Diversity with Proximity:

Opportunities and Challenges of ASEAN Value Chains

Paper to be presented at

3rd Annual Bank Negara Malaysia Economics Research Workshop

Nalin Nookhwun[1]

Pailin Palitwanont[2]

Warittha Prajongkarn[3]

November 2015

Abstract

ASEAN's production chains, hereafter referred as "ASEAN Value Chains (AVCs)" have been well established on the back of the diverse ASEAN's economic structure and factor endowment as well as institutional factors. In this study, textile and automotive industries are selected to be the AVC representatives in order to explore the structure of the AVCs. The standard "gravity model" is used to identify key enabling factors to further enhance these AVCs. The findings from this paper are hoped to provide meaningful policy recommendations as follows: (1) Realization of different ASEAN member's competitiveness as partners in the AVCs is a prerequisite to strengthen the AVCs; (2) Improvement in quality of overall infrastructure of ASEAN is essential to reduce trade costs; (3) AEC should intensify its effort in harmonizing rules and regulations; and (4) ASEAN needs to stand ready to adapt itself to any possible external challenges.

*Contacts of authors: [1] Nalinn@bot.or.th [2] Pailinp@bot.or.th [3] WaritthP@bot.or.th

Table of Contents

List of Exhibits

List of Exhibits (cont'd)

1. Introduction

The diversity among members of the ASEAN Economic Community (AEC) has proven to become a key strength for the ongoing integration process, more so due to the increasing interconnectedness among these members. Regional supply networks, as parts of Global Value Chains (GVC), have tapped on ASEAN's "diversity with proximity". These GVCs, hereinafter referred to as "ASEAN Value Chains (AVC)" have been propelled by the region's diverse natural resources and labour endowments, differentiation in logistical connectivity and varying industry specializations. Together with various infrastructure setups, the region is making good use of each member's comparative advantages under the AVC, thus enhancing these domestic strengths towards competiveness of the region.

This paper aims to demonstrate the dynamism of AVC and how this integration can be supported by the AEC. To clearly elaborate the case of AVC and its prospects the following methodology will be used:

First, representative AVCs are chosen under the criteria that they involve significant operational linkages across different ASEAN members. More importantly, these AVCs should have strong and positive prospects of growth. The systematic selection process is also expected to demonstrate other potential products, highlighting AVCs that could be further developed, expanded, and supported jointly by members based on the ongoing and broad-based integration. From this selection process, the textile and automotive industries are chosen as representative AVCs.

Next, the representative AVCs will be examined as a case study in terms of production structure, and trade opportunities (regional and global). In a broader perspective, this paper will also discuss possible regional as well as external changes that may help to support the dynamics of the value chain. This includes each member's advancement of its development stage, improvement of logistical connectivity, and growing consumer markets and final demand.

In this paper, we use the standard "gravity model" to approximate the bilateral trade relationships between any two countries in the textile and

automotive industries. We then extend the model further to examine the key fundamental factors driving or impeding bilateral trades in such industries especially in ASEAN. The results reveal that different characteristics among ASEAN members enhance the strengths of existing regional production and value chains, where some key factors remain challenging. Moreover, the representative AVC is a good case in point for developing other supply chains providing the existing platforms and integration.

In this light, the findings in this paper address both opportunities and challenges which provide meaningful policy recommendations for future coordination among related entities. We also hope that this paper would provide a basis for further policy dialogues among ASEAN members and inspire ASEAN policymakers to think of ASEAN as one integral market and work together as one for the progress of the region.

The paper proceeds as follows: Section 2 reviews the concept of the Value Chain (VC in general). Section 3 examines development of the VCs in ASEAN and factors that would strengthen AVCs going forward. Section 4 discusses two representative cases of the AVC. Section 5 covers key enablers and obstacles. Section 6 addresses the way forward to strengthen the AVC. The last section ends with the conclusion.

2. Concept of the Global Value Chain (GVC)

According to Gereffi and Fernandez-Stark (2011), a value chain is "a set of activities that firms and workers undertake to bring a product from its conception to its end use". These activities encompass both the upstream stage of production such as product design, research and development and marketing, as well as downstream production stage, such as manufacturing, logistics and transportation.

With the evolving world trade and production patterns, the global trading landscape has included a key element what we now call "Global Value Chain: GVC". The GVC is the geographical fragmentation of production (Jones and Kierzknowski, 1990). It often involves a complex multinational

production network where each production stage is relocated to different parts of the world.

The GVC concept leverages on the benefit of classical Ricardian comparative advantage, which occurs when one country can produce a good or service at a lower opportunity cost than another (Ricardo, 1817). The development of international production networks arises from the specialization in a particular production process of a country. Once the production processes are located across countries, foreign direct investment (FDI) becomes the next logical step. Multinational enterprises (MNEs) play crucial roles in FDI and high-tech industries, or industries with long value chains, such as autos and auto parts, computers and computer parts, electronics and electrical appliances, machineries, and textiles and garments (Abonyi, 2006).

There are several factors that contribute to development of the GVC:

1) Connectivity improvements such as through railroads and steamships in the late 19th century have paved the way for the transportation and distribution of goods to other areas, thereby making separation of production from consumption feasible (Baldwin, 2006). However, such geographical connectivity seemed to only benefit some industrialized regions such as Europe, North America and Japan. These economies were able to take advantage of large scale production, distribute the excess goods to other countries and become profitable.

2) Revolution of the information and communication technology (ICT) in the mid-1980s have allowed for the effective distant coordination and a separation of production processes to exploit countries' specialization in specific tasks from raw material supplying to assembling of final products, and thus reduce the coordination costs.

3) Trade and investment liberalization. Apart from lower transportation and coordination costs, trade costs have become lower in the decades following the World War II owing largely to trade and investment liberalization. Reducing trade tariffs has allowed for the greater trade flows between countries. Furthermore, domestic trade and investment policies have played

crucial roles in promoting the GVC. The purpose of such policies may vary from import-substitution, export-promotion, to the elimination of domestic gaps in the value chain of production depending on the economic development of a country. China, as a prominent example, has also promoted out-bound FDI by creating overseas clusters of production supported by its own technology and foreign currency holdings.

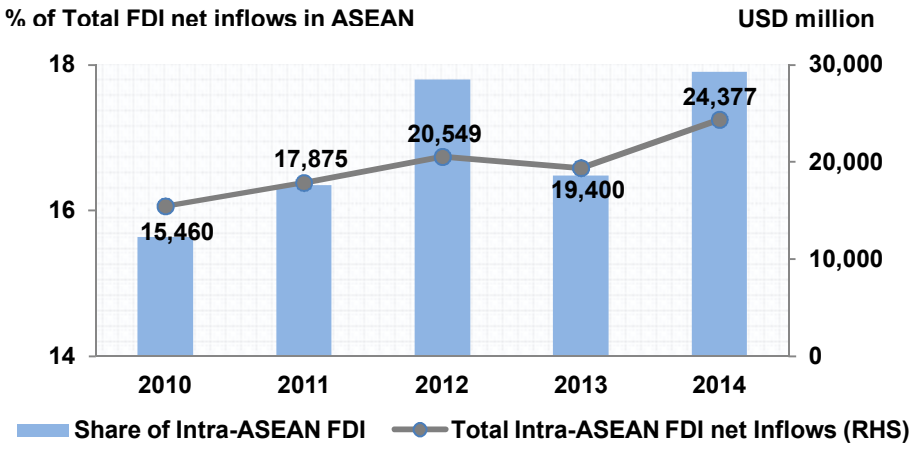
More efficient integrated production processes have allowed more countries to share the slices of the pie, as developing countries can now participate in the chains specializing in labour intensive stage of production (Baldwin, 2014). Consumers can thus enjoy a wider choice of products jointly made by many countries all over the world. Another benefit from the dispersion of production chain is the transfer of technology and know-how along the chains. This would help to foster economic transformation of developing economies in the longer run.

