible set of entrepreneurial

projects. Empirical evidence generally supports this proposition, although the magnitude and durability of the effect are contingent on the quality of intermediation and on potential diminishing returns at very high levels of deepening. Panel-based evidence from Chile, for instance, indicates that local financial depth, when paired with external-finance dependence, is positively associated with regional new firm creation, underscoring the role of credit markets in converting entrepreneurial intention into formally registered ventures (Fernández et al., 2021). Similarly, evidence from the United Arab Emirates suggests that financial development—measured using composite indicators that incorporate depth-related dimensions—remains a robust predictor of entrepreneurial activity after controlling for macroeconomic and institutional conditions, implying that finance can operate as a relatively direct enabling mechanism for entry where the institutional environment is sufficiently supportive (Hameli et al., 2021).

At the cross-country level, however, the relationship is consistently qualified: in multi-economy analyses, quality-adjusted private credit is shown to shape the entrepreneurship–growth nexus, where financial depth amplifies entrepreneurship-related gains when allocation is efficient but may weaken the nexus when deepening occurs without commensurate improvements in credit quality and productive allocation (Haini & Slesman, 2024). This qualification aligns with broader theoretical and methodological discussions emphasizing that financial provisioning is necessary to mobilize investable resources, yet beyond certain thresholds further financial expansion can generate misallocation, crowding-out dynamics, or vulnerabilities that dampen longer-run growth benefits and potentially distort entrepreneurial activity toward less productive entry (Yaroshenko & Vovchak, 2024).

A complementary perspective is that the practical value of "more finance" is ultimately tested at the firm level, where financial feasibility constraints condition whether innovation-oriented strategies—particularly those requiring digital transformation and process redesign—can be implemented in ways that are sustainable rather than merely aspirational. In case-based evidence on Philippine family-owned SMEs, strategic repositioning and digitally enabled value innovation are framed as viable only when initiatives remain financially feasible, illustrating how resource constraints can shape the translation of enabling conditions into realized entrepreneurial outcomes

(Atento et al., 2025). Taken together, the literature supports the view that credit availability and financial depth are generally conducive to formal business creation, but the claim is most credible when deepening is paired with improvements in allocation efficiency and intermediation quality, reinforcing the caution that "more finance" is not uniformly equivalent to "better entrepreneurial outcomes" across contexts (Fernández et al., 2021; Hameli et al., 2021; Haini & Slesman, 2024; Yaroshenko & Vovchak, 2024).

2.2 Economic development and formal business entry

The literature generally supports the proposition that higher levels of economic development—commonly proxied by GDP per capita—are associated with higher rates of formal business entry, although the relationship is consistently framed as conditional rather than automatic. Evidence from sub-Saharan Africa indicates that real GDP exerts a positive influence on new firm entry, yet the magnitude and persistence of this relationship are shaped by the reform environment, particularly financial liberalization and institutional quality, implying that development-level improvements stimulate entry when complementary governance and financial conditions reduce barriers to formalization (Ogbeide & Adeboje, 2020). Cross-country evidence in emerging-economy settings similarly suggests that economic development supports formal business creation, but institutional frictions can redirect or suppress the translation of higher income levels into newly registered firms. In particular, tax system complexity and corruption may inhibit entry by increasing compliance burdens and uncertainty, or may reshape incentives and transaction costs in ways that alter observed entry dynamics—reinforcing the view that GDP per capita operates through policy-mediated and institution-mediated channels rather than as a standalone driver (Bilan & Apostoaie, 2025).

Within Southeast Asia, the argument that GDP per capita proxies deeper capability and governance differences is consistent with WDI-based macro-developmental work documenting persistent development gradients and their association with labor-market and welfare outcomes across ASEAN contexts (Quinto & Atento, 2025). While such macro-developmental evidence is not equivalent to direct proof about firm registration rates, it strengthens the interpretive premise that "development level" captures a bundle of structural

conditions—market size, purchasing capacity, institutional maturity, and administrative capability—that plausibly condition whether formal entry becomes feasible at scale. Firm-level evidence likewise illustrates how policy and institutional shifts can materially reshape operating environments, requiring adaptation even among incumbents; for example, organizational responses to universal healthcare integration and digital disruption highlight how regulatory and policy regimes can reconfigure competitive conditions and compliance demands—channels that can also influence the attractiveness and viability of formal entry for new firms (Atento & Atento, 2025).

Synthesizing these perspectives, the literature treats development as an enabling condition that improves the feasibility of formal business activity—through stronger markets, greater purchasing capacity, and improved resource availability—while emphasizing that the development-to-entry link is mediated by governance quality and by the configuration of regulatory and policy environments (Ogbeide & Adeboje, 2020; Bilan & Apostoaie, 2025). As such, the prevailing view is that higher GDP per capita tends to be associated with increased formal business entry, but the strength and sometimes even the direction of the association vary across contexts depending on whether institutions amplify or dampen incentives and capabilities required for business registration and early-stage survival (Ogbeide & Adeboje, 2020; Bilan & Apostoaie, 2025).

2.3 Population density, urban concentration, and entrepreneurial activity

Evidence on the relationship between population density or urban concentration and entrepreneurship suggests a context-dependent balance between agglomeration advantages and congestion costs. Dense urban environments can strengthen entrepreneurial ecosystems by providing larger and more diverse markets, thicker labor pools, and more frequent interactions that facilitate matching between entrepreneurs, customers, suppliers, and talent. In Lagos, Nigeria, population density and urban diversity are described as a dual-edged force: density contributes positively by expanding markets and supplying entrepreneurial labor and capabilities, yet it simultaneously intensifies pressure on infrastructure and services, compelling entrepreneurs to develop coping innovations, alter operating models, or relocate in

response to congestion and infrastructural strain (Oladele et al., 2025).

