Interlinking Essays on Trade and Industrial Policy

By

Moe Nwet Nwet Aung

Dissertation

Submitted to

KDI School of Public Policy and Management

In Partial Fulfillment of the Requirements

For the Degree of

DOCTOR OF PHILOSOPHY

IN PUBLIC POLICY

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Abstracts

Chapter 1

Agglomeration, Competition and Productivity: Evidence from Myanmar

This study discusses to the understanding of agglomeration and competition impact on productivity within the context of Myanmar, an economy primarily focused on agriculture but which is striving to transition from least developed country (LDC) status via industrialization. Utilizing firm-level data from the first nationally representative manufacturing survey in 2017 and 2019, the analysis reveals limited evidence of the effects of agglomeration on productivity while controlling for firm-specific characteristics using fixed effect empirical specifications. In contrast to earlier research emphasizing spillover productivity gains from agglomeration, the empirical findings indicate that a high concentration of exporters within agglomerations is associated with increased productivity. This finding is attributed to firms' characteristics, particularly their exporting status. Exporting firms expands their portion of industry revenue, whereas a firm that remains non-exporting experiences a decline in market share (Melitz, 2003). This discrepancy in market performance results in a productivity gap, with exporting firms that are clustered together exhibiting elevated productivity levels. However, the estimated results also provide substantial evidence of competition within agglomerations, implying that both exporting and non-exporting firms experience additional higher productivity levels due to the degree of competition.

Key Words: Agglomeration, Competition, Productivity, Exporting Firms

Chapter 2

Firm formalization and the improved potentials for employment opportunities in micro and small enterprises: Evidence from Myanmar

Examining data from the Myanmar Micro, Small, and Medium Enterprises Survey over two- year period, this study delves into the impact of firm formalization on potential employment opportunities. It highlights the vital role of registered MSMEs in fostering inclusive economic growth and employment opportunities, particularly in developing nations. However, the process of firm formalization often encounters endogeneity issues, which may result in biased estimations. To address this concern, the study adopts an instrumental variable approach, utilizing the frequency of tax inspector visits as an instrumental variable for firm formalization. The empirical results indicate that increased tax inspector visits significantly influence firms to formalize, consequently leading to enhanced employment opportunities. Thus, addressing the formalization of the informal sector is imperative for fostering employment and driving sustainable economic development within the country.

Key Words: Employment opportunities, Formal and Informal firm, Instrumental variable

Chapter 3

Are exchange rate uncertainties adding additional barriers to intra - ASEAN trade and investment performance: Do free trade agreements matter?

Extensive empirical research has yet to reach a consensus on the nexus between exchange rate uncertainties and balance of trade. Most of the associated research and discord has been applied to trade amongst advanced countries or trade between advanced countries and developing countries. This paper differentiates from most other studies, as it analyzes the intra-regional trade, investment flows and the impact of exchange rate uncertainty within a single economic bloc. It adds to the current discussions by confining the research to ASEAN, a homogenous socio-economic community comprising 10-member states that use individual currencies, deploy different monetary, trade and investment policies and have implemented a regional trade agreement, designed to boost internal trade. The empirical findings utilizing the Error Correction model for panel data show that exchange rate uncertainty negatively influences intra-export and effects positively on FDI in the long term. However, upon countering for the implementation of the ASEAN Free Trade Agreement (AFTA), the results indicate that currency volatility exerts a favorable influence on both intra-ASEAN trade (exports) and Foreign Direct Investment (FDI). Moreover, it is suggested that within ASEAN, exchange rate uncertainty serves to mitigate the distortion of trade flows, thereby bolstering the region as a more robust trading hub under the free trade agreement.

Key Words: Exchange rate uncertainty, FDI, Intra exports, Free trade bloc

Dedication

To my family.
In loving memory of Professor Tin Win.

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Chapter 1

Agglomeration, Competition, and Productivity:

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1.1 Introduction

Micro, small, and medium enterprises (MSMEs) serve as a primary driver of economic growth across various sectors. Sustaining this sector is critical for achieving the economic goals of least developed countries in the short to medium term. Productivity of firms is essential for the sector's sustainability and growth, requiring effective policies and investments to enhance productivity through technological and production advancements. Agglomerations, or clusters of enterprises in a single location, enhance competition and foster connectivity, boosting productivity and enabling knowledge sharing among firms as noted by Marshall (1890). Agglomeration economies significantly affect firm productivity and longevity by enhancing competitiveness and fostering knowledge spillovers. Studies show that these economies facilitate labor, capital, and investment spillovers, including technology adoption, within clustered areas. This results in both internal and external economies of scale, enhancing efficiency and productivity. Such economic activity concentrations provide vital insights for industrial policy and contribute to economic growth discussions (Rand et al., 2019). Additionally, there is a close link between competition and innovation in productivity gains (Ahn, 2002).

Academic research primarily aims to understand agglomeration economies and their effects from national to local and firm-level productivity. Distinctions exist between urbanization economies, which benefit from diverse economic activities in a specific area, and localization economies, where firms within a single economic sector cluster together. Such localized clusters specialize in areas like motor vehicle production or electronics.

This study examines agglomeration economies in Myanmar, where productivity gains within clusters are not evident. The country's historical reliance on colonial and post-colonial central planning and recent shifts towards modernized practices due to rapid technological and logistical advancements informs this investigation. Research shows that foreign market enterprises and high-tech sectors significantly influence productivity compared to state-owned and low-tech firms (Sun et al., 2018; Cieślik et al., 2018; Gokan et al., 2019; Beaudry and Schiffauerova, 2009).

This study explores how agglomeration impacts productivity based on firms' export status in Myanmar, integrating agglomeration and exporting theories using micro-level data from 2017 and 2019 Myanmar MSME Survey.

The EG index by Ellison and Glaeser, 1997 measures industry geographic concentration and how natural advantages affect manufacturing shares within specific areas. Their findings indicate significant diversity across industries, with certain sectors showing high concentration due to local knowledge transmission or natural advantages.

In Myanmar, centralized planning organized industrial agglomerations, a strategy used also in neighboring countries. This involves establishing industrial zones and relocating firms, primarily in urban centers like Yangon and Mandalay. The study assesses the effectiveness of agglomeration and export-led trade policies in achieving transformative growth, exploring whether traditional models and competition levels apply in environments where capital, innovation, and creativity have historically lagged.

The research uses Myanmar firm-level data to examine productivity, agglomeration, and competition, focusing on exporting and non-exporting firms. Unlike previous studies based in developed countries, this analysis applies methodologies used by Ramachandran et al., 2020, Andersson and Lööf, 2011, and Nakamura, 2012. The results suggest limited productivity gains from agglomeration for non-exporting firms, contrasting with prior studies. However, exporting firms clustered together show higher productivity, benefiting from knowledge spillovers and stronger international market ties.

This paper contributes to understanding the productivity effects of agglomeration in developing countries and suggests further micro-level analysis to enhance policy strategies for enhancing productivity through agglomeration, particularly for domestic exporting and non-exporting firms. Rapid advancements in technology, production methods, and communications also expand traditional spillover effects, particularly benefiting larger export-oriented and service-providing domestic firms. However, limitations in data prevent precise estimations of benefits for smaller firms. The sections that follow will review literature, outline the study's methodology, present empirical results, and discuss implications for policymakers in optimizing new forms of agglomerations.

1.2 literature

1.2.1 The Agglomeration and Productivity Debate

Marshall, 1890 first identified localized agglomerations by studying English cities specializing in certain industrial products. He attributed their formation to two primary factors: geographic attributes, including natural resources, features, and climate; and patronage to royal courts, which generated markets for high-quality products due to high demands and purchasing power. Marshall also discussed technology spillover through knowledge exchange, citing examples like railways, trade, and educational instruments that facilitate learning and replication. Jacobs, 1969 introduces the concept of urbanized agglomerations, viewing them through the lens of urban diversity. She argued that economic diversity within a territory fosters innovation as ideas from different sectors merge and incubate.

Building on the foundational theories of Marshall and Jacobs, later studies have proposed new types of agglomerations. Ellison and Glaeser, 1999 expand on their previous work on US manufacturing industries, highlighting the role of natural cost advantages as drivers for agglomeration. They, along with other researchers like Carlton, 1983, Bartik, 1985, and V. Henderson, 1997, note that location decisions are often influenced by cost differences, positioning natural advantages as key factors in geographic concentrations. Porter, 2003 introduces the concept of clusters, organizational phenomena that replicate innovations in technology and competition, emphasizing the relative benefits and spillovers generated by different agglomeration categories. These developments highlight the evolving understanding of agglomeration effects and their implications for economic growth and innovation.

Various studies examine the channels how urbanization economies scale with the number and size of firms within a region. For example, an early study by Krugman, 1991 notes that having a concentration of diverse firms in one area fosters a robust market for specialized labor, reducing unemployment risks and mitigating labor shortages. The

literature, including Hoover, 1948 consistently shows that a city or firm's economic performance is closely linked to knowledge and information spillovers, although debates persist about the extent of these spillovers on firm profitability, market structure, and output.

Duranton and Puga, 2004 delve into the mechanisms of learning, matching, and sharing within agglomerations, which are pivotal for understanding productivity impacts. Foreign firms may relocate or fragment their production to capitalize on lower costs in developing countries, while domestic firms benefit from enhanced learning opportunities and technology transfers from these foreign entities, leading to improved product quality and competitive positioning in the market.

Azari et al., 2016 find that larger urban areas, due to their size, support a wider range of activities. Conversely, smaller peri-urban satellite cities specializing in specific economic activities form what is now known as "cluster agglomerations". Firms in these clusters benefit from positive external scale economies and improved opportunities for sharing, matching, and learning, which in turn increase productivity and reduce average costs. Nakamura, 2012 questions the ongoing effectiveness of localization economies in Japan for enhancing productivity. Current research notes a decline in the number of firms and local agglomerations as fragmented production systems and the attractiveness of lower offshore costs drive production shifts. Kim et al., 2021 utilizes under-exploited UK microeconomic panel data to explore how agglomeration economies affect productivity, identifying strong spatial spillover effects and significant productivity impacts within specific areas, which may lead to long-term productivity convergence.

The existing literature provides a rationale for the spatial clustering of economic activities (Kim et al., 2021, Andersson and Lööf, 2011, Azari et al., 2016, Badr et al., 2019). These clusters tend to endure due to the causal relationship between agglomeration and productivity and the role of knowledge spillovers and external economies in boosting production in nearby areas. Agglomeration is complex, involving diverse equilibrium outcomes. Duranton and Kerr, 2015 suggest that empirical progress in this field relies on precisely defining causal relationships.

This study differs from prior research by examining how agglomeration impacts productivity based on firms' export activities, comparing non-exporting firms with exporting firms of similar characteristics.

1.2.2 Quantifying spillovers and benefits

Much literature has been developed to quantify the spillovers and benefits associated with agglomeration, i.e., to qualify the positive and negative aspects. Rosenthal and Strange, 2003 provide a comprehensive and concise review of the chronological development of such research, analyzing the relationship between localized agglomeration and productivity. They suggest that it is commonly found that increasing the size of the agglomeration increases firm productivity in a range of between 3 and 8 percent. However, they note that a significant challenge is the availability of data related to these production inputs. Azari et al., 2016 find that externalities from localized and urbanized economies are potentially offered together with enhancing productivity for firms and employees through spillover effects.

Using Japanese firm-level data, Nakamura, 2012 studies to estimate several effects of localized and urbanized agglomeration on productivity and including those associated with city wide (urban) that include connectivity features. The author suggested that localized agglomeration still retains the potential to enhance productivity in traditional domestic industries, which requires firm-level collaboration and government policy and interference to ensure the promotion of multilateral external effects (sharing of inputs).

Using city-by-industry panel data from 2003 to 2013, 207 Chinese county-level cities and 28 two-digit manufacturing industries, Wei et al., 2020 find that agglomeration negatively impacts productivity. They also observed that total factor productivity (TFP) growth is not typically associated with high levels of agglomeration. While proximity plays a role, spatial concentration facilitates diverse and less costly consumption, thereby enhancing productivity (Rosenthal and Strange, 2020). Additionally, firms located near concentrated production areas can benefit from shared inputs, including access to quality services such as general infrastructure (Marshall, 1920).

1.2.3 Competition Effects and Clustering

Porter, 2003 examines the interrelationships between industries to refine discussions about spillover effects and the degree of competition. He suggests that competition motivates domestic entrepreneurs within the same industry to innovate, which is crucial for a firm's survival (maturity) and higher productivity. Porter introduces the concept of "clusters," which are geographic concentrations of interlinked industries, often seen in fragmented production systems that require well-organized global or regional production strategies. However, in developing countries like Myanmar, a lack of innovation, perception of competition, and weak inter-industry connectivity mean that domestic firms are at risk of being replaced by foreign firms as markets integrate globally. Thus, the strategic structure of agglomerations should focus on strengthening the interconnections among local enterprises, thereby integrating domestic firms into global value chains through exporting, which promotes sustainability and growth for domestic firms.

Additionally, the innovation, knowledge, and technical spillovers associated with clusters are partially dependent on a firm's externalities. Clusters, while linked to localized agglomeration and competition, also function as innovation hubs within urban economies. For instance, clusters can center around "technology and services" rather than products, accommodating a variety of firms operating in these sectors. Beaudry and Schiffauerova, 2009 argue that intense competition in the same market provides strong incentives for innovation, which in turn accelerates technological advancement and increases productivity.

Glaeser et al., 1992, using data from 1956 to 1987 covering large industries in 170 U.S. cities, conclude that industry employment growth is more encouraged by localized competition and urban variety than by specialization, and that spillovers occur between different industry types. This finding aligns with those suggested by Jacobs (1969), indicating that higher local competition among firms in the same industry could strengthen the flow of ideas between economic agents.

1.2.4 Agglomeration and Exporting

This study combines theories of agglomeration and exporting to examine their impact on productivity, engaging with the research themes identified by (Andersson and Lööf, 2011, Azari et al., 2016, Ramachandran et al., 2020, and Nakamura, 2012). These themes include the dynamics of agglomeration, competition, and productivity. By considering firm size and industry affiliations, their studies find that firms in larger agglomerations often achieve higher productivity levels. Building on Porter's concept, this premise suggests that innovation driven by clustered firms significantly boosts productivity and competitive advantage. In developing economies, exporting firms typically exhibit higher productivity than their domestic, non-exporting counterparts. Furthermore, analyzing ownership structures—whether foreign or domestic—is crucial for evaluating the productivity gains from spillover effects, highlighting how foreign firms can introduce innovative practices and knowledge to domestic industries.

The empirical patterns are supported by Melitz's theory of learning by exporting that firms engaging in international markets often see productivity boosts from new insights, best practices, and technology transfers. This exposure enhances their operational efficiency and market competitiveness. Conversely, firms that do not engage in exporting miss out on these benefits, typically showing lower productivity. Initially, firms face uncertainties about their capabilities and future prospects (Hopenhayn, 1992). Some choose to invest in entering export markets to expand their market presence, leading to increased revenue. Others, staying out of export markets, often see their domestic market shares and revenues shrink. The productivity gains and market share increase of exporting firms contribute to higher aggregate productivity, as described by (Melitz, 2003).

1.3 Data and Measurement

1.3.1 Data

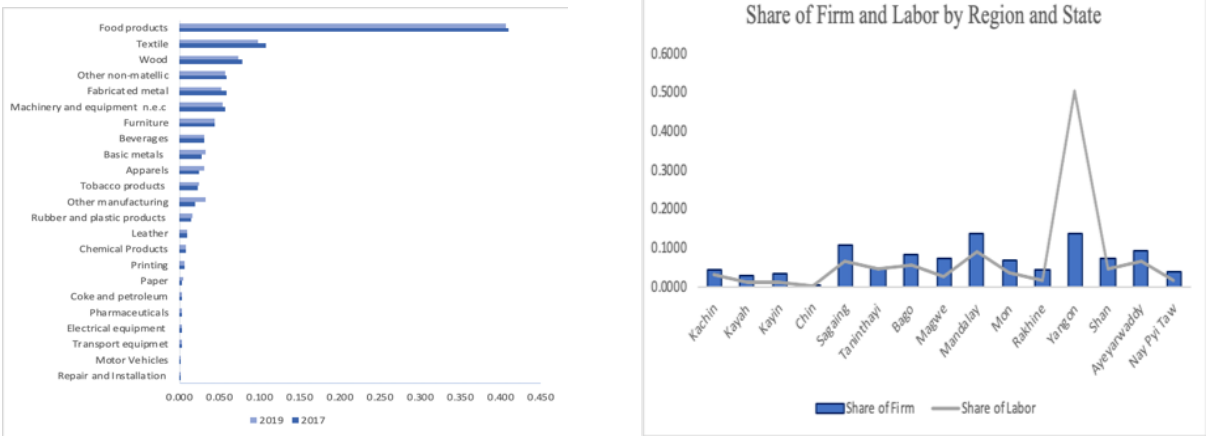
The data for this research is sourced from the Myanmar Micro, Small, and Medium Enterprise Survey, a nationally representative survey of private manufacturing enterprises conducted in 2017 and 2019 respectively. In contrast to the sample in the 2019 study, which consists of 2,497 businesses and 5,227 of their 34,435 employees, the 2017 survey interviewed 2,496 business owners and 6,722 of their 32,671 employees. The surveys include a balanced panel of 2,268 businesses that took part in both study phases and are statistically representative of more than 71,000 registered manufacturing firms in Myanmar.

The survey was conducted in 35 townships across the country, fourteen states and regions, and Nay Pyi Taw Union Territory, all accommodating Micro, Small, and Medium-sized enterprises in their territories. Data is arranged to allow for the examination of the national distribution of firms by state and region, applying the government's industry classification system and that differentiates between micro, small, and medium enterprises and the eight aggregated industrial sectors. The registered firms within the regions and states were randomly selected, and lists were stratified into Myanmar Standard Industrial Classification (MSIC) 4-digit codes. Accordingly, the Myanmar Enterprise Survey (2019) captured data from micro firms that comprise 74 percent of the sample, while small firms comprise 20 percent. Medium-sized firms account for 5 percent of the sample, while large firms comprise 0.5 percent. Following the previous studies, the analysis deployed similar control variables such as gender representation in managerial roles and ownership structures of the firm to maintain consistency in the methodology.

Many firms in Myanmar are privately held or operated as family businesses. The three most prevalent industries are food, textiles, and wood, as depicted in Figure 1.1 (a). Over 60 percent of the firms included in the sample belong to the food industry and are classified as microenterprises, which typically operate in low-tech sectors with

limited economic activity. However, there are exceptions in certain industries, particularly those that cannot benefit from spillover effects such as shared inputs. In terms of labor distribution, firms located in Yangon have the highest concentration of workers, as shown in Figure 1.1 (b). However, it is worth noting that the dispersion of workers in the Mandalay and Sagaing regions may exceed the proportion of firms in those areas.

Figure 1.1: (a)share of diverse industries in the sample.(b)share of Firm and Labor by Region and State.

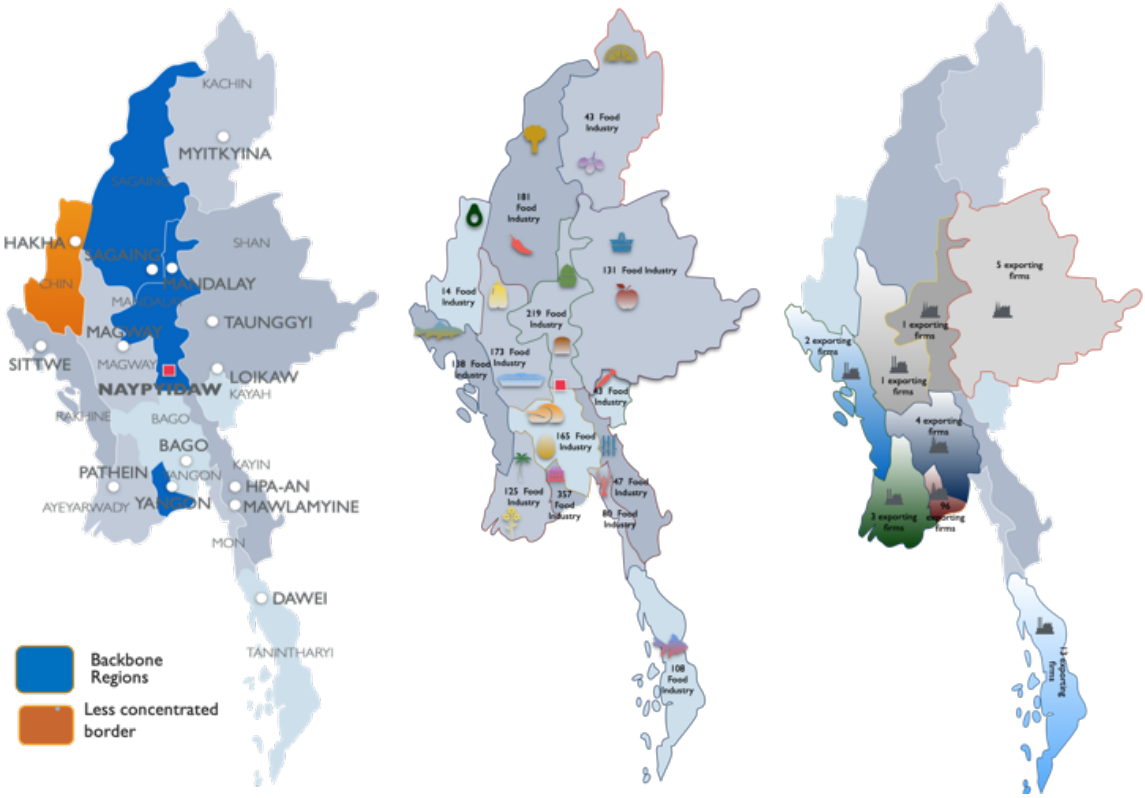


(a) (b)

Source: Represented by author using MSME 2017 and 2019 data (CSO)

The surveys correspond to the overall population and geographic distribution of the nation. The majority of enterprises are located in Myanmar's well-connected backbone regions, such as Yangon, Mandalay, and Sagaing, with only a few scattered firms in the border regions with China, India, and Thailand (Figure 1.2). It is notable that there are no exporting firms located in northern Myanmar, indicating the limited economic activity in that region. Many exporting enterprises are concentrated in the Yangon area, where there is maritime connectivity and well-established financial and transport infrastructures.

Figure 1.2: Geographic distribution of major industries



Source: Represented by author using MSME 2017 and 2019 data (CSO)

1.4 Measurement

Expanding on the previous research, this study examines the relationship between agglomeration and productivity using data from firm-level surveys of micro, small, and medium enterprises. Consistent with prior research, this study further analyze the impact of competition and agglomeration on productivity, with a particular focus on how these factors vary based on the exporting status of firms.

1.4.1 Total Factor Productivity and Labor Productivity

This study utilizes various measures of productivity, including labor productivity and total factor productivity (TFP). It follows the methodology outlined by Andersson and Lööf, 2011, which involves estimating productivity using a standard Cobb-Douglas production function augmented with regional population size.

$$y_{ijgt} = AK_{ijgt}^{\alpha} L_{ijgt}^{\beta} \tag{1.1}$$

By log-linearizing equation (1), specified using the following estimated equation;

$$\ln y_{ijgt} = \ln \rho_{ijgt} + \alpha \ln k_{ijgt} + \beta \ln l_{ijgt} + \gamma \ln e_{ijgt} + \mu_{ijgt} \tag{1.2}$$

Where subscript i=1, 2....N refers to a firm, j, g and t refers to industry classification, region and time respectively, y measures the value added of the firm, p denotes productivity of the firm. α, β represent the share of labor and capital, k denotes capital, l denotes labor, and e denotes expenditure for inputs. Ramachandran et al., 2020 identified a simultaneity problem when estimating Total Factor Productivity (TFP) using the Ordinary Least Squares (OLS) approach. Levinsohn and Petrin, 2003 observed that firms experiencing significant positive productivity shocks might react by increasing their input usage, leading to a correlation between input levels and the specific shocks encountered by the firm when estimating the production function.

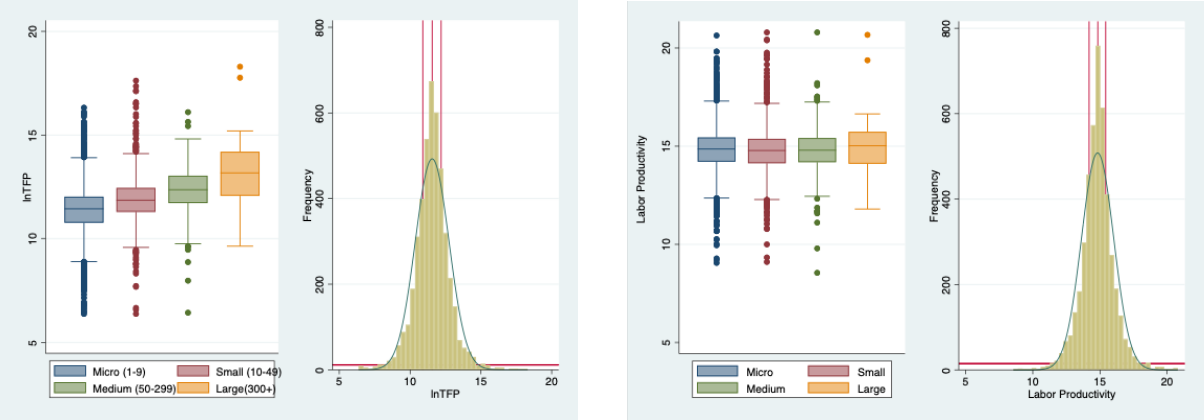
To address the estimation production function's endogeneity issue, Levinsohn and Petrin, 2003 introduce the use of intermediate input as a proxy by applying a semi-parametric method (LP method). However, the intermediate input used in the model must hold the monotonic assumption, i.e., the firm's choice regarding utilizing its intermediate inputs strictly increases its capital stock and productivity. From this assumption, demand for intermediate inputs depends on k_{ijgt} and p_{ijgt}. $e_{ijgt} = e_{ijgt}(k_{ijgt}, p_{ijgt})$.

This research employs a similar approach, utilizing raw materials as a proxy for unobservable productivity shocks, given that value added is utilized as the dependent variable. To compute Total Factor Productivity (TFP), the methodology outlined by Ackerberg et al., 2015 and adapted by ACF is employed.

Value added per employee serves as an indicator of labor productivity. Theoretical considerations suggest that apart from labor productivity and wages, other factors such as the cost of capital, capital productivity, and intermediate inputs also influence firm-level productivity. Furthermore, it is acknowledged that workplace characteristics and those present at higher levels within a firm's hierarchy can impact labor productivity as well (Brunow and Blien, 2015).

Productivity dispersion is significantly more pronounced among micro and small firms when compared to medium and large firms, as shown in Figures 1.3 (a) and (b). Within each classification, there is observable heterogeneity specific to each firm, as depicted in the frequency distributions in the figures. Although there is a smaller median disparity across all firm sizes, the distributions still exhibit relatively narrow ranges.

Figure 1.3: (a)TFP by Firm size (b)Labor Productivity by Firm size.