3. ASEAN Value Chains (AVC)

3.1 Evolution of Value Chains in ASEAN

The large diversity with close proximity in ASEAN underpins the region's well-established regional production network, accounting for about 5 percent of global manufacturing (in value-added terms) (McKinsey&Company, 2014). This is very significant, given that ASEAN economies account for only 3 per cent of world GDP. The close manufacturing linkages have led to higher needs to import and export materials from and to other member countries. A recent joint report by the ASEAN Secretariat and the World Bank (2013) shows that the trade in combined intermediate and capital products accounted for around 70 percent of the total intra-ASEAN trade. Moreover, regional value added in total ASEAN's exports has increased from 65 percent in 1995 to 69 percent in 2011. The increased intensity in the regional production networks is also proven by an increase in intraregional FDI, as shown in Exhibit 1, from 15.5 USD billion in 2010 to 24.4 USD billion in 2014, or 58-percent increase or twice as large as ASEAN's GDP growth.

Exhibit 1: Foreign direct investments net inflows, intra- and extra-ASEAN



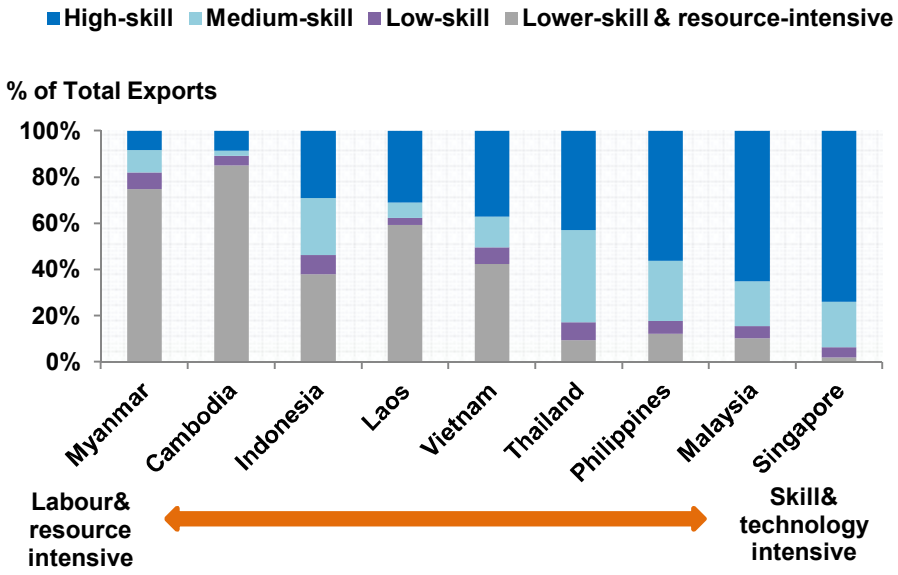
Source: ASEAN Secretariat (2015)

The rise of ASEAN Value Chain (AVC) since 1980s can be explained by two key fundamentals:

1) Economic fundamentals: ASEAN economies vastly differ in terms of factor endowment and patterns of production, resulting in different economic structures. Thailand, the Philippines, Malaysia and Singapore have higher-skilled labour and more capital, while the other countries are rich in natural resources and have low-wage labour. These are reflected in the exports of ASEAN countries, where the first group exports high-skilled and technology-intensive products and the latter group exports labour-and resource-intensive goods (Exhibit 2).

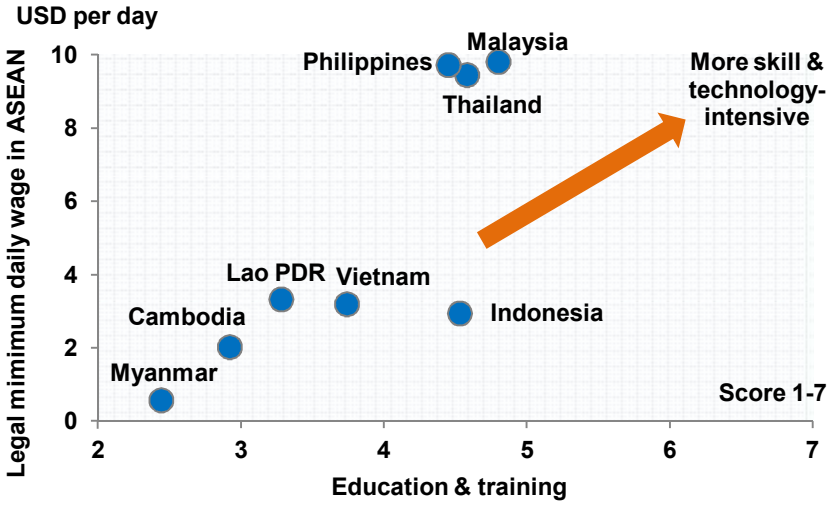
Such diversification among ASEAN members is also captured by wages. Exhibit 3 shows that ASEAN offers a wide range of minimum daily wages, ranging from 0.6 USD per day in Myanmar to 9.8 USD per day in Malaysia. Athukorala (2010) points out that wage diversification across Asia is a factor that affects decision-making on production base relocations. Myanmar, Cambodia, Lao PDR, Vietnam and Indonesia have become destinations for relatively low wages. This diversification allows for a wider choice in the relocation of production bases to more competitive ones.

Exhibit 2: Export structure of ASEAN countries



Source: UNCTADSTAT

Exhibit 3: Legal minimum daily wages and higher education & training in ASEAN countries



Note: Education & training is from higher education & training criteria from World Economic Forum 2014

Source: World Economic Forum 2014, Business-in-Asia.com

2) Institutional fundamentals:

A number of multinational enterprises (MNEs) seek to take advantage from ample natural resources in Asia. The 1985 Plaza Accord signed by the key industrial nations of that time played a catalytic role, as it resulted in the massive appreciation of the Yen, leading to higher production and labour

costs. This has led Japanese MNEs as well as other developing economies to seek cost-competitive production bases elsewhere (Cheewatrakoolpong, Sabhasri and Bunditwattanawong, 2013).

Afterwards, the opening up of Cambodia, Lao PDR and Vietnam to international trade and investment in the late 1980s, helped spur the growth of AVCs even further. Cambodia was the first to embark on a market-oriented reform process in 1985. In the Lao PDR, the process of transition to a market-oriented economy began in 1986. The opening of Vietnam's economy to trade and foreign direct investment (FDI) was part of "doi moi" (renovation) reforms initiated also in 1986.

Moreover, trade and investment policies, which include regulatory relaxations and development of necessary infrastructure reduced the costs of conducting business and thus helped promote greater participation of MNEs in the AVCs. For example, Malaysia has offered complete logistics links in its Port Klang Free Zone in 1972. In Thailand, the investment law was relaxed in 1986 to exempt corporate and export taxes for FDI projects. Vietnam established an export processing zone in 1992 to provide facilities and one stop license application service.

In addition, ASEAN has embarked on its own set of initiatives to improve transport and trade facilitation in the subregion. These trade facilitation activities were under the Greater Mekong Subregion (GMS) program, which addressed both hardware and software issues. A key initiative towards this end is the Cross-Border Transport Agreement (CBTA), a comprehensive multilateral instrument. Measures under the CBTA include one-stop customs inspection, cross-border movement of persons, transit traffic regimes, and eligibility requirements for vehicle cross-border traffic. The CBTA has been implemented at various border-crossing points, for example, between China and Lao PDR along the North–South Corridor, and between Cambodia and Vietnam along the Southern Economic Corridor (Menon, 2012)[1].

[1] Source: Menon (2012), Narrowing the Development Divide in ASEAN: The Role of Policy.

Going forward, ASEAN could continue to be a value chain hub with good prospects. Three current developments could stimulate substantial growth in the sector as follows (McKinsey&Company, 2014):

1) Technological advancement in ASEAN: The continued rise in digitalization ("big data") and the internet could improve demand forecasting and production planning, leading to better customer service and higher profit margins. Fifteen percent of ASEAN respondents in a survey by the Economist Intelligence Unit (2013) said they were optimistic that big data's ability to improve forecasting accuracy could increase revenue or efficiency for their companies by more than 50 percent. On the cost side, analyzing detailed, real-time data on everything, from suppliers' inventory and shipments in transit, to downstream customer demand, allows manufacturing companies to tighten inventory control and maximize production capacity. Research by the McKinsey Global Institute (MGI) indicates that disruptive technologies in manufacturing could increase profit margins and lower costs, potentially creating USD 25 billion to USD 45 billion of annual economic impact in ASEAN by 2030. However, many manufacturing firms in ASEAN are still lagging behind in applying available technologies to their operations and skill gaps of workers also appear to be an important barrier.