At the same time, evidence from China cautions against a universal "density advantage" interpretation. Urban agglomeration does not consistently promote entrepreneurship in Chinese settings, with the argument that large cities can impose high fixed costs and elevate competitive intensity, thereby discouraging business creation even when urban environments offer potentially higher returns for those able to overcome entry barriers (Li et al., 2023). This implies that the net effect of density depends on whether agglomeration economies dominate or whether costs related to rent, congestion, competition, and regulatory or administrative entry barriers dominate within a given institutional and market context.

The plausibility of congestion and infrastructure strain as countervailing mechanisms is reinforced by urban-focused empirical studies in the Philippines that document how densely populated settings can concentrate risk, stress public services, and expose infrastructure limitations. For instance, community studies in flood-prone urban barangays highlight how environmental exposure and public-health vulnerability can cluster in dense settings, reflecting pressures that can indirectly shape local operating conditions and transaction costs (Temporada et al., 2025). Similarly, post-rehabilitation monitoring of urban waterways underscores the ongoing need to manage environmental quality and food-safety risks in urban-adjacent production spaces, again pointing to infrastructure and environmental constraints as real features of dense territorial systems (Ylagan et al., 2025). These findings do not constitute direct tests of the density–entrepreneurship relationship, but they support the underlying conceptual claim that density often coincides with service, environmental, and governance pressures that can raise the cost of doing business.

Beyond the scale of density itself, the literature emphasizes that population composition and spatial concentration of particular groups may be equally important in shaping entrepreneurial outcomes. Evidence from U.S. metropolitan areas indicates that higher immigrant population shares—typically concentrated in urban settings—are significantly associated with increased self-employment rates, suggesting that demographic composition can strengthen entrepreneurial activity through mechanisms such as enclave markets, social networks, and occupational specialization that

density measures alone may not capture (Siddique et al., 2025). Regional studies during periods of disruption further qualify the density–entrepreneurship relationship by showing that entrepreneurial adaptation and recovery are not necessarily concentrated in the densest cores; peripheral or less dense locations can display comparable or even stronger entrepreneurial dynamics when shocks, structural change, and evolving constraints reshape where entrepreneurship emerges within a broader territorial system (Rogova & Sycheva-Peredero, 2023). Overall, the literature converges on a nuanced proposition: density may foster entrepreneurship through agglomeration economies and market proximity, but can also suppress entry when congestion costs, fixed costs, and competitive pressures outweigh advantages and when infrastructure constraints limit the productive utilization of density-driven opportunities (Oladele et al., 2025; Li et al., 2023; Siddique et al., 2025; Rogova & Sycheva-Peredero, 2023).

2.4 Tertiary education enrollment and formal entrepreneurship

The literature indicates that higher tertiary education enrollment does not, by itself, reliably translate into higher levels of formal entrepreneurial activity at the macro or country level, because the education–entrepreneurship relationship is mediated by program content, institutional quality, labor market incentives, and the opportunity costs of entrepreneurial entry. A recurring finding is that entrepreneurship education embedded within higher education can strengthen proximal psychological and capability outcomes—most notably entrepreneurial intention and self-efficacy—yet these gains do not automatically scale into higher rates of formal firm creation as captured by business registration metrics (Mei et al., 2020; Adu et al., 2020). In this view, tertiary systems may develop entrepreneurial mindsets and intentions, but national-level entry rates remain contingent on whether graduates face enabling institutional conditions, accessible financing, and supportive ecosystems that reduce startup friction and facilitate transition from intention to action (Mei et al., 2020; Adu et al., 2020).

Related studies suggest that higher education interventions may affect the quality and strategic orientation of entrepreneurship more than the quantity of new ventures. University entrepreneurship programs can shape opportunity recognition, entrepreneurial skills, and preparedness

among those who enter entrepreneurship; however, entry rates may remain unchanged if programs function primarily as selection and capability enhancement mechanisms rather than broad participation-expansion mechanisms (Lee & Eesley, 2020). At the macro level, an additional constraint arises from labor-market sorting and the rising opportunity costs of entrepreneurship among highly educated populations. Evidence indicates that educational attainment and entrepreneurial education can be associated with entrepreneurial activity in some contexts, yet the relationship may weaken—or even turn adverse—when higher education expands salaried employment preferences, raises reservation wages, or channels graduates into professional labor markets where formal employment is perceived as a superior or less risky pathway than venture creation (Bayar et al., 2022).

The interpretive challenge is that tertiary enrollment is a quantity indicator that obscures heterogeneity in curriculum relevance, pedagogy, institutional governance, and students' access to skill-building opportunities. Evidence from Philippine higher education research emphasizes that outcomes depend not only on participation but on institutional alignment, quality, and the learning infrastructure that enables competence formation. For instance, e-learning and curriculum integration initiatives in management education are framed as requiring institutional alignment and credible implementation pathways—implying that the same enrollment rate can yield different capability outcomes depending on governance and delivery quality (Atento, 2025). Similarly, research on AI-enabled personalization stresses that adoption, learning effectiveness, and equity are shaped by institutional capacity and governance, reinforcing the claim that human-capital formation is sensitive to system quality rather than reducible to participation rates (Rao et al., 2025). Broader reviews of higher education challenges further point to leadership, systems constraints, and implementation realities that condition whether education translates into competence and readiness outcomes (Bermido et al., 2025).

In addition, entrepreneurship-relevant capability formation may hinge on specific literacies—such as financial and monetary policy awareness—that shape saving, investment, and planning behavior among students and early-career adults, which are plausibly relevant inputs to entrepreneurial preparedness even when not measured as entrepreneurship per se (Espelita et al.,

2025). Overall, the consensus across studies is that tertiary enrollment alone is insufficient to consistently increase formal entrepreneurial activity; education effects depend on targeted entrepreneurship education, education quality, role-model exposure and experiential learning, and supportive institutional environments that convert capability into entry and sustainability (Bayar et al., 2022; Lee & Eesley, 2020; Gonzalez-Perez et al., 2025; Fabbro et al., 2024).