(a) (b)

Source: Represented by author using MSME 2017 and 2019 data (CSO)

The data presented in Table 1-1 indicates limited differences between exporters and non-exporters in terms of Total Factor Productivity (TFP). However, it is observed that non-exporting firms demonstrate lower productivity levels at a minimum. A similar productivity pattern is noted across industrial groupings, with lower productivity being associated with low-value, labor-intensive production.

Table 1.1: Total Factor Productivity (TFP) by Export and Non-Export

	Observation	Min	Max
Export	117	8.683647	16.13703
Non-Export	4337	4.802688	16.70185

Source: Author's compilation

Table 1.2: Total Factor Productivity by group industry

No	Industry	TFP (export)		TFP (non-export)	
		Min	Max	Min	Max
1	Food, Beverages, Tobacco	8.683647	16.09848	5.524476	16.70185
2	Textile, Apparels, Leather	9.588625	16.13703	4.802688	15.64948
3	Wood	8.813295	10.66864	8.068567	14.67307
4	Paper, Printing			7.391387	13.92154
5	Coke and petroleum, Chemical			6.271049	13.35664
6	Pharmaceuticals			8.151959	11.86329
7	Rubber and plastic, non-metallic	9.682044	12.54503	7.581803	14.85834
8	Metals	10.19406	11.4823	6.240582	14.40802
9	Electrical equipment, Machinery			7.500617	13.08199
10	Motor Vehicles			10.40265	12.61587
11	Transport equipment, Repair and Installation			9.182673	13.58202
12	Furniture, Other manufacturing	10.71479	11.6536	7.024974	14.79144

Source: Author's compilation

1.4.2 Agglomeration Index

The EG index, introduced by Ellison and Glaeser, 1997, is commonly used to assess the degree of agglomeration. This index enables comparisons across different industries and relies solely on employment related region-industry data. Ramachandran et al., 2020 and Cassey and Smith, 2014 consider the Ellison and Glaeser, 1997 index as a dependable measure of industrial localization. They suggest that enhancing the interpretation of the index can be achieved by simulating confidence intervals. However, the use of the EGI may have limitations, as it sometimes overlooks the influence of a firm's size distribution, deviating from reality. EGI is more of a spatial concentration index than a real agglomeration index, representing the spatial dispersion of firms inside a specific geographic unit (Nakamura, 2012). An industry with a low or statistically insignificant EGI value would exhibit a more uniform distribution of firms across geographic units and thus cannot be considered localized in a few regions (Kathuria et al., 2015).

The EG index (γ) utilizes a range of defined values between minus and plus one to indicate the level of firm concentration in a known territorial spatial confine. The index follows an ad hoc threshold of $\gamma > 0.05$ interprets as the level of concentration is very high whereas $0.05 > \gamma > 0.02$, $0 < \gamma < 0.02$, $\gamma < 0$ interprets as the level is concentrated, not very concentrated and excessively diffused, respectively.

The industry is disproportionally distributed among the geographic units to a greater or lesser extent depending on the EG values. EG index's positive value indicates a high level of spatial concentration. The agglomeration index (EGI) in this study, as adopted by (Ellison and Glaeser, 1997), is defined as follows:

$$EGI = \frac{(\sum_{c=1}^{n}(s_c - r_c)^2 - (1 - \sum_{c=1}^{n} r_c^2)\sum_{j=1}^{N} z_j^2)}{(1 - \sum_{c=1}^{n} r_c^2)(1 - \sum_{j=1}^{N} z_j^2)} \tag{1.3}$$

$\sum_{c=1}^{n}(s_c - r_c)^2$ is the raw localization index and $\sum_{j=1}^{N} z_j^2$ is the Herfindahl Hirschman index of employment concentration inside industry j. Due to the limited availability of data at the firm level, the distribution of firm sizes is employed instead of plant-level distribution. Therefore, unlike studies based on plant-level EGI, this study utilizes the following approach:s_c represents share of the industry's employment in area c and r_c represents share of aggregate manufacturing employment that is in that area c. In this study, the EG index is measured using 2-digit industrial codes at the township (city) level. The advantage of utilizing the EG index lies in its ability to facilitate comparisons across different industries and to establish a benchmark for the absence of agglomeration (EG index = 0). This enables researchers to assess the extent of agglomeration formation.

1.4.3 Competition and Export

Competition and Export Drawing from Martin et al., 2011, this study incorporates competition as a measure of the competitive pressure present in a specific spatial region. They suggested that Michael Porter's theory regarding the relationship between competition and agglomeration (Porter et al., 1998) could be tested by including such a variable.

According to Porter, competition fosters innovation, and increased competition among clusters enhances firm performance. Therefore, the analysis employs the Herfindahl-Hirschman index of employment concentration within industry j and area g at time t, with its inverse natural log, to assess this aspect.

$$\text{Com}_{jgt} = \ln\left(\frac{1}{HHI_{jgt}}\right) \tag{1.4}$$

In Myanmar, exporters operate through two channels: direct exports by the firms themselves and exports facilitated by intermediary trading companies that hold the necessary export licenses and permits. More than half of the exporting enterprises utilize the direct export channel. Specifically, out of total the exporting firms, 62 enterprises engage in direct exports, 44 firms use trading companies, and 13 firms export through both channels. The concentration of exporting enterprises is notably high in the Yangon area, attributed to its better connectivity and well-established logistics infrastructure. It is noteworthy that only around 5 percent of Myanmar's overall enterprises are exporters (MSMEs, 2017). Table 1.3 shows descriptive statistics.

Table 1.3: Descriptive Statistics

	Obs	Mean	Std.Dev	Min	Max
Dependent Variables					
Total Factor Productivity	4457	10.997	1.139	4.803	16.702
Labor Productivity	4499	14.823	1.202	8.55	20.796
Independent Variables					
Ellison and Glaeser Index (EGI)	4536	0.061	0.1	-0.081	0.351
Location Quotient	4536	2.679	3.408	0	39.784
Competition	4536	5.116	1.211	1.239	6.391
Characteristics					
Firm size	4536	1.317	0.586	1	4
Firm age	4536	20.109	13.182	6	108
Industrial zone	4536	0.2	0.4	0	1
Male	4536	0.689	0.463	0	1
Ethnic	4536	0.066	0.248	0	1
Average wage	4536	149376.63	71390.823	30000	2000000
Type of Ownership					
Firmly business	4016	0.537	0.499	0	1
Private Firm	4016	0.435	0.496	0	1
Partnership	4016	0.01	0.099	0	1
Cooperative	4016	0.001	0.027	0	1
Limited company	4016	0.016	0.125	0	1
Joint Venture Company	4016	0.001	0.027	0	1
Educational Level					
No Education	4536	0.176	0.381	0	1
Primary School	4536	0.283	0.45	0	1
Middle School	4536	0.19	0.393	0	1
High School	4536	0.111	0.314	0	1
Vocational Training	4536	0.003	0.057	0	1
Diploma	4536	0.006	0.076	0	1
Bachelor's Degree	4536	0.153	0.36	0	1
College	4536	0.015	0.121	0	1
Manager (Top management)	4536	0.289	1.102	0	31

Note: EG is calculated based on Ellison and Glaeser, 1997. The Location Quotient, adapted from Holmes and Stevens, 2002, compares the country's relative industry employment concentration with the relative concentration of industry employment in a given region. It evaluates natural clusters through employment location. Competition is adopted from Martin et al., 2011 by using the Herfindahl index of employment concentration.

1.5 Empirical Analysis

1.5.1 Agglomeration, Competition and Productivity

This paper examines how agglomeration economies affect firm productivity. It is recognized that agglomeration externality estimates have significant endogeneity issues. Simultaneity bias and unobserved heterogeneity are the main endogenous causes affecting the estimation of geographical externalities (Martin et al., 2011).

Using firm and plant panel data as found in previous studies enables rigorous handling of such endogeneity problems and the measuring agglomeration externalities similar to micro theories. Since the error term and the independent variables are correlated in this situation, the OLS estimates of the coefficients are likely to be biased due to the

endogenous variables. The unobserved heterogeneity problem poses a limiting issue for this topic. The panel fixed effects model regresses TFP at firm level on the EG index and other control variables. This provides valuable insights into how the concentration of economic activity within an industry influences the productivity of individual firms operating within that industry. By examining how TFP varies across different levels of industrial agglomeration, its supports a better understanding the dynamics of productivity growth and competitiveness within specific industries. The EG index is a major explanatory variable in the model for analyzing productivity and agglomeration.

The following baseline model specification is used in this study;

$$TFP_{ijgt} = \beta_0 + \beta_1 EGI_{jt} + \beta_2 Com_{jgt} + \gamma X_{ijgt} + \phi_i + \epsilon_{ijgt} \tag{1.5}$$

Furthermore, this study takes in to account the interactions between agglomeration and exporting firms. This interaction suggests whether the relationship between agglomeration and firm productivity varies depending on whether a firm engages in exporting or not. The following panel fixed effects model specification provided below (6) is employed:

$$\begin{aligned} TFP_{ijgt} =& \beta_0 + \beta_1 EGI_{jt} + \beta_2 Com_{jgt} + \theta Export_{ijgt} + \\ & \alpha EGI_{jt} \times Export_{ijgt} + \gamma X_{ijgt} + \phi_i + \epsilon_{ijgt} \end{aligned} \tag{1.6}$$

where subscript i, j, g, t represents firm, industry, region and time respectively. Total Factor Productivity is denoted by the letters TFP, Ellison and Glaeser index by EG, competition by Com. X refers to the set of control variables that include firm age, firm size, labor share, export (dummy), industry zone (dummy) and characteristic of ownership such as ethnicity, gender, level of education, and top management. ϕ_s captures all unobserved time-invariant fixed effects. The regression equation estimates the effect of industry-level concentration, EG_{jt}, on the firm-level outcome, $lnTFP_{ijgt}$. However, this specification does not differentiate cities with different agglomeration, thus assuming that a city with many plants enjoys the same productivity advantage as a city with a few plants. In addition, because EGI index does not change much between years, state fixed effects might absorb most of explanatory power. This study addresses the concern

by exploring the concentration effect conditional the export status and using Location Quotient (LQ) instead of EGI, thus utilizing variation between regions (Section 1.6).

Assuming that domestic firms maintain consistent operations within the same industry or location over time, unobservable firm-level characteristics can be effectively handled. The inclusion of fixed effects for regions accounts for the unique characteristics of individual firms that remain constant over time (Martin et al., 2011). A potential concern arises regarding pairwise omitted variables in the data, which could lead to endogeneity issues. Hence, it is crucial to control for firm-specific characteristics that have a substantial impact on productivity. Analysis of firm-level data from Myanmar indicates that in the context of least developed countries, agglomerations do not demonstrate a significant effect on productivity levels.

The findings presented in Table (1.4), columns (1) and (2), reveal relatively comparable coefficients for agglomeration, indicating negative but statistically insignificant effects on productivity. These results imply a concentration of fragmented production, wherein less productive firms exhibit lower levels of productivity. While prior research suggested a substantial enhancement in productivity due to agglomeration, the data from Myanmar suggests otherwise, particularly for non-exporting firms. Consequently, the observable impacts linked with traditional agglomeration models appear to be minimal, indicating that the least productive domestic enterprises may not experience significant productivity benefits from operating within agglomerated regions.

These results align with the findings of Beaudry and Schiffauerova, 2009, who assert that mature, low-tech industries exhibit lower productivity compared to high-tech industries. This assumption is supported by the Myanmar data, which indicates that the majority of enterprises are small and operate within the food industry with limited technological advancements and production capabilities. In fact, particular industries may exhibit a lack of upstream-downstream linkages, resulting in lower productivity within those industries.

Based on firm-level data from Myanmar, the textile industry emerges as the most concentrated, with significant presence in the Mandalay and Sagaing regions. Notably, this industry tends to focus on domestic markets, largely operating on traditional practices passed down through generations. The apparel industry appears as the second most concentrated sector, predominantly clustered in Yangon. While many firms within this industry focus on domestic markets, some are also engaged in exporting activities. The food industry, while not as concentrated as Textiles or Apparel, still exhibits noteworthy levels of concentration. This sector is characterized by substantial export activities, especially from key hubs such as Yangon, Tanintharyi, and Rakhine regions, where favorable natural advantages contribute to its prominence.

Table 1.4 sheds light on how agglomeration affects productivity differently for exporting and non-exporting firms in Myanmar. The results depicted in columns (3, 4, and 5) show that agglomerated exporting firms exhibit a statistically significant and positive correlation with productivity. Despite the limited number of exporting firms in the sample, which is common in many developing nations like Myanmar as illustrated in Figure 1.2, these findings remain robust. They suggest that the interplay between agglomeration and export status ultimately dictates a substantial productivity advantage. These results are consistent with the findings of Sun et al., 2018, indicating that (i) firms with higher intrinsic productivity benefit more from agglomeration, and (ii) non-exporting firms experience negative profits and tend to exit the market.

Agglomerated exporting enterprises demonstrate higher productivity levels attributed to knowledge spillover from other exporting firms and more efficient operations due to intensified relationships with foreign markets (Sun et al., 2018; Cieślik et al., 2018). These studies emphasize the presence of linkage effects among exporting firms, forming a dense network of connections that enhance production efficiency, technical and management capabilities, and market diversity. Additionally, research indicates that countries involved in exporting finished products and manufactured goods tend to exhibit elevated productivity.

This aspect holds significance for Myanmar's policymakers, suggesting the need to develop markets for finished Myanmar products as an alternative to the current practice of exporting primary products or partially finished goods. In addition, the analysis suggests that an increase in the degree of industry competitiveness results in higher productivity. Across all specifications, the results consistently show a positive and statistically significant relationship between the level of industrial competitiveness and productivity. These empirical findings are consistent with earlier studies (Ramachandran et al., 2020; Cieślik et al., 2018). In summary, the findings from Myanmar dataset support Porter et al., 1998 that the competitiveness of firm play a crucial role in determining productivity levels.

The results in columns (4) and (5) show that firm size is negatively associated with labor productivity. The findings reflect a previous study by Badr et al., 2019, which found that when micro and small firms collaborate with large ones, their productivity increases more than it does for larger firms.

Table 1.4: Agglomeration, Competition and Total Factor Productivity

Productivity	(1)	(2)	(3)	(4)	(5)
EGI x Export		5.4942	6.8027**	7.1908**	6.2061*
		(3.5517)	(3.2975)	(3.2335)	(3.0736)
EGI	-0.2288	-0.1668	-0.1827	-0.0713	0.0469
	(0.3501)	(0.3442)	(0.3302)	(0.3156)	(0.3037)
Export status		0.9417***	0.8730***	0.9257***	0.8327***
		(0.1939)	(0.1985)	(0.2149)	(0.2033)
Competition			0.0678***	0.0737***	0.0766***
			(0.0227)	(0.0229)	(0.0232)
Labor share			0.0019**	0.0010	0.0009
			(0.0008)	(0.0008)	(0.0007)
Firm size				-0.2271**	-0.2682***
				(0.0948)	(0.0947)
Firm age (ln)				-0.0497	-0.0494
				(0.0337)	(0.0338)
Top Management				0.0251	0.0193
				(0.0273)	(0.0272)
Male				0.0586	0.0501
				(0.0491)	(0.0477)
Ethnic (Dummy)				-0.0900	-0.0989
				(0.0787)	(0.0782)
Located in industrial zone					0.1928**
					(0.0739)
Bachelor's Degree				-0.0188	-0.0247
				(0.0557)	(0.0561)
Limited Company					0.2402
					(0.1429)
Observations	4,456	4,456	4,456	4,456	4,456
R-squared	0.0340	0.0549	0.0631	0.0685	0.0722
Region/State FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Control	No	Yes	Yes	Yes	Yes

Note: Dependent Variable is Total Factor Productivity (TFP).Significant level; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. To take into account the likely correlation among firms in the city, standard errors that are clustered at the city level are in parentheses.

Table (1.4) presents the impact of agglomeration on productivity, taking in to account various essential variables to mitigate potential biases. In column (3), the share of labor is considered, while other factors such as the gender, ethnicity, and education level of owners or managers are incorporated in column (4). Additionally, the geographical positioning of firms, particularly whether they are located in an industrial zone, is included in column (5) to account for its association with firm productivity.

Table (1.5) shows the effects of agglomeration on productivity utilizing the propensity score matching approach. However, it is important to note that this study does not aim to establish causal relationships. Due to the limited representation of exporting enterprises in the dataset, which mirrors the national population of exporting firms, and covers only a two-year time frame, the findings cannot conclusively determine that exporting firms benefit more from agglomeration.

To address this limitation, propensity score matching algorithms are employed to correct for sample selection bias by accounting for observable disparities between exporting and non-exporting groups.

Despite the reduction in the number of observations post-matching, matching techniques offer an impartial evaluation of the effects of exporting status, ensuring that outcomes are not influenced by treatment assignment based on baseline characteristics (Dehejia and Wahba, 2002). In Table (1.5), column (2), it is observed that agglomeration has a positive impact on productivity. The results regarding interaction effects and the level of industry competition remain consistent with those of the full sample, indicating that exporting firms derive greater benefits from agglomeration compared to non-exporting enterprises. The assessment of localization and urbanization economies by firm type, including state-owned, private, and foreign-owned firms (Gokan et al., 2019), reveals that such economies do not significantly affect the productivity of state-owned enterprises and that only foreign-owned businesses are influenced by urbanization. These findings are consistent with the situation in Myanmar, where foreign enterprises predominantly engage in exporting. Similarly, the analysis reflects the findings of Ramachandran et al., 2020, which suggest that agglomeration benefits large plants while negatively impacting the productivity of small plants.

Table (1.5) indicates that exporting and non-exporting enterprises exhibit similar firm characteristics, except for their exporting status, yet exporting firms achieve greater productivity gains. Regulatory limits require Myanmar's exporting enterprises to register with the Union of Myanmar Federation of Chambers of Commerce and Industry (UMFCCI). As applicants and members, firms must adhere to specific rules, legalities, and

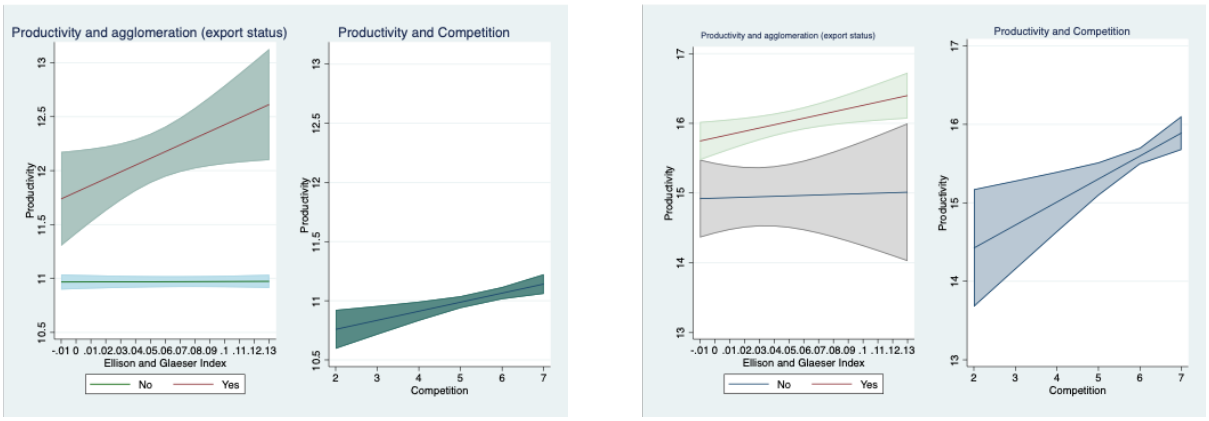
financial requirements set forth by the UMFCCI. This raises costs for individual firms, consequently lowering productivity. Some firms may fail to achieve these criteria and opt to engage trading companies to export their products at a lower cost. In addition, while the textile industry is the most concentrated, it relies heavily on traditional manufacturing processes and places minimal focus on exports. This lack of emphasis on exports, combined with the industry's persistent dependence on traditional practices, impedes its capacity to increase productivity through agglomeration and expand its market reach.

Table 1.5: Agglomeration, Competition and Total Factor Productivity (Matched results)

Productivity	(1)	(2)	(3)	(4)	(5)	(6)
EGI x export			8.8016**	7.5965*	8.8107***	7.0256***
			(3.7874)	(3.8497)	(2.6362)	(2.0050)
EGI	2.8873	10.4374***	-4.0130*	3.2191	3.0583	5.0208*
	(4.3350)	(2.7332)	(2.0536)	(3.6533)	(2.8278)	(2.6880)
Export		0.8711***	0.8881**	0.8561**	0.8416**	0.7280**
		(0.2630)	(0.3489)	(0.3517)	(0.3044)	(0.2797)
Competition		0.3782***		0.2344***	0.2408***	0.3606***
		(0.0918)		(0.0782)	(0.0706)	(0.0881)
Labor share		0.0212**		0.0278***	0.0220**	0.0215**
		(0.0076)		(0.0034)	(0.0080)	(0.0076)
Firm size		-0.4764			-0.3265	-0.4692
		(0.3551)			(0.3679)	(0.3613)
Firm age (ln)		-0.5624**			-0.5111**	-0.5778**
		(0.2294)			(0.2372)	(0.2371)
Managers Top		0.0220			0.0314	0.0217
		(0.0403)			(0.0452)	(0.0405)
Male		-0.0924			-0.1031	-0.0829
		(0.2324)			(0.2731)	(0.2301)
Ethnic (dummy)		0.1452			0.0935	0.1336
		(0.0984)			(0.0941)	(0.0968)
Located in Industry zone		-0.3000				-0.2798
		(0.2920)				(0.2892)
Education level		-0.2747			-0.2696	-0.2760
		(0.2030)			(0.2230)	(0.2053)
Type of Ownership		0.7388**				0.7229***
		(0.2654)				(0.2471)
Observations	177	177	177	177	177	177
R-squared	0.1160	0.3176	0.2058	0.2622	0.2866	0.3207
Region/State FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Control	No	Yes	Yes	Yes	Yes	Yes

Note: Dependent Variable is Total Factor Productivity (TFP).Significant level; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. To take into account the likely correlation among firms in the city, standard errors that are clustered at the city level are in parentheses.

Figure 1.4: (a)Marginal effects (Before Matched).(b)Marginal effects (After Matched)



(a) (b)

Source: Represented by author using MSME 2017 and 2019 data (CSO)

Figure (1.4-a) illustrates the marginal effects of agglomeration, competitiveness, and productivity within industries. The graphs depict a significant positive relationship between agglomeration and productivity, particularly for exporting firms, while no effect is observed for non-exporting firms. This suggests that agglomeration effects are only applicable to enterprises engaged in exporting activities.

Figure (1.4-b) displays the marginal effects of agglomeration on productivity based on the exporting status. It shows that both export and non-export enterprises experience productivity benefits when matched for certain qualities, but exporting enterprises exhibit a stronger influence of agglomeration, resulting in higher productivity levels. Additionally, both figures demonstrate that competition is positively associated with higher productivity levels, indicating that more competitive industries tend to be more productive compared to less competitive ones.

As emphasized in previous research, addressing the endogeneity concern can be achieved by employing fixed effects, given that infrastructure, public services, and other fixed characteristics are improbable to undergo significant changes over a relatively short-term period. This approach is applicable in this study, considering the data timeframe of only two years and the likelihood of stability in such characteristics over this period.

Table (1.6) displays the estimation outcomes utilizing fixed effects. In column (1), the omission of Region and State fixed effects across firms and industries is noted. The estimated results reveal positive and statistically significant association between interaction effects and productivity. Similarly, similar outcomes are observed when year-fixed effects are omitted (Column-2). Upon controlling for region and year fixed effects (Column 3), the findings suggest that agglomerated exporting firms positively and significantly impact productivity. Notably, the coefficients of all interaction effects displayed in columns (1, 2, and 3) are largely consistent. Based on these results (Columns 2 and 3), it is evident that firms located in industrial zones exhibit higher productivity compared to those operating outside such zones. Additionally, a substantial relationship is observed between labor share and productivity dispersion. An increase in productivity dispersion leads to a reallocation of value-added towards firms with a low (and falling) labor share, rather than a generalized decrease in firm-level labor shares (Gouin-Bonenfant, 2022).

Table 1.6: Agglomeration, Competition and Total Factor Productivity

Productivity	Year	Region/State	Full
EGI x Export	6.1542*	6.3030*	6.2061*
	(3.0966)	(3.1199)	(3.0736)
EGI	0.2106	0.0187	0.0469
	(0.1748)	(0.3055)	(0.3037)
Export	0.7750***	0.8364***	0.8327***
	(0.2084)	(0.2001)	(0.2033)
Competition	0.0647**	0.0761***	0.0766***
	(0.0245)	(0.0232)	(0.0232)
Labor share	0.0011	0.0009	0.0009
	(0.0010)	(0.0008)	(0.0007)
Firm size	-0.3146***	-0.2659***	-0.2682***
	(0.0994)	(0.0935)	(0.0947)
Firm age (ln)	-0.0319	-0.0511	-0.0494
	(0.0421)	(0.0342)	(0.0338)
Top Management	0.0091	0.0206	0.0193
	(0.0268)	(0.0278)	(0.0272)
Male	0.0580	0.0415	0.0501
	(0.0449)	(0.0475)	(0.0477)
Ethnic (Dummy)	-0.1199	-0.0867	-0.0989
	(0.0771)	(0.0782)	(0.0782)
Located in Industry zone	0.1257	0.1924**	0.1928**
	(0.0941)	(0.0749)	(0.0739)
Bachelor's Degree	0.0178	-0.0748	-0.0247
	(0.0634)	(0.0595)	(0.0561)
Limited Company	0.1694	0.2512*	0.2402
	(0.1443)	(0.1439)	(0.1429)
Observations	4,456	4,456	4,456
R-squared	0.0393	0.0675	0.0722
Year FE	Yes	No	Yes
Control	Yes	Yes	Yes

Note: Dependent Variable is Total Factor Productivity. Column (1) add the year fixed effect. Column (2) results are estimated with only Region and State fixed effect. Column (3) is estimated by using Region/ State and Year Fixed Effect. Significant level; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. To take into account the likely correlation among firms in the city, standard errors that are clustered at the city level are in parentheses.

1.6 Robustness Check: Using Location Quotient

To ensure the robustness of the findings, alternative methods for evaluating agglomeration effects are employed, as suggested by Holmes and Stevens, 2002. One such method is the use of the location quotient (LQ), which measures the relative concentration of industry employment in a specific region compared to the national average. This metric helps identify natural clusters based on employment dispersion and can indicate a large area including many metropolitan centers that function as a single local workforce.

The robustness check involves the inclusion of fixed effects to account for shocks affecting every firm in the sample within each specific year. The results presented in Table (1.7), are consistent with prior research by Rand et al., 2019, who analyzed cross-sectional microdata. Their findings indicated that higher firm density, as captured by agglomeration variables, has no significant effect on productivity. Furthermore, in locations where the distribution of exporting firms is uniform across industries, productivity tends to be higher. This result pertains to the Jacobs effect, a distinctive form of urbanization externality, highlighting the significance of industrial composition in determining productivity levels.

The results indicate that only exporting firms located in concentrated industries exhibit a productivity advantage over firms in other regions. The findings remain consistent after applying the matching approach, suggesting that firms in densely populated areas may expand to capitalize on productivity gains associated with specific locations, possibly due to local natural conditions or other agglomeration benefits.