2) Shift in production costs in other regions: Wage competitiveness in China has been waning as labour costs increased significantly in the past decade. As a result, ASEAN countries such as Cambodia, Indonesia, Lao PDR, Myanmar and Vietnam stand to gain with lower wage costs and are poised to become the next 'factory to the world.' A recent survey of McKinsey revealed that 19 percent of ASEAN businesses themselves plan to shift investment or businesses from China into ASEAN.

3) Growing consumer demands in ASEAN: If ASEAN were a single country, it would be the seventh-largest economy in the world, with a combined GDP of 2.6 USD trillion in 2014 (ASEAN Secretariat, 2015). Moreover, income growth has remained strong since 2000, with the gross national income per capita growth of approximately 8 percent (World Bank, 2015). As a result of ASEAN's economic development, approximately 67 million households in ASEAN are part of the "consuming class," defined as

those with incomes exceeding 7,500 USD or the level at which they can begin to make significant discretionary purchases. That number was estimated to double to 125 million households by 2025, making ASEAN a pivotal consumer market of the future (McKinsey&Company)[2].

3.2 A more integrated AVC through the AEC

The establishment of the AEC, which involves deepening and broadening economic integration in both product and factor markets would provide impetus to strengthen the existing value chains and attract new prospective ones in this region. The details on the progress of the AEC and how it would enhance the AVC will be discussed in the following section.

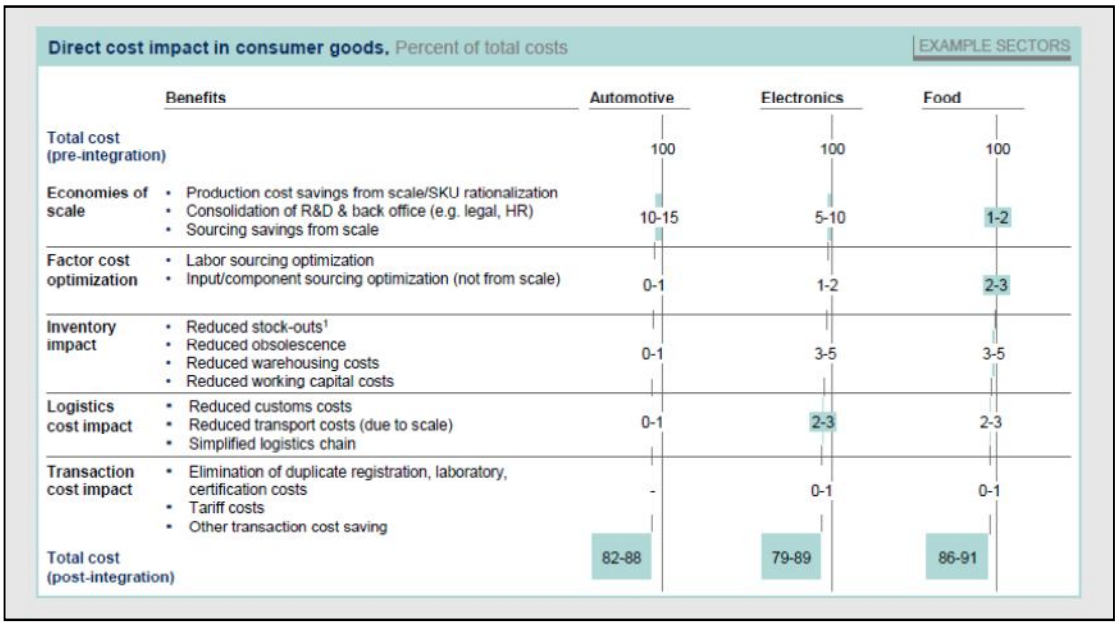
The closer economic cooperation among ASEAN member countries and the international trend of regionalism have paved the way to the ASEAN Economic Community (AEC) which is to be launched at the end of 2015. The goal of the AEC is to achieve a single market and production base characterized by free flows of goods, services and investments, as well as freer flows of capital and skilled labour. To date, although the progress of service and investment liberalisation has been relatively slower, ASEAN has made significant progress in tariff elimination, trade facilitation and connectivity enhancement. The tariffs of six economies of ASEAN have already been eliminated by 2010, except for only a few sensitive items, and the CLMV countries i.e. Cambodia, Lao PDR, Myanmar and Vietnam remain on track for achieving this goal. On trade facilitation and connectivity, the ASEAN Economic Blueprint includes several measures, namely, the harmonization of trade and customs procedures, ASEAN Single Window (ASW), and harmonization of standards, technical regulations and conformity assessment procedures. Complementing these initiatives are the ASEAN Framework Agreement on the Facilitation of Inter-State Transport, the ASEAN Framework Agreement on Multimodal Transport and the Master Plan on ASEAN Connectivity, all of which aim to reduce the cost of moving goods

[2] Source: http://www.mckinsey.com/insights/public_sector/understanding_asean_seven_things_you_need_to_know

across ASEAN's borders. Efforts in trade facilitation are bearing fruit as reflected in a significant decline in ASEAN's intra-regional trade costs from an ad valorem equivalent of 100 percent in 2001 to 85 percent in 2009 (ASEAN Secretariat and World Bank 2013).

A report by the McKinsey Global Institute (MGI) has found that in many sectors, greater integration driven by the AEC could produce productivity benefits worth up to 20 percent of the cost base in addition to boosting demand and allowing greater consumer surplus (Exhibit 4). One of the largest potential benefits is the opportunity to exploit economies of scale when technical regulations are harmonized and mutual recognition agreements allow companies to produce more understanding ASEAN. The MGI work across a range of manufacturing sectors, namely, automotive, electronics, and food. It has found that opportunities exist to create scale benefits worth 5 to 15 percent of the total cost base. In the automotive sector, for example, smaller factories in locations such as Vietnam and the Philippines operate below the industry's typical minimum efficiency threshold, but integration could set the stage for major productivity gains. A harmonized market could also lower inventory costs by reducing the number of specialized products companies needed to keep in stock and minimize obsolescence (goods arriving after when customers need them). Reducing 'factory-to-shelf' time and enabling lower inventory levels can also help preserve working capital; these savings are particularly important for small and medium enterprises, for which financing is often a constraint. In food manufacturing, these savings could be worth about 5 percent of the total cost base.

Exhibit 4: Realization of the AEC could unleash further economic value of the AVC



Source: McKinsey Global Institute analysis (2014)

4. Representative cases of the AVC

From the previous section, it can be drawn that ASEAN is well-positioned and continues to be value chain hubs, given its vast diversity of factor endowment, various supporting policies, and rising demand in the region. Next, two AVC representatives will be selected and explored to illustrate the structure of value chains, the current stage of ASEAN countries in these chains and key enabling factors for further development. The findings will provide platform for formulating meaningful policy recommendations to all related entities.

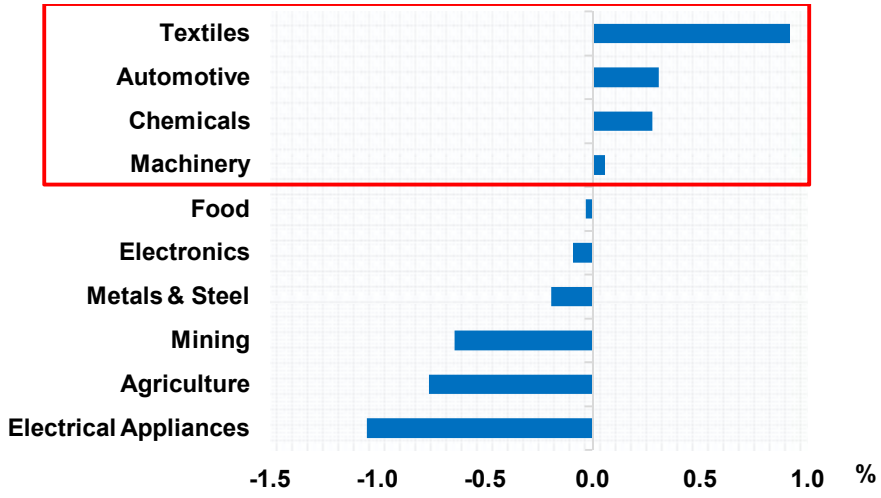
4.1 Selecting the AVC representatives

In this section, two representatives of ASEAN Value Chains (AVCs) are selected from top 10 major exports of non-oil products[3] of ASEAN by considering 4 criteria as follows:

[3] We exclude oil products from the sample because the huge drop in oil price in late 2014 has greatly impacted oil export values.