2.5 Short-run macroeconomic conditions versus structural drivers of formal business creation

Short-run macroeconomic conditions—particularly inflation, unemployment, and general year-to-year fluctuations—are frequently examined as potential correlates of formal business formation, yet the empirical literature tends to portray these variables as secondary once structural and institutional determinants are accounted for. Evidence using dynamic panel approaches indicates that entrepreneurship-related outcomes are more systematically shaped by medium- to long-run fundamentals such as economic growth trajectories, foreign direct investment inflows, economic openness, and consumption conditions than by short-term volatility indicators. In this line of work, inflation and unemployment often exhibit weak, low-elasticity, or inconsistent relationships with new firm creation, suggesting that they may influence entry at the margin but are not primary drivers of cross-country differences in formal entrepreneurial activity (Mai et al., 2025; Fahim & Naamane, 2021).

This prioritization of structural forces is consistent with evidence emphasizing the importance of economic transformation and long-run system characteristics in shaping entrepreneurial dynamics. Macro-level analyses focusing on structural change and technological transitions argue that shifts in industrial composition and innovation regimes can materially alter conditions for entrepreneurship, thereby dominating short-run macro indicators in explanatory relevance (Wang & Lu, 2020). Research on innovative entrepreneurship similarly highlights that while stability can matter, decisive predictors more frequently involve deeper developmental and capability foundations—particularly human capital and ecosystem readiness—rather than short-run fluctuations (Jurgelevičius & Kučaidze, 2020).

Within ASEAN-focused WDI-based macro-developmental research, inflation and unemployment are treated as salient social and policy-relevant signals, but are analyzed as part of a broader structural system—including development status, labor-market composition, and welfare outcomes—rather than as standalone "switches" that mechanically predict real-economy behavior (Quinto & Atento, 2025). Complementary Philippine evidence on monetary policy awareness further underscores that inflation targeting and policy regimes operate through behavioral and expectations channels—affecting saving, spending, and investment orientations—suggesting that even when inflation is measured as a macro indicator, its real-economy implications are mediated by institutional credibility and economic literacy, not merely by the observed rate itself (Espelita et al., 2025). Taken together, the literature supports an interpretation in which inflation, unemployment, and time trends provide limited incremental explanatory power for formal business entry once structural determinants and country heterogeneity are accounted for, particularly when entrepreneurship is operationalized via registration-based measures (Mai et al., 2025; Wang & Lu, 2020; Fahim & Naamane, 2021; Jurgelevičius & Kučaidze, 2020; Vyrostková & Kádárová, 2023).

2.6 Thematic synthesis of the literature

Across the reviewed studies, the determinants of formal entrepreneurial activity cohere around a layered set of mechanisms that are more stable than short-run macroeconomic signals. First, the literature converges on financial depth as a foundational enabling condition for formal firm creation, particularly when entrepreneurship is measured using registration-based indicators. Credit expansion and broader financial development tend to lower liquidity constraints and improve feasibility of entry, yet the strength of this relationship depends on the quality of intermediation and the efficiency of credit allocation; where deepening occurs without corresponding improvements in allocation quality, the entrepreneurship-enhancing role of finance may weaken or become distorted (Fernández et al., 2021; Hameli et al., 2021; Haini & Slesman, 2024; Yaroshenko & Vovchak, 2024). Firm-oriented evidence reinforces that feasibility constraints remain operative even when strategic opportunities are identified, because innovation and digital repositioning must remain financially viable to be sustainable in practice (Atento et al., 2025).

Second, development level (GDP per capita) functions less as a mechanical determinant of entry and more as a proxy for a broader capability set—market depth, purchasing power, administrative

capacity, and institutional maturity—that conditions whether new firms can enter formally and survive. Empirical evidence supports a generally positive association between development and entry, but emphasizes mediation through governance and regulatory configurations; where burdens, uncertainty, or corruption persist, development gains may not translate efficiently into higher formal entry rates (Ogbeide & Adeboje, 2020; Bilan & Apostoaie, 2025).

Third, spatial concentration and population density operate through a balance of agglomeration economies and congestion pressures. Density can foster entrepreneurship via market access and network spillovers, yet may discourage entry when costs, competition, and infrastructure strain dominate (Oladele et al., 2025; Li et al., 2023). Urban empirical contexts further suggest that density often coincides with service and environmental pressures that can increase transaction costs and operational risk, reinforcing the plausibility of congestion-cost mechanisms in dense settings (Temporada et al., 2025; Ylagan et al., 2025).

Fourth, human capital proxied by tertiary enrollment exhibits a less uniform relationship with formal entrepreneurship than finance, development, or density. While higher education and entrepreneurship education strengthen intention, self-efficacy, and capability formation, the evidence emphasizes an intention–action conversion problem: mindset gains do not automatically translate into higher formal entry without ecosystem supports and enabling institutions (Mei et al., 2020; Adu et al., 2020; Lee & Eesley, 2020). In addition, tertiary enrollment is a coarse indicator that obscures differences in education quality and governance, including technology-enabled pedagogy and equity conditions that shape whether enrollment yields competence outcomes relevant to economic participation (Atento, 2025; Rao et al., 2025).

Finally, short-run macroeconomic conditions (inflation, unemployment, and time trends) are frequently discussed, but are often empirically weaker once structural determinants are controlled. Macro indicators are best interpreted as contextual signals whose effects depend on deeper institutional structures and behavioral channels, rather than as primary drivers of cross-national differences in formal entry (Mai et al., 2025; Fahim & Naamane, 2021; Wang & Lu, 2020; Jurgelevičius & Kučaidze, 2020; Vyrostková & Kádárová, 2023).