Table (1.7) shows the influence of agglomeration on productivity using different productivity measures, consistently showing significant effects across different specifications. Columns (1) to (4) model the location quotient (LQ) of exporting firms, indicating a positive and statistically significant association with productivity. Assessing how agglomeration influences productivity helps validate the reliability of agglomeration economics as a determinant of location choice. The findings confirm that agglomeration plays a role in productivity, depending on the exporting status, while controlling for relevant variables

and incorporating year and region/state fixed effects. Furthermore, after accounting for industry fixed effects, the results given in Appendix (Table A5) are similar with the previously discussed findings, which were not taken into consideration.

Table 1.7: Agglomeration, Competition and Total Factor Productivity

Productivity	Before Matched		After Matched)	
	OLS	ACF	OLS	ACF
LQ x Export	0.4076**	0.4018**	0.5484***	0.5420***
	(0.1550)	(0.1539)	(0.1550)	(0.1534)
LQ	0.0121	0.0112	-0.0642	-0.0665
	(0.0126)	(0.0126)	(0.0690)	(0.0691)
Competition	0.0904***	0.0898***	0.0904***	0.0898***
	(0.0258)	(0.0258)	(0.0258)	(0.0258)
Labor share	0.0003	0.0005	0.0003	0.0005
	(0.0010)	(0.0009)	(0.0010)	(0.0009)
Export status	0.2959	0.3034	-0.0001	0.0074
	(0.2749)	(0.2733)	(0.3781)	(0.3768)
Firm size	-0.2289**	-0.2774***	0.2108*	0.2108*
	(0.0964)	(0.0968)	(0.1029)	(0.1018)
Firm age(ln)	-0.0561	-0.0541	0.0161	0.0165
	(0.0366)	(0.0365)	(0.0099)	(0.0098)
Top Management	0.0194	0.0184	-0.5405	-0.5903
	(0.0278)	(0.0279)	(0.3957)	(0.3955)
Male	0.0491	0.0505	-0.6537**	-0.6496**
	(0.0456)	(0.0455)	(0.2494)	(0.2483)
Ethnic(dummy)	-0.0881	-0.0894	0.0206	0.0202
	(0.0818)	(0.0816)	(0.0395)	(0.0396)
Located in Industry zone	0.1929**	0.1911**	-0.0760	-0.0718
	(0.0766)	(0.0768)	(0.2385)	(0.2404)
Bachelor's degree	-0.0229	-0.0235	0.2049*	0.2023*
	(0.0560)	(0.0560)	(0.1059)	(0.1058)
Limited company	0.2339	0.2305	-0.2009	-0.1966
	(0.1478)	(0.1449)	(0.3130)	(0.3115)
Observations	4,456	4,456	177	177
R-squared	0.0728	0.0737	0.3191	0.3199
Region/State FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Control	Yes	Yes	Yes	Yes

Note: Dependent Variable is Total Factor Productivity. Significant level; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. To take into account the likely correlation among firms in the city, standard errors that are clustered at the city level are in parentheses.

1.7 Conclusion

The conclusion of this study emphasizes the conditional yet significant role of agglomeration in enhancing productivity, particularly when aligned with exporting activities. The empirical design of this research highlights that high concentrations of exporting firms in agglomerations yield greater productivity gains, primarily due to knowledge and technical spillovers from these exporters. The study identifies a clear productivity gap between exporting and non-exporting firms, with exporting firms clustered in agglomerations exhibiting higher productivity levels. This productivity disparity suggests potential for narrowing through policies that foster strong inter-industry connections, thus enhancing collective productivity.

The analysis suggests actionable strategies to boost the productive effects of agglomeration and competition, especially in developing countries where innovation and creativity may lag. In such environments, foreign companies often outperform domestic ones initially, underscoring the impact of externalities on domestic firms' growth and their entry into export markets. The findings advocate for policies that focus on regions dominated by mature, low-tech industries with limited economic diversity, proposing initiatives to foster innovative activities that can elevate productivity.

The importance of measuring productivity gains from spillover effects is highlighted as a necessary step to develop policies and legislation aimed at accelerating economic development. The study underscores that, independent of exporting status, there is a positive and significant correlation between the degree of competitiveness and productivity.

Further analysis of firm-level data from Myanmar indicates that the export structure of least developed countries influences the feasibility of adopting an export-led productivity model for development. Despite some nations showing higher productivity levels due to exporting value-added commodities and manufacturing items, the findings suggest that policies, legislation, and investments should support local businesses in producing value-added goods for export. Such support could enhance local firms' participation in regional production networks, promoting sustainable and inclusive growth.

The conclusion also touches on the historical context of industrial policies from the 19th century and post-war periods, which are still applicable in many emerging nations today. However, shifts in technology and consumer markets necessitate that government policies now more clearly define and support the roles of domestic industries in import-export activities and their integration into fragmented manufacturing processes through agglomeration economies. Addressing the challenges facing Myanmar's industry sector—including limited import substitution capability, conflicting policies, and competitive pressures—is crucial for ensuring the economic resilience and prosperity of domestic businesses.

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Chapter 2

Firm Formalization and the Improved Potentials for Employment Opportunities in Micro and Small Enterprises:

Evidence from Myanmar

2.1 Introduction

MSMEs are widely recognized as a vital engine of economic growth and socio-economic development, especially in developing countries. A significant obstacle to the expansion of the MSMEs sector and associated employment opportunities is frequently cited as being the persistence of the informal sector. This persistence not only represents the policy and structural issues common in many developing economies, but also the social construct that underpin the tripartite choice owned by businesses, consumers, and job seekers. The latter issue, that of the social construct, is currently providing focus for new research into the current expansion of the informal sector, as observed in the advanced industrialized nations.

Much debate concerning the informal sector and its comparison to the formal sector has been developed since the early work of Lewis, 1950. Emerging from numerous papers, several stylized facts explaining informality from different perspectives can be presented (La Porta and Shleifer, 2014; Ulyssea, 2020). However, it is globally accepted that the size of the informal economy is vast, accounting for, in some cases over 50% of economic activity especially in the developing countries.

Informality is prevalent in the micro and small business sector, where workers are often employed on a temporary, cash-paid basis, leading to the underdevelopment of domestic labor markets. In developing countries, micro and small firms contribute significantly more to employment opportunities than the overall employment share. Therefore, MSMEs have the potential to enhance employment opportunities, development, and productivity. However, informality is also perceived as being indicative of poor economic performance, and therefore, it is expected that an increase in economic growth will lead to a reduction in the size of the informal economy (Rauch, 1991).

Using firm-level survey data from Myanmar, this study looks into the impact of formalization on employment opportunities, as defined by the number of permanent employees in the firm. The Myanmar dataset relied on self-reporting of formal registration status by firms and therefore raises concerns about data reliability, exposing potential endogeneity

issues, notably due to measurement errors, which can lead to biased estimates.

To address this issue, the study employs an instrumental variable strategy. This paper initially explores the factors influencing the firm's formalization and reveals that visits by tax inspectors to firms is an essential requisite for formalization. Over the two-year period that the Myanmar data covers, only a small number of informal firms are found to have transitioned to formal status. Due to the small sample size, the study does not investigate the differences in results between informal and formal firms. Analysing such variations would lead to ambiguous conclusions regarding the transition from informal to formal status.

As found in the case of Myanmar, informal firms generally operate within a low-value area of the economy. They are typically very small family businesses with unskilled and undereducated owners. The low productivity resulting from such characteristics often leads to business failure, as informal firms cannot compete with the formal sector. The formal and informal economies in least developed countries are disconnected, with limited transition from informal to formalization. The high costs (both official and unofficial) associated with the transition to formality, along with trust issues with authorities, are underlying factors that influence such disconnects. As more firms become formalized, individual firms have the potential to significantly contribute to boosting the nation's economy and improving the quality of life by providing stable work opportunities. In this context, this paper examines how firm formalization affects the quality of employees within formalized firms by considering variables such as a related increase in total sales at the firm level, sales per capita, average salary, and skilled labor.

The informal sector makes for a substantial share of GDP in developing countries. For example, according to World Economics' Quarterly Informal Economy Survey 2022 (QIES), Myanmar's informal sector is estimated to account for 49 percent of GDP (USD 171 billion). Although the informal sector contributes to early-stage sector development in developing nations, informal firms fail to flourish due to both structural and organizational barriers. Structurally, legal, regulatory, and taxes often impede firm development as high individual costs are incurred. Organizationally, many firms face issues of inad-

equate capital, access to affordable capital, weakness of business planning skills, and a lack of awareness of market competition.

Unregistered firms face barrier to accessing government development programs, which include basic training and access to finance. These characteristics, common among informal firms, collectively impede the firm's survival and expansion in the long run, leading to the persistence of the informal sector, as observed in Myanmar. Several studies have attempted to identify the factors that contribute to the persistence of informal businesses (Williams and Nadin, 2012; Bu and Cuervo-Cazurra, 2020). A substantial increase in formalization will require regulatory enforcement and other policy initiatives, including incentives for firms to register (KhaMis, 2014).

According to Myanmar law and practice, for a firm to be considered formalized, it must register with local administrations via township development committees or municipal offices. However, at the national level, formalization entails registration and obtaining permits from national institutions such as the Directorate of Investment and Company Administration and the Directorate of Industrial Supervision and Inspection. Despite the various registration options available, firm informality persists in Myanmar, being influenced by numerous factors.

Given the ongoing debate surrounding the persistence of informality, it is imperative to conduct a deeper examination to identify potential solutions to this issue. This study proposes that the function of tax inspector visits contributes to mitigating this persistence by employing a novel methodology based on practices observed in Myanmar.

One of the functions of tax inspectors is to raise awareness and educate the public, including entrepreneurs, about tax systems and their benefits. To fulfil this function, tax inspectors visit all registered and non-registered firms to provide tax information and encourage tax registration. These visits influence the formal positioning of firms because business owners become aware of tax regimes, which in turn opens various opportunities and benefits. Furthermore, through regular visits by tax inspectors, correct tax payments are enforced based on company records and accounts. Ensuring the collection of correct tax amounts and issuing receipts improves transparency and trust in the tax collection

system. The benefits and transparency of tax collection positively encourages informal enterprises to be more inclined to register. The concept of benefits associated with an awareness of business regulation has been highlighted as a driver for firm formalization (De Mel et al., 2013).

This study attempts to answer the questions, "Do expansions of formally registered enterprises improve potential employment opportunities?" and "To what extent do formal firms outperform informal firms regarding total sales?" To answer the questions, the following hypotheses are tested, hypothesis 1: Formal firms provide more secure job opportunities, hypothesis 2: Registered firms are more likely to be able to boost total sales, and hypothesis 3: Employees in formal firms receive higher compensation.

The findings indicate a favourable association between the probability of firm formalization and the expansion of permanent employment opportunities within the firm, alongside a simultaneous increase in overall sales at the firm level, considering the frequency of visits by tax inspectors. Moreover, the results suggest that formalized firms contribute to enhancing the quality of employment and offering higher wages. The results of the instrumental variable approach, which includes visits by tax inspectors to the firm as an instrumental variable, are consistent with those of the Ordinary Least Squares (OLS) analysis. The other control variables employed in both analyses remain the same.

The main contribution of this research is to expand the existing literature on formalization and employment opportunities by providing insight into the visits and frequency of visits by tax inspectors to enterprises as a significant factor influencing a firm's decision to formalize. Furthermore, this study contributes empirical evidence from a transitioning country (Myanmar) to enhance the current understanding of the relationship between firm formalization and employment opportunities, thereby deepening the understanding of the relationship between firm formalization and firm total sales.

The remainder of the study is presented as follows; Section 2 provides an overview of the firm's formalization and job opportunities based on existing literature and studies, Section 3 discusses data and variables, Section 4 sets out and explains the methodology and empirical findings. In Section 5, the conclusion and policy implications are presented.

2.2 Literature

Policies aimed at promoting formalization must highlight the potential benefits of registration for firms, as well as the drawbacks of not registering (Amin, 2016). For instance, informal firms may encounter difficulties in securing loans, which can hinder their ability to add value or develop their products within the MSME sector. Conversely, formalization has the potential to increase government tax revenues, thereby enabling greater public sector investments in business-supportive infrastructures and credit lines. This, in turn, can contribute to improved firm performance and enhanced employee well-being by expanding access to social security, healthcare, and workers' compensation, as government revenues increase (KhaMis, 2014).

A significant contributing factor to formalization is access to affordable finance, which eliminates the need for entrepreneurs to enter to costly short-term grey market finance solutions. Lakuma et al., 2019 discovered that the absence of creditworthy MSMEs and the consequent limited access to finance led to a scenario where economic activity shifted towards larger formal firms, often resulting in the collapse of informal firms.

In Myanmar, approximately 40 percent of the population lives below the national poverty line (World Bank, 2022), with income disparities widening post-pandemic. The size and composition of Myanmar's workforce indicate that 47.9 percent are exclusively engaged in agriculture (ILO, 2022). While Myanmar's official unemployment rate is reported as 1.5 percent of the workforce (ADB, 2022), a significant portion of the workforce is engaged in the informal sector, which is not reflected in these figures. Given the prevalence of informal employment, workers' safety and satisfaction are low due to a lack of regulation and social security, leading to underdevelopment of the labor market and low productivity.

Low productivity and a lack of innovation are a product of the lack of incentives that are generated by the informal sector that creates a vicious cycle of conditions for lower growth and an elongated development process. According to this perspective, collaboration between government and the business sector is essential in developing and

implementing solutions to enable such transition for MSMES to formalise and subsequently to generate secure job possibilities while decreasing the number of informal firms (OECD, 2002).

De Soto, 1989 defined "informality" as a group encompassing, businesses, workers, and activities operating outside the legal and regulatory frameworks of the contemporary economy. Despite the emphasis of research on the informal sector, consensus has yet to be reached on the definition of formal and informal sectors and businesses. According to Amin and Islam, 2015, the most cited factors for distinguishing between formal and informal businesses include firm size, business registration, and compliance with fiscal and regulatory procedures.

Informal firms typically exhibit characteristics such as smaller in size, lower labor productivity, and lower profits compared to formal firms. This disparity is often attributed to their reliance on unskilled labor, limited access to finance, and a lack of incentives (Amin, 2016; Amin, 2016). Consequently, informal enterprises lag behind in various aspects compared to formal firms and face challenges in hiring skilled labor due to restricted production and demand. In the context of labor productivity and employee motivation, prolonged working hours, insufficient wages, and unfavourable working conditions are prevalent issues within this sector, leading to negative outcomes. Additionally, workers in the informal sector are often ineligible for social security benefits and frequently face job insecurity. In contrast to previous studies focusing on the drawbacks of informality, this research focus on the benefits of formalization. It aims to highlight the advantages of formalization for both firms and employees.

2.2.1 New employment opportunity

According to the International Labour Organization (ILO), over 60 percent of the global population works in the informal sector, with the majority found in emerging and developing nations. However, the informal sector also plays a significant role in advanced economies. In most developing countries, over 85 percent of employees are engaged in informal work, with a higher concentration of informal workers in rural areas compared

to urban areas. This disparity reflects the predominantly agricultural nature of rural work, which relies heavily on seasonal labor. In contrast, urban informal workers are active throughout the year and are employed in various sectors including manufacturing, trade, transportation, communication, and finance. While the rural informal workforce is larger, employment in the urban informal sector presents greater challenges in terms of public service provision.

In Myanmar, a significant portion of the population depends on the economic sustainability of the informal sectors. The country has a youthful population, with 64.9 percent aged 15 to 64, 29.2 percent under 14, and 5.9 percent above 65 (ILO, 2018-2021). A country with a large working-age population and a low dependency rate stands to benefit considerably in terms of productivity and economic growth. Leveraging the demographic dividend in Myanmar, this study delves into firm preferences for employment, specifically considering gender disaggregation. It builds upon prior research by Babbitt et al., 2015 to offer insights into gender-specific employment preferences within firms.

Employees' choices over formal and informal employment have implications for their well-being and acceptance of work conditions, including adherence to employment regulations such as personal tax payments. However, relying solely on unemployment rates to assess the labor market's condition is inadequate due to poverty and a lack of unemployment benefits, which compel many individuals to seek any form of work to sustain themselves (ILO, 2018-2021). When considering total labor underutilization, the informality rate becomes more significant, with 75.6 percent of employed individuals working in the informal sector by industry. From this standpoint, developing the formal private sector is crucial for promoting economic growth and reducing unemployment (Aterido et al., 2019).

To explore employment opportunities in Myanmar's MSME sector, data from the Myanmar Firm-level Survey is employed. However, due to data limitations, the study cannot consider employment opportunities in agriculture or the service sector, as the data exclusively covers manufacturing firms. While the manufacturing sector may not be the primary employer, it is crucial to analyse it, given the government's aspirations

for industrialization, which have led to significant public sector investments in associated connectivity infrastructures.

2.2.2 The tripartite arrangement to maintain the informal sector

Informality remains prevalent and persistent in many countries a significant portion being associated with the emerging economies. In response, extensive research has been conducted, with early literature (Lewis et al., 1954; Harris and Todaro, 1970) still being relevant today. Consolidating research findings reveals that the underlying reasons for informality can be attributed to a tripartite arrangement of choices: the choice of the entrepreneurs, the choice of the consumers, and the choice of the employees.

The choice of entrepreneurs to operate informally is influenced by various factors, especially in developing countries. De Soto, 1989 argues that overburdening regulations, corruption, and time costs of formalization discourage people from formalizing. Additionally, the associated costs of overcoming these obstacles are often financially too costly for entrepreneurs. On the other hand, some research suggests that the informal sector expands as a result of societal factors, with informality being perceived as parasitic, as it takes advantage of social services and public sector investments without contributing in return (Levy, 2010).

The choice of the consumers; Consumers make rational choices to purchase goods and services from the informal economy, thereby creating a market to support the maintenance of the informal sector. The choice is not explicitly related to cost but includes the failure of the formal sector in terms of availability, speed, customer attention, quality of services or products and social pressures (Williams and Martinez-Perez, 2014).

The Choice of the Employees; Employees decisions and inclinations to work informally have a large bearing on the formalization debate. In some cases, people may well seek to participate in the informal economy as social actors (Williams and Kayaoglu, 2016), whereby a lack of vertical trust in government, especially in terms of taxation exists. The "social actor" construct is currently being explored as an alternative to the concept of

an economic actor, who considers the benefits of informal work greater than any fines or associated costs of fine to understand the rise of the informal economy in many advanced countries.

In Myanmar and other developing countries, self-employment (own account workers) is predominant. Many individuals, often due to social norms, engage in work within the family unit or family business, often without professional qualifications. Informal work also encompasses people looking for temporary employment with extended family members or acquaintances to supplement family income sources (Chen and Carré, 2020).

2.2.3 Informal firms escaping the scrutiny and inefficiencies of authorities

Numerous studies suggest that firms, particularly in developing countries, choose informality to evade scrutiny by authorities. With Myanmar ranking 157 out of 180 on the corruption perception index , indicating a higher prevalence of corruption, entrepreneurs may be hesitant to formalize their businesses. Djankov et al., 2002, for example, argue that higher entry costs are often associated with overly bureaucratic business formalization procedures in developing countries, which also exhibit higher levels of corruption. Essentially, the more steps required for a firm to attain formal status, the greater the associated corruption levels.

Similar studies indicate that the inconvenience of registration procedures and tax evasion remains a significant barrier for informal businesses (Fajnzylber et al., 2011). According to Ulysses, 2018, reducing the registration cost of the formal sector can substantially decrease the percentage of informal enterprises. The author analyzed repeated cross-sectional survey data covering informal and formal firms in Brazil from 1997 to 2003, suggesting that reducing informality enhances welfare and leads to higher GDP and incomes. Informal businesses often evade taxes and regulations, providing economic incentives for entrepreneurs, especially in the case of micro-businesses. The penalties incurred are typically proportional to the firm's size and increase accordingly. Ulysses, 2018 suggests that the higher probability of inspection and associated financial penalties

reduces the incentive to operate informally, and tax enforcement significantly reduces informality due to non-compliance costs. Influencing choices play a central role in an entrepreneur's decision to formalize their business. This decision is also influenced by the national environment and changes in perceptions and cultures (Williams and Kayaoglu, 2016). In the case of Myanmar, the conservative social culture influences such decisions, with a majority of society adhering to government laws and respecting public servants, unlike situations found in the advanced countries that have been studied.

Scholars strongly suggest that tax administration is the most effective policy instrument for reducing informality (Liu-Evans and Mitra, 2022). Accordingly, considering the presumption of Myanmar citizens adhering to tax administration laws, this study explores the role and influence of tax inspectors in the formalization processes using an instrumental variable approach, thereby contributing to the associated literature. Uniquely, as captured in the Myanmar survey data, this study identifies that a visit from a tax inspector is a factor that influences entrepreneurs to formalize their firms.

2.3 Conceptual framework and methodology

The informal economy presents both obstacles and opportunities for national development and growth; indeed, it is a widespread and pervasive phenomenon globally. While informal businesses contribute to economies through increased consumption, informality also poses significant challenges, particularly in the labor market. Since informal employment lacks regulation and is characterized by non-compliance, it offers a low-cost entry phenomenon for business owners. However, this aspect is counterbalanced by its negative impact on the quality of labor market development, further affecting the growth of the SME sector and influencing firm preferences.

La Porta and Shleifer, 2014 suggest that in developing countries, up to 50 percent of economic activity is generated by informal firms, providing a livelihood for billions of people. They also highlight the contentious role of informality in economic development. Their research presents five stylized facts related to the informal sector: (i) its size is

substantial, especially in developing countries; (ii) it exhibits low productivity; (iii) informal firms tend to be small and lack potential for formalization; (iv) a disconnect exists between the informal and formal economy, with informal firms remaining stagnant; and (v) as countries experience growth, the informal sector tends to shrink.

Specifically, firms self-select into formality based on the benefits and costs associated with formalization. If formality increases profits, business owners will perceive a rationale to register and become formal (Ontiveros, 2012). Collectively, the findings suggest that efforts to discourage the persistence of informal sectors aim to promote employment opportunities and increase firms' revenue through the transition to formalization.

Intuitively, formal firms have greater opportunities to expand their market by enabling the emergence of innovative products through knowledge. Registered firms can benefit from access to finance and local contracts through various government and non-government lending policies, providing them with capital to develop new products or expand their market. It is evident that the more innovative products a firm produces and the higher the demand generated, the more people it will need to employ. Demenet et al., 2016 rationalise that one reason that enterprises remain informal due to a fear of attracting the attention of authorities and the need for transparency of finances and business deals when firms register themselves with the appropriate authorities.

2.3.1 Conceptual framework for Myanmar study

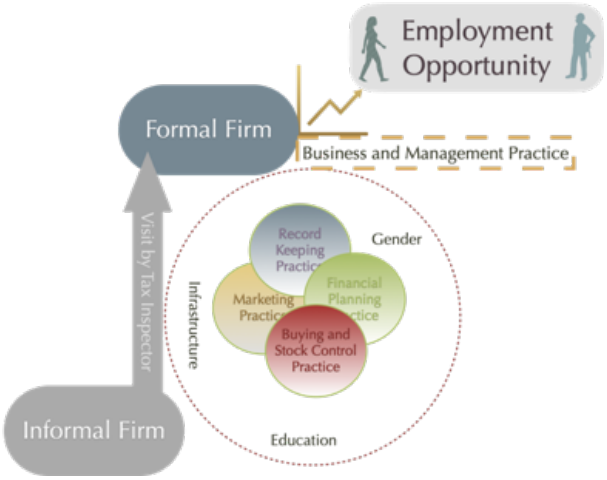
In the case of Myanmar, tax inspectors frequently visit both formal and informal firms for inspection purposes. As a result, most visited firms are unable to evade tax payments, and they become aware of the additional benefits associated with becoming a licensed business. In such circumstances, firms receive information about the tax system, payments, and the benefits related to taxation. Therefore, the impact and frequency of tax inspectors visiting the firm play a crucial role in mitigating the persistence of informality.

This study primarily examines the effects of firm formalization on the enhancement of potential employment opportunities within micro and small enterprises. It controls for various firm characteristics, including gender, level of education of the owner/manager,

and infrastructure factors such as rail transport. Firms that adopt effective business and management practices are more likely to increase their workforce to capitalize on business growth opportunities (see in figure 2.1).

Ontiveros, 2012 explores formality among MSMEs in Bolivia, a country with similar characteristics regarding informal work and enterprises as seen in the case of Myanmar. Ontiveros' findings reveal heterogeneity in the benefits of formalization. Particularly, the results suggest that firms inclined to register experienced positive marginal effects, whereas firms less concerned with registration faced negative effects from formalization. Building on this concept of firm formalization, this study expands the analysis to explore how the returns to formal status vary between registered and unregistered enterprises.

Figure 2.1: Conceptual Framework of employment opportunity and formalization



Source: Represented by author

2.4 Data Analysis

The data set is a nationally representative two-year survey of private manufacturing enterprises, the Myanmar Micro, Small, and Medium Enterprise survey. The surveys consist of a balanced panel of 2,268 businesses that participated in both study phases, and they are statistically representative of over 71,000 registered manufacturing firms in Myanmar. However, due to the non-random selection of firms, the data does not entirely represent Myanmar's informal sector. Nonetheless, similar to other research, the survey sample captures the more established and productive informal firms (Berkel and Tarp, 2022).

The survey covered 35 townships across the country, including fourteen states and regions, as well as Nay Pyi Taw Union Territory, all of which accommodate Micro, Small, and Medium-sized enterprises. Given that most informal firms fall within the micro and small enterprise categories, the sample is restricted to include only micro and small enterprises to examine the effect of formalization on potential employment opportunities. According to the Myanmar Enterprise Survey report (2019), micro firms comprise 74 percent of the sample, while small firms comprise 20 percent. Medium and large firms account for the remaining 6 percent; however, they have been left out from the analysis.

Table (2.1) presents descriptive statistics for all variables used in the regression. The number of permanent employees and total sales of the firms are designated as the dependent variables in the analysis. Employee data is disaggregated into female permanent employees and permanent male employees separately to explore different patterns of employment in the labor market through a gender lens. According to the statistics, some firms do not hire permanent employees. The primary explanatory variable is formalization, which indicates 1 if the firm is registered and 0 otherwise. In this analysis, the time tax inspectors visit the firms is used as an instrumental variable. Detailed summary data on tax inspector visiting time based on the firm type is provided in Appendix (Table B.1).

Table 2.1: Descriptive Statistics

Variable	Mean	Std.Dev	Min	Max
Dependent Variables				
Permanent employee	5.53	6.63	0	70
Permanent male employee	3.43	4.16	0	40
Permanent female employee	2.10	4.36	0	40
Total Sale	17.42	1.62	12.28	24.44
Independent Variables				
Formal registration (Dummy)	0.85	0.35	0	1
Tax inspectors visiting time	0.87	1.53	0	24
Firm age	20.20	13.33	6	108
Firm size	1.21	0.41	1	2
Male	0.69	0.46	0	1
Bachelor's Degree	0.33	0.47	0	1
Average wage	147917.39	71812.37	30000	2000000
Risk attitude	1.54	0.72	0	3
Trust level	2.53	0.66	1	4
Railroad (Dummy)	0.45	0.49	0	1
Advertisement (Dummy)	0.08	0.27	0	1
Run out of stock (Dummy)	0.23	0.42	0	1
Recording practice (Dummy)	0.30	0.45	0	1
Set the target sale (Dummy)	0.21	0.41	0	1

Note: The dependent variable is employment opportunities, measured by the number of permanent employees.