1) Major export products of ASEAN with high growth potential: The AVC should produce key export products and have high potential to drive ASEAN exports going forward. This paper employs the change of product shares in ASEAN exports as a proxy. The results show that ASEAN's export shares of textiles increased the most during 2010-2014, followed by automotives, chemicals and machinery respectively.

Exhibit 5: Change of product shares in ASEAN exports (2010-2014)



Source: Calculated by authors

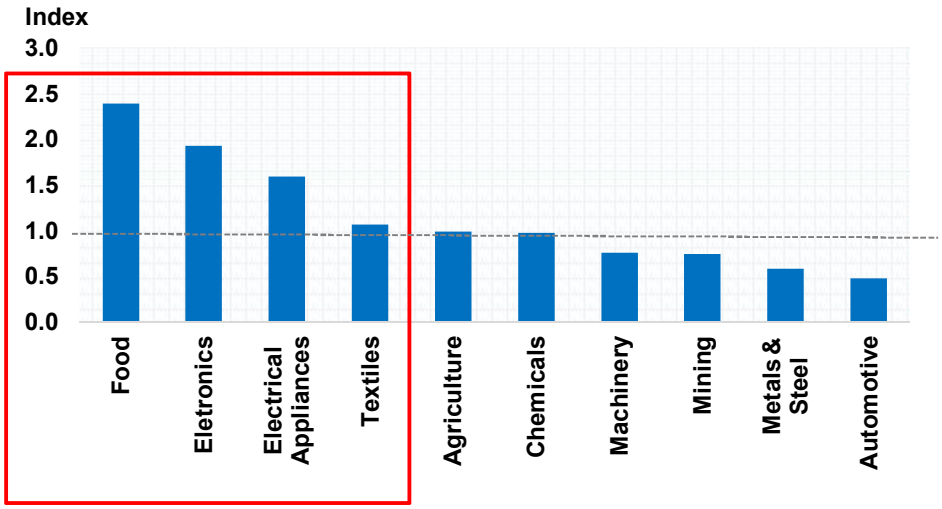
2) Global Competitiveness: The selected AVC should also be able to compete with that of other regions. The Revealed Comparative Advantage (RCA) Index is applied here to identify competitiveness of the top 10 ASEAN exports. The RCA index presented by Balassa (1965) is used, the formula is expressed as follows:

$$RCA = (X_{ij} / X_{it}) / (X_{nj} / X_{nt}) = (X_{ij} / X_{nj}) / (X_{it} / X_{nt}),$$

where X represents exports, i is a country, j is a product, t is a set of products and n is a set of countries. RCA measures country's exports of a product relative to its total exports and to the corresponding exports of a set of countries. Thus, if the RCA is greater than one, the country is said to have a comparative advantage in that industry.

Exhibit 6 illustrates that, in the case of top 10 export products of ASEAN, only food, electronics, electrical appliances and textiles have comparative advantage globally.

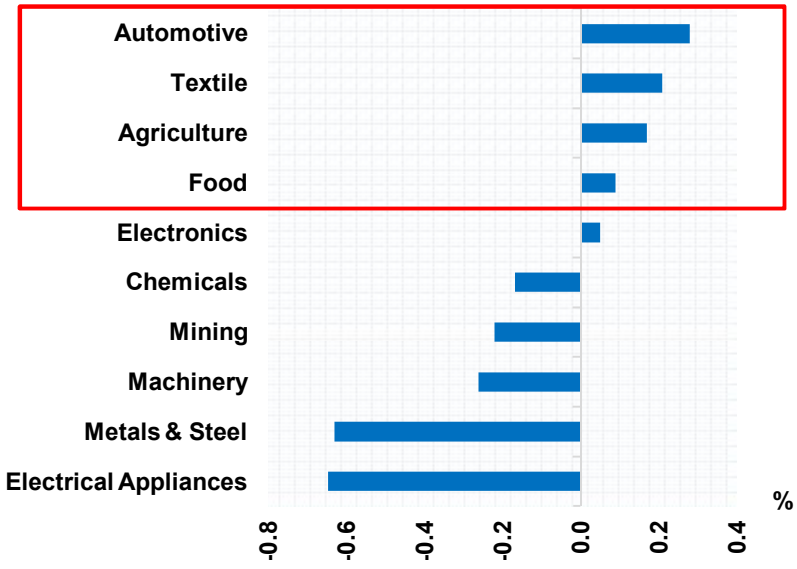
Exhibit 6: Revealed comparative advantages of the top 10 ASEAN exports (Average 2012-2014)



Source: Calculated by authors

3) Prospects in global markets: Demand of the selected AVCs in the global markets has to be rising over time implying their products were in demand of global consumers. This can be captured by the change of export product shares. The results show that automotive, textiles, agricultural and food products are among the top 4 products whose shares increased over the years 2010-2014.

Exhibit 7: Change of export product shares in world markets (2010-2014)



Source: Calculated by authors

4) High regional value-added: The selected AVC should contribute to high regional value-added in the production chain. From Exhibit 8, the

regional value-added of the textile industry (which is subdivided into textiles and leather products[4]) is relatively high, with 62.7 percent of ASEAN exports in 2011.

Exhibit 8: Share of regional value added in ASEAN's exports in 2011

Manufacturing	2011
Wood and wood products	73.5
Food, beverages and tobacco	72.6
Non-metallic mineral products	65.7
Textiles and leather	62.7
Chemicals and chemical products	62.1
Precision instruments	61.4
Rubber and plastic products	61.0
Publishing, printing and reproduction of recorded media	60.4
Metal and metal products	56.0
Machinery and equipment	53.8
Electrical and electronic equipment	43.5
Coke, petroleum products and nuclear fuel	42.5
Motor vehicles and other transport equipment	37.5

Source: ASEAN Investment Report 2013-2014 (2014)

By considering all criteria, the textile production chain is ranked in the top four in all selection criteria and hence it is selected to be one of the representative cases of the AVCs for this paper. However, in order to identify the key supporting factors of the production chain and intra-regional trade in ASEAN, another representative chain is selected for comparison. In this case, automotive industry is chosen for two main reasons:

First, it meets three criteria for selecting the AVC which are (1) one of the top 10 non-oil export products of ASEAN, (2) high growth potential, with its second largest change in product shares in ASEAN exports between 2010 and 2014, (3) growing demand in the world markets, with the largest change in export product shares in the world markets. But for the regional value-added criteria, although the regional value-added of automotive exports of ASEAN is relatively low, but it increased over time from 27.3 percent in 1990 to 37.5 percent in 2011.

Second, it is classified as medium-to-high skill products by UNCTAD as opposed to the textile industry which falls into the labour-and resource-intensive category.

[4] Due to the limitation of data to measure regional value added of textile products, the textile and leather product group is considered instead.

4.2 Overview of the two representative cases

4.2.1 Textile industry in ASEAN

The scope of the textile study

The textile industry in this study will cover the production of five industries which include fibers, yarns, fabrics, apparels and other textile products as illustrated in Exhibit 9.

Exhibit 9: Scope of the textile industry

Stage of production	Harmonization codes
1. Fibers	
1.1 Natural fibers	5001, 5002, 5101, 5103, 5105, 5201, 5202, 5203, 5204, 5305
1.2 Synthetic fibers	5402, 5403, 5404, 5405, 5406, 5501, 5502, 5503, 5504, 5505, 5506, 5507
2. Yarns	
2.1 Natural yarns	5003, 5004, 5005, 5006, 5106, 5107, 5108, 5109, 5110, 5204, 5205, 5206, 5207, 5306, 5307, 5308
2.2 Synthetic yarns	5401, 5508, 5509, 5510, 5511
3. Fabrics	
3.1 Natural fabrics	5007, 5111, 5112, 5113, 5208, 5209, 5210, 5211, 5212, 5309, 5310, 5311, 5802
3.2 Synthetic fabrics	5407, 5408, 5512, 5513, 5514, 5515, 5516, 5801, 5803, 5806, 5809
3.3 Knitted fabrics	6001, 6002, 6003, 6004, 6005, 6006
4. Apparels	6101, 6102, 6103, 6104, 6105, 6106, 6107, 6108, 6109, 6110, 6111, 6112, 6113, 6114, 6115, 6116, 6117, 6201, 6202, 6203, 6204, 6205, 6206, 6207, 6208, 6209, 6210, 6211, 6212
5. Other textile products	5601, 5602, 5603, 5604, 5605, 5606, 5607, 5608, 5609, 5701, 5702, 5703, 5704, 5705, 5804, 5805, 5807, 5808, 5810, 5811, 5901, 5902, 5903, 5904, 5905, 5906, 5907, 5908, 5909, 5910, 5911, 6301, 6302, 6303, 6304, 6305, 6306, 6307, 6308, 6309, 6310

Source: Kohpaiboon et al. (2014)

An overview of ASEAN textile exports

Textiles are one of the key product of ASEAN which was ranked sixth in the top ASEAN exports. This export value has been increasing over time from 24 USD billion in 2001 to 64 USD billion in 2014, accounting about 4.9 percent of the ASEAN's total exports. Vietnam, Indonesia, Cambodia and Thailand were the top textile exporters (Exhibit 10), while the top export

destinations for ASEAN were the U.S., Japan, South Korea, China and Germany (Exhibit 11).