2.7 Research gap

Despite converging evidence on finance, development, and spatial structure as key determinants of entrepreneurship, several gaps remain that motivate a focused ASEAN replication and extension using formal business entry indicators. First, the reviewed studies emphasize that relationships between macro-structural variables and entrepreneurship are context-dependent, particularly for density and education effects, yet region-specific evidence for Southeast Asia remains comparatively fragmented. Density effects can be positive in some contexts and muted or adverse in others depending on congestion, cost structures, and competitive intensity (Oladele et al., 2025; Li et al., 2023). Education effects are repeatedly framed as contingent on quality, curricular design, ecosystem linkages, and labor-market sorting, implying that tertiary enrollment may not operate as a stable cross-country predictor of formal entry (Bayar et al., 2022; Gonzalez-Perez et al., 2025; Mei et al., 2020; Adu et al., 2020). This heterogeneity creates a need for ASEAN-specific evidence that tests whether dominant structural channels identified elsewhere hold in a region characterized by sharp development gradients, diverse institutional arrangements, and varied urbanization dynamics.

Second, a measurement gap remains salient in cross-country entrepreneurship research: many studies conflate entrepreneurship with labor-market proxies (e.g., self-employment), while fewer directly examine formal entry using registration-based indicators. Where formal entry is examined, finance and development are highlighted as key drivers, but institutional mediation and credit-quality differences remain central qualifiers (Fernández et al., 2021; Haini & Slesman, 2024; Yaroshenko & Vovchak, 2024; Ogbeide & Adeboje, 2020). An ASEAN-focused study using formal new business density can therefore clarify whether finance and development retain explanatory power for legally registered firm creation in Southeast Asia, where informality, regulatory variation, and differing financial architectures may alter observed relationships.

Third, a methodological gap persists regarding the extent to which cross-country models adequately account for unobserved country heterogeneity. Several themes—especially institutional mediation, infrastructure constraints, and ecosystem readiness—imply persistent country-level characteristics that shape entrepreneurial outcomes but are not fully captured by observed covariates

(Bilan & Apostoaie, 2025; Wang & Lu, 2020; Jurgelevičius & Kučaidze, 2020). This motivates modeling strategies that explicitly incorporate country heterogeneity when estimating associations between structural predictors and formal business entry, rather than relying exclusively on pooled specifications that assume homogeneity in baseline entrepreneurial conditions.

Finally, the proposition that short-run macro indicators are weak once structural factors are controlled requires region-specific verification using a consistent formal-entry measure. Dynamic and comparative evidence implies that inflation and unemployment may have small or unstable associations relative to deeper structural drivers (Mai et al., 2025; Fahim & Naamane, 2021; Vyrostková & Kádárová, 2023). ASEAN-focused WDI-based macro-developmental research already demonstrates the feasibility of long-horizon, multi-indicator modeling in the region (Quinto & Atento, 2025); extending this orientation to formal new business density can strengthen empirical grounding for prioritizing structural policy levers—such as financial depth and development capacity—over short-run stabilization variables when the policy objective is to expand formal firm creation.

In response to these gaps, the present study positions itself as a region-specific replication and extension that evaluates whether financial depth, development level, spatial concentration, and human-capital proxies explain variation in formal new business density across ASEAN countries while accounting for persistent cross-country heterogeneity. The goal is to generate ASEAN-relevant evidence on the relative contribution of structural versus short-run macro conditions in shaping formal entrepreneurial entry and to provide a more context-sensitive basis for interpreting education and density effects that prior research shows to be heterogeneous across settings.

3. Methodology

3.1 Research design

The study employed a quantitative, explanatory design using an annual cross-country panel of ASEAN member states. The objective was to estimate the association between selected macro-structural conditions and formal entrepreneurial entry, operationalized through the World Bank's registration-based business density indicator. The empirical strategy treated country observations as repeated measures over time and explicitly

accounted for persistent cross-country differences through a mixed-effects framework.

3.2 Data source, extraction, and analytic sample

All variables were obtained from the World Bank's World Development Indicators (WDI) and organized into a country–year panel suitable for longitudinal cross-country analysis. The initial extract contained multiple countries and indicators in a wide (year-column) format; the data were reshaped into a long panel with one row per country–year and one column per indicator. Observations for Bangladesh were excluded during cleaning because the study's geographic scope is ASEAN.

The resulting analytic panel comprised annual observations for ASEAN countries with sufficient data availability for the dependent variable and required predictors within the final estimation window. In the mixed-model estimation implemented in Jamovi, the fitted model used 95 complete country–year observations across 9 country groups (Country Code), reflecting an unbalanced panel structure driven by indicator-level missingness in WDI series.

3.3 Variables and measurement

3.3.1 Dependent variable

New business density (IC.BUS.NDNS.ZS) measures the number of newly registered limited liability firms per 1,000 working-age people (ages 15–64) per calendar year. This indicator captures formal business entry recorded through registration systems and is reported annually in the World Bank Entrepreneurship Database and WDI.

3.3.2 Independent variables

Domestic credit to private sector by banks (% of GDP) (FD.AST.PRVT.GD.ZS) refers to financial resources provided to the private sector by other depository corporations (deposit-taking institutions except central banks). These resources include loans, purchases of nonequity securities, trade credits, and other accounts receivable that establish a claim for repayment; in some countries, the measure may include credit to public enterprises. The indicator is expressed as a percentage of GDP. In the model, it serves as the banking-sector credit measure linked to formal business entry.

GDP per capita (constant 2015 US$) (NY.GDP.PCAP.KD) is gross domestic product

divided by midyear population, where GDP is the sum of gross value added by all resident producers plus product taxes minus subsidies not included in the value of products, calculated without deductions for depreciation or natural resource depletion/degradation. The series is expressed in constant 2015 U.S. dollars. In the model, it represents cross-country differences in economic output per person under a constant-price basis.