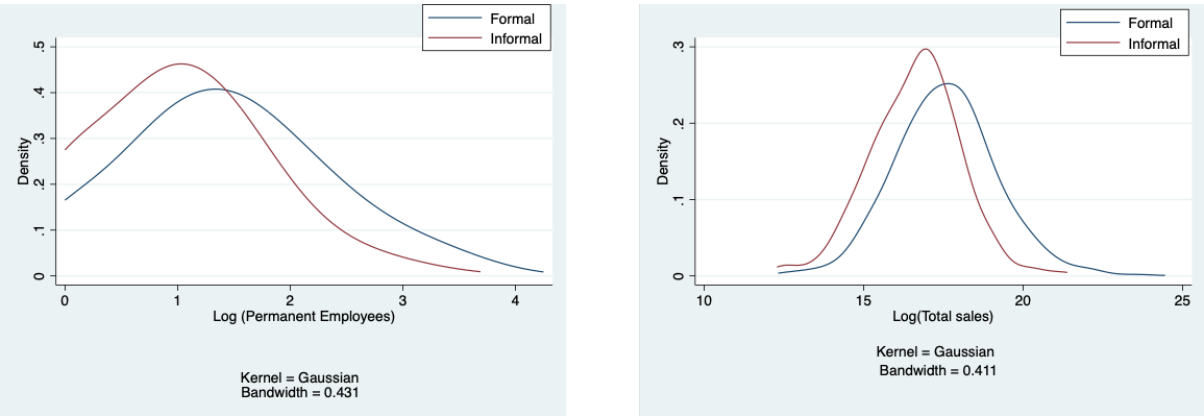
2.4.1 Employment and Total sales

Higher levels of employment and total sales serve as underlying drivers for firm growth and sustainability. The analysis reaffirms that a developed formal economy is critical for the country's MSMEs to achieve higher levels of employment and total sales. Previous research evaluates firm performance based on firm registration type (subnational or national). Berkel and Tarp, 2022 suggested that, from a firm performance perspective, policy focus should be on growing formal firms rather than formalization itself. This study evaluates the favorable effect of firm formalization on employment opportunities and total sales for national economic growth, regardless of whether it is nationally or subnational registered.

Studies have revealed that informal firms have lesser-educated management or owners, fewer employees, lower revenue and profitability, and lower productivity than formal enterprises (La Porta and Shleifer, 2008, La Porta and Shleifer, 2014; Ulysses, 2018). This

finding is also consistent with the analysis of Myanmar data, which shows a difference in employment and total sales between formal and informal enterprises (Fig. 2.2-a and 2.2-b) and a significantly skewed distribution to the right revealing higher potentials of formalization. Furthermore, there is a significant overlapping region between formal and informal employment and total sales distributions. According to these statistics, formalization reveals a higher level of employment and total sales than non-formalized firms.

Figure 2.2: (a)Employment distribution.(b)Total sales distribution.



(a) (b)

Source: Represented by author using MSME 2017 and 2019 data (CSO)

2.4.2 Model specification

The following model is applied to examine the extent to which formal firms can boost the potential for employment opportunities. Employment opportunity is measured using the number of permanent employees in the firm in this study. To analyze the relationship between formalization and employment opportunities, the following baseline structural specification is employed.

$$\text{Baseline model: } lnEO_{it} = \beta_0 + \beta_1 FF_{it} + \gamma X_{it} + \psi_j + \delta_r + \phi_t + \epsilon_{it} \tag{2.1}$$

Where subscript i, t represents firm and time respectively. Employment opportunity is denoted by the letters EO. FF is the measure of formalization for the firm taking 1 if the firm is registered and 0 otherwise. γ is the set of control variables including firm characteristics such as firm age, owner education level and gender, risk attitude, business

practices and management. ψ ,δ and ϕ capture the industry, region, and year-fixed effects, respectively.

2.4.3 Instrumental variable (IV) approach

The estimation results may be biased in the association between formalization and employment opportunities (permanent employees) due to endogeneity concerns. Firstly, unobserved firm characteristics might be correlated with both firm formalization and employment opportunities. Secondly, the self-reported status of formal registration by the firm can be questionable, leading to potential measurement error. Thirdly, there could be reverse causality between firm formalization and employment opportunities, where formal firms may hire additional employees to boost their output and market share, and informal firms with larger workforces may seek formal recognition to access loans and other opportunities.

This could result in an upward bias in the estimation. Additionally, inconsistencies in year-on-year reporting in firm-level survey data can affect the estimation outcomes (Awaworyi Churchill and Danquah, 2022). These factors suggest that the estimate provided by the Ordinary Least Squares (OLS) model may be biased and inconsistent.

The potential issue of endogeneity biases is addressed by fixed-effects estimations, particularly in tackling the problem of omitting unobservable firm characteristics. By employing fixed-effects models, the bias resulting from time-invariant firm characteristics is eliminated, leading to significant benefits of this approach (Dang and La, 2020). However, the fixed-effect model also has its limitations. Firstly, it does not provide a solution to the endogeneity bias generated by unobserved time-variant components. Secondly, measurement error in the fixed-effects estimator may result in severe attenuation bias.

In this regard, an instrumental variable (IV) approach is used to address the endogeneity problem, serving as an alternative method to minimize endogeneity bias and overcome the limitations of the fixed-effect estimator (Dang and La, 2020). The initial assumption is that the IV strategy relies on identifying suitable instruments that affect the endogenous variable (relevance condition) but have no direct impact on the dependent variable

(Cawley et al., 2018; Bascle, 2008). The second assumption, the exclusion restriction must be met, ensuring that the IV focuses on regressor variants that are uncorrelated with the error term (Bascle, 2008).

To validate these two assumptions, tax inspector visits to firms at the city level over a two-year period are used as the instrument. The relevant condition is considered valid in this research as tax inspector visits are only related to the probability of firms formalizing. These visits can enlighten firms on the tax benefits of licensing and suggest registration procedures, thereby positively influencing the entrepreneur's choice. However, there is no direct correlation with the improvement of employment in the firms; while employment may improve, it would do so only through rigorous formalization.

To confirm the exclusion restriction, the effects of tax inspectors' visiting time to the firms on the probability of the firm being formalized (entrepreneur's choice) should not be associated with unobserved factors that influence the improvement of employment opportunities. From this perspective, tax inspector visiting time is an appropriate variable to instrument for the firm's tendencies towards formalization. As the main endogenous regressor, formalization is a dummy variable; therefore, this paper applies the first-stage probit model. The following first-stage specification for the IV approach is used in this study;

$$\text{First stage: } FF_{it} = \phi + \theta TI_{it} + \rho X_{it} + \alpha_j + \mu_r + \tau_t + \xi_{it} \tag{2.2}$$

Where variable TI represents the tax inspector visiting to firm i, year t. α, μ and τ capture the industry, region, and year-fixed effects, respectively.

2.5 Empirical Results and Discussion

The results of the study are presented under individual subheadings inclusive of the robustness checks deployed to validate the findings given the limitations of the data.

2.5.1 Employment opportunity and formalization

Table (2.2) presents the baseline regression findings for employment opportunities based on OLS estimation with robust standard error clusters at the city level, controlling for region, industry, and year-fixed effects. The results suggest a positive association between formalized enterprises and employment at the 1% significance level. Using data from 2017, Columns 1, 2, and 3 illustrate the effects of firm formalization on the number of permanent employees. Columns 4–6 incorporate 2019 data to examine the relationship between firm formalization and permanent positions. Columns 7–9 present pooled results for permanent employment. Across all columns, the findings indicate that registered businesses are significantly more likely to increase the potential for employment opportunities.

Alternatively, the decision to hire permanent employees may be influenced by greater risks associated with such hires, which could impact the firm's decision-making. The model controls for firm characteristics that are significant factors in a firm's ability to expand its business by hiring more people. Additionally, the findings suggest that access to infrastructure (such as connectivity, IT, and finance) increases the likelihood of firms hiring permanent employees.

Table 2.2: Employment opportunity and formalization (OLS)

	2017			2019			Pool		
	(1) Total Employment	(2) Male	(3) Female	(4) Total Employment	(5) Male	(6) Female	(7) Total Employment	(8) Male	(9) Female
Formalization (Dummy)	0.3344***	0.3506***	0.4856***	0.2806***	0.3351***	0.2249***	0.3286***	0.3679***	0.3657***
	(0.0558)	(0.0579)	(0.0771)	(0.0526)	(0.0553)	(0.0746)	(0.0385)	(0.0402)	(0.0536)
Firm age	0.0140	0.0130	0.0082	0.0053	0.0053	0.0836*	0.0170	0.0138	0.0561*
	(0.0319)	(0.0307)	(0.0484)	(0.0304)	(0.0298)	(0.0458)	(0.0222)	(0.0215)	(0.0333)
Male	-0.0767*	-0.0087	-0.0178	-0.0030	0.1279***	-0.0087	-0.0459	0.0575**	-0.0232
	(0.0422)	(0.0421)	(0.0603)	(0.0393)	(0.0395)	(0.0573)	(0.0290)	(0.0290)	(0.0415)
Education level	0.0491**	0.0583**	0.0008	0.1252***	0.0923***	0.0771**	0.0366***	0.0313**	0.0035
	(0.0244)	(0.0233)	(0.0389)	(0.0207)	(0.0199)	(0.0319)	(0.0136)	(0.0131)	(0.0214)
Risk attitude	0.0312	-0.0144	0.0451	0.0664**	0.0683**	0.0568	0.0445**	0.0241	0.0478
	(0.0272)	(0.0258)	(0.0422)	(0.0276)	(0.0267)	(0.0435)	(0.0195)	(0.0187)	(0.0303)
Trust level	0.0442	0.0141	0.0051	0.0510	0.0603**	0.0051	0.0485**	0.0363*	0.0018
	(0.0288)	(0.0274)	(0.0443)	(0.0313)	(0.0302)	(0.0500)	(0.0213)	(0.0204)	(0.0331)
Railroad	0.1614***	0.0893**	0.1591***	0.1068***	0.0967***	0.0459	0.1474***	0.1046***	0.1192***
	(0.0385)	(0.0367)	(0.0616)	(0.0379)	(0.0367)	(0.0602)	(0.0270)	(0.0260)	(0.0427)
Advertisement	0.1514**	0.1528***	0.2209**	0.2654***	0.2138**	0.3351**	0.1981***	0.1715***	0.2800***
	(0.0617)	(0.0589)	(0.0951)	(0.0898)	(0.0845)	(0.1318)	(0.0512)	(0.0489)	(0.0775)
Stock control practices	-0.0531	-0.1685***	0.0126	-0.0399	0.0221	-0.0019	-0.0563*	-0.1075***	-0.0039
	(0.0407)	(0.0389)	(0.0633)	(0.0571)	(0.0551)	(0.0982)	(0.0332)	(0.0320)	(0.0529)
Recording practices	0.2647***	0.2827***	0.1373*	0.5114***	0.4389***	0.3352***	0.4278***	0.3849***	0.2726***
	(0.0511)	(0.0483)	(0.0771)	(0.0425)	(0.0411)	(0.0648)	(0.0327)	(0.0313)	(0.0488)
Set of target sale	0.1856***	0.1662***	0.1061	0.1474***	0.0582	0.0847	0.1540***	0.1059***	0.0859
	(0.0510)	(0.0480)	(0.0770)	(0.0511)	(0.0496)	(0.0728)	(0.0362)	(0.0346)	(0.0528)
Observations	1,892	1,641	839	2,057	1,816	967	3,949	3,457	1,806
R-squared	0.1553	0.1592	0.1554	0.1702	0.1571	0.1113	0.1436	0.1383	0.1172
Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region/State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	-	-	-	-	-	-	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Dependent Variable is employment opportunity measured by the number of permanent employees (log). Stock control practices refer to the circumstance in which the firm is operating in the condition of slowing down production speed. Significant level; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Columns 1, 2, and 3 represent the result of 2017. Columns 4, 5, and 6 report 2019 results. Columns 7,8 and 9 represent the result of 2017 and 2019 (Pool). To take into account the likely correlation among firms in the city, standard errors are clustered at the city level.

Business practice and management variables are controlled to account for the association between the number of permanent employees and firm formalization. As exhibited in Table (2.2), firms deploying distinct business practices and management structures (an indicator of an educated entrepreneur / owner) are more likely to have permanent employees. The firm's advertising and market research capacity is essential in expanding the enterprise network and growing the business. The data suggest that increased activity in this area is likely to increase the number of employees with secure contracts (table-2.2). It is found that good financial recording practice (bookkeeping) of business sales and purchases is also a feature that contributes to the decision in hiring employees. Columns 1–9 show that a firm's recording practices are beneficial in contemplating increasing employee appointments. Overall, Table (2.2) shows that a firm's formalization has beneficial effects on increasing the number of permanent employees while controlling for firm characteristics. The empirical findings are consistent with those of (La Porta and

Shleifer, 2008, La Porta and Shleifer, 2014; Ulysses, 2018; Fajnzylber et al., 2011), who state that formality contributes to increase employment.

2.5.2 Tax inspector visits changes perceptions

Table (2.3) presents the IV regression findings using the first-stage probit method. The variables employed are identical to those used in the OLS results, with the addition of tax inspectors visiting the firm as an instrument variable. The results report that the firm's probability of formalization is positively related to an increase in permanent employment in the firm by considering the number of visits by tax inspectors to the firm. The first-stage regression findings in Table (2.3) reveal a significant positive correlation, at the 1% level, between the number of tax inspector visits and firm formalization. Additionally, the F statistics exceed 10, indicating that the instrument used in the regression is not weak, according to the rule of thumb. Moreover, the Anderson-Rubin Wald endogeneity test (see Appendix B.0.1) shows that the null hypothesis is rejected, suggesting that the regressor formalization is indeed endogenous, necessitating the use of an IV to address this issue.

Columns 2, 5, and 8, illustrate that formalization has a considerable influence on boosting permanent male employment. Similarly, there is a positive and substantial relationship between formalization and increased female employment, as shown in Columns 3, 6, and 9. Table (2.3), presenting IV analysis, suggests a favorable association between formalization and job permanence. The sign and significant level of IV findings are the similar with the OLS results for all employees, male and female. However, the IV estimates are substantially larger than the baseline estimation results, indicating that endogeneity causes a downward bias in the baseline estimate (Awaworyi Churchill and Danquah, 2022).

Table 2.3: Employment opportunity and formalization, IV approach, first stage probit

	2017			2019			Pool		
	(1) Total Employment	(2) Male	(3) Female	(4) Total Employment	(5) Male	(6) Female	(7) Total Employment	(8) Male	(9) Female
Formalization (Dummy)	1.0094***	1.0562***	1.1414***	0.9102***	1.0350***	0.8538***	0.8622***	0.8353***	0.9996***
	(0.1430)	(0.1279)	(0.2455)	(0.1640)	(0.2242)	(0.1624)	(0.1034)	(0.1078)	(0.1487)
Firm age	0.0248	0.0102	0.0114	-0.0014	0.0845**	-0.0055	0.0169	0.0128	0.0530
	(0.0308)	(0.0294)	(0.0436)	(0.0289)	(0.0416)	(0.0279)	(0.0220)	(0.0214)	(0.0330)
Male	-0.1061***	0.0079	-0.0324	-0.0222	-0.0073	0.0949***	-0.0450	0.0561*	-0.0210
	(0.0402)	(0.0392)	(0.0542)	(0.0372)	(0.0514)	(0.0367)	(0.0288)	(0.0288)	(0.0411)
Education level	0.4397***	0.3086***	0.4877***	0.0977***	0.0550**	0.0739***	0.0352***	0.0298**	0.0022
	(0.1043)	(0.0977)	(0.1542)	(0.0177)	(0.0257)	(0.0168)	(0.0136)	(0.0130)	(0.0213)
Risk attitude	0.0578**	-0.0023	0.0507	0.0180	0.0269	0.0280	0.0419**	0.0218	0.0435
	(0.0267)	(0.0252)	(0.0390)	(0.0257)	(0.0378)	(0.0245)	(0.0194)	(0.0186)	(0.0301)
Trust level	-0.0388	-0.0264	-0.0791*	0.1401***	0.1108***	0.1205***	0.0517**	0.0379*	0.0072
	(0.0281)	(0.0266)	(0.0405)	(0.0282)	(0.0419)	(0.0268)	(0.0212)	(0.0203)	(0.0328)
Railroad	0.0477	0.0380	0.0060	0.2285***	0.2063***	0.1760***	0.1401***	0.0980***	0.1142***
	(0.0372)	(0.0350)	(0.0548)	(0.0353)	(0.0524)	(0.0337)	(0.0270)	(0.0259)	(0.0423)
Advertisement	0.1397**	0.1557***	0.1852**	0.2986***	0.3672***	0.1914***	0.1999***	0.1732***	0.2825***
	(0.0601)	(0.0571)	(0.0858)	(0.0725)	(0.0998)	(0.0679)	(0.0511)	(0.0488)	(0.0772)
Stock control practices	-0.2428***	-0.2797***	-0.1497**	0.1437***	0.2197***	0.1149**	-0.0604*	-0.1106***	-0.0095
	(0.0403)	(0.0382)	(0.0593)	(0.0487)	(0.0730)	(0.0465)	(0.0331)	(0.0319)	(0.0525)
Recording practice	0.5639***	0.4785***	0.2891***	0.4013***	0.2046***	0.3697***	0.4213***	0.3789***	0.2673***
	(0.0447)	(0.0418)	(0.0625)	(0.0402)	(0.0576)	(0.0384)	(0.0326)	(0.0312)	(0.0485)
Set of target sale	0.0782*	0.0731*	0.0539	0.1902***	0.0690	0.1336***	0.1542***	0.1050***	0.0852
	(0.0475)	(0.0444)	(0.0665)	(0.0467)	(0.0638)	(0.0445)	(0.0360)	(0.0345)	(0.0524)
Instrument	0.4952***	0.7381***	0.4594***	0.5129***	0.4840***	0.5450***	0.4909***	0.6192***	0.4593***
	(0.0440)	(0.0698)	(0.0539)	(0.0490)	(0.0620)	(0.0573)	(0.0344)	(0.0469)	(0.0423)
Observations	2,324	2,043	1,168	2,486	1,264	2,202	3,949	3,457	1,806
F statistics	49.2508	42.9376	24.4304	32.9158	25.5569	15.0835	82.9309	70.5446	35.2004
Region/State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	-	-	-	-	-	-	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Dependent Variable is employment opportunity which is measured by the number of permanent employees (log). Significant level; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Columns 1, 2, and 3 represent the result of 2017. Columns 4, 5, and 6 report 2019 results. Columns 7,8 and 9 represent the result of 2017 and 2019 (Pool). The dependent variable in the first stage is formalization (dummy). Other variables in 2sls are used in the first-stage regression in the same way. To take into account the likely correlation among firms in the city, standard errors that are clustered at the city level

The analysis also evaluates whether firm formalization influences the "quality" of employees within formalized firms by utilizing variables such as sales per capita, average salary, and skilled labor. The results of all OLS and IV estimations are displayed in Appendix (Tables B3, B5, and B6). The estimated coefficients are positive and statistically significant, indicating that formalization improves employees' quality as well as increasing wages.

Table (2.4) presents the 2SLS results, which are consistent with the first-stage probit results in Table (2.3). The pooled result of the 2SLS is higher than the first-stage probit result (column 7). The first-stage regression reveals a positive and substantial correlation between the number of tax inspectors visiting time and firm formalization at the 1% significance level. The size of the coefficient in the first-stage result obtained using the 2SLS approach is smaller than that of the first-stage probit. Overall, the findings indicate that firms engaging in formal registration are more likely to hire permanent employees.

Table 2.4: Employment opportunity and formalization; Instrumental variable approach 2sls

	2017			2019			Pool		
	(1) Total Employment	(2) Male	(3) Female	(4) Total Employment	(5) Male	(6) Female	(7) Total Employment	(8) Male	(9) Female
Formalization (Dummy)	1.3066***	0.7362**	0.7834**	0.7488**	0.9773**	0.7624	0.9091***	0.6961***	0.7668**
	(0.3599)	(0.3313)	(0.3652)	(0.3447)	(0.3889)	(0.5069)	(0.2485)	(0.2589)	(0.2984)
Firm age	-0.0851*	-0.0196	-0.0291	-0.0393	-0.0398	0.0248	-0.0413	-0.0121	0.0084
	(0.0498)	(0.0414)	(0.0659)	(0.0448)	(0.0410)	(0.0720)	(0.0335)	(0.0296)	(0.0484)
Male	-0.1281***	-0.0177	-0.0190	-0.0364	0.1040**	-0.0378	-0.0827**	0.0477	-0.0364
	(0.0491)	(0.0431)	(0.0603)	(0.0467)	(0.0432)	(0.0644)	(0.0336)	(0.0302)	(0.0430)
Education level	0.2035*	0.0224	0.3571*	0.1200***	0.0842***	0.0648*	0.0343**	0.0308**	-0.0024
	(0.1224)	(0.1073)	(0.1835)	(0.0213)	(0.0211)	(0.0344)	(0.0140)	(0.0132)	(0.0221)
Risk attitude	0.0299	-0.0134	0.0435	0.0609**	0.0678**	0.0515	0.0414**	0.0245	0.0453
	(0.0292)	(0.0261)	(0.0422)	(0.0283)	(0.0276)	(0.0446)	(0.0200)	(0.0188)	(0.0307)
Trust level	0.0833**	0.0272	0.0196	0.0511	0.0655**	-0.0031	0.0605***	0.0431**	0.0097
	(0.0340)	(0.0298)	(0.0476)	(0.0318)	(0.0313)	(0.0515)	(0.0224)	(0.0212)	(0.0339)
Railroad	0.1244***	0.0833**	0.1302*	0.0999**	0.0888**	0.0236	0.1292***	0.0988***	0.0890*
	(0.0435)	(0.0373)	(0.0706)	(0.0389)	(0.0381)	(0.0648)	(0.0288)	(0.0265)	(0.0485)
Advertisement	0.0769	0.1197*	0.1882*	0.2397**	0.1882**	0.2816**	0.1566***	0.1481***	0.2366***
	(0.0716)	(0.0657)	(0.1029)	(0.0931)	(0.0886)	(0.1433)	(0.0554)	(0.0525)	(0.0845)
Stock control practices	-0.0597	-0.1671***	0.0060	-0.0670	-0.0101	-0.0544	-0.0689**	-0.1125***	-0.0189
	(0.0438)	(0.0393)	(0.0638)	(0.0612)	(0.0601)	(0.1114)	(0.0345)	(0.0324)	(0.0546)
Recording practice	0.2018***	0.2593***	0.1063	0.4720***	0.3917***	0.2659***	0.3814***	0.3614***	0.2238***
	(0.0595)	(0.0526)	(0.0856)	(0.0518)	(0.0510)	(0.0924)	(0.0388)	(0.0365)	(0.0608)
Set of target sale	0.2053***	0.1718***	0.1101	0.1733***	0.0902*	0.1041	0.1775***	0.1168***	0.0966*
	(0.0552)	(0.0487)	(0.0772)	(0.0552)	(0.0547)	(0.0763)	(0.0385)	(0.0359)	(0.0539)
First Stage IV result									
Tax inspector visiting time	0.0344***	0.0342***	0.0465***	0.0438***	0.0375***	0.0445***	0.0438***	0.0375***	0.0445***
	(0.0047)	(0.0047)	(0.0075)	(0.0061)	(0.0059)	(0.0095)	(0.0061)	(0.0059)	(0.0095)
Observations	1,892	1,641	839	2,057	1,816	967	3,949	3,457	1,806
R-squared	0.0187	0.1362	0.1401	0.1380	0.0940	0.0629	0.0940	0.1216	0.0895
Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region/State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	-	-	-	-	-	-	Yes	Yes	Yes

Note: Dependent Variable is employment opportunity which is measured by the number of permanent employees (log). Significant level; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Columns 1, 2, and 3 represent the result of 2017. Columns 4, 5, and 6 report 2019 results. Columns 7,8 and 9 represent the result of 2017 and 2019(Pool). The dependent variable in the first stage is formalization (dummy). Other variables in 2sls are used in the first-stage regression in the same way. To take into account the likely correlation among firms in the city, standard errors that are clustered at the city level

2.5.3 Employment opportunity and formalization (Robustness check)

Since formal firms are non-random selection, the results could be biased in this study. To further examine the robustness of the findings a propensity score matching approach (PSM) is applied. PSM aims to determine the average effect of treatment (formalization, whether the firm is recognized as a registered firm) on the outcome variable - permanent employees. Each treatment group element is suitably paired with one (or more) control group elements and in this conditional sample, one may therefore infer that components of both groups display no systematic differences important to the selection process, as described by Arnold and Hussinger, 2005.

The results of wave (1) and (2) of the survey data are provided in Columns (1) and (2) of Table (2.5). The findings indicate that formalization is statistically associated with an increase in permanent employees. Column (3) presents sample pool results and estimation findings, revealing a favorable relationship between formalization and permanent employees. Column (4) in Table (2.5) examines the effect of formalization on total firm revenue, which may encourage firms to register. Columns (5) and (6) evaluate employee quality, and the results show that formalization is beneficial attributed with sales per capita and skill labor. All specifications of the matched results are similar as they were before. Thus, it can be verified that formal firms are more likely to foster new employment opportunities in terms of both quantity and quality while additionally increasing total sales as compared to informal firms in the Myanmar case.

Table 2.5: Employment opportunity and formalization; IV, first stage probit (matching)

	(1) EO_2017	(2) EO_2019	(3) EO_Pool	(4) Total Sales	(5) Sales per capita	(6) Skill labor
Formalization (Dummy)	1.1039**	1.7463***	1.3651***	1.9126***	1.2899***	1.4810***
	(0.4315)	(0.3709)	(0.3124)	(0.4279)	(0.4337)	(0.1051)
Firm size				1.2841***	-0.2548***	1.3795***
				(0.0599)	(0.0543)	(0.0272)
Firm age	0.0190	-0.0137	0.0102	0.0847**	0.0557	0.0586***
	(0.0350)	(0.0333)	(0.0244)	(0.0411)	(0.0373)	(0.0188)
Male	-0.1329***	-0.0068	-0.0757**	0.1215**	0.1254***	0.0014
	(0.0459)	(0.0424)	(0.0315)	(0.0533)	(0.0484)	(0.0240)
Education level	0.0488*	0.1369***	0.0398***	0.0807***	0.0537**	0.0222**
	(0.0269)	(0.0219)	(0.0147)	(0.0248)	(0.0225)	(0.0113)
Risk attitude	0.0407	0.0524*	0.0404*	0.1233**	0.0482	0.0925***
	(0.0295)	(0.0300)	(0.0212)	(0.0493)	(0.0447)	(0.0224)
Trust level	0.0464	0.0687**	0.0555**	0.0745**	0.0335	0.0093
	(0.0311)	(0.0336)	(0.0230)	(0.0358)	(0.0325)	(0.0162)
Rail Road	0.1777***	0.1044**	0.1488***	0.0885**	0.0490	0.0232
	(0.0417)	(0.0406)	(0.0291)	(0.0389)	(0.0353)	(0.0176)
Advertisement	0.1553**	0.2210**	0.1887***	0.1881**	0.1369*	0.0442
	(0.0643)	(0.0914)	(0.0531)	(0.0899)	(0.0815)	(0.0405)
Stock control practices	-0.0205	-0.0351	-0.0359	-0.0099	-0.0106	0.0181
	(0.0440)	(0.0593)	(0.0355)	(0.0601)	(0.0545)	(0.0274)
Recording practice	0.2719***	0.5492***	0.4544***	0.4298***	0.2435***	0.1411***
	(0.0548)	(0.0452)	(0.0349)	(0.0604)	(0.0547)	(0.0274)
Set of target sale	0.2034***	0.1672***	0.1715***	0.1685**	0.0640	0.0463
	(0.0551)	(0.0547)	(0.0391)	(0.0661)	(0.0600)	(0.0300)
Instrument	0.1631**	0.3110***	0.2083***	0.2045***	0.1899***	0.1663***
	(0.0665)	(0.0977)	(0.0550)	(0.0541)	(0.0550)	(0.0430)
Observations	1,649	1,792	3,441	3,441	3,441	3,441
Control	Yes	Yes	Yes	Yes	Yes	Yes
Region/State FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	-	-	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes

Note: Dependent Variables; Employment opportunity (EO), Total sales, Sales per capita and skill labor. Significant level; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. To take in to account the likely correlation among firms in the city, standard errors are clustered at the city level.