Moreover, ASEAN is also an important textile production base, as it is ranked as the second largest exporter after China, with 7.8 percent of total world textile exports in 2014.

Exhibit 10: Share of textile exports (% of total ASEAN's textile exports)

ASEAN countries	Exports value (USD bn)	% of total ASEAN's textile exports
Vietnam	26.0	40.6
Indonesia	12.7	19.8
Cambodia	8.5	13.3
Thailand	7.5	11.8
Malaysia	3.4	5.2
Philippines	2.1	3.3
Singapore	2.1	3.2
Myanmar	1.5	2.3
Lao PDR	0.3	0.4
Brunei	0.01	0.01

Source: Trademap

Exhibit 11: Top 5 export markets of ASEAN's textiles

Key export markets	% of total ASEAN's textile exports
U.S.	30.1
Japan	10.4
South Korea	6.5
China	5.8
Germany	5.3

Source: Trademap

Overview of the textile supply chain

Textile production is usually divided into three stages: upstream, midstream and downstream as shown in Exhibit 12. The upstream industry involves productions of natural fibers, e.g. cotton, silk, and wool, and synthetic fibers, which are mostly a by-product of oil, such as polyester and polyamide. As this production stage employs raw materials extensively, the value-added of its outputs is in the next two stages.

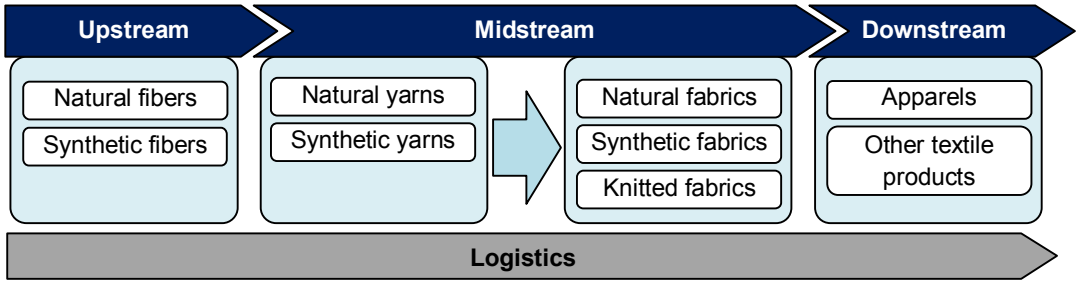
The midstream industry comprises two key industries which are (1) spinning of yarns and (2) weaving or knitting of fabrics. With different types of raw materials, yarns can be subdivided into natural yarns and synthetic yarns, while fabrics can be subcategorized into three types: natural fabrics, synthetic fabrics and knitted fabrics. The production of yarns and fabrics ranges from pre-treatment, dying or printing, which differentiates fabrics to match specific needs of customers. Thus, this stage of production has the

highest value-added compared to that of the downstream and the upstream sectors.

The downstream stage consists of two industries: The first one is the apparel industry, which is concentrated on cutting and sewing the finished apparel. This industry has three types of producers, ranking from its lower to higher value-added outputs as follows: (1) Original Equipment Manufacturer (OEM), focusing on manufacturing process according to customers' specifications and design, (2) Original Design Manufacturer (ODM) focusing on design and (3) Original Brand Manufacturer (OBM) focusing on developing its own brand. Another production in the downstream are other textile products which have higher value-added than that of the apparel. These textile products include textiles used for home furnishing as well as industrial purposes, such as automobile, healthcare, construction, and agriculture.

To complete the chain, the textile production mentioned above also has backward linkages with the agriculture and mining sectors for raw materials, as well as forward linkages with logistics and trading sectors.

Exhibit 12: Structure of the textile production chain

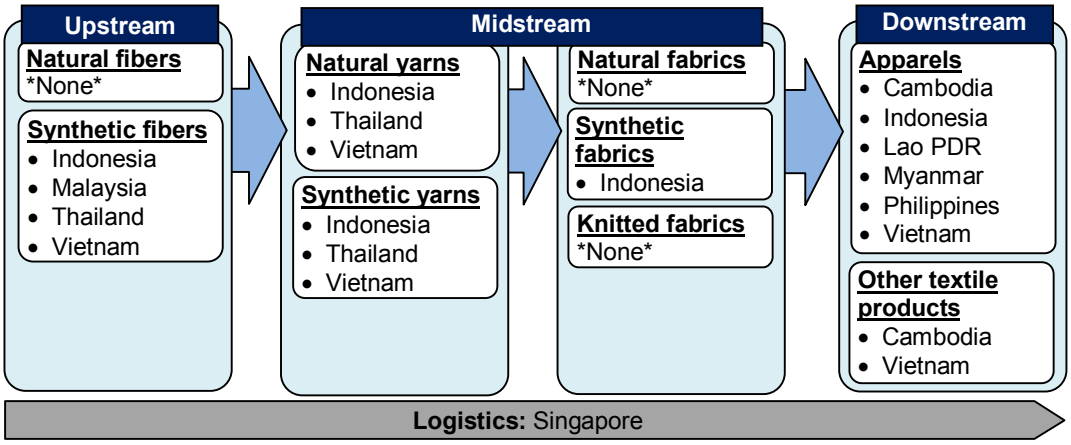


Source: Adapted from Kohpaiboon et al. (2014)

Position of ASEAN countries in the regional textile supply chain

After the structure of the textile production chain has been discussed in the previous section, we will then identify which ASEAN countries are the key players in each stage of the chain. This will help us understand the current comparative advantages of ASEAN countries in this industry.

Exhibit 13: Comparative advantages of ASEAN members in textile supply chain



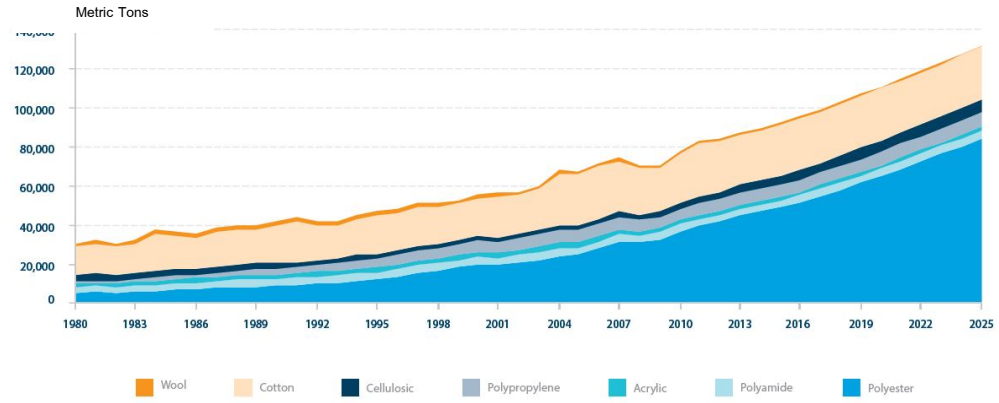
Source: Calculated by authors

Here, the RCA index is used to specify the position of ASEAN in the chain. The index reveals that, overall, there is no individual ASEAN country with comparative advantages in every stage of the chain. However, if ASEAN countries are considered as a region, it will have comparative advantages in almost all stages in the world market, except for natural fibers and natural and knitted fabrics.