Population density (people per sq. km of land area) (EN.POP.DNST) is computed as midyear population divided by land area in square kilometers. In the model, it represents variation in population concentration across countries and over time.

School enrollment, tertiary (% gross) (SE.TER.ENRR) is the gross enrollment ratio at the tertiary level, defined as total enrollment in tertiary education—regardless of age—divided by the population of the age group that officially corresponds to tertiary education. Tertiary education typically requires completion of secondary education as a minimum condition of admission. In the model, it functions as the tertiary enrollment measure used to characterize cross-country differences in tertiary participation.

Unemployment, total (% of total labor force) (modeled ILO estimate) (SL.UEM.TOTL.ZS) refers to the share of the labor force that is without work but available for and seeking employment. In the model, it represents the annual unemployment condition associated with each country-year observation.

Inflation, consumer prices (annual %) (FP.CPI.TOTL.ZG) reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services (as measured by the consumer price index). In the model, it represents annual consumer-price inflation for each country-year observation.

Individuals using the Internet (% of population) (IT.NET.USER.ZS) refers to individuals who used the Internet (from any location) within the last three months, expressed as a percentage of the population. In the model, it represents the extent of internet usage in each country-year observation.

Year was included as a time variable to account for common temporal movement across the observation window captured in the panel.

3.3.3 Handling of missing data

The study did not interpolate or extrapolate values, including for years beyond the observed availability of the dependent variable. Instead, the analysis proceeded as an unbalanced panel, with estimation based on country–year observations that had available data for the dependent variable and the set of included predictors. The final fitted model therefore reflects complete-case estimation under the mixed-model framework as implemented in Jamovi.

3.4 Statistical model and estimation procedure

To account for repeated observations within countries and persistent cross-country differences in baseline entrepreneurship levels, the study estimated a linear mixed-effects model with a random intercept by country. The model can be written as:

$$
\begin{aligned}
\text{NBD}_{it} = {} & \beta_0 + \beta_1 \text{Year}_t + \beta_2 \text{Density}_{it} + \beta_3 \text{Credit}_{it} \\
& + \beta_4 \text{Inflation}_{it} + \beta_5 \text{Internet}_{it} \\
& + \beta_6 \text{GDPpc}_{it} + \beta_7 \text{Tertiary}_{it} \\
& + \beta_8 \text{Unemployment}_{it} + u_i + \varepsilon_{it}
\end{aligned}
$$

where NBD_{it} is new business density for country i in year t, u_i is a country-specific random intercept capturing time-invariant heterogeneity, and ε_{it} is the idiosyncratic error term.

Estimation was conducted in Jamovi using the linear mixed model implementation based on the lme4/lmer engine with a Gaussian specification. The model was estimated using restricted maximum likelihood (REML), and fixed-effect significance testing used Satterthwaite degrees of freedom as provided by the software output.

3.5 Model diagnostics and reporting conventions

Because predictors are expressed in different natural units (e.g., GDP per capita in constant dollars versus percentage indicators), coefficient magnitudes were interpreted with explicit reference to measurement units. Statistical significance was assessed using conventional thresholds (e.g., $p < .05$), and variance decomposition was reported through the random-effects output, including the intraclass correlation coefficient (ICC) where available, to quantify the share of variance attributable to between-country differences.

Table 4.1. Random-Effects Variance Components and Intraclass Correlation (ICC) for New Business Density

Random component	Variance	SD
Country-level random intercept (Country Code)	0.0578	0.2404
Residual (within-country)	0.1095	0.3309

Note. ICC = 0.346, computed as $\sigma_{country}^2/(\sigma_{country}^2 + \sigma_{residual}^2)$. Model estimated using a linear mixed-effects model with a random intercept for Country Code (REML). Analytic sample: 95 country–year observations across 9 country groups.

4. Results and Discussion

4.1 Mixed-model results overview and between-country heterogeneity in new business density

A linear mixed-effects model (see Tables 4.1, 4.2a, and 4.2b) was estimated to examine the macro-structural correlates of new business density in selected ASEAN countries using an unbalanced country–year panel. The model specified country code as a random intercept, allowing baseline levels of formal business entry to vary across countries while estimating common fixed effects for year and the selected macroeconomic and structural predictors. The fitted model was based on 95 country–year observations nested within 9 country groups, reflecting the usable observations remaining after WDI-series availability and complete-case estimation in the specified model.

Random-effects results indicate substantively meaningful between-country heterogeneity in new business density. The estimated variance of the country-level random intercept was 0.0578, while the residual (within-country) variance was 0.1095, yielding an intraclass correlation coefficient (ICC) of 0.346. This ICC implies that approximately 34.6% of the total variance in new business density is attributable to differences between countries, while the remaining variance reflects within-country change over time and unexplained country–year variation. The magnitude of the ICC supports the analytic decision to use a mixed-effects specification rather than a pooled regression model that assumes a common baseline across countries, because a substantial portion of entrepreneurial entry variation is associated with persistent country-level characteristics not directly captured by the observed covariates.