2.5.4 Total sales and formalization

Applying the same concept, tax inspectors visiting the firm is used as an instrumental variable for the firm's formalization. However, this time, firm sales are employed as the dependent variable to ascertain if firms indeed benefit from being formally registered.

To analyze the relationship between total sales and formalization, the following baseline regression is employed:

$$lny_{it} = \beta_0 + \beta_1 FF_{it} + \gamma X_{it} + \psi_j + \delta_r + \phi_t + \epsilon_{it} \tag{2.3}$$

Where y represents the total sales of the firm. Managerial capacity is also a crucial factor considered for enhancing firm performance. Data from the Myanmar survey reveals that approximately 12 percent of managers or owners in informal enterprises hold a Bachelor's degree, contrasting with 88 percent in formal enterprises. A firm managed by an educated manager or owner is more likely to increase overall sales, serving as evidence of human capability (La Porta and Shleifer, 2008).

This section discusses the findings regarding the association between formalization and firm sales. The findings indicate that formalized firms are positively and substantially related to growing overall sales. Additionally, reduced form regressions results are reported in Appendix (Table B2) to assess the relationship between exogenous variables and dependent variables (employment, total sales, and wages). Based on the sign of coefficient, the results confirm the presence of a positive relationship between the instrument variable and the dependent variable.

Table (2.6) reports the OLS estimates for total sales of the firm and firm formalization results. Columns 1–5 show that if an enterprise is officially registered, the firm's total sales are more likely to increase over time. The estimated results are consistent with previous studies (La Porta and Shleifer, 2008, La Porta and Shleifer, 20142; Ulysses, 2018; Fajnzylber et al., 2011) indicating that formalized firms tend to have substantially higher revenue. In column 1, control variables are not included; however, the sign and significant level remain consistent with columns 2–4, which incorporate control variables. Nevertheless, the coefficient is comparatively greater when potential omitting factors and endogeneity issues are disregarded.

Table 2.6: Total Sales and formalization (OLS)

Total Sales	(1)	(2)	(3)	(4)	(5)
Formalization (Dummy)	0.9562***	0.6870***	0.6771***	0.6795***	0.6358***
	(0.0687)	(0.0628)	(0.0628)	(0.0626)	(0.0621)
Firm size		1.4862***	1.4781***	1.4530***	1.3066***
		(0.0542)	(0.0541)	(0.0541)	(0.0551)
Firm age(ln)		0.0212	0.0063	0.0165	0.0155
		(0.0363)	(0.0365)	(0.0364)	(0.0360)
Male		0.1484***	0.1516***	0.1243***	0.1087**
		(0.0480)	(0.0479)	(0.0480)	(0.0474)
Education level		0.0855***	0.0869***	0.0878***	0.0890***
		(0.0228)	(0.0228)	(0.0227)	(0.0224)
Risk attitude				0.1402***	0.0883***
				(0.0316)	(0.0317)
Trust level				0.0802**	0.0656*
				(0.0345)	(0.0341)
Railroad			0.1638***	0.1692***	0.1567***
			(0.0448)	(0.0447)	(0.0441)
Advertisement					0.1835**
					(0.0825)
Stock control practices					0.0013
					(0.0541)
Recording Practice					0.4171***
					(0.0544)
Set of Target sale					0.1860***
					(0.0592)
Observations	4,260	4,260	4,260	4,260	4,260
R-squared	0.0435	0.2449	0.2473	0.2530	0.2741
Control	No	Yes	Yes	Yes	Yes
Region/State FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes

Note: Dependent Variable is total sale of the firm(log). Significant level; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. To take in to account the likely correlation among firms in the city, standard errors are clustered at the city level.

This study observes that regular tax inspector visits are vital in promoting the likelihood of firm formalization. Table (2.7) highlights this, exhibiting the results of the first stage regression, which show a positive and significant at the 1% level relationship between the number of tax inspectors' visiting time and firm formalization. Column (2) suggests that increasing the size of the firm supports the firm's total sale.

Table 2.7: Total sales and formalization; Instrumental variable approach, first stage probit

Total Sales	(1)	(2)	(3)	(4)	(5)
Formalization (Dummy)	2.2476***	1.7794***	1.7635***	1.7385***	1.7299***
	(0.1619)	(0.1598)	(0.1611)	(0.1630)	(0.1569)
Firm size		1.5548***	1.5516***	1.5388***	1.2969***
		(0.0550)	(0.0550)	(0.0550)	(0.0550)
Firm age (ln)		0.0217	0.0149	0.0233	0.0091
		(0.0371)	(0.0373)	(0.0373)	(0.0358)
Male		0.0462	0.0476	0.0283	0.1018**
		(0.0482)	(0.0482)	(0.0484)	(0.0471)
Education level		0.0194	0.0183	0.0177	0.0859***
		(0.0226)	(0.0226)	(0.0226)	(0.0223)
Risk attitude				0.1081***	0.0826***
				(0.0316)	(0.0315)
Trust level				0.0353	0.0700**
				(0.0345)	(0.0339)
Railroad			0.0740*	0.0746*	0.1415***
			(0.0450)	(0.0449)	(0.0439)
Advertisement					0.1874**
					(0.0823)
Stock control practices					-0.0070
					(0.0539)
Recording Practice					0.4125***
					(0.0542)
Set of Target sale					0.1868***
					(0.0588)
Instrument	0.5009***	0.4978***	0.4975***	0.4976***	0.4905***
	(0.0323)	(0.0326)	(0.0326)	(0.0327)	(0.0325)
Observations	4,260	4,260	4,260	4,260	4,260
Control	No	Yes	Yes	Yes	Yes
Region/State FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes

Note: Dependent Variable is the total sale of the firm(log). Significant level; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The dependent variable in the first stage is formalization (dummy). Other variables in 2sls are used in the first-stage regression in the same way. To take in to account the likely correlation among firms in the city, standard errors are clustered at the city level.

The availability of rail transport as an additional control is applied to determine whether adequate connectivity infrastructure can be attributed to higher sales levels. The findings reinforce these concerns (column-3). In columns 4 and 5, business practice and firm behaviour are controlled, as a firm with effective business practices and a willingness to take risks is more likely to increase its sales. Furthermore, the results in column (5) reveal that higher-educated managers and owners of enterprises are associated with

higher levels of total sales. As shown in Table (2.7), the number of tax inspectors visiting the enterprise offers the firm to be formalized, and formal firms profit more effectively from the favourable effect on total sales.

Table 2.8: Total Sales and Formalization; Instrumental Variable Approach 2SLS

Total Sales	(1)	(2)	(3)	(4)	(5)
Formalization (Dummy)	2.1803***	1.9206***	1.7482***	1.7104***	1.6345***
	(0.4061)	(0.3945)	(0.4031)	(0.4094)	(0.4092)
Firm size		1.3499***	1.3729***	1.3544***	1.2135***
		(0.0710)	(0.0712)	(0.0715)	(0.0680)
Firm age (ln)		-0.0976*	-0.0873	-0.0739	-0.0783
		(0.0533)	(0.0533)	(0.0536)	(0.0530)
Male		0.0596	0.0537	0.0303	0.0401
		(0.0574)	(0.0574)	(0.0576)	(0.0561)
Education level		0.0813***	0.0287	0.0283	0.0854***
		(0.0239)	(0.0230)	(0.0229)	(0.0231)
Risk attitude			0.0500	0.0524	0.1275***
			(0.0471)	(0.0469)	(0.0469)
Trust level				0.1458***	0.0808**
				(0.0333)	(0.0327)
Railroad				0.0367	0.0912**
				(0.0370)	(0.0366)
Advertisement					0.1335
					(0.0872)
Stock control practices					-0.0231
					(0.0565)
Recording Practice					0.3520***
					(0.0618)
Set of Target sale					0.2266***
					(0.0630)
First stage IV result					
Tax Inspector visiting time	0.0405***	0.0387***	0.0379***	0.0372***	0.0364***
	(0.0034)	(0.0035)	(0.0035)	(0.0035)	(0.0035)
Observations	4,260	4,260	4,260	4,260	4,260
R-squared	0.0305	0.1765	0.1796	0.1878	0.2298
Control	No	Yes	Yes	Yes	Yes
Region/State FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes

Note: Dependent Variable is the total sale of the firm(log). Significant level; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The dependent variable in the first stage is formalization (dummy). Other variables in 2sls are used in the first-stage regression in the same way. To take in to account the likely correlation among firms in the city, standard errors are clustered at the city level.

The 2SLS approach is employed to examine the determinants of firm formalization and total firm sales, with visit by tax inspectors to the firm as an instrumental variable.

After controlling for variables that might affect the firm's total sales, the results in column (5) of Table (2.7) using the first-stage probit coefficient method are comparatively larger than the results in column 5 of Table (2.8) using the 2SLS approach. Nonetheless, the empirical findings show an association between firm formalization and firm's total sales, and the sign and significance level of estimation from OLS and IV are consistent. However, the findings of IV estimations are significantly greater than the results of the baseline estimation, demonstrating that endogeneity generates a downward bias in our baseline estimate.

2.6 Conclusion

This research provides evidence that firm formalization in Myanmar contributes to the creation of permanent job opportunities and enhances enterprise performance, as assessed by overall total sales. Utilizing panel data from two years of the Myanmar Micro, Small, and Medium Enterprises Panel Survey, this paper reveals that formalization is associated with a higher likelihood of additional employment opportunities and a related increase in total sales at the firm level. Thus, this study underscores the importance of formalizing the informal sector in developing countries, as previously emphasized by (Babbitt et al., 2015).

Additionally, this study suggests that the function of the tax inspector is an essential variable in the firm's transition from informal to formal status. Similarly, research by De Andrade et al., 2016 suggested that while policymakers and researchers have focused on lowering the costs of formalization but have yet to pay much attention to the issue of costs to firms and the economy if they remain informal. Furthermore, they argue that there is potential for improvement in the enforcement level that regular tax inspections can foster.

According to the findings of this study, an increase in the frequency of tax inspectors visiting the enterprise influenced the decisions of entrepreneurs and firm owners to transition into formalized companies. Consequently, tax inspector visits result in a higher level

of understanding of the tax regime and what happens to the taxes recovered, including the benefits to both firm and employees. The detrimental impact of persisting informality, along with the variability within informal firms, is becoming increasingly recognized among the business community, employees, and consumers alike.

2.6.1 Policy Implication

Considering the initial hypotheses; that formal firms provide more secure job opportunities, that through registration informal firms are more likely to be able to boost firms' total sales, and that employees in formal firms receive higher compensation than in informal ones, the result of analysis subsequently supports all three assumptions. Therefore, these findings can be considered as having significant policy implications in the context of developing countries in relation to MSMEs, industrialization, and the labor market.

Formalization in the Myanmar context will provide additional well-paid job opportunities that would not be experienced if informality persists within the MSME sector. The finding suggests, in contradiction to other research, that public policy and public investments need to incentivise and facilitate firm formalization to advance the economy and the labour market. Similarly, government policy that intends to incorporate all MSME activity into the real economy through formalization will, as the resultant data reveals, boost firm profitability, contributing positively to economic growth.

Finally, in the context of social, economic development and well-being, the higher remittances identified further validate the prioritization of public policy to focus on the transition of firms from informal to formal status. Additional policy synergy will be afforded as formalization will ultimately result in improved revenue collection and the creation of new fiscal space.

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Chapter 3

Are Exchange Rate Uncertainties Adding Additional Barriers to Intra-ASEAN Trade and Investment Performance:

Do Free Trade Agreements Matter?

3.1 Introduction

Although a substantial body of research exists related to the exchange rate volatility and trade balance, consensus is yet to be reached on the associations between these two variables and the related monetary policies that countries opt to implement. Many governments enact policy to devalue currencies as an instrument to increase exports, improve their balance of trade and additionally to attract Foreign Direct Investment (FDI). Since disagreements remain abound in this area of research, the effect of exchange rate volatility and currency risk on trade balance and if such policy solutions through trade agreements should be sought remains an open question. Empirical findings that have attempted to verify the relationship between exchange rate risk and trade have been inconclusive (Latief and Lefen, 2018; Dellas and Zilberfarb, 1993), suggesting that most empirical research has failed to find a systematically significant relationship between exchange rate risk and international trade.

Much of the research inquiries were limited to high-income countries, particularly the USA after the devaluation crisis of 1971. since the emergence of early theory, subsequent empirical studies have broadened the focus to include analysis of the same intersections but for developing nations and the trade between high and middle-income countries. However, research that is narrowed to analyze the impact of exchange rate volatility and intra-trade flows within a single trading bloc that applies a regional free trade agreement and where currency union is not applied is limited.

The ASEAN member states (AMS), as a single trading bloc, have experimented with several exchange rate regimes since the 1990s (Aflouk et al., 2016). This study, with its focus on ASEAN and all AMS, revisits previous theory but examines the relationship between intra-trade that is confined within a trading bloc and the exchange rate volatilities of multiple currencies used within that bloc. It determines if intra-ASEAN trade and external trade reacts the same to the effects of currency risk as seen in other examples.

This research further examines if differences in this interconnection are apparent between high-income and the other ASEAN nations in the context of fluctuation in exchange

rate through monetary policy. This study employs a moving average historical standard deviation to measure exchange rate volatility across all ten ASEAN currencies facilitates the confirmation that exchange rate uncertainty affects intra-ASEAN trade. Furthermore, the analysis explores the effects of exchange rate uncertainty on Foreign Direct Investment (FDI) inflows, aiming to determine, whether associated currency exchange rate uncertainty attract increased FDI flows.

Since ASEAN comprises a mixture of economies in different stages of maturity, exchange rate uncertainties are considered to act differently. Hall et al., 2010 suggested that there are grounds to suspect that the consequences of exchange-rate volatility on emerging economies' exports may differ from those of other developing nations' exports. The study investigates this phenomenon collectively, considering its implications on the broader context of international trade within the specified region. Adistya et al., 2022 observed that volatility in the country's currency exchange rates mirrored changes in economic conditions, particularly in nations in the Southeast Asia area.

The results of this study reveal if and under what conditions exchange rate volatility influences intra-ASEAN trade flows. The applied empirical analysis of exchange rate volatility within ASEAN, i.e., referencing the impacts of multi-currency trade transactions in ASEAN on trade flows, seeks to answer the question: "how currency exchange rates volatility affects intra ASEAN export in the short and long term, do the implementation of free trade agreements favorably impact the relationship between exchange rate volatility and intra export? And Does exchange rate risk have a beneficial effect on foreign direct investment?

Empirical findings suggest that stronger free trade agreements within the bloc have beneficial effects on exports despite presence of exchange rate volatility. The findings propose that exporters in the region do not perceive such volatility as a significant trade concern. The increase in export levels is observed as a strategy to mitigate revenue losses associated with increased risks of currency exchange fluctuations (Kasman and Kasman, 2005). In addition, the results across all specifications show that a positive long-term impact of exchange rate volatility on FDI. Given the uncertainty surrounding exchange

rates throughout the investment life cycle, these risks can potentially yield positive effects, as they may result in higher returns.

This study contributes to the existing trade theory literature by examining the true relative cost of currency risk within a free trade bloc. Its primary contribution lies in exploring both short-term and long-term relationships between exchange rate uncertainty and intra-ASEAN export and investment performance, employing a combination of ARDL and the Error Correction Model. The analysis focuses on the ASEAN free trade bloc, some insights into the complex dynamics of the relationship between exchange rate uncertainties, intra-regional exports, and FDI. It also explains how FTAs have a substantial impact on the decision-making behavior of exporters and investors. Despite the region's adherence to AFTA, which should theoretically promote higher levels of intra-ASEAN trade, this research provides insights into the practical implications of these agreements.

The methodological approach employed in this study is constrained by data limitations. Consequently, defining solutions that can effectively interpret exchange rate risk in the context of trade and investment across countries within the region poses a challenge.

3.2 Background

3.2.1 ASEAN, a brief description

The Association of Southeast Asian Nations (ASEAN) comprises of ten nations that have formed a regional free trade bloc and one of the most productive regions globally. ASEAN is characterized by its member states' broad social, economic, and cultural diversity. Some countries are classified as either OECD or higher middle-income countries, while three are in the final graduation process from least developed country status.

ASEAN plays an important role as a global trading and manufacturing hub in international merchandise with trade flows expanding by more than three and a half times since 2000, reaching a value of USD 3.8 trillion (2022).

3.2.2 The role of ASEAN in merchandise trade

The regional ASEAN Free Trade Agreement (AFTA) defines the role of ASEAN in global merchandise trade and Intra-ASEAN trade. Although the AFTA entered into force in 1992, its implementation has differed from other regional trade agreements, with less abrupt impacts being witnessed in terms of intra-ASEAN trade flows.

These slower changes are typified, in part, by the positioning of each member state in terms of geodetic location, the strength of their financial sectors and individual integration into fragmented production networks. However, one such factor, which lies at the heart of the current ASEAN intra-trade reform initiatives and a cornerstone of the AFTA is the elimination of non-tariff measures (NTMs). These measures have evolved over time, previously implemented in various forms to effectively establish new areas of protectionism and maintain monopolistic advantages.

The relevant economic indicators for ASEAN are presented below. The most populous countries being Indonesia, followed by the Philippines and Vietnam. GDP per capita ranges from a low of USD 1,314 (Myanmar) to a high of USD 72,388 (Singapore), thereby setting the economic classification of each AMS.

The AMS do not participate within a single currency union, using their own sovereign currencies, for which they apply different exchange rate mechanisms. The four systems that are deployed being, a floating regime (Indonesia, Malaysia, Philippines and Thailand), whereby the exchange rate is not controlled nor influenced by the monetary authorities or the government. It is considered that the floating mechanism relies only on market forces and determinations. However, all governments at some stage and to different levels do interfere with their own currency valuations.

Table 3.1: Relevant ASEAN economic indicators

Country	Population (millions)	GDP (US$ million)	GDP (per capita)	Economic Classification	Exchange rate arrangement explain*
Singapore	5.453	394,578	72,399	High Income	Stabilized arrangement (Composite)
Brunei Darussalam	0.430	13,924	32,383	High Income	Currency board (hard pegs)
Malaysia	32.576	372,770	11,399	Upper Middle Income	Floating
Thailand	65.213	505,890	7,645	Upper Middle Income	Floating
Indonesia	272.248	1,185,776	4,348	Upper Middle Income	Floating
Vietnam	98.506	361,962	3,674	Lower Middle Income	Crawl-like arrangement
Philippines	110.198	393,612	3,552	Lower Middle Income	Floating
Lao PDR	7.337	19,635	2,693	Lower Middle Income	Crawl-like arrangement
Cambodia	16.592	27,164	1,603	Lower Middle Income	Stabilized arrangement (USD) (soft pegs)
Myanmar	55.295	72,862	1,314	Lower Middle Income	Other managed arrangement

Sources: ASEAN Statistical Yearbook (2022) IMF annual report (2022) and W.B. Country Classifications (2022) Note: * floating regime (exchange rate is not controlled nor influenced by the monetary authorities or the government), stabilized arrangements (Singapore and Cambodia) offer a fixed stable exchange rate against either a basket of currencies or a single currency, crawl-like arrangement (reset the exchange rates at regular intervals, often on a weekly basis)

Stabilized arrangements (Singapore and Cambodia) offer a fixed stable exchange rate against either a basket of currencies or a single currency. The currency rates are fixed over a specific period but are allowed to fluctuate over a very narrow band (in the region of +/- 2 percent). Typically, a country that operates such a regime commonly holds high levels of reserves of its main trading partner(s).

The crawl-like arrangement regimes employed by Vietnam and Lao PDR are pegged regimes, typically pegged against the US Dollar. Unlike stabilized pegged arrangements, these regimes allow for wider fluctuation spreads. Furthermore, countries adopting crawl-like arrangements must reset the exchange rates at regular intervals, often on a weekly basis.

With the exchange rate regimes mentioned above being utilized across ASEAN, this study has compiled data that benchmarks all AMS currencies against the US dollar. The analysis is based on a 30-year time series, utilizing monthly figures.

3.2.3 Integrated ASEAN production

ASEAN recorded trade in goods with the world at USD3.8 trillion (2022) comprising of imports totaling USD 1.883 trillion and exports totaling USD 1.961 trillion. The productive sectors of ASEAN countries rely significantly on one another for critical resources, components, machine tools and products such as electrical machinery, and mineral fu-

els. Intra-ASEAN trade accounts for 21.3% (ASEAN statistical highlight, 2022) of the region's total merchandise trade, making it one of the most important facets of the ASEAN socio-economic union.

The industrialization and development of ASEAN has been spurred by the trends of fragmented global production, leading to production integration of ASEAN into many value chains. However, Zhong and Su, 2021, in a recent study, found that ASEAN related international fragmented production has declined given the impacts of the 2021 pandemic and reduced consumption in western markets but has been counter-balanced by greater levels of regional consumption and production as identified through increased intra-ASEAN trade. The same study offers that this production shift is further complimented through the positive move of ASEAN towards deeper and advanced global economic integration, being driven by services and primary industry sectors.

The report suggests that such production shifts are because of the advancement of the ASEAN economies, enhanced ASEAN business capacitances, new workforce capabilities and shifts in global production patterns. Such findings are subsequently strengthened through this study which reports the growth in intra-ASEAN trade flows, are contrary to the study by Los et al., 2015.

3.2.4 Intra-ASEAN trade

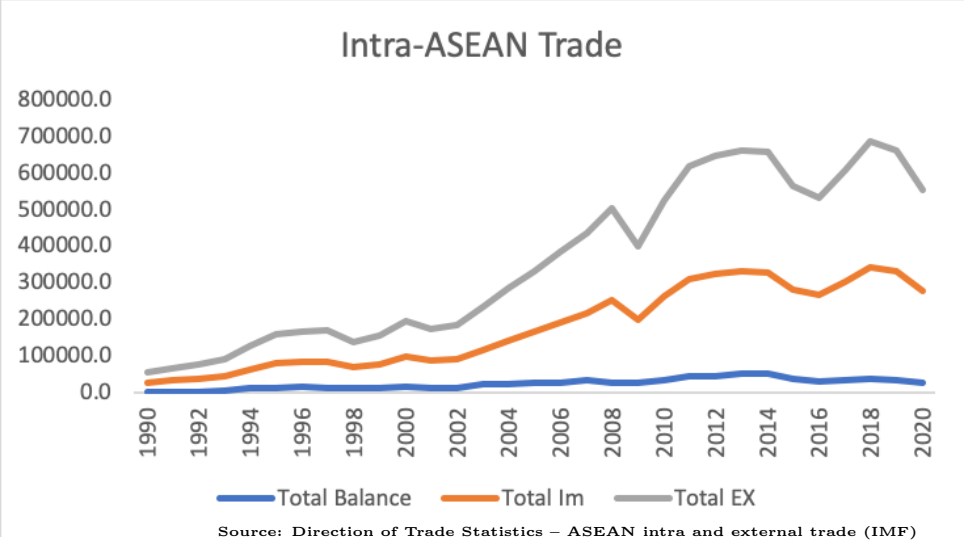
A crucial aspect of enhancing internal trade within ASEAN involves harmonization, which entails improving economic activities across participating countries . This includes ensuring the free movement of goods and services, enhancing trade efficiency and competitiveness, and reducing the burdens of legislative inconsistencies. Deeper economic integration and development are being promoted by allowing free flows of capital and labor that mitigate growth barriers, such as technical know-how and productivity enhancements. Trade facilitation provides an opportunity to reduce further impeding regulations viz a viz the harmonization of legislation, standards, and practice.

As highlighted in the cases of ASEAN and the European Union's expansion of internal trade, subsequent increases of the combined regional economic growth rate has been achieved through the narrowing of member states' trade imbalances. Intra-trade benefits for both firms and consumers alike are experienced due to a lesser monopolistic market, the increased availability of varieties of products, thereby improving competitiveness, and lowering costs.

Karunaratne, 1998 study of Thailand's trade confirmed that improved trade liberalization produced an across-the-board tariff reduction with its trading partners. However, it was noted that trade frictions resulting from currency risk (volatility) would generate individual state-oriented growth, promoting income and purchasing power inequality amongst the same partners. The promotion of intra-trade within a formal institutional arrangement comprising a diverse set of member countries that internally carry existing complications leads to the distribution of unfair trade earnings.

This study proposes the strengthening of free trade agreements contribute towards the mitigation of exchange rate uncertainty on intra-exports. As illustrated below, total internal trade has generally increased since 1990, while the data reveals exports are relatively higher than imports suggesting a status quo of the trade imbalance amongst all AMS. Despite the existence of currency volatility, internal trade flows within the region are seen to be growing over time in Figure-3.1, presenting the possibility of potential improvement of intra-trade is likely to be seen without the barrier of exchange rate uncertainty. The data demonstrate that there is no convergence of total imports and total exports shown, given issues with harmonized reporting and logging of trade data as different methodologies and processes are deployed by each member state.

Figure 3.1: Intra ASEAN Trade



3.2.5 Unevenness within the ASEAN free trade bloc

Considering ASEAN functions as a major global free trade area that is underscored through the AFTA (1992), significant variances in the context of the performance of member states' trade balances, currencies, and macroeconomic indexes are seen. These features help to identify the differences in the cost of exports that are, in some cases, impairing the ability of domestic firms in some member states to enter the intra-ASEAN export markets. This is contributing to widening intra-ASEAN trade gaps as highlighted in research that details the industrialization patterns of selective AMS (Haraguchi et al., 2017).