On the upstream and midstream parts, Indonesia, Thailand, Vietnam and Malaysia, specialize in synthetic fibers and the first three countries are also good at synthetic yarns. This is because most of these countries are supported by their domestic petrochemical industry. Indonesia and Thailand also have comparative advantages in synthetic fabrics.

However, natural fibers and fabrics are not lay strengths of ASEAN. Trade data shows that more than 96 percent of natural fibers and fabrics were imported from outside ASEAN and this proportion is much higher than that of other products in the chain. This should have a smaller effect on the competitiveness of ASEAN in the future as the consumption of synthetic fibers is higher than the use of natural fibers. They are expected to contribute to 98 percent of global fibers consumption growth through 2025 (Exhibit 14). This will help ASEAN to depend less on raw materials from outside and strengthen the textile production chain of ASEAN.

Exhibit 14: Growth of global fiber consumption



Source: Australia and New Zealand Banking Group Limited (2015)

On the downstream side, the countries which have comparative advantages in the apparel industry are Cambodia, Indonesia, Lao PDR, the Philippines and Vietnam. Such advantages arise from low labour costs which are the key competitiveness of this sector. Cambodia, Indonesia, Lao PDR, Myanmar and Vietnam also have comparative advantages in the other textile product industries.

It is also worth pointing out that Singapore does not have comparative advantages in any sector of the textile chain. This is partly due to its high wages. However, Singapore still extensively engages in supply chain management and also specializes in financial sectors and other business services which help to facilitate both intra- and extra-trade of the ASEAN's textile industry. This is reflected by the fact that many global brands have chosen Singapore as their regional headquarters and the results of the RCA index shown in Exhibit 15.

Exhibit 15: The results of the RCA index

	Transport	Financial services	Charges for the use of intellectual property	Telecom and information services	Other business services
Singapore	✓	✓			✓
Philippines				✓	✓
Myanmar					✓
Indonesia					✓
Vietnam	✓				

Note: ✓ means having comparative advantage
Source: Calculated by authors

The trade balance (Exhibit 16) among ASEAN countries is also mostly in line with the results of the RCA. Thailand, Singapore and Malaysia, are among the net exporters of intermediate and other textile products. The intermediate products are mainly exported to Cambodia and Vietnam, as they are the key apparel exporters. Meanwhile, the other textile products, which are more technology and innovation intensive, are supplied to other ASEAN countries to use in other industries.

Exhibit 16: Intra-regional trade balance in textile products in 2014

Intermediate products	
Countries	**Trade balance (USD mn)**
Thailand	736.1
Singapore	157.9
Malaysia	141.3
Indonesia	9.9
Brunei	-7.2
Lao PDR	-50.9
Philippines	-71.0
Cambodia	-139.8
Myanmar	-175.9
Viet Nam	-330.0

Apparels	
Countries	**Trade balance (USD mn)**
Vietnam	198.8
Cambodia	154.1
Indonesia	134.8
Thailand	62.4
Lao PDR	-6.2
Myanmar	-20.8
Brunei	-24.3
Philippines	-44.6
Malaysia	-147.8
Singapore	-249.9

Other textile products	
Countries	**Trade balance (USD mn)**
Thailand	247.9
Singapore	118.5
Malaysia	89.8
Vietnam	25.9
Brunei	-7.8
Lao PDR	-21.0
Philippines	-21.3
Cambodia	-38.8
Myanmar	-72.2
Indonesia	-89.4

Source: Trademap

These results produce meaningful implications to ASEAN that individual ASEAN countries are not able to compete in the world market without regional integration. Increasing ASEAN integrated production networks will enhance the region comparative advantages that each country alone does not have.

4.2.2 Automotive supply chain in ASEAN

Scope of the study of automotive industry

In this study, the automotive production chain includes the production of automobile and its raw materials which are from various industries e.g. plastic, glass, iron and steel. The scope of the related products can be classified into three stages of production: upstream, midstream and downstream, as shown in the following Exhibit 17:

Exhibit 17: Scope of the automotive industry

Stage of production	Harmonization codes
Upstream	
• Plastic	3902, 3903
• Rubber	4002
• Iron & steel products	7208, 7209, 7210, 7211, 7212, 7215, 7217, 7219, 7220, 7228, 7229, 7305, 7306
Midstream	
• Plastic products	3926
• Rubber products	4009, 4010, 4013, 4016
• Glass	7007, 7009,
• Iron & steel products	7320
Downstream	
• Metal products	8302
• Machinery	8407, 8408, 8409, 8413, 8421, 8425, 8482, 8483, 8484
• Electronics products	8501, 8502, 8503, 8507, 8511, 8512, 8531, 8533, 8536, 8539, 8544
• Automobile and parts	8701, 8702, 8703, 8704, 8707, 8708
• Meters & control mechanisms	9029, 9032
• Car seats	9402

Source: Adapted from Kohpaiboon et al. (2014)

Overview of the ASEAN's automotive exports

The automotive industry is one of the key industries of ASEAN. The export value of automobiles and their associated raw materials increased from about 21 USD billion in 2001 to 104 USD billion in 2014, accounting for 7.8 percent of total ASEAN exports. The export shares of automobiles and intermediate products were 21 percent and 79 percent of the total automotive export value. Individually, Thailand has the highest automotive export value, which was about 42 USD billion in 2014, equivalent to 40.3 percent of the total automotive exports of ASEAN, followed by Singapore, Malaysia, Indonesia, Vietnam and the Philippines (Exhibit 18). In the global market, ASEAN was the 7th largest automotive exporters, with 3.9 percent of the world automotive exports. ASEAN is the top automotive importer of this region, followed by Japan, China, the U.S., and Australia as illustrated in Exhibit 19.

Exhibit 18: Share of automotive exports (% of total ASEAN's automotive exports)

ASEAN countries	Exports Value (USD bn)	% of total ASEAN's automotive exports
Thailand	41.8	40.3
Singapore	23.1	22.3
Malaysia	11.7	11.3
Indonesia	10.3	9.9
Viet Nam	9.9	9.5
Philippines	6.5	6.3
Cambodia	0.2	0.2
Brunei	0.03	0.03
Lao PDR	0.02	0.02
Myanmar	0.01	0.01

Source: Trademap

Exhibit 19: Top 5 export markets of ASEAN's automobile

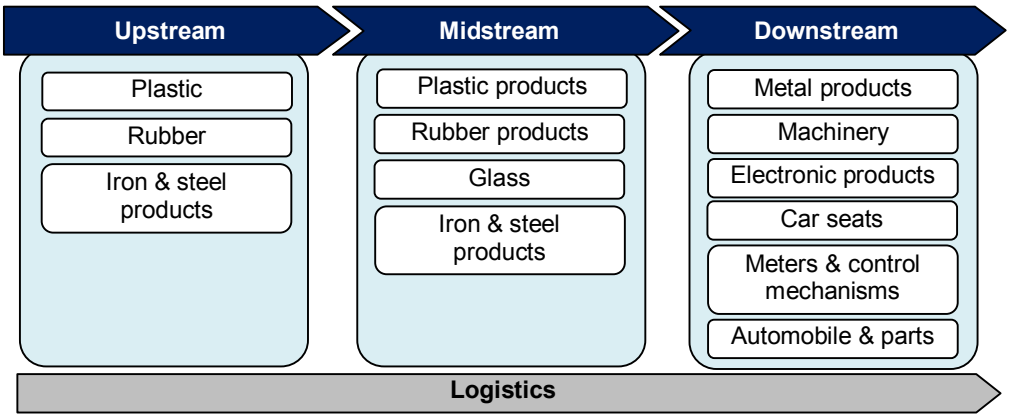
Key Export Markets	Exports Value of ASEAN (USD bn)	% of total ASEAN's automobile exports
ASEAN	35.0	33.8
Japan	11.0	10.7
China	8.0	7.7
U.S.	7.1	6.8
Australia	6.7	6.4

Source: Trademap

Overview of the automotive supply chain

Similar to the textile industry, the automotive production chain can be divided into three stages: upstream, midstream and downstream industry (Kohpaiboon et al., 2014) (Exhibit 20). The upstream industry is the first step of manufacturing process. It comprises third-tier producers including the production of transforming plastic pigments, iron and steel and rubber products. The midstream industry or second-tier producers involve automotive components production by using inputs from third-tier producers. The outputs of this stage include plastic and rubber products, iron and steel and glass for use in automobiles. The downstream comprises two industries: first, the production of raw materials, which is the last step of transforming raw materials from other industries into automotive components including metal products, machinery, electronic products, car seats, meters and control mechanisms and auto parts. Second is the process of assembly of automobiles. However, there are also other sectors involved in all stages of automotive production chain, that is, logistics.