Table 4.2. Fixed Effects Results of the Linear Mixed Model Predicting New Business Density

Table 4.2a. Fixed effects omnibus tests

Predictor	F	df	df (res)	p
Year	0.4363	1	44.4	0.512
Population density	33.8605	1	10.5	< .001
Domestic credit to private sector by banks (% of GDP)	26.5731	1	23.5	< .001
Inflation (annual %)	0.2529	1	86.0	0.616
Internet users (% of population)	0.0313	1	66.0	0.860
GDP per capita (constant 2015 US$)	30.3199	1	16.0	< .001
Tertiary enrollment (% gross)	4.5986	1	70.5	0.035
Unemployment (% of labor force)	0.1510	1	23.4	0.701

Table 4.2b. Fixed-effects parameter estimates

Predictor	B (Estimate)	SE	95% CI (Lower, Upper)	df	t	p
(Intercept)	1.82709	0.09023	[1.64766, 2.00652]	4.45	20.249	< .001
Year	-0.01279	0.01937	[-0.05130, 0.02572]	44.37	-0.661	0.512
Population density	5.69e-4	9.78e-5	[3.74e-4, 7.63e-4]	10.48	5.819	< .001
Domestic credit to private sector by banks (% of GDP)	0.01673	0.00324	[0.01027, 0.02318]	23.52	5.155	< .001
Inflation (annual %)	-0.00507	0.01007	[-0.02510, 0.01497]	85.97	-0.503	0.616
Internet users (% of population)	9.36e-4	0.00528	[-0.00957, 0.01144]	65.96	0.177	0.860
GDP per capita (constant 2015 US$)	6.93e-5	1.26e-5	[4.43e-5, 9.43e-5]	16.02	5.506	< .001
Tertiary enrollment (% gross)	-0.01598	0.00745	[-0.03080, -0.00116]	70.50	-2.144	0.035
Unemployment (% of labor force)	-0.01632	0.04198	[-0.09980, 0.06717]	23.37	-0.389	0.701

Within this modeling framework, the fixed-effects results identify a small subset of structural predictors that are statistically associated with new business density after accounting for country-level heterogeneity. Population density, domestic credit to the private sector by banks (as a share of GDP), and GDP per capita exhibit positive and statistically significant associations with formal business entry, while tertiary enrollment exhibits a negative association in the estimated baseline specification. In contrast, year, inflation, internet usage, and unemployment do not reach statistical significance in the model, indicating that these variables do not add explanatory power for new business density once cross-country baseline differences and the core structural predictors are simultaneously considered.

4.2 Fixed effects estimates: macro-structural determinants of new business density

Fixed-effects parameter estimates and associated inferential statistics are summarized in Table 4.2bFixed effects results indicate that four predictors are statistically associated with new business density in the estimated mixed-effects model: population density, domestic credit to the private sector by banks, GDP per capita (constant 2015 US$), and tertiary enrollment (gross). Population density shows a positive and statistically significant association with new business density (B = 5.69e-4, p < .001; 95% CI [3.74e-4, 7.63e-4]), indicating that higher population concentration is associated with higher formal firm entry rates, conditional on the other covariates and on country-level baseline differences captured by the random intercept. Domestic credit to the private sector by banks (% of GDP) is likewise positive and statistically significant (B = 0.01673, p < .001; 95%

CI [0.01027, 0.02318]), indicating that greater bank-provided credit relative to GDP is associated with higher new business density within the modeled ASEAN panel. GDP per capita (constant 2015 US$) is also positive and statistically significant (B = 6.93e-5, p < .001; 95% CI [4.43e-5, 9.43e-5]), implying that higher levels of output per person are associated with higher levels of formal business entry, controlling for finance, density, and the remaining predictors.

In contrast to these positive structural correlates, tertiary enrollment (% gross) exhibits a statistically significant negative association with new business density (B = −0.01598, p = .035; 95% CI [−0.03080, −0.00116]). This result indicates that, within the fitted specification, higher tertiary enrollment is associated with lower new business density after accounting for other structural covariates and for cross-country baseline heterogeneity. This coefficient should be interpreted as a modeled association rather than a causal effect; however, the sign and significance suggest that tertiary participation, as measured here, does not correspond to higher formal firm entry in the observed panel.

Four predictors do not reach statistical significance: year (p = .512), inflation (p = .616), internet usage (p = .860), and unemployment (p = .701). The non-significant year effect suggests that, after controlling for the included structural indicators and country heterogeneity, there is no detectable linear time trend in new business density across the pooled panel. Similarly, the lack of statistically significant coefficients for inflation, internet usage, and unemployment indicates that these variables do not provide additional

explanatory value for formal entry in the presence of population density, bank credit depth, GDP per capita, and tertiary enrollment within this model.

4.3 Discussion of findings

The mixed-model results indicate that formal business entry, as measured by new business density, is structured primarily by a set of macro-structural conditions rather than by short-run macroeconomic indicators in the estimated ASEAN panel. This pattern is consistent with the synthesis developed in the preceding sections: the strongest and most stable correlates of formal firm creation are those that reflect enduring differences in a country's development capacity, financial system depth, and spatial-economic structure, while cyclical indicators contribute limited incremental explanatory power once these structural drivers and country-level heterogeneity are incorporated.

A first and central finding is the positive association between domestic credit to the private sector by banks (% of GDP) and new business density. In substantive terms, this result aligns with the broad proposition that the availability of bank-provided credit is associated with an environment where formal entry is more feasible. Higher levels of bank credit relative to GDP may signal wider access to financial resources for private-sector activity, which can reduce liquidity constraints and improve the capacity of prospective entrepreneurs to cover start-up and early operating costs. This association is particularly relevant for formal registration-based entrepreneurship indicators, because business registration and early compliance requirements often entail fixed costs that are more manageable when financing depth is greater. Importantly, the model estimates this relationship while controlling for GDP per capita, population density, and other macro covariates, and while accounting for persistent country-level differences through the random intercept, suggesting that the observed association is not merely an artifact of baseline country differences.

A second major finding is the positive association between GDP per capita (constant 2015 US$) and new business density. This supports the interpretation that higher development levels are linked with higher rates of formal firm entry. Under a constant-price measure, higher GDP per capita reflects stronger average output and resource availability within the economy, which may translate into broader market demand, more robust support services, and institutional capacity that can facilitate business registration and formal operation. In the context of ASEAN, where countries exhibit substantial development gradients, this finding suggests that differences in development level remain an important structural correlate of formal entrepreneurship even when financial depth and other macro conditions are accounted for. The result is also compatible with the view that formal entry is not merely an individual decision but is embedded in market viability and in the functioning of institutional and administrative systems that develop alongside economic growth.