3.3 Literature Review

Most of the research in the relationship between exchange rate uncertainties and the balance of trade area has been conducted from the perspective of the advanced economies in particular the USA and the EU, the latter being a homogeneous trade bloc that uses a single currency. Empirical research on trade and exchange rate risk effects has resulted in contrary findings, demonstrating that exchange rate volatility can have both beneficial and detrimental impact on exports (Sharma and Pal, 2018; Latief and Lefen,

2018; Broll and Eckwert, 1999; Taglioni 1, 2002; Hall et al., 2010; Bosupeng et al., 2024). In accordance with the findings of Hall et al., 2010, the effects are attributed to economic agents' risk aversion, the availability of hedging alternatives, and the prevalence of other types of business-related risks.

3.3.1 The effects of changes in exchange rate

Although the results of this study do not reveal the effects of exchange rate changes on trade, it is beneficial to review the literature on asymmetric effects. Bosupeng et al., 2024 pointed out the link between asymmetric impacts and volatility in their study of the relationship between exchange rate volatility and trade. The authors explore whether changes in exchange rates have differing effects on the trade balance depending on whether the exchange rate appreciates or depreciates, while also considering how volatility in exchange rates may influence these effects.

Magee, 1973 highlighted the effects of exchange rate changes in the short run on the balance of U.S. trade and the latter trade balance impacts created after quantity responses took effect (long-run effects). The research being based on the devaluation of the USD and the subsequent delinking of the USD to gold revealed a phenomenon that applies to a country's trade balance when currency devaluation occurs in that it worsens before it improves. According to Magee, currency depreciation has a negative short-run effect on trade balances but a positive long-run effect. Contrary, recent papers (Rose and Yellen, 1989) argued against Magees' findings. Using American data comprising a twenty-five-year time series, they could not find statistically reliable evidence to support the concept of stable short-term and long-term effects. However, it is noted that the US does not represent a small open economy as defined by Khan et al., 1991.

Rahman and Mustafa, 1996 offered similar views on the subject and re-examined the effects of nominal exchange rate changes in US on bilateral trade with India, Japan, Malaysia, South Korea, and Thailand. Their findings revealed no evidence to support the Magees' hypothesis except for the case of trade between the US and Japan (both classified as high-income countries).

Bosupeng et al., 2024 explores changes in exchange rates have differing effects on the trade balance depending on whether the exchange rate appreciates or depreciates, while also considering how volatility in exchange rates may influence these effects. Bosupeng et al., 2024 suggested that exchange rate policies should be adjusted to align with exchange rate volatility, with the aim of leveraging volatility to enhance the positive effects of an exchange rate shock. This strategy necessitates effective coordination with each country's monetary policy transmission mechanism.

3.3.2 The single market impacts of exchange rate volatility on intra-trade flows

Over the last decade, data reveals the existence of exchange rate differences and volatilities of the ASEAN currencies when analyzed against the U.S. dollar, suggesting that the shaping and influencing of national currency exchange rates by the domestic policies has been prevalent. The variations of exchange rates over given timeframes for each ASEAN economy benchmarked against the USD led to differentiation in the cost of capital for domestic firms. These higher costs of capital subsequently induced lower domestic investment rates and hence impacted upon exports. Taglioni 1, 2002 revealed that exchange rate uncertainty exerts a negative impact on trade within a multi-country, multi-currency setting. By examining 12 EU nations (1976 to 1995) and employing a panel estimation approach, exchange rate uncertainty significantly affected intra-EU trade. Additionally, exchange rate volatility in a single market imposes additional costs on risk-averse market participants that, in turn, respond by favoring margin trading positions, thereby limiting market growth and competition (Hooy and Choong, 2010). On the contrary, this study shows that after implementing free trade agreements, exchange rate volatility has had a beneficial impact on intra exports in the case of ASEAN countries.

Studying this phenomenon specifically in the Intra-Asia context, H. C. Tang, 2014 found that the lack of exchange rate flexibility has gained significance as a major factor contributing to global trade imbalances. This study establishes that the trade imbalances among the ASEAN countries depend not only on the level of development of the member

countries but also by the utilization of ten different currencies and their relative strength against the USD.

Thus, the monetary policy and the flexibility of the exchange rate regime of a country that operates within a free trade bloc is a "critical stimulation factor" for trade growth. Exchange rate differentials influence the level of risk which is being taken by traders and producers. This risk is crucial for firms to make long-term decisions related to trade since exporters and importers apply an opposite consideration of currency risk. This study demonstrates that, to counteract these challenges, policies that adjust exchange rates and foster a flexible regime are required to establish favorable parameters, ensuring gains from both trade directions. These are the underpinning conditions found across ASEAN as member states strive to maintain a status quo regarding competitiveness and trade balances with other member states.

3.3.3 Currency uncertainty and Foreign Direct Investments

Foreign Direct Investment (FDI) has been steadily increasing year-on-year in ASEAN countries, contributing to an increase in export performance, notably in the manufacturing sector (Handoyo et al., 2023). This outlook is substantiated by sustained high-level of investment flows into the region. Notably, in 2020, amidst profound global economic challenges, ASEAN attracted an impressive USD 70 billion in new investments (ASEAN Secretariat, 2021). Multinational corporations often invest in the region to leverage cost-effective production and gain access to emerging markets. Many economies have developed a symbiotic link between FDI inflows and export growth.

Handoyo et al., 2023 suggested that due to the inherent risks that relate to currency exchange rate fluctuations it is critical to realize that such export operations are molded by the interaction of both risk-averse and risk-taking behaviors. The effect of currency uncertainty on investments (risk) is a core consideration for all investments. In the context of the uncertainty of exchange rates over the life cycle of an investment these can have a positive effect, where such risks can lead to higher returns or negative effects where the same risks will render the investment valueless. According to Dhakal et al.,

2010), a depreciating exchange rate can either benefit or harm foreign investors. The authors identify that a depreciating exchange rate, for example, may promote exports and generate profits from resource-seeking FDI. When currencies devalue, foreign investors may experience negative effects because of the costs necessary to avoid transaction and translation losses.

The uncertainty of currency exchange rates infrequence FDI decisions following the methodology defining optimal investment under uncertainty (Abel, 1983). Abel's work reveals the positive effects of uncertainty on investments in that increased profits are seen as exchange rate volatility increases. It can also be assimilated to the FDI exchange rate volatility (currency risk) given that investors often seek additional returns through currency transactions. FDI as a percentage of GDP is considered within the research with exchange rate volatility to ascertain how much contribution is provided through FDI flows towards economic activity and national growth. Cross-country analysis is performed to determine the associations between FDI and currency volatility.

3.3.4 The role of regional free trade agreements

Free Trade Agreements (FTA) can lead to either the enrichment or creation of trade or reduce or divert trade. Trade is enhanced when the FTA positively impacts on internal trade flows without disrupting external ones. In the context of diversion, the positive impacts of internal trade flows are at the expense of external flows (Dalimov, 2009).

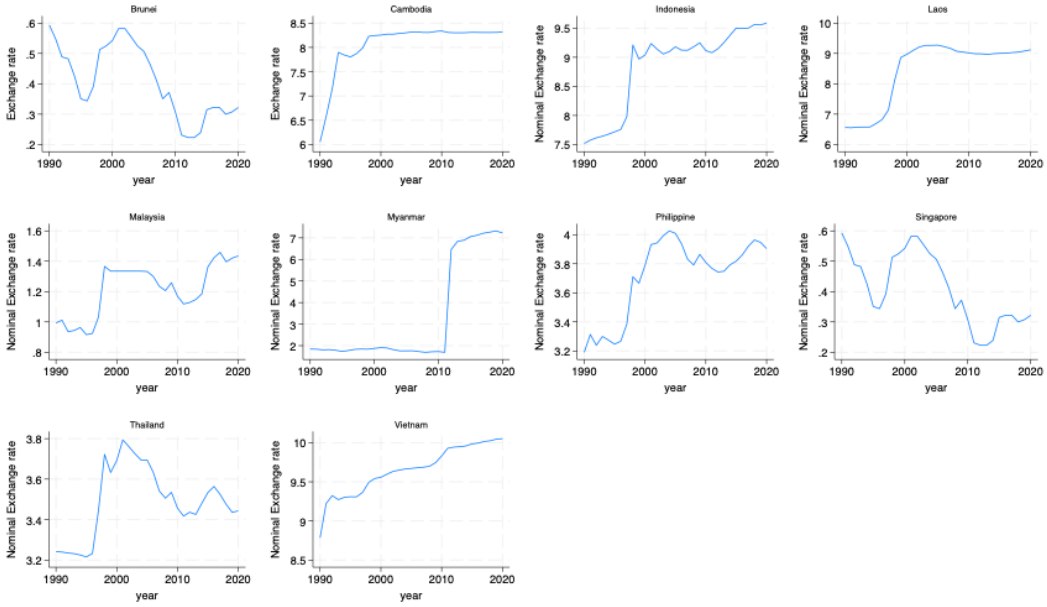
Regional Free Trade Agreements (RFTA) were popularized post WTO Uruguay (2004), with all WTO member states apart from being engaged in such arrangements. The ASEAN FTA, like other RFTAs are discriminatory in their nature, as they allow for free trade movements internally without tariffs and elongated customs procedures but externally allow the signatories to individually apply trade barriers to external trading partners. Examining the impacts of the ASEAN FTA, Calvo Pardo et al., 2009 found the following key points of differentiation when compared against other regional trade agreements.

The liberalization of internal trade being unlike that found in other agreements, has been slower with gradual change taking place. This being linked to the different tariff adjustments made to specific products and the speed of implementation. Overall, the study concludes that the AFTA has increased intra-trade flows between the AMS and in parallel has not negatively impacted external trade flows, as internal trade liberalization has also stimulated the reduction of ASEAN wide tariffs and barriers, providing a benefit to external trade. Thus, the AFTA is an important consideration when analyzing the currency exchange rate volatility and trade flow nexus.

3.4 Data and Methodology

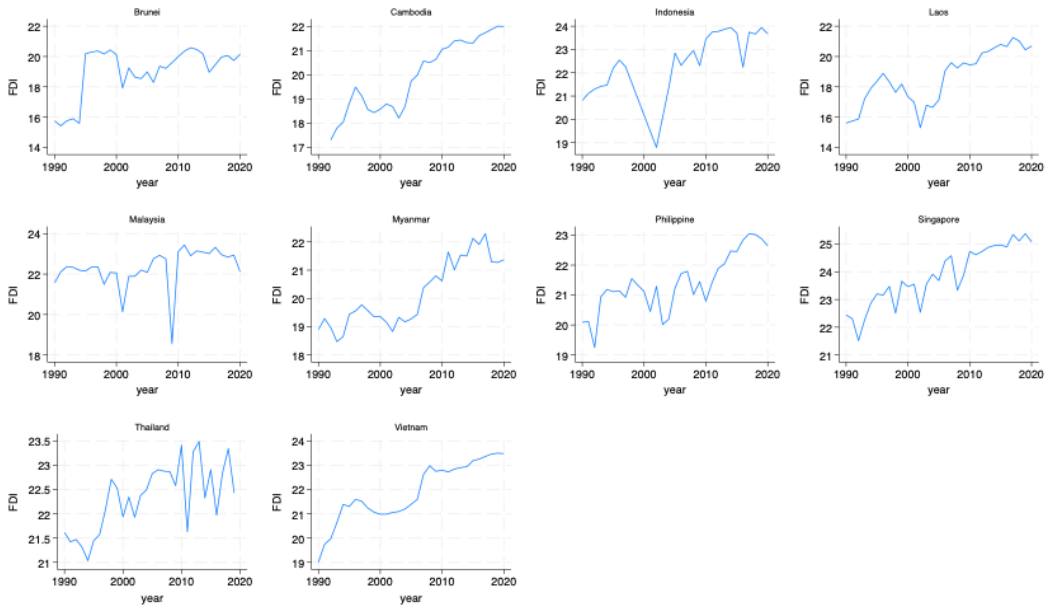
Whereas many previous studies specific to the region have been limited to analyzing trade between the leading 5 ASEAN countries and an external partner, this paper studies ASEAN as a whole and the internal trade among the member states. The extent that exchange rate uncertainty affects Intra-ASEAN trade is examined by considering only the internal AMS exports. Since it is found that USD is used for most of these trade transactions, exchange rate changes between AMS currencies and the USD allow monetary policies to be utilized as an instrument for boosting competitiveness and market share based in alignment to previous theories. This study is closely related, methodologically, to previous studies, such as H. C. Tang, 2014 , who considered how exchange rate volatility can affect intra-trade based on types of goods and commodities. Figure 3.2 and Figure 3.3 illustrates the exchange rate varies over time among the ASEAN countries and the net FDI inflows among the ASEAN countries respectively.

Figure 3.2: ASEAN Exchange Rate vs U.S. Dollar



Source: Direction of Trade Statistics

Figure 3.3: ASEAN FDI net inflows



Source: World Development Indicator (WDI)

3.4.1 Data

To determine the impact of exchange rate uncertainty on ASEAN intra-regional trade flows, the associated volume of the exports covering 1990-2020 years is used, sourced from the Direction of Trade Statistics (IMF). GDP, inflation, interest rate, political stability

and FDI as a percentage of GDP sourced from World Development Indicators are applied as control variables. The exchange rate is referenced from International Financial Statistics (IFS/IMF). Inflation data acts as a control for economic changes in which exchange rate, domestic price, and foreign price impact the flow of investment. To measure the volatility of the exchange rate, the monthly figures for each ASEAN currency is utilized, sourced from International Finance Statistics (IFS/IMF).

Previous studies provide no empirical consensus on which statistical measure to employ to quantify exchange rate volatility. It is widely contested in the literature whether real or nominal exchange rate volatility measurement is appropriate for analyzing the impact of exchange rate volatility on international trade (Sharma and Pal, 2018). The authors suggested that a volatility estimate based on real exchange rates only partially captures price changes. It becomes difficult to distinguish the risk influenced by other factors that impact both local and foreign pricing. Applying such assumptions, the nominal exchange rate is used to estimate volatility of the AMS currency to understand the impact of exchange rate volatility on intra-ASEAN trade flows.

This study also examines the relationship between foreign direct investment as a percentage of GDP and exchange rate volatility. Such analysis allows for a better comprehension of the comparative importance of FDI between the AMS and how much it contributes to a country's economic activity and growth.

3.4.2 Volatility

Volatility, a statistical estimation, can be measured various approaches. One such method is the "moving average standard deviation," which assesses exchange rate uncertainty, representing the irregular pattern of variation over time for a given variable. Utilizing nominal exchange rates for each ASEAN Member State (AMS), this approach calculates cross-country variations among the ten individual currencies and the USD. However, employing nominal exchange rates creates the series nonstationary. Following the methodology outlined by Abdullah et al., 2017, the series is transformed into the rate of return on exchange rates through a logarithmic transformation using the provided formula.

$$R^{ER}_{(t,s)} = \ln\left(\frac{ER_{(t,s)}}{ER_{(t,s-1)}}\right) \approx \frac{ER_{(t,s)} - ER_{(t,s-1)}}{ER_{(t,s-1)}} \tag{3.1}$$

Where $R^{ER}_{(t,s)}R$ is measured as the rate of return of the exchange rate, t,s refers to monthly time intervals, $ER_{(t,s)}$ is the nominal exchange rate of the local currency for ASEAN countries against USD at period t,s, and $ER_{(t,s-1)}$ is the nominal exchange rate at period (s-1).

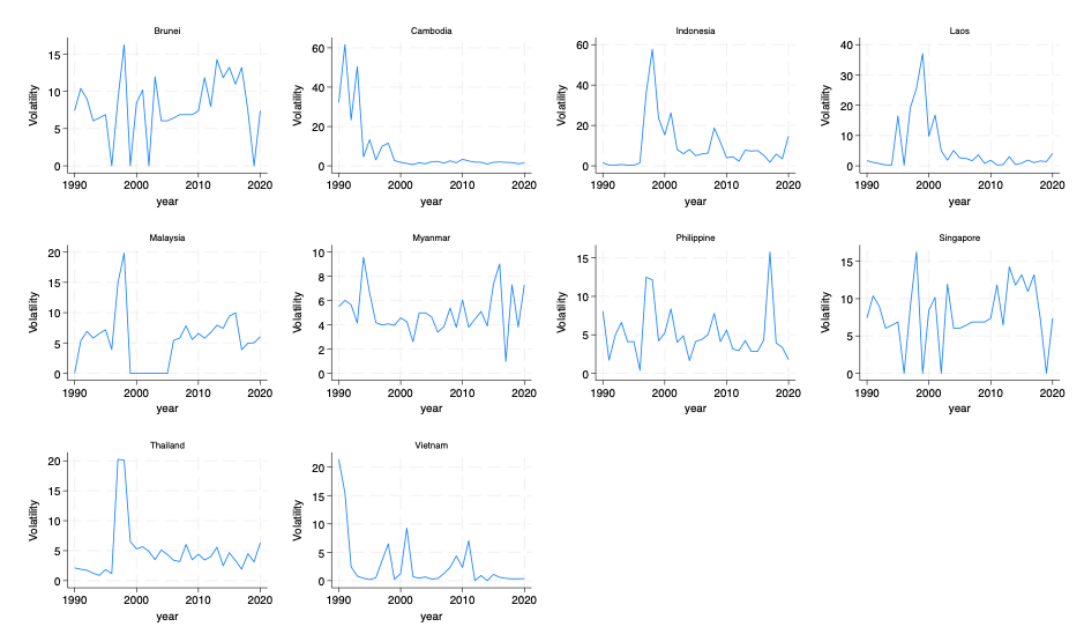
Following previous literature (Ekanayake and Dissanayake, 2022; Kasman and Kasman, 2005; Chowdhury, 1993; Arize, 1995), the volatility of the exchange rate is measured by the following equation.

$$V_t = \sqrt{\frac{1}{12-1}\sum_{i=1}^{12}\left(R^{ER}_{(t,s)} - \overline{R^{ER}_t}\right)^2} \tag{3.2}$$

Where V_t is the annual exchange rate volatility, 12 is the order of the moving average. $R^{ER}_{(t,s-i)}$ is the monthly nominal exchange rate (square return), and $(\overline{R^{ER}_t})$ is the annual mean return of the monthly nominal exchange rate. In this study, volatility is annualized by utilizing monthly returns and employing a 12-month window, which corresponds to one year. After obtaining the standard deviation, it is adjusted to reflect an annualized data. This adjustment ensures that the volatility measure is expressed in annual terms.

Figure 3.4 illustrates the volatility of the exchange rate over time for each ASEAN country.

Figure 3.4: ASEAN Exchange rate volatility



Source: Author's calculations

Table 3.2 provides the descriptive statistics for ASEAN.

Table 3.2: Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
Intra export	8.373	2.034	3.235	11.775
FDI (% of GDP)	5.277	5.492	-2.757	29.761
Volatility	6.211	7.578	0.0	61.58
Exchange rate	4.755	3.585	0.223	10.052
GDP (ln)	24.57	2.324	-0.106	29.698
Inflation	6.427	11.714	-2.3	125.3
Interest Rate	3.83	7.166	-42.1	35.42
Political Stability	-0.112	0.79	-2.095	1.616
Free Trade Agreements	0.71	0.455	0	1
Crisis (Asia)	0.032	0.177	0	1
Crisis (Global)	0.032	0.177	0	1

Source: Author's compilation
Note: Intra-ASEAN exports refer to the volume of exports traded among ASEAN countries. The data source is the Direction of Trade Statistics from the IMF. Foreign Direct Investment (FDI) is expressed as a relative percentage of GDP, sourced from the World Bank. Volatility is assessed using a moving average standard deviation approach based on exchange rates, with exchange rate data obtained from the IMF. GDP, inflation, interest rates, and political stability data are sourced from the World Bank. Political stability is measured using a country's rank score, ranging from approximately -2.5 to 2.5.

3.4.3 Methodology

This study examines how the volatility of the exchange rates can significantly impact the level of intra-ASEAN exports and global investment flows (FDI) that are driving the rapid growth of the AMS. Heterogeneity among countries is likely to manifest its effects primarily in the short run. For instance, the impacts of global or Asia-specific crises may vary across nations, influencing their developmental trajectories differently.

Conversely, the anticipation is for a more homogeneous impact across ASEAN countries in long-run structures. The accompanying quantitative methodology determines the factors that have driven economic development by minimizing intra-trade balances using effective trade policy and reducing the exchange rate risk. This study references previous studies that investigated the relationship between exchange rate volatility on exports, such as (Ekanayake and Dissanayake, 2022; H. C. Tang, 2014; Hooy and Choong, 2010; Hall et al., 2010) and trade dynamics (Kohn et al., 2021; Bergin et al., 2018). By analyzing cross-country (ASEAN) evidence it can be ascertained to what extent the volatility of exchange rate affects the intra ASEAN exports after controlling for other key determinants particularly in considering the regional AFTA and the two financial crises, ASEAN (1997) and global crisis (2008). The following static model specification is employed for estimation.

$$y_{it} = \beta_0 + \beta_{1i} ER_{it} + \beta_{2i} V_{it} + \gamma_i X_{it} + \alpha_i + \phi_t + \epsilon_{it} \tag{3.3}$$

Where i denotes countries, t is time, y is the dependent variable, intra export is measured total intra export within the region, ER. is the exchange rate across countries, and X is a set of control variables. V is the measured volatility of the exchange rate. In the equation, X refers to the set of control variables such as GDP, inflation, interest rate, political stability, free trade agreements, and Asia and global crisis. α and ϕ capture the country and year fixed effect, ϵ is a zero-mean error term. Inflation is used as a proxy variable for the consumer price index (CPI).

The limitations of static panel approach become evident when considering the dynamic nature of the data. While these estimation techniques, namely fixed effects, and random

effects models, effectively handle structural heterogeneity by accounting for individual-specific intercepts or time-invariant characteristics, they impose a limitation by assuming uniform slope coefficients across countries. This indicates that, despite the acknowledged differences among nations, the static panel approaches enforce a consistent relationship between independent and dependent variables across all countries. This limitation, as highlighted by Samargandi et al., 2015, underscoring the need for alternative modeling approaches that can better capture the complex and changing characteristics of the data.

To examine both the short-run and long-run relationships among the variables, equation (1) is modified to incorporate an error correction specification, employing the Autoregressive Distributed Lag (ARDL) model with lag orders (p, q) (Pesaran et al., 1999). The Akaike Information Criterion (AIC) is employed to determine lag orders for each country, beginning with a general ARDL (1, 1, 1, 1, 1, 1, 1,1,1) specification outlined by Pesaran et al., 1999. Building upon prior literature recommendations proposed by Loayza and Ranciere, 2006, considering the limitations of a restricted number of time-series observations, it is recommended to refrain from excessively expanding the order of the Autoregressive Distributed Lag (ARDL) model as this would impose undue parameter requirements on the available data. Given that the primary focus of this research is on the long-run parameters, the study opts to adopt a common lag structure across countries.

The ARDL model offers a distinct advantage in that it allows for the specification of the coefficients representing the long-run relationships among variables, while simultaneously accommodating the variability of short-run effects across different countries. The statistical approach yields more reliable short run and long run coefficient estimates, reducing the issues associated with misleading regressions (Arize, 1995). The Error Correction Model (ECM) is frequently employed in macroeconomics to examine the relationships between economic variables, the short-run and long-run consequences of shocks or policy changes. The following model specification is used to estimate the short-run and long-run impacts of exchange rate volatility on trade (Ekanayake and Dissanayake, 2022; Hooy and Choong, 2010).

$$\Delta y_{it} = \beta_{0i} + \sum_{j=1}^{p} \phi_{ij} \Delta y_{it-j} + \sum_{j=0}^{q} \theta_{ij} + \Delta ER_{it-j} + \sum_{j=0}^{q} \varphi_{ij} \Delta V_{it-j} + \sum_{j=0}^{q} \delta ij \Delta X_{it-j} + \vartheta_i EC_{it-1} + \alpha_i + \phi_t + \epsilon_{it} \tag{3.4}$$

Where Δ is the first difference operator, y denotes intra export, p is associated with the lag-dependent variable, and q is associated with lag regressors. EC_{t-1} is the lag error correction term. Using the error correction procedure, it can be determined whether there exists convergence between intra ASEAN exports and exchange rate volatility in the long term. The error correction model determines long-run equilibrium convergence in which the convergence exists if there is an error coefficient is between zero and minus one. To resolve the problem of heteroskedasticity and autocorrelation, the panel unit root test, IPS, is employed (Im et al., 2003). Conventional regression approaches are appropriate if the variables are stationary. If the variables in equation (1) are nonstationary, with time-dependent means and variances, then cointegration tests are required to establish and validate the long-run relationships (Arize, 1995). Cointegration of variables indicates a shared stochastic tendency, signifying a stable, long-term equilibrium connection. Short-term deviations from this equilibrium, however, may occur, introducing errors. The Error Correction Model is designed to identify and fix these short-term discrepancies, returning the system to its long-term equilibrium.

3.5 Empirical Results and Discussion

3.5.1 Unit Root and Cointegration Test

To ascertain that data points within a stationary time series are distributed around a constant mean and exhibit a consistent variance, thus facilitating relatively stable model estimates, it is essential to conduct unit root tests. Given that some of the variables in the model exhibit non-stationarity with a stochastic trend, resulting in the absence of a

constant mean or variance, but rather displaying a long-term path or trend characterized by gradual and persistent changes over time, the panel unit root test, as proposed by Im et al., 2003 is employed. The test results indicate that variables including intra-export, exchange rate, political stability, and GDP exhibit nonstationary at a 5% significance level and possess a unit root. However, these variables become stationary after first differencing. Conversely, other variables such as volatility, inflation, and FDI as a percentage of GDP are stationary at a 5% significance level. Therefore, based on the unit root tests, the variables are integrated at different orders, with intra-export, exchange rate, political stability, and GDP being integrated of order one, denoted as I (1), while volatility, inflation, and FDI as a percentage of GDP are integrated of order zero, denoted as I (0).

Table 3.3: Unit Root Test

Variable	Level		Order	First Difference	
	Statistic	P-value		Statistic	P-value
W-t-bar Intra Export	-1.4386	0.0751	I (1)	-8.3286	0.0000
W-t-bar Exchange Rate	-0.4475	0.3273	I (1)	-6.6559	0.0000
W-t-bar GDP	1.8092	0.9648	I (1)	-6.1831	0.0000
W-t-bar Volatility	-8.4908	0.0000	I (0)	-	-
W-t-bar Inflation	-4.9150	0.0000	I (0)	-	-
W-t-bar Political Stability	-0.8475	0.1984	I (1)	-12.3983	0.0000
W-t-bar FDI as % of GDP	-3.1224	0.0009	I (0)	-	-

Note: "W-t-bar" can be interpreted as the lagged difference of a variable at time "t". To determine if a time series variable is non-stationary, the ADF test looks for a unit root. The lagged values of the variable and their differences are captured by the lagged difference operator.

Given that the data exhibits a mixture of stationary and non-stationary characteristics, the application of a cointegration test is necessary. This test is critical in identifying relationships that result in a combination of initially non-stationary variables eventually forming a stationary series, allowing for a better comprehension of the data and its underlying dynamics in an econometric or statistical context. Following the results of the unit root tests, it is imperative to conduct cointegration tests to ascertain whether the variables exhibit a stable long-run relationship, as proposed by McCoskey and Kao, 1998 and Kao, 1999. In this study, the Kao panel cointegration test is employed. The results

in Table 3.4 reveal that all panels exhibit cointegration at a 5% significance level, signifying that the variables share a long-run relationship. The outcomes of the unit root and cointegration tests confirm the consistency of the suggested models, thus affirming the ARDL approach to cointegration, specifically the re-parameterized model known as the Error Correction Model (ECM). This approach is employed to capture both short-run and long-run relationships in the data.