Exhibit 20: Structure of automotive production chain



Source: Adapted from Kohpaiboon et al. (2014)

Position of ASEAN countries in the regional automotive supply chain

The ASEAN automotive production is dominated by multinational companies (MNCs) and also some domestic with their massive investments to set up production bases in the region. The strategies for the MNCs to choose production bases for each specific type of automotive vehicle are based on national specialization, market accession and demand in domestic market. Thus, in ASEAN, automobile production is concentrated in just some countries as a cluster, namely, Thailand, Indonesia and Malaysia. Thailand has been chosen to be a production base of small and medium passenger cars and one-ton pick-ups, while Indonesia has been chosen to be a production base of sports utility vehicles (SUVs) and multi-purpose vehicles (MPVs).

More interestingly, Thailand and Indonesia currently have also become strategic assembly bases for leading automobile companies from the U.S. and Japan. This is evidenced by a recent increase in the R&D facilities in both countries to help in the development and design of components produced in ASEAN and other emerging countries.

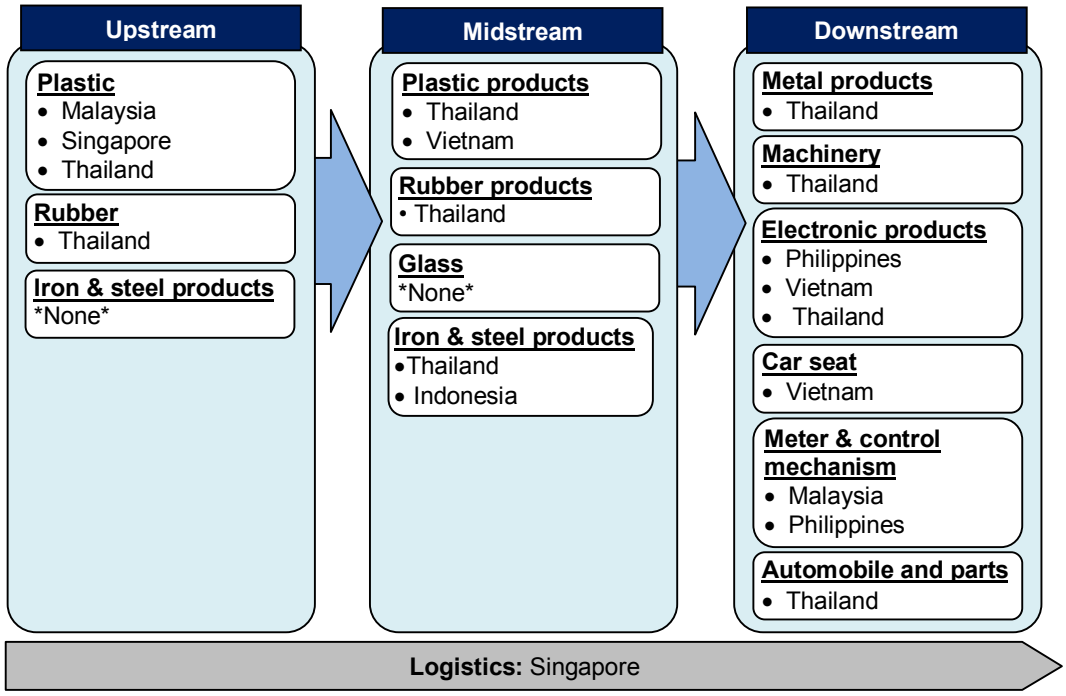
Malaysia, on the other hand, focuses on the production and development of its own national brands, while the development of the production in CLMV progress slowly and are still concentrated in Completely Knocked Down (CKD) assembles.

These are in line with the results of the RCA index by using automotive and its raw material exports data in 2014. The results show that only five ASEAN countries have comparative advantages in at least one industry in the automotive supply chain. However, Thailand seems to be the largest automotive hub (Exhibit 21), with more industries having comparative advantages and it is also the largest exporter in intra-ASEAN automotive product trade.

For Indonesia, although it is the second biggest automobile producers in ASEAN, it has comparative advantage only in iron and steel products. This is partly because its automotive production is mainly for domestic consumption. According to the data from the ASEAN Automotive Federation, the proportion of domestic sales to production in Indonesia in 2014 was about 93 percent for automobiles. The sales to production ratio are much higher than that of Thailand, accounting for around 47 percent. Rapid growth in automobile production with insufficient increase in intermediate production in the country makes Indonesia the largest importer of intermediate products from ASEAN countries, largely from Thailand.

In sum, again, there is no individual country with comparative advantages in all industries of automotive production chain, while ASEAN as a region has comparative advantages in most stages of automotive production chain, except iron and steel in the upstream part of the chain and glass. However, it is noteworthy that the RCA index reveals greater concentration in some key automotive producers as a cluster compared to the textile industry. However, rising wages in ordinary automotive producing countries such as Thailand, Malaysia and Indonesia, coupled with the elimination of tariffs under the AEC allows the production of labour-intensive and less complex components to relocate towards CLMV countries.

Exhibit 21: Comparative advantages of ASEAN members in the automotive Industry



Source: Calculated by authors

Exhibit 22: ASEAN's automobile production in 2014

Country	Units	% of total ASEAN production
Thailand	1,880,007	47.2
Indonesia	1,298,523	32.6
Malaysia	596,418	15.0
Vietnam	121,084	3.0
Philippines	88,845	2.2
Total	3,984,877	100.0

Source: ASEAN Automotive Federation (2015)

5. Key enablers and challenges in the ASEAN Value Chain

In this part, we aim to examine the main factors driving bilateral trades in the textile as well as automotive industries. We then extend our examination to explore the key fundamental factors that could help support the value chain of such industries as well as highlight the key priorities for policy recommendations. In order to address those issues, we approximate the bilateral trade relationships between any two countries applying the "gravity equation" based on theoretical framework developed by Krugman and Obstfield (2005). Apart from the original inclusion of only two independent variables, GDP and distances, the equation is then extended to include other factors perceived to affect the bilateral trade flows. Our standard gravity equation is estimated in the logarithm form as follows:

$$log(Trade_{ijt}) = constant + \beta_1 log(GDP_{it}) + \beta_2 log(GDP_{jt}) + \beta_3 log(dist)_{ij} + \beta_4 comlang_{ij} + \beta_5 border_{ij} + \beta_6 RTA_{ij} + Time\ dummies + \varepsilon_{ijt}$$

where *i* is a source country (exporter), *j* is a destination country (importer), *t* represents year from 2001 to 2012, $Trade_{ijt}$ is the bilateral trade flows in nominal terms from country i to j in year t, GDP_{it} is country i's nominal Gross Domestic Product (GDP) in year t, GDP_{jt} is country j's nominal GDP in year t, $dist_{ij}$ is distance in miles between country i and j as measured by the log of geographical distance between two capital cities, $comlang_{ij}$ is a dummy taking value 1 if country i and j share the same language and 0 otherwise, $border_{ij}$ is a dummy taking value 1 if country i and j have connected border and 0 otherwise, RTA_{ij} is a dummy taking value 1 if there exists regional trade agreement between country i and j and 0 otherwise, $Time\ dummies$ is a dummy taking value 1 for year t and 0 otherwise, ε_{ijt} is an error term.

The detailed information regarding the regression equation and methodology can be found in Appendix (Methodology) whereas abbreviations and sources on all dependent and independent variables can be found in Appendix (Table 1).

Drivers of bilateral trade flows in textile industry

The results from the baseline regression as shown in Exhibit 23 provide the estimated results with expected signs, thereby confirming the typical results generated from the general gravity model. Firstly, the GDP is used as a proxy for economic size as well as the development of the economy. The estimated coefficients of GDP for both source and destination countries are positive and highly significant. This implies the bilateral trades in the textile industry will be greater if the country becomes richer or more sophisticated.

Secondly, the distances between two countries act as indirect barriers for trade. This distance term therefore appears to have a negative and significant impact on trade promotion as transportation costs increase with distances. Conversely, dummies on common border and language have

shown a positive impact as they are used to capture information costs. Adjacent countries or countries with common languages tend to have similar business practises and environments. Hence, these countries with less information asymmetries will tend to trade more among each other.