The positive association between population density and new business density indicates that more densely populated country–year contexts are associated with higher formal firm entry. This relationship is consistent with the general expectation that denser environments can support entrepreneurship through market proximity, thicker buyer–seller networks, reduced search costs, and stronger opportunities for exchange and service provision. In a macro panel setting, density may also capture the scale and intensity of urbanization and the concentration of economic activity, conditions that can raise the expected returns to entry and increase the viability of formal firms. Although density can theoretically operate in both directions—enabling through agglomeration and constraining through congestion and cost pressures—the present model indicates that within the observed ASEAN panel, the net association is positive after controlling for development and banking credit depth.

In contrast to these structural predictors, the model yields a statistically significant negative association between tertiary enrollment (% gross) and new business density. This result indicates that higher tertiary enrollment is associated with lower formal business density in the fitted specification, conditional on other predictors and on country-level baseline differences. This finding does not imply that education reduces entrepreneurship in a causal sense; rather, it suggests that tertiary participation, as measured by gross enrollment, does not correspond to higher formal business entry within the observed panel and estimation window. One plausible interpretation is that higher tertiary participation may be associated with labor-market sorting toward salaried professional work, thereby reducing the propensity to enter formal entrepreneurship as captured through new firm registrations. In addition, the tertiary enrollment indicator is a participation measure rather than a

measure of entrepreneurship-specific training or curriculum content; therefore, it may not track the dimensions of education most directly linked to formal venture creation. The negative sign thus reinforces the broader literature-based caution that education indicators can be context-sensitive and that the relationship between higher education participation and formal business entry may differ across regions and institutional settings.

Finally, the non-significance of year, inflation, internet usage, and unemployment suggests that, within this model, these variables do not provide systematic explanatory power once structural factors and country-level heterogeneity are considered. The absence of a significant year effect implies that there is no detectable linear time trend common across the panel after accounting for the included covariates. Similarly, inflation and unemployment—often considered short-run macro conditions that could influence entry incentives—do not emerge as statistically relevant predictors of formal new business density in this specification. Internet usage also does not reach significance, implying that variation in population internet use is not associated with variation in formal firm registration rates once development level, financial depth, and density are accounted for. Taken together, this pattern supports a structural interpretation of formal entrepreneurship in the ASEAN panel: formal firm entry is more closely aligned with enduring economic capacity, financial system depth, and population concentration than with short-run macroeconomic fluctuations.

In conjunction with the random-effects results reported earlier, the fixed-effects pattern also underscores that a substantial portion of entrepreneurship variation remains attributable to persistent country-level differences. With an ICC indicating that a meaningful share of variance lies between countries, the results suggest that unobserved or slowly changing characteristics— such as administrative efficiency, regulatory quality, informality structures, and institutional effectiveness—may continue to shape formal business entry beyond what is captured by the included macro indicators. This provides a basis for interpreting the present findings as identifying key structural correlates within an ASEAN panel while acknowledging that country-specific contexts remain highly consequential for formal entrepreneurship outcomes.

4.4 Model notes, scale considerations, and reporting limitations

The fitted linear mixed-effects model produced a software warning indicating that several predictors are expressed on markedly different numerical scales. This is expected in cross-country macro panels where variables are naturally measured in distinct units—for example, GDP per capita is expressed in constant U.S. dollars, while other predictors are expressed as percentages (e.g., inflation, unemployment, domestic credit to the private sector by banks) or as counts per land area (population density). In the present analysis, estimates were retained in their original WDI units to preserve interpretability in real-world terms; consequently, coefficient magnitudes should be interpreted with explicit reference to each variable's measurement unit rather than by comparing raw coefficient sizes across predictors. Where more intuitive interpretation is desired, rescaling strategies (e.g., expressing GDP per capita in thousands of dollars, or population density per 100 persons per sq. km) may be used to present effects in policy-relevant increments. Such rescaling would change only the numerical representation of the coefficient and not the underlying fitted relationship, sign, or statistical significance pattern.

A further reporting point concerns model fit indices. In the current Jamovi output, the software indicates that model R^2 "cannot be computed." This reflects a reporting limitation of the interface and/or the selected output settings rather than a failure of estimation, as convergence was achieved and fixed and random effects were produced. Accordingly, results are reported primarily through fixed-effects tests and coefficient estimates (with confidence intervals), and through variance components and the ICC for the random intercept. The ICC remains particularly informative in this setting because it quantifies the extent to which variation in new business density is attributable to between-country differences rather than within-country fluctuation over time.

Finally, the panel used in estimation is unbalanced due to indicator availability across countries and years in WDI series. The model therefore reflects the set of country–year observations retained under complete-case estimation for the specified variables, rather than a fully balanced ASEAN panel. As such, the estimated associations should be interpreted as conditional relationships within the usable observation set, with the understanding that missingness patterns— especially in education and labor-market series— can affect the composition of the analytic sample. No interpolation or forward extrapolation was

applied; therefore, the results correspond to observed values within the period covered by the extracted WDI indicators and the dependent variable series.

4.5 Summary of key empirical findings

The mixed-effects results indicate that formal business entry, measured through new business density, varies substantially across countries in the ASEAN panel and that a meaningful share of this variation is attributable to persistent cross-country differences. The random-intercept specification captures this heterogeneity, with the estimated intraclass correlation indicating that baseline country conditions account for a sizable portion of total variance in new business density.

Controlling for this country-level heterogeneity and the included covariates, four fixed effects emerge as statistically relevant in the baseline model. Population density, domestic credit to the private sector by banks (% of GDP), and GDP per capita (constant 2015 US$) are positively associated with new business density, indicating that higher population concentration, greater banking-sector credit provision to the private sector, and higher development level correspond to higher rates of formal firm registration. Tertiary enrollment (% gross) shows a statistically significant negative association with new business density, indicating that higher tertiary participation is associated with lower formal business entry within the fitted specification, conditional on other predictors and country effects.