Table 3.4: Cointegration Test

Cointegration Test	Intra export		FDI (% of GDP)	
	Statistic	P-value	Statistic	P-value
Kao test	-2.6295	0.0043	-4.7598	0.0000
Modified Dickey-Fuller t	-2.3201	0.0102	-4.8307	0.0000
Augmented Dickey-Fuller t	-1.6368	0.0508	-2.4792	0.0066
Unadjusted modified Dickey-Fuller t	-4.2868	0.0000	-10.8266	0.0000
Unadjusted Dickey-Fuller t	-2.9626	0.0015	-6.6072	0.0000

Note: In the cointegration test results, the "Intra-Export" column reports the outcomes of the test conducted on intra-export, encompassing all relevant independent variables such as volatility, exchange rate, inflation, interest rate, political stability, crisis (Asia), and crisis (global). Simultaneously, the "FDI (percent of GDP)" column presents the cointegration test results for Foreign Direct Investment (FDI) as a percentage of Gross Domestic Product (GDP). This analysis includes the same set of independent variables utilized in the intra-export results column.

3.5.2 Results of exchange rate volatility on intra export

Table 3.5: Intra export (long-run effect)

Intra Export	(1) PMG	(2) PMG	(3) DFE	(4) DFE
Error Correction	-0.3619***	-0.3389***	-0.1662***	-0.1865***
	(0.1257)	(0.1241)	(0.0347)	(0.0359)
Volatility	-0.0234***	-0.0271***	0.0274	0.0310
	(0.0065)	(0.0074)	(0.0248)	(0.0226)
Exchange rate	0.0001***	0.0000***	0.0001	0.0001
	(0.0000)	(0.0000)	(0.0001)	(0.0001)
GDP (ln)	0.8263***	0.8205***	0.5681***	0.5441***
	(0.0436)	(0.0502)	(0.1440)	(0.1316)
Inflation	0.0320***	0.0432***	-0.0453**	-0.0358**
	(0.0064)	(0.0060)	(0.0181)	(0.0162)
Interest rate	-0.0103	-0.0075	-0.0454*	-0.0484**
	(0.0068)	(0.0068)	(0.0270)	(0.0242)
Political stability	0.1360*	0.1931***	0.0138	-0.0290
	(0.0698)	(0.0708)	(0.2576)	(0.2300)
Crisis (Asia)		-0.2400		-2.1739**
		(0.1502)		(0.9993)
Crisis (Global)		-0.5737***		-0.1653
		(0.1417)		(0.7792)
Hausman test (PMG or DFE)	2.84	5.77	$(Prob > chi2)$ 0.3293	0.8281
Observations	288	288	288	288
Country FE	Yes	Yes	Yes	Yes
Control	Yes	Yes	Yes	Yes

Notes: Columns (1) and (2) apply the Pool Mean Group (PMG). Columns (3) and (4) apply Dynamic Fixed Effect (DFE) model. Column (1) and (3) results represent without controlling the global crisis and Asia crisis. The results of the Hausman test reveal a p-value greater than 0.05. Under the null hypothesis, we cannot reject the null hypothesis, suggesting that the Panel Mean Group (PMG) is more efficient. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table (3.5) illustrates the outcomes of the Pool Mean Group model (PMG) and the Dynamic Fixed Effect (DFE) model that are used to determine the long run effects of exchange rate volatility on intra ASEAN exports, taking in to account the lag on the dependent variables. PMG is less sensitive; in the long run, all variables are homogeneous across nations. However, DFE provides identical findings in the short and long run, implying that the DFE estimator restricts the rate of adjustment. Table (3.5) shows the long-run relationship among the variables.

The Hausman test is utilized to determine which model is best fit for the findings revealing that the PMG model is the most appropriate. The PMG allows for the determination of common long-run coefficients without relying on the less plausible assumption that each country's dynamics are identical. Column (1) results presents that current exchange rate volatility is one of the additional barriers identified in the study that has a detrimental influence on regional trade before considering the effects of Asia Crisis (1997) and Global Crisis (2008).

After controlling both crisis effects, the results demonstrate that, over time, exchange rate risk continued to negatively influence on intra ASEAN exports but at a slightly higher level and is statistically significant. The findings indicate that the effect of global crisis is negatively associated with intra ASEAN export whereas the Asia crisis is not statistically significant on trade (Column-2). The level of intra-export decline is 2 percent more than the rate of volatility rises due to the volatility of exchange rates across countries.

Furthermore, the findings suggest that political stability has a statistically significant beneficial effect on intra ASEAN exports. Macroeconomic stability, as represented by inflation, influences investment decisions and can be identified as the driving cause for the positive correlation of inflation with trade. The empirical findings of this study indicate that inflation is positively associated with intra-ASEAN export. This finding is consistent with earlier research by (Morina et al., 2020M; Kiganda et al., 2017).

Morina et al., 2020 argue that this effect fuels rapid productivity growth as witnessed in some countries, resulting in the real price increases of tradable goods, becoming an actual source of inflation, which tends to rise faster in emerging economies whilst simultaneously increasing productivity in mature economies. Kiganda et al., 2017 suggest that inflation has a favorable impact on intra-regional exports as higher domestic demands for affordable substitutes is seen for which increases of output for domestically produced products is required.

The error correction term plays a crucial role in quantifying the rate of adjustment required to restore a dynamic model to equilibrium. Specifically, the Error Correction Model (ECM) coefficient, which assesses the speed at which variables approach their

equilibrium levels, is of paramount importance. In the context of this study, it is expected that this ECM coefficient will not only be statistically significant but also carry a negative sign. As per the findings of Banerjee et al., 1998, the presence of a relatively significant error correction term serves to further substantiate the existence of a robust long-term relationship, which, in this case, pertains to the impact of currency rate volatility on intra-ASEAN trade.

Table 3.6: Intra export (short run)

Intra Export	(1) PMG	(2) PMG	(3) DFE	(4) DFE
Intra export (lag)	0.0637	0.1106**	-0.1053*	-0.1022*
	(0.0911)	(0.0558)	(0.0602)	(0.0604)
Volatility	-0.0017	0.0003	-0.0065**	-0.0056*
	(0.0039)	(0.0031)	(0.0030)	(0.0031)
Exchange rate	-0.4553	-0.3878	0.0001	0.0000
	(0.4761)	(0.4202)	(0.0001)	(0.0001)
GDP (ln)	0.2830	0.0902	0.7350***	0.3842
	(0.6178)	(0.5223)	(0.2503)	(0.2969)
Inflation	-0.0012	-0.0036	0.0053**	0.0050*
	(0.0052)	(0.0040)	(0.0026)	(0.0027)
Interest rate	-0.0034	-0.0066	-0.0014	-0.0016
	(0.0037)	(0.0042)	(0.0036)	(0.0036)
Political stability	0.0013	-0.0198	-0.0158	-0.0139
	(0.0685)	(0.0516)	(0.0403)	(0.0403)
Crisis (Asia)		-0.0030		0.2513**
		(0.1716)		(0.1278)
Crisis (Global)		0.1649*		0.0695
		(0.0865)		(0.1040)
Observations	288	288	288	288
Country FE	Yes	Yes	Yes	Yes
Control	Yes	Yes	Yes	Yes

Note: Variables are the first difference operator. Column (1) and (2) use pool mean group (PMG) estimator. Column (1) and (3) results represent without controlling the global crisis and Asia crisis. Column (3) and (4) represents the results of dynamic fixed effects (DFE) approach. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table (3.6) provides the short-run results for the AMS. Column (1) shows that exchange rate volatility negatively influences intra-export. However, it is not statistically significant implying that currency rate volatility will not be seen as a barrier to intra-export decisions in the short run. The result in column (2) indicates that the past value of intra export has a positive effect on present value of intra-export. Columns (3) and (4)

analyze the application of dynamic fixed effects, the results for all conditions show that exchange rate fluctuation disadvantages intra-ASEAN exports. However, these short-term condition's implications are not the primary focus in this research as exporters are unable or unlikely to change their export status nor will domestic (ASEAN) firms enter or depart from export markets in the short term.

The tabulated results in Table (3.7) provide empirical evidence that supports these expectations. Notably, the expected negative sign of the Error Correction Coefficient is found to be statistically significant for each specification model. This statistically significant coefficient confirms the existence of a long-term relationship between the variables under investigation. Examining the Error Correction coefficients, as presented in columns 1, 2, and 3, they range from -0.32 to -0.35. This range suggests that deviations from the long-term equilibrium are corrected at adjustment speeds varying from 32% to 35%.

Table 3.7: Intra export (Long term effect)

Intra Export	(1) FTA_{1999}	(2) FTA_{2005}	(3) FTA_{2010}
Error correction	-0.3457**	-0.3273***	-0.3370**
	(0.1378)	(0.1190)	(0.1475)
Volatility	0.0086**	0.0073**	0.0083**
	(0.0034)	(0.0032)	(0.0037)
Exchange rate	-0.0000***	-0.0000***	-0.0000***
	(0.0000)	(0.0000)	(0.0000)
GDP (ln)	0.9488***	0.7246***	1.0161***
	(0.0385)	(0.0628)	(0.0533)
Inflation	0.0029	-0.0229***	-0.0008
	(0.0058)	(0.0079)	(0.0061)
Interest rate	-0.0088**	-0.0144***	-0.0047
	(0.0039)	(0.0045)	(0.0038)
Political stability	-0.0314	-0.0811***	0.0297
	(0.0241)	(0.0261)	(0.0265)
FTA (dummy)	0.6104***	0.5838***	0.7305***
	(0.0760)	(0.0715)	(0.0783)
Crisis (Asia)	0.1475	0.2328	0.3269
	(0.3529)	(0.3374)	(0.3573)
Crisis (Global)	-0.1392***	-0.2244***	-0.2698***
	(0.0531)	(0.0573)	(0.0814)
Observations	288	288	288
Country FE	Yes	Yes	Yes
Control	Yes	Yes	Yes

Notes: Results for Column 1 reflect the effects of free trade agreements (FTAs) after 1999, the first year that all 10-member nations engaged in FTAs. Results from Column 2 are based on an analysis of the effects of FTA after five years, post 2005. Results from Column 3 represent FTA post 2010. I did not include the Dynamic Fixed Effects (DFE) results in the table after controlling for the Free Trade Agreement (FTA). The Hausman test yielded a result of 5.05, with a p-value of 0.7517, suggesting that the Pooled Mean Group (PMG) model is more efficient than the Dynamic Fixed Effects (DFE) model. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

The main findings in Table (3.7) being that the elasticity estimate of exchange rate volatility is positive and significant at the 5% level. This finding is consistent with Kasman and Kasman, 2005, who argue that the positive impact of exchange rate volatility on exports demonstrates that such volatility is not viewed primarily as a trade risk by countries' exporters. The empirical results indicate that exporters from ASEAN countries tend to be risk-averse and are unwilling to transfer their excess supply from foreign to domestic markets due to presence of exchange rate volatility. The increased level of exports is observed as a strategy to mitigate revenue losses associated with higher risks of currency exchange fluctuations (Kasman and Kasman, 2005).

The key findings presented in Table (3.8) reveal that the estimated elasticity of exchange rate volatility is consistently negative across all specifications; however, it is not statistically significant. The empirical results suggest that, in the short run, exporters from ASEAN countries do not base their export decisions on exchange rate volatility. Notably, in Columns 2 and 3, a positive and significant effect of Free Trade Agreements (FTA) on exports is observed. Based on the preceding Hausman test results, it is established that the PMG model is more efficient than the DFE model. Consequently, when introducing the free trade agreement variable into the model, the analysis is conducted exclusively using the PMG model across all specifications.

Table 3.8: Intra export (Short term effect)

Intra Export	(1) FTA_{1999}	(2) FTA_{2005}	(3) FTA_{2010}
Intra export (lag)	0.1937***	0.1954***	0.2012***
	(0.0422)	(0.0401)	(0.0458)
Volatility	-0.0026	-0.0024	-0.0026
	(0.0032)	(0.0032)	(0.0031)
Exchange rate	-0.2647	-0.3035	-0.2242
	(0.4015)	(0.4025)	(0.3777)
GDP (ln)	0.5735	0.3140	0.5426
	(0.5176)	(0.5400)	(0.4768)
Inflation	-0.0048	-0.0010	-0.0041
	(0.0063)	(0.0068)	(0.0069)
Interest rate	-0.0026	-0.0033	-0.0024
	(0.0059)	(0.0062)	(0.0047)
Political stability	0.0587	0.0614	0.0301
	(0.0562)	(0.0564)	(0.0601)
FTA (dummy)	0.2081	0.4154**	0.2358*
	(0.1693)	(0.1903)	(0.1343)
Crisis (Asia)	-0.0576	-0.0824	-0.1274
	(0.1687)	(0.1924)	(0.1717)
Crisis (Global)	0.0871	0.1417*	0.0868
	(0.0615)	(0.0764)	(0.0590)
Observations	288	288	288
Country FE	Yes	Yes	Yes
Control	Yes	Yes	Yes

Notes: Results for Column 1 reflect the effects of free trade agreements (FTAs) after 1999, the first year that all 10-member nations engaged in FTAs. Results from Column 2 are based on an analysis of the effects of FTA after five years, post 2005. Results from Column 3 represent FTA post 2010. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

To observe the behavior of ASEAN exporters, the relationship between ASEAN nations and selected other Asian countries such as (Bangladesh, Hong Kong, Pakistan, Sri Lanka, Iran Islamic) who are not signatories to the AFTA but maintain a sizable trade relationship with ASEAN are examined – see appendix. Table C1 illustrates the long run results of exchange rate volatility and extra-ASEAN export, whereas Table C2 results indicate short run results. In the short run, there is no effect of exchange rate uncertainty on export to the selected countries, according to Table C2, column 2 (Appendix). However, in the long run, the results suggest that exporters generally respond to the risk of exchange rate volatility by expanding their exports. However, this response may be influenced by the importing country's inelastic demand for specific products.

In addition, this study verifies the importance of an inclusive regional free trade agreement. To mitigate exchange rate volatility, ASEAN member nations pursue regional economic cooperation initiatives or agreements. These agreements could be formulated with the aim of stabilizing currencies and enhancing intra-regional trade. The analysis reveals that intra ASEAN exports are favorably affected by exchange rate volatility, showing an increase by approximately 0.9% (column- 1), while the pace of increased exports declined by 0.13% over the same period (column-2). This effect can be explained by the external shocks generated by global financial crisis that include loss of export markets as consumption in the western economies shrunk. According to the study, for every 1% increase in exchange rate volatility, the rate of intra-ASEAN exports increased by 0.83% after 2010 (column 3), suggesting that the positive impacts of the regional FTA persist over time. This finding is consistent with Hassan et al., 2023, who argue that implementing trade agreements results in higher trade in the long run.

3.5.3 Results of exchange rate volatility on FDI

The same empirical specification and regressors are employed to analyze the relationship between foreign direct investment and exchange rate volatility. The results of all specifications in Table (3.9) reveals the long-term effect of exchange rate volatility on FDI is positive and significant at 1%. The findings being consistent with earlier research by

Dhakal et al., 2010, who studied the association between exchange rate volatility and FDI from East Asian nations, their analysis, revealing that exchange rate volatility has a positive influence on FDI. Even in the presence of exchange rate volatility, providing stable economic and political settings and offering incentives to international investors can attract FDI. A key factor driving this trend is the convergence of rising labor costs, concerns about supply chain stability, and geopolitical tensions. These variables may help to mitigate the unfavorable consequences of currency risk, making the investment destination attractive. The increase in Foreign Direct Investment (FDI) is mostly due to substantial investment activity, particularly in Singapore, Indonesia, and Vietnam (ASEAN Secretariat, 2021).

More importantly, government support and industry-specific considerations can lead international investors to exhibit a less response behavior when investing in a country while facing exchange rate risk. Certain industries produce goods or services with inelastic demand, meaning that consumers are less sensitive to price changes. In such cases, foreign investors may be more willing to accept exchange rate risk, as the impact of currency fluctuations on demand and revenue is limited.

However, exchange rate risk resulting from exchange rate volatility influences the flow of FDI must be seen as a two-way street with research pointing out scenarios in which the impacts can be both detrimental and beneficial (Latief and Lefen, 2018, 2018; Dhakal et al., 2010). According to the empirical findings of this study, inflation, interest rates, and the global crisis all have a negative and considerable impact on foreign direct investment (Table 3.9). The results also reveal that political stability is vital for attracting foreign direct investment into ASEAN countries Columns (1-4).

Table 3.9: Foreign direct investment (Long term effect)

Intra Export	(1) Without FTA	(2) FTA_{1999}	(3) FTA_{2005}	(4) FTA_{2010}
Error correction	-0.3400***	-0.3588***	-0.3831***	-0.3205***
	(0.0855)	(0.0999)	(0.0921)	(0.0849)
Volatility	0.3504***	0.2837***	0.2514***	0.3054***
	(0.0726)	(0.0546)	(0.0494)	(0.0741)
Exchange rate	-0.0001	-0.0000	-0.0002	-0.0002
	(0.0001)	(0.0001)	(0.0001)	(0.0002)
GDP (ln)	0.4436**	0.4195**	-0.2248	0.1692
	(0.1804)	(0.1847)	(0.2250)	(0.2395)
Inflation	-0.0349	-0.0608*	-0.0643*	-0.0364
	(0.0373)	(0.0356)	(0.0342)	(0.0395)
Interest rate	-0.1764***	-0.1403***	-0.0779*	-0.1437**
	(0.0408)	(0.0421)	(0.0425)	(0.0615)
Political stability	1.4414***	1.3177***	2.0807***	1.7254***
	(0.3604)	(0.4585)	(0.4437)	(0.6282)
FTA (dummy)		-0.0830	0.1588	0.8271
		(0.5980)	(0.5220)	(0.8084)
Crisis (Asia)	2.2785	0.1193	0.9511	4.8304**
	(1.5050)	(1.3932)	(1.2406)	(2.2596)
Crisis (Global)	-2.9431**	-1.9836**	-2.2749***	-1.1617
	(1.1637)	(0.8630)	(0.7802)	(1.3470)
Observations	285	285	285	288
Country FE	Yes	Yes	Yes	Yes
Control	Yes	Yes	Yes	Yes

Notes: Dependent variable is Foreign Direct Investment (% of GDP). Results for Column 1 reflect the effects of free trade agreements (FTAs) after 1999, the first year that all 10-member nations engaged in FTAs. Results from Column 2 are based on an analysis of the effects of FTA after five years, post 2005. Results from Column 3 represent FTA post 2010. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table (3.10) results illustrate that in the short run (column 1) without controlling for the FTA, exchange rate volatility has a negative sign and is statistically significant on FDI (% of GDP). The results in columns (2, 3, 4) imply that exchange rate risk has no influence on FDI. These findings underscore that businesses and producers are not adjusting or making investment decisions in the short term.

Table 3.10: Foreign direct investment (Short run effect)

Intra Export	(1) Without FTA	(2) FTA_{1999}	(3) FTA_{2005}	(4) FTA_{2010}
FDI (% of GDP) (lag)	-0.1174**	-0.0990	-0.0996	-0.1122*
	(0.0581)	(0.0625)	(0.0732)	(0.0628)
Volatility	-0.1075***	-0.0304	-0.0225	-0.0618
	(0.0319)	(0.0545)	(0.0546)	(0.0461)
Exchange rate	0.4558	1.7064	0.3687	0.7124
	(2.9370)	(3.6933)	(3.4822)	(3.2276)
GDP (ln)	5.4986**	5.8322*	6.1771**	7.9877***
	(2.5879)	(3.3062)	(2.5468)	(2.8127)
Inflation	0.3251	0.3204	0.3129*	0.2368
	(0.2234)	(0.1982)	(0.1897)	(0.1660)
Interest rate	-0.0045	0.0065	-0.0153	-0.0184
	(0.0350)	(0.0242)	(0.0242)	(0.0420)
Political stability	-0.9786*	-0.6332	-0.4962	-0.6928
	(0.5074)	(0.5099)	(0.5849)	(0.5506)
FTA (dummy)		3.1549**	3.0165**	1.4160
		(1.3976)	(1.2313)	(1.2356)
Crisis (Asia)	-0.5197	-0.3583	-0.5252	-0.8760
	(0.7164)	(0.7335)	(0.6353)	(0.7299)
Crisis (Global)	-2.4363	-2.7381*	-2.6051*	-2.2946*
	(1.5217)	(1.5645)	(1.3854)	(1.2343)
Observations	285	285	285	285
Country FE	Yes	Yes	Yes	Yes
Control	Yes	Yes	Yes	Yes

Notes: Dependent variable is Foreign Direct Investment (% of GDP). Results for Column 1 reflect the effects of free trade agreements (FTAs) after 1999, the first year that all 10-member nations engaged in FTAs. Results from Column 2 are based on an analysis of the effects of FTA after five years, post 2005. Results from Column 3 represent FTA post 2010. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

3.6 Conclusion and policy implication

This study proposes to examine the specificities of currency exchange rate volatility on intra-regional trade flows and FDI in a unique setting of ASEAN, a homogenized trade bloc that is governed through the regional AFTA in which a single currency union is not being used.

The research provides empirical evidence to answer the original two specific questions; how currency exchange rates volatility affects intra ASEAN trade in the short and long term, how do free trade agreements effects and what influence exchange rates uncertainty affect investment performance in terms of FDI. The analysis reveals some unique speci-

ficities for the ASEAN that tend to agree with the latest research in this area, suggesting that original concepts of currency exchange rate volatility and trade nexus debate need be advanced as unparalleled changes in the globalized production, trading and consumption pattern are occurring with rise of a new middle class in the East and the subsequent decline of the middle class in the West. The results of this empirical study also emphasize the critical nature of regional free trade agreements for exporters and investors.

The results of the research illustrate that exchange rate volatility has a favorable influence on both intra-export and foreign direct investment. Despite the significant differences in data and methodology, the results of this study are consistent with previous research (Franke, 1991; De Grauwe, 1988; Sercu and Vanhulle, 1992; Dellas and Zilberfarb, 1993). They also found that exchange rate volatility has a favorable effect on international trade. In terms of the short run effects on intra-ASEAN trade, there is limited evidence of exchange rate volatility having any affect. However, this is reversed for the long run, with the results suggesting a beneficial (positive) effect. This finding has significant monetary policy impacts for the AMS and underpins the notions of choice businesses and investors need to make to assure that their export activities are risk adverse and better still, return higher margins of profit.

The short and long run impacts of the AFTA on the same trade nexus reveals a positive effect. Whilst in the short run, the AFTA is seen to induce a slight increase in intra-ASEAN trade, with higher benefits being returned in the long run. This again, is consistent with other related research that finds a very gradual positive impact of the AFTA on intra ASEAN trade, but more importantly the AFTA appears not to have a detrimental effect on trade with countries that are not signatories.

In the case of FDI, the analysis suggests that in the short run, exchange rate volatility does not have any effects on FDI, as these are generally factored into FDI contracts either through currency hedging or agreement tenure. In the long run the effect on FDI of exchange rate volatility on FDI is positive and significant and agrees with similar findings published by Dhakal et al., 2010. The underlying narrative of FDI decision-making, currency hedging, and higher rates of returns of investments is consistent with

these findings that exchange rate volatility has a positive influence on FDI. Investors are looking for additional returns from currency exchange volatility which was exemplified through the ASEAN financial crisis whereby a considerable level of FDI was issued in US dollar. Subsequently AMS have set targets and limits of FDI that is denominated in USD, EURO and Yen to de-risk FDI and promote FDI is agreed and received in domestic currencies.

In conclusion, exchange rate volatility influences both exports and FDI through influencing competitiveness, risk perception, and financial planning. The specific effects depend on the degree and direction of the exchange rate variations (appreciation or depreciation). Policymakers and businesses routinely engage in collaborative efforts to mitigate exchange rate risk, bolster economic cooperation, and cultivate a favorable environment for trade and investment within the ASEAN region.