By contrast, year, inflation, internet usage, and unemployment do not reach statistical significance in the model, implying that these variables do not provide additional explanatory power for new business density once structural predictors and country-level heterogeneity are incorporated. Overall, the empirical pattern supports an interpretation in which formal business entry in the observed panel is more closely associated with structural factors—development level, banking credit depth, and population concentration—than with short-run macroeconomic conditions.

5. Conclusions and Recommendations

5.1 Conclusions

Based on the mixed-effects panel analysis of selected ASEAN countries, formal business entry—as measured by new business density—shows

substantial variation across countries and across time. A material proportion of this variation is attributable to persistent between-country differences, indicating that baseline national conditions continue to shape entrepreneurial entry outcomes even after accounting for observable macroeconomic and structural predictors. This supports the methodological decision to use a random-intercept mixed model rather than relying on pooled estimates that assume uniform baseline entrepreneurship levels across countries.

Within the fitted specification, three structural predictors demonstrate consistent positive associations with new business density: population density, domestic credit to the private sector by banks (as a percentage of GDP), and GDP per capita (constant 2015 US$). These findings indicate that countries and years characterized by greater population concentration, deeper banking-sector credit provision to the private sector, and higher development level tend to exhibit higher levels of formal business entry. Taken together, the results support a structural interpretation of formal entrepreneurship in the ASEAN panel: formal firm registration is more strongly associated with development capacity and financial system depth than with short-run macroeconomic fluctuations.

Tertiary enrollment (gross) exhibits a statistically significant negative association with new business density in the baseline model. This suggests that higher tertiary participation does not necessarily correspond to higher formal business entry within the observation set and period covered by the dataset, after controlling for development level, financial depth, and other covariates. This relationship should be interpreted as an association rather than a causal effect and may reflect context-specific linkages between higher education participation and labor-market sorting or opportunity-cost dynamics. Nonetheless, the direction and significance of the estimate indicate that education participation, as captured by gross tertiary enrollment, is not a direct proxy for higher formal entry in the modeled ASEAN panel.

Finally, year, inflation, internet usage, and unemployment do not reach statistical significance in the baseline model. This suggests that these variables do not provide systematic explanatory power for differences in new business density once structural predictors and country-level heterogeneity are considered. The results therefore imply that, within this model, formal business entry is more closely aligned with structural and developmental

conditions than with short-run macroeconomic indicators or linear time trends.

5.2 Recommendations

In light of the findings, the study offers recommendations oriented toward strengthening structural conditions associated with formal business entry, while recognizing that country-level institutional differences remain influential and that the present analysis is associative rather than causal.

First, policymakers and economic development agencies in ASEAN should prioritize financial intermediation policies that expand productive private-sector credit. Given the positive association between domestic credit to the private sector by banks and new business density, initiatives that improve credit access for emerging and early-stage firms—particularly those targeting viable micro, small, and medium enterprises (MSMEs)—may support higher rates of formal business registration. Such initiatives may include improving credit information systems, strengthening credit risk assessment for small enterprises, reducing administrative barriers in SME lending, and promoting structured financing pathways for newly registered firms.

Second, entrepreneurship development efforts should be integrated with broader development and productivity strategies rather than treated as standalone programs. The positive association between GDP per capita and new business density suggests that formal entry is closely tied to overall development capacity and market viability. Thus, entrepreneurship policy may be more effective when embedded within programs that strengthen market demand, improve infrastructure reliability, and enhance institutional capacity for business registration and compliance. This also implies that entrepreneurship performance targets should be interpreted in relation to development stage and not solely as independent policy outcomes.

Third, urban and spatial planning bodies should consider the role of population concentration in shaping entrepreneurial opportunity structures. Since population density is positively associated with new business density in the model, economic zone development, urban connectivity improvements, and support for commercial clustering may facilitate entrepreneurial entry by improving market proximity and enabling basic ecosystem conditions. At the same time, such efforts should include safeguards against congestion costs and infrastructure strain, which can undermine

entrepreneurial viability even in dense settings. Policies that improve transport efficiency, reduce administrative bottlenecks, and ensure basic service reliability in dense corridors may help sustain the entrepreneurial advantages associated with population concentration.

Fourth, higher education systems should strengthen the entrepreneurship-to-entry conversion pathway. The negative association between tertiary enrollment and new business density suggests that tertiary participation alone does not correspond to greater formal business creation in the modeled panel. Higher education institutions may therefore consider expanding practice-oriented entrepreneurship education, incubation support, mentorship arrangements, and structured linkages between graduating cohorts and financing/registration support mechanisms. The goal is to increase the likelihood that entrepreneurial capability formation translates into actual firm registration and early-stage sustainability, particularly in economies where professional wage employment dominates graduate expectations.

Fifth, future research should extend the present analysis by examining additional ASEAN-relevant institutional variables and by testing alternative entrepreneurship outcomes. Given the substantial country-level variance captured by the random intercept, further studies should incorporate institutional indicators that may explain persistent cross-country differences, such as regulatory quality, ease of doing business proxies (where available), governance indicators, or measures of informality and administrative efficiency. Researchers may also compare results using alternative dependent variables (e.g., self-employment rates) to determine whether structural predictors operate differently for formal versus informal entrepreneurial activity.

Finally, future work may evaluate robustness through alternative specifications, including rescaled predictors for interpretability, lag structures to address temporal sequencing, or comparative approaches that test whether the identified structural correlates differ across subgroups of ASEAN economies. Such extensions would strengthen the policy relevance of the findings and clarify whether the observed relationships hold consistently across differing institutional and development contexts within the region.

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