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Appendix A

Appendix Chapter 1

Table A.1: Ellison-Glaeser Index

2 digit	Industry	EG Index	
MSIC Code		2017	2019
10	Food products	0.02	0.01
11	Beverages	0.01	0.00
12	Tobacco products	0.13	0.12
13	Textile	0.35	0.33
14	Apparels	0.20	0.17
15	Leather	0.05	0.08
16	Wood	0.02	0.02
17	Paper	-0.02	-0.03
18	Printing	0.01	0.14
19	Coke and petroleum	0.02	-0.02
20	Chemical Products	0.13	0.14
21	Pharmaceuticals	-0.06	-0.06
22	Rubber and plastic products	0.01	0.00
23	Other non-metallic	0.07	0.06
24	Basic metals	0.02	0.02
25	Fabricated metal	0.04	0.04
27	Electrical equipment	0.09	0.12
28	Machinery and equipment n.e.c	0.02	0.02
29	Motor Vehicles	0.15	0.14
30	Transport equipment	-0.08	-0.08
31	Furniture	0.01	0.01
32	Other manufacturing	0.02	0.02
33	Repair and Installation	0.22	0.16

Source: Author's compilation

Table A.2: Total Factor Productivity by Industry

2 digit	Industry	TFP (Export)		TFP (Non-export)	
MSIC Code		Min	Max	Min	Max
10	Food products	8.683647	16.09848	5.803901	16.70185
11	Beverages			5.524476	15.05364
12	Tobacco products			8.916818	15.72657
13	Textile			7.884006	15.64948
14	Apparels	10.24679	16.13703	4.80268	13.20299
15	Leather	9.588625	11.51875	6.907504	11.98983
16	Wood	8.813295	10.66864	8.068567	14.67307
17	Paper			7.978391	13.92154
18	Printing			7.391387	12.89059
19	Coke and petroleum			8.093833	11.8084
20	Chemical Products			6.271049	13.35664
21	Pharmaceuticals			8.151959	11.86329
22	Rubber and plastic products			9.682044	12.54503
23	Other non-metallic			7.581803	14.85834
24	Basic metals			6.240582	14.40802
25	Fabricated metal	10.19406	11.4823	6.933355	13.37391
27	Electrical equipment			9.779058	11.68105
28	Machinery and equipment n.e.c			7.500617	13.08199
29	Motor Vehicles			10.40265	12.61587
30	Transport equipment			9.182673	13.58202
31	Furniture			7.024974	14.79144
32	Other manufacturing	10.71479	11.6536	7.533488	13.51927
33	Repair and Installation			10.2288	12.60504

Source: Author's compilation

Table A.3: Total Factor Productivity by group Industry

No	Industry	TFP	
		Min	Max
1	Food, Beverages, Tobacco	5.524476	16.70185
2	Textile, Apparels, Leather	4.802688	16.13703
3	Wood	8.068567	14.67307
4	Paper, Printing	7.391387	13.92154
5	Coke and petroleum, Chemical	6.271049	13.35664
6	Pharmaceuticals	8.151959	11.86329
7	Rubber and plastic, non-metallic	7.581803	14.85834
8	Metals	6.240582	14.40802
9	Electrical equipment, Machinery	7.500617	13.08199
10	Motor Vehicles	10.40265	12.61587
11	Transport equipment, Repair and Installation	9.182673	13.58202
12	Furniture, Other manufacturing	7.024974	14.79144

Source: Author's compilation

Table A.4: Regression Results (Agglomeration and TFP) based on exporting status

TFP	Export	Non-Export
EGI	22.5337***	0.1209
	(3.0739)	(0.2983)
Competition	0.4158***	0.0757***
	(0.0798)	(0.0231)
Firm size	-0.1299	-0.2916***
	(0.6571)	(0.0886)
Firm age	-0.7692***	-0.0432
	(0.2348)	(0.0340)
Labor share	0.0455**	0.0010
	(0.0146)	(0.0007)
Top Management	0.0099	0.0285
	(0.0513)	(0.0344)
Male	-0.0202	0.0529
	(0.1718)	(0.0482)
Ethnic (Dummy)	0.0236	-0.1010
	(0.3778)	(0.0793)
Located in Industrial zone	1.1196**	0.1808**
	(0.4592)	(0.0736)
Limited Company	0.8621	0.0946
	(0.6038)	(0.1659)
Bachelor's Degree	0.5103*	0.1272**
	(0.2732)	(0.0503)
Region/State FE	Yes	Yes
Year FE	Yes	Yes
Control	Yes	Yes
Observations	117	4,337
R-squared	0.4440	0.0598

Robust standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table A.5: Agglomeration (Location Quotient), Competition, and Productivity

Productivity	(1)	(2)	(3)	(4)	(5)	(6)
LQ X Export			0.4384**	0.4372**	0.4578**	0.4125**
			(0.1679)	(0.1672)	(0.1734)	(0.1691)
LQ	0.0098	0.0110	0.0079	0.0038	0.0080	0.0086
	(0.0152)	(0.0149)	(0.0153)	(0.0161)	(0.0162)	(0.0162)
Export status		0.9552***	0.2695	0.2713	0.0471	0.0459
		(0.1510)	(0.3208)	(0.3199)	(0.3299)	(0.2891)
Competition		0.2367		0.1908	0.1701	0.1922
		(0.6195)		(0.6206)	(0.6181)	(0.6196)
Firm size		-0.1826***			-0.1557**	-0.1828***
		(0.0568)			(0.0574)	(0.0570)
Firm age (ln)		-0.0591*			-0.0641**	-0.0628*
		(0.0306)			(0.0313)	(0.0313)
Top Management		0.0234			0.0277	0.0229
		(0.0268)			(0.0278)	(0.0274)
Male		0.0461			0.0545	0.0470
		(0.0455)			(0.0471)	(0.0459)
Ethnic (Dummy)		-0.0934			-0.0771	-0.0857
		(0.0805)			(0.0834)	(0.0828)
Located in Industrial Zone		0.1840**				0.1822**
		(0.0805)				(0.0763)
Bachelor's Degree		-0.0190			-0.0114	-0.0179
		(0.0763)			(0.0560)	(0.0565)
Limited company		0.3168*				0.2622*
		(0.1421)				(0.0569)
Observations	4,456	4,456	4,456	4,456	4,456	4,456
R-squared	0.0527	0.0805	0.0722	0.0736	0.0788	0.0821
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Region/State	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Control	Yes	Yes	Yes	Yes	Yes	Yes

Note: Dependent Variable is Total Factor Productivity. Significant level; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. To take into account the likely correlation among firms in the city, standard errors that are clustered at the city level are in parentheses.

Table A.6: Agglomeration and Labor Productivity (Interaction Effect)

Productivity	(1)	(2)	(3)	(4)
EGI x Export	-0.8627	0.6531	0.7925	4.3825**
	(2.5197)	(2.3397)	(2.3370)	(1.7659)
EGI	-0.9675***	-0.5515*	-0.5878**	-0.4728*
	(0.3514)	(0.2818)	(0.2625)	(0.2590)
Export	1.1751***	1.0990***	1.0714***	0.9199***
	(0.2568)	(0.2700)	(0.2875)	(0.2407)
Labor share			0.0014*	0.0018**
			(0.0008)	(0.0007)
Competition		0.1033***	0.0967***	0.1016***
		(0.0240)	(0.0253)	(0.0251)
Firm size		-0.2734**	-0.2573**	-0.3502***
		(0.1243)	(0.1233)	(0.1169)
Firm age(ln)		0.0113	0.0188	0.0245
		(0.0278)	(0.0310)	(0.0307)
Managers Top			0.0322	0.0265
			(0.0300)	(0.0308)
Male			0.0704	0.0819*
			(0.0464)	(0.0472)
Ethnic (dummy)			0.0214	0.0151
			(0.0627)	(0.0664)
Located in Industrial zone			0.2991***	0.2751***
			(0.1001)	(0.0950)
Private Firm				0.1141*
				(0.0585)
Limited Company				0.4942***
				(0.1447)
Bachelor's Degree				0.2534***
				(0.0891)
Region/Year FE	Yes	Yes	Yes	Yes
Control	No	No	No	Yes
Observations	4,498	4,498	4,498	4,498
R-squared	0.0664	0.0869	0.0891	0.0977

Note: Dependent Variable is Labor Productivity. Significant level; ***$p < 0.01$, ** $p < 0.05$, * $p < 0.1$To take into account the likely correlation among firms in the city, standard errors that are clustered at the city level are in parentheses.

Table A.7: Agglomeration and Labor Productivity (Region/State and Year Fixed Effect)

Productivity	Region/State FE	Year FE	Full
EGI x Export	4.5772**	4.0417**	4.3825**
	(1.7799)	(1.8376)	(1.7659)
EGI	-0.5484**	-0.3916	-0.4728*
	(0.2618)	(0.2416)	(0.2590)
Export	0.9352***	0.8778***	0.9199***
	(0.2348)	(0.2481)	(0.2407)
Labor share	0.0014*	0.0019**	0.0018**
	(0.0007)	(0.0009)	(0.0007)
Competition	0.0969***	0.0895***	0.1016***
	(0.0252)	(0.0267)	(0.0251)
Firm size	-0.3253***	-0.3709***	-0.3502***
	(0.1181)	(0.1215)	(0.1169)
Firm age (ln)	0.0232	0.0372	0.0245
	(0.0317)	(0.0376)	(0.0307)
Managers Top	0.0300	0.0175	0.0265
	(0.0312)	(0.0303)	(0.0308)
Male	0.0621	0.0938*	0.0819*
	(0.0463)	(0.0463)	(0.0472)
Ethnic	0.0335	0.0225	0.0151
	(0.0652)	(0.0692)	(0.0664)
Located in Industrial zone	0.2870***	0.2087**	0.2751***
	(0.0985)	(0.0884)	(0.0950)
Private Firm	0.1229**	0.0843	0.1141*
	(0.0589)	(0.0613)	(0.0585)
Limited Company	0.5035***	0.3939**	0.4942***
	(0.1347)	(0.1470)	(0.1447)
Bachelor Degree	-0.0823	0.2734***	0.2534***
	(0.1002)	(0.0966)	(0.0891)
Control	Yes	Yes	Yes
R-squared	0.0861	0.0668	0.0977
Observations	4,498	4,498	4,498

Note: Dependent Variable is Labor Productivity. Significant level; ***$p < 0.01$, ** $p < 0.05$, * $p < 0.1$To take into account the likely correlation among firms in the city, standard errors that are clustered at the city level are in parentheses.

Appendix B

Appendix Chapter 2

Table B.1: Descriptive Statistics of Visit by Tax Inspector to the Firm

Variable	Obs	Mean	Std. dev	Min	Max
Informal	628	0.2245	0.6933	0	10
Formal	3,632	0.9824	1.6082	0	24
Micro Firm	3,349	0.8265	1.5134	0	16
Small Firm	911	1.0329	1.5902	0	24
Micro Firm (Informal)	575	0.2139	0.6893	0	10
Micro Firm (Formal)	2,774	0.9535	1.6041	0	16
Small Firm (Informal)	53	0.3396	0.7323	0	3
Small Firm (Formal)	858	1.0758	1.6189	0	24

Source: Represented by the author using MEMS 2017-2019 data (CSO)

Table B.2: Reduced-form regression

	(1) Permanent Employment	(2) Total Sales	(3) Average Wages
Tax Inspector Visiting Time	0.0337***	0.0781***	0.0124***
	(0.0090)	(0.0156)	(0.0038)
Firm Age	0.0472**	0.0940**	-0.0087
	(0.0220)	(0.0383)	(0.0093)
Male	-0.0259	0.1008**	0.0520***
	(0.0291)	(0.0509)	(0.0123)
Education Level	0.0350**	0.0916***	0.0094
	(0.0138)	(0.0242)	(0.0058)
Risk Attitude	0.0424**	0.1142***	0.0273***
	(0.0197)	(0.0342)	(0.0083)
Trust Level	0.0473**	0.0734**	0.0233***
	(0.0215)	(0.0369)	(0.0089)
Railroad (Dummy)	0.1480***	0.1962***	0.0174
	(0.0273)	(0.0477)	(0.0115)
Advertisement (Dummy)	0.2255***	0.3622***	0.0440**
	(0.0515)	(0.0888)	(0.0215)
Stock Control Practices (Dummy)	-0.0501	-0.0318	0.0323**
	(0.0334)	(0.0583)	(0.0141)
Recording Practice (Dummy)	0.4431***	0.7016***	0.0570***
	(0.0329)	(0.0576)	(0.0139)
Set of Target Sale (Dummy)	0.1433***	0.2135***	0.0206
	(0.0364)	(0.0637)	(0.0154)
Observations	3,949	4,260	4,260
R-squared	0.1308	0.1547	0.1117
Control	Yes	Yes	Yes
Region/State FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes

Note: Dependent Variables are number of permanent employees, total sales, average wages. Significant level; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. To take in to account the likely correlation among firms in the city, standard errors that are clustered at the city level are in parentheses.

Table B.3: Average wages and formalization; OLS, First stage (Probit), 2sls

Average wages	OLS	First Stage (Probit)	2sls
Formalization (Dummy)	0.1500***	0.2667***	0.3171***
	(0.0160)	(0.0531)	(0.1038)
Firm Size	0.0485***	0.0469***	0.0329*
	(0.0142)	(0.0142)	(0.0172)
Firm Age (ln)	-0.0230**	-0.0232**	-0.0387***
	(0.0093)	(0.0093)	(0.0134)
Male	0.0444***	0.0439***	0.0329**
	(0.0122)	(0.0122)	(0.0142)
Education Level	0.0095	0.0093	0.0089
	(0.0058)	(0.0058)	(0.0059)
Risk Attitude	0.0260***	0.0256***	0.0248***
	(0.0082)	(0.0082)	(0.0083)
Trust Level	0.0246***	0.0253***	0.0289***
	(0.0088)	(0.0088)	(0.0093)
Railroad	0.0144	0.0129	0.0095
	(0.0114)	(0.0114)	(0.0119)
Advertisement	0.0289	0.0291	0.0205
	(0.0213)	(0.0212)	(0.0221)
Stock Control Practices	0.0311**	0.0307**	0.0270*
	(0.0140)	(0.0139)	(0.0143)
Recording Practice	0.0389***	0.0377***	0.0280*
	(0.0140)	(0.0140)	(0.0157)
Set of Target Sale	0.0236	0.0239	0.0304*
	(0.0153)	(0.0152)	(0.0160)
Tax Inspector Visiting Time (Instrument)		0.4852***	0.0364***
		(0.0336)	(0.0035)
Observations	4,260	4,260	4,260
Control	Yes	Yes	Yes
Region/State FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes

Note: Dependent Variable is the average salary of employees over the period. Significant level; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. To take in to account the likely correlation among firms in the city, standard errors that are clustered at the city level are in parentheses.

Table B.4: Employment opportunity and formalization; Fixed Effects Approach

	2017			2019			Pool		
	(1) Total Employment	(2) Male	(3) Female	(4) Total Employment	(5) Male	(6) Female	(7) Total Employment	(8) Male	(9) Female
Formalization (Dummy)	0.4319***	0.3492***	0.5636***	0.3532***	0.3870***	0.2945***	0.3261***	0.3345***	0.3588***
	(0.0856)	(0.0641)	(0.1129)	(0.0661)	(0.0526)	(0.1014)	(0.0575)	(0.0441)	(0.0896)
Firm age	0.1029*	0.0737*	0.1251**	0.0901	0.0591	0.1804**	0.0847	0.0602	0.1483**
	(0.0537)	(0.0386)	(0.0588)	(0.0609)	(0.0382)	(0.0740)	(0.0559)	(0.0389)	(0.0686)
Male	-0.0513	-0.0116	0.0418	0.0174	0.0690**	0.0593	-0.0109	0.0337	0.0380
	(0.0521)	(0.0425)	(0.0553)	(0.0375)	(0.0301)	(0.0582)	(0.0334)	(0.0304)	(0.0372)
Education level	-0.0575*	-0.0441*	-0.0506	0.0810***	0.0643***	0.0628**	0.0281*	0.0226*	0.0093
	(0.0294)	(0.0256)	(0.0328)	(0.0214)	(0.0199)	(0.0253)	(0.0145)	(0.0133)	(0.0182)
Risk attitude	0.0395	0.0145	0.0187	0.0066	0.0104	0.0130	0.0365	0.0231	0.0279
	(0.0386)	(0.0290)	(0.0555)	(0.0377)	(0.0367)	(0.0556)	(0.0280)	(0.0249)	(0.0378)
Trust level	-0.0737**	-0.0414	-0.1167***	0.0888***	0.0816***	0.0717*	0.0083	0.0094	-0.0308
	(0.0295)	(0.0249)	(0.0339)	(0.0316)	(0.0282)	(0.0359)	(0.0211)	(0.0217)	(0.0250)
Railroad	-0.0082	0.0216	-0.0512	0.2229***	0.1826***	0.2308***	0.1111***	0.0913**	0.0999
	(0.0681)	(0.0556)	(0.1062)	(0.0462)	(0.0433)	(0.0587)	(0.0400)	(0.0399)	(0.0618)
Advertisement	0.1318*	0.1226**	0.1781	0.1896**	0.1340*	0.2584**	0.1463**	0.1247**	0.1976**
	(0.0759)	(0.0597)	(0.1102)	(0.0709)	(0.0760)	(0.0994)	(0.0637)	(0.0597)	(0.0923)
Stock control practices	-0.2040***	-0.2210***	-0.1481	0.1225**	0.1079**	0.1623**	-0.0433	-0.0796*	-0.0148
	(0.0537)	(0.0505)	(0.0889)	(0.0590)	(0.0421)	(0.0788)	(0.0402)	(0.0405)	(0.0682)
Recording practice	0.4582***	0.4182***	0.2095***	0.2818***	0.2895***	0.1259**	0.3221***	0.3164***	0.1873***
	(0.0481)	(0.0406)	(0.0571)	(0.0406)	(0.0387)	(0.0490)	(0.0320)	(0.0312)	(0.0406)
Set of target sale	0.0717	0.0709	0.0556	0.2215***	0.1606**	0.1498*	0.1598***	0.1144**	0.1162**
	(0.0553)	(0.0658)	(0.0601)	(0.0666)	(0.0729)	(0.0747)	(0.0491)	(0.0541)	(0.0529)
Observations	2,324	2,043	1,168	2,486	2,202	1,264	3,949	3,457	1,806
R-squared	0.3178	0.2804	0.2694	0.3264	0.2872	0.2623	0.2730	0.2479	0.2374
Region/State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	-	-	-	-	-	-	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control	(0.0856)	(0.0641)	(0.1129)	Yes	Yes	Yes	Yes	Yes	Yes

Note: Dependent Variable is employment opportunity which is measured by the number of permanent employees. Significant level; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Columns 1, 2, and 3 represent the result of 2017. Columns 4, 5, and 6 report 2019 results. Columns 7,8 and 9 represent the result of 2017 and 2019.

Table B.5: Sales per capita (Total sales/ total employees)

Sales per capita	OLS	First stage probit	2sls	Fixed effects
Formalization (Dummy)	0.4545***	1.3592***	1.0607***	0.4374***
	(0.0563)	(0.1461)	(0.3652)	(0.0637)
Firm size	-0.2777***	-0.2865***	-0.3342***	-0.1868**
	(0.0499)	(0.0499)	(0.0607)	(0.0835)
Firm age (ln)	-0.0216	-0.0281	-0.0785*	-0.0520
	(0.0326)	(0.0325)	(0.0473)	(0.0393)
Male	0.0971**	0.0901**	0.0555	0.1005
	(0.0430)	(0.0428)	(0.0500)	(0.0639)
Education level	0.0639***	0.0615***	0.0617***	0.0382
	(0.0203)	(0.0202)	(0.0206)	(0.0273)
Risk attitude (Dummy)	-0.1322	-0.1307	-0.1369	-0.0651
	(0.1151)	(0.1148)	(0.1165)	(0.1357)
Trust level (Dummy)	0.0502*	0.0457	0.0456	0.0454
	(0.0288)	(0.0286)	(0.0292)	(0.0387)
Rail road (Dummy)	0.0268	0.0298	0.0423	-0.0002
	(0.0310)	(0.0308)	(0.0326)	(0.0463)
Advertisement	0.0790**	0.0662*	0.0613	0.0421
	(0.0400)	(0.0399)	(0.0418)	(0.0517)
Out of Stock	0.1428*	0.1462*	0.1125	0.1435**
	(0.0749)	(0.0747)	(0.0778)	(0.0685)
Recording Practice	0.0163	0.0121	0.0014	-0.0161
	(0.0491)	(0.0489)	(0.0504)	(0.0451)
Set of Target sale	0.0711	0.0716	0.0957*	0.0252
	(0.0537)	(0.0534)	(0.0562)	(0.0666)
Instrument		0.4898***	0.0364***	
		(0.0326)	(0.0035)	
Observations	4,260	4,260	4,260	4,260
Control	Yes	Yes	Yes	Yes
Region/State FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes

Note: Dependent Variable is total sales per total employees over the period. Significant level; *** p¡0.01, ** p¡0.05, * p¡0.1. To take in to account the likely correlation among firms in the city, standard errors that are clustered at the city level are in parentheses.

Table B.6: Effects of formalization on skill labours

	OLS	First stage probit	2sls	Fixed effects
Formalization (Dummy)	0.1473***	0.6358***	0.4016**	0.1777***
	(0.0292)	(0.1127)	(0.1862)	(0.0337)
Firm size	1.3942***	1.3919***	1.3715***	1.2954***
	(0.0256)	(0.0255)	(0.0305)	(0.0447)
Firm age (ln)	0.0610***	0.0615***	0.0374	0.0714**
	(0.0168)	(0.0167)	(0.0240)	(0.0290)
Male	0.0092	0.0077	-0.0072	0.0208
	(0.0221)	(0.0219)	(0.0252)	(0.0208)
Education level	0.0247**	0.0234**	0.0238**	0.0217*
	(0.0105)	(0.0104)	(0.0106)	(0.0117)
Risk attitude (Dummy)	0.0091	0.0073	0.0077	0.0115
	(0.0148)	(0.0147)	(0.0149)	(0.0198)
Trust level (Dummy)	0.0218	0.0258	0.0291*	-0.0071
	(0.0160)	(0.0159)	(0.0169)	(0.0194)
Rail road (Dummy)	0.0997***	0.0937***	0.0928***	0.0541
	(0.0205)	(0.0205)	(0.0213)	(0.0395)
Advertisement	0.0416	0.0422	0.0280	0.0538
	(0.0381)	(0.0380)	(0.0396)	(0.0486)
Out of Stock	0.0049	0.0013	-0.0017	-0.0052
	(0.0252)	(0.0251)	(0.0258)	(0.0307)
Recording Practice	0.1203***	0.1171***	0.1034***	0.0942***
	(0.0253)	(0.0252)	(0.0282)	(0.0295)
Set of Target sale	0.0717***	0.0725***	0.0829***	0.0603
	(0.0274)	(0.0273)	(0.0288)	(0.0462)
Instrument		0.4703***	0.0368***	
		(0.0366)	(0.0036)	
Observations	4,023	4,023	4,023	4,023
Control	Yes	Yes	Yes	Yes
Region/State FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes

Note: Dependent Variable is the average salary of employees over the period. Significant level; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. To take in to account the likely correlation among firms in the city, standard errors that are clustered at the city level are in parentheses.

B.0.1 The Anderson-Rubin Wald endogeneity test

Tests of joint significance of endogenous regressor (formalization)

Ho: B1=0 and orthogonality conditions are valid.

Anderson-Rubin Wald test F (1,34) = 4.80 P-val=0.0353

Anderson-Rubin Wald test Chi-sq(1)= 4.96 P-val=0.0259

Note; Rejection of Ho, the regressor, is endogenous

Appendix C

Appendix Chapter 3

Table C.1: Extra ASEAN export (Long term effect)

Intra Export	(1) PMG	(2) PMG	(3) DFE	(4) DFE
Error Correction	-0.2769***	-0.0846**	-0.2303***	-0.2128***
	(0.0853)	(0.0360)	(0.0386)	(0.0376)
Volatility	-0.0065	0.1431***	-0.0010	-0.0328
	(0.0068)	(0.0382)	(0.0296)	(0.0257)
Exchange rate	0.0000	0.0002	0.0001**	0.0001**
	(0.0000)	(0.0001)	(0.0001)	(0.0001)
GDP (ln)	0.6200***	0.1842	0.5833***	0.5627***
	(0.0599)	(0.1787)	(0.1536)	(0.1567)
Inflation	-0.0019	-0.2327***	-0.0135	-0.0084
	(0.0083)	(0.0619)	(0.0228)	(0.0254)
Interest rate	-0.0359***	-0.0612*	0.0169	0.0083
	(0.0094)	(0.0363)	(0.0275)	(0.0290)
Political stability		-0.1721		-0.0616
		(0.1821)		(0.2696)
Crisis (Asia)		1.5567		-1.0761
		(0.9838)		(1.2160)
Crisis (Global)		-0.7039		0.5900
		(0.5300)		(0.9270)
Observations	282	282	282	282
Country FE	Yes	Yes	Yes	Yes
Control	Yes	Yes	Yes	Yes

Note: Dependent variable is the value of ASEAN countries' aggregate export values to 5 countries (Bangladesh, Hong Kong, Pakistan, Sri Lanka, Iran Islamic). Column (1) and (2) are the results of pool mean group. Column (3) and (4) represent the result of dynamic fixed effects. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table C.2: Extra ASEAN export (short term effect)

Intra Export	(1) PMG	(2) PMG	(3) DFE	(4) DFE
Export (lag)	0.0201	0.0108	-0.0981**	-0.0671*
	(0.0498)	(0.0748)	(0.0393)	(0.0380)
Volatility	0.0073***	0.0054	0.0039	0.0100**
	(0.0025)	(0.0056)	(0.0048)	(0.0043)
Exchange rate	-0.2866	-0.3575	0.0000	-0.0000
	(0.2642)	(0.3211)	(0.0001)	(0.0001)
GDP (ln)	-0.2585	0.5920	0.2608	-0.0665
	(0.4619)	(0.6603)	(0.3508)	(0.3921)
Inflation	-0.0009	-0.0099	-0.0020	-0.0047
	(0.0035)	(0.0119)	(0.0037)	(0.0036)
Interest rate	0.0030	0.0091	-0.0036	-0.0029
	(0.0073)	(0.0069)	(0.0046)	(0.0046)
Political stability		-0.1885		-0.1578***
		(0.1158)		(0.0552)
Crisis (Asia)		-0.1121		-0.0040
		(0.1739)		(0.1806)
Crisis (Global)		0.3558		0.0989
		(0.2245)		(0.1399)
Observations	282	282	282	282
Country FE	Yes	Yes	Yes	Yes
Control	Yes	Yes	Yes	Yes

Note: Dependent variable is the value of ASEAN countries' aggregate export values to 5 countries (Bangladesh, Hong Kong, Pakistan, Sri Lanka, Iran Islamic). Column (1) and (2) are the results of pool mean group. Column (3) and (4) represent the result of dynamic fixed effects. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table C.3: Extra ASEAN Import (long term effect)

Intra Import	(1) PMG	(2) PMG	(3) DFE	(4) DFE
Error Correction	-0.2372***	-0.0934**	-0.2292***	-0.2289***
	(0.0722)	(0.0400)	(0.0365)	(0.0362)
Volatility	-0.0320**	-0.0714**	-0.0297*	-0.0288
	(0.0154)	(0.0350)	(0.0177)	(0.0179)
Exchange rate	0.0001**	-0.0001	0.0001**	0.0001**
	(0.0001)	(0.0001)	(0.0000)	(0.0000)
GDP (ln)	-0.0342	0.3715*	-0.0740	-0.0855
	(0.0801)	(0.1947)	(0.1079)	(0.1094)
Inflation	-0.0546**	0.1562***	-0.0313**	-0.0279**
	(0.0274)	(0.0500)	(0.0138)	(0.0137)
Interest rate	-0.0210	0.0824	-0.0398**	-0.0437**
	(0.0215)	(0.0517)	(0.0196)	(0.0195)
Political stability		-0.6091**		-0.1030
		(0.3094)		(0.1836)
Crisis (Asia)		-1.7429		-1.1066
		(1.1671)		(0.8086)
Crisis (Global)		-5.1937***		0.1381
		(1.7412)		(0.6308)
Observations	288	288	288	288
Country FE	Yes	Yes	Yes	Yes
Control	Yes	Yes	Yes	Yes

Note: Dependent variable is the value of ASEAN countries' aggregate Import values to 5 countries (Bangladesh, Hong Kong, Pakistan, Sri Lanka, Iran Islamic). Column (1) and (2) are the results of pool mean group. Column (3) and (4) represent the result of dynamic fixed effects. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table C.4: Extra ASEAN Import (short term effect)

Intra Import	(1) PMG	(2) PMG	(3) DFE	(4) DFE
Import (lag)	-0.1041*	-0.1511**	-0.0289	-0.0118
	(0.0534)	(0.0608)	(0.0527)	(0.0526)
Volatility	0.0021	-0.0014	0.0049	0.0046
	(0.0031)	(0.0052)	(0.0032)	(0.0032)
Exchange rate	0.1434	0.2302*	0.0000	0.0000
	(0.0876)	(0.1284)	(0.0001)	(0.0001)
GDP (ln)	1.0582**	1.3708***	0.5511**	0.2227
	(0.4246)	(0.4797)	(0.2398)	(0.2701)
Inflation	0.0216**	0.0013	0.0016	0.0005
	(0.0086)	(0.0095)	(0.0027)	(0.0027)
Interest rate	0.0013	-0.0003	-0.0039	-0.0036
	(0.0044)	(0.0068)	(0.0036)	(0.0036)
Political stability		0.0271		-0.0470
		(0.0810)		(0.0399)
Crisis (Asia)		0.2784**		0.2232*
		(0.1375)		(0.1232)
Crisis (Global)		0.4980***		0.1936*
		(0.1529)		(0.1037)
Observations	288	288	288	288
Country FE	Yes	Yes	Yes	Yes
Control	Yes	Yes	Yes	Yes

Note: Dependent variable is the value of ASEAN countries' aggregate Import values to 5 countries (Bangladesh, Hong Kong, Pakistan, Sri Lanka, Iran Islamic). Column (1) and (2) are the results of pool mean group. Column (3) and (4) represent the result of dynamic fixed effects. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.