Exhibit 23: Baseline regressions of the textile industry

Dependent Variable: Log of textile trade	(1) Pooled OLS	(2) Between Effects	(3) Random Effects	(4) Source Country Fixed Effects	(5) Country Pair Fixed Effects	(6) Hausman Taylor
Log (Nominal GDP) - Source	1.061***	1.154***	1.013***	0.043	0.095*	0.123***
	(54.316)	(54.328)	(51.601)	(0.569)	(1.835)	(2.642)
Log (Nominal GDP) - Destination	0.958***	0.997***	0.994***	0.992***	1.034***	1.027***
	(52.071)	(52.205)	(55.868)	(12.759)	(19.336)	(21.227)
Log (Distance)	-0.979***	-0.919***	-1.121***	-1.352***		-1.787
	(-19.939)	(-16.792)	(-23.646)	(-29.822)		(-0.453)
Common Language	0.711***	0.777***	0.727***	0.824***		-4.667
	(8.864)	(8.859)	(8.276)	(12.062)		(-0.392)
Border	1.032***	1.187***	1.256***	0.224		-3.059
	(6.350)	(4.629)	(4.896)	(1.228)		(-0.056)
Regional Trade Agreement	0.701***	0.973***	0.275***	0.663***	0.095*	0.096**
	(7.945)	(8.807)	(5.850)	(9.359)	(1.829)	(2.032)
Constant	10.782***	9.320***	11.522***	23.927***	8.095***	23.077
	(24.674)	(16.655)	(26.777)	(22.757)	(19.281)	(0.653)
Observations	35,528	35,528	35,528	35,528	35,528	35,528
R-squared	0.474	0.506	0.472	0.751	0.022	
Time dummies	YES	YES	YES	YES	YES	YES
Number of pairid		6,194	6,194	6,194	6,194	6,194
Hausman test (p-value)			402.37 (0.00)			1.68 (0.9956)

Robust t-statistics in parentheses, Errors clustered at country-pair level
*** p<0.01, ** p<0.05, * p<0.1

Source: Calculated by authors

Lastly, the inclusion of Regional Trade Agreement (RTA) dummy yields positive results, which implies the creation of trade agreement between any country pair is conducive for bilateral trade growth. However, it is worth to note that the RTA variable may be endogenous since there might be some causal links between the formation of RTA and bilateral trade flows in such a way that the RTA may occur as a result of higher trade rather than increasing trade itself.

Intraregional trade integration in the textile industry

From Exhibit 24, all intraregional dummies including Asia, European Union, Latin America and NAFTA appear positive and significant according to Exhibit 24 Column 1, which suggests a high degree of the trade integration in the textile industry among countries in the region compared to trade

integration with the rest of the world, especially the EU followed by Asia. Present trends suggest the relocation of production from the U.S. and Western Europe to developing countries in South East and Southern Asia (Kilduff & Chi, 2007). However, as we allow for the inclusion of dummies such as distance and common language, the estimates become less significant with lower magnitude or appear insignificant in some variables. This is because greater intraregional trade integration can partly be explained by countries having close proximity, common language as well as regional trade agreement. The result of the intra-NAFTA bilateral trade coefficient which appears less insignificant explains the fact well as NAFTA trade agreement largely explains an increase of nearly 50 percent of total US exports of textile to the other two NAFTA partners in 2002 after it was signed in 1994 (US Department of Commerce report, 2004).

Moreover, in the Column 3 of Exhibit 24*,* as we drop all intraregional dummies and add instead ASEAN and non-ASEAN dummies. The estimation result suggests a higher level of intraregional trade integration among non-ASEAN countries. A lower degree of intraregional trade in ASEAN can be explained by the fact that countries in ASEAN tends to trade across region rather than within. As shown in part 3, ASEAN exhibits 7.5 percent of trade within the region where main components of textile trade volume go to the U.S., amounting to roughly 30 percent of ASEAN exports in the textile.

Exhibit 24: Regional trade integration of textile industry

Dependent Variable: Log of textile trade	(1) Random Effects	(2) Random Effects	(3) Random Effects	(4) Source Country Fixed Effects	(5) Country Pair Fixed Effects
Log(Nominal GDP) - Source	0.968***	1.000***	1.009***	0.048	0.095
	(50.500)	(50.941)	(51.673)	(0.638)	(1.409)
Log(Nominal GDP) - Destination	0.960***	0.967***	0.988***	0.989***	1.034***
	(52.511)	(51.972)	(53.811)	(12.752)	(14.722)
Log(Distance)		-0.831***	-1.108***	-1.176***	
		(-15.653)	(-23.771)	(-21.413)	
Common Language		0.669***	0.713***	0.567***	
		(7.519)	(8.396)	(8.021)	
Border		1.037***	1.198***	0.107	
		(5.641)	(6.919)	(0.621)	
Regional Trade Agreement		0.209***	0.281***	0.610***	0.095
		(3.859)	(5.217)	(8.567)	(1.587)
Asia-Intra Dummy	3.131***	2.184***		-0.655***	
	(21.625)	(15.978)		(-4.322)	
European Union-Intra Dummy	3.206***	1.670***		0.791***	
	(38.018)	(14.330)		(7.356)	
Latin America-Intra Dummy	2.793***	1.288***		2.057***	
	(14.985)	(7.278)		(10.855)	
NAFTA-Intra Dummy	2.802***	0.706		0.173	
	(10.567)	(1.128)		(0.220)	
ASEAN-Intra Dummy			0.924***		
			(2.639)		
Asia-Intra (excl. ASEAN) Dummy			2.281***		
			(10.706)		
Constant	2.604***	9.163***	11.432***	20.381***	8.095***
	(16.608)	(19.378)	(26.654)	(20.721)	(15.186)
Observations	39,565	35,528	35,528	35,528	35,528
R-squared	0.4383	0.4852	0.4751	0.758	0.022
Number of pairid	6,931	6,194	6,194	6,194	6,194
Time Dummies	YES	YES	YES	YES	YES

Robust t-statistics in parentheses, Errors clustered at country-pair level

*** p<0.01, ** p<0.05, * p<0.1

Source: Calculated by authors

Fundamental factors supporting the trade in the textile industry

For our next empirical analysis, we would like to explore the impact of key fundamental pillars that may help to foster the intraregional trade in the textile industry namely, quality of infrastructure, innovation, higher education and training and labour force.

Exhibit 25: Fundamental factors of the textile industry

Dependent Variable: Log of textile trade	(1) Random Effect	(2) Random Effect	(3) Random Effect	(4) Random Effect	(5) Random Effect	(6) Random Effect	(7) Country Pair Fixed Effect	(8) Source Country Fixed Effect
Log (Nominal GDP) - Source	0.842***	0.842***	0.842***	0.842***	0.842***	0.843***	-0.048	-0.100
	(31.840)	(31.829)	(31.829)	(31.839)	(31.843)	(31.814)	(-0.641)	(-1.183)
Log (Nominal GDP) - Destination	0.967***	0.967***	0.967***	0.967***	0.967***	0.967***	0.981***	0.969***
	(38.290)	(38.283)	(38.244)	(38.257)	(38.266)	(38.232)	(13.122)	(11.746)
Log (Distance)	-1.139***	-1.132***	-1.131***	-1.132***	-1.131***	-1.132***		-1.331***
	(-24.125)	(-23.901)	(-23.887)	(-23.897)	(-23.885)	(-23.885)		(-28.630)
Common Language	0.580***	0.581***	0.580***	0.581***	0.579***	0.580***		0.803***
	(6.785)	(6.797)	(6.791)	(6.798)	(6.773)	(6.783)		(11.483)
Border	1.196***	1.175***	1.175***	1.172***	1.177***	1.175***		0.250
	(6.897)	(6.775)	(6.780)	(6.753)	(6.791)	(6.759)		(1.389)
Regional Trade Agreement	0.294***	0.290***	0.290***	0.290***	0.290***	0.290***	0.101*	0.677***
	(5.437)	(5.359)	(5.371)	(5.361)	(5.372)	(5.354)	(1.692)	(9.285)
Infrastructure - Source	0.210***	0.212***	0.210***	0.210***	0.210***	0.212***	0.040	0.004
	(6.307)	(6.354)	(6.318)	(6.319)	(6.312)	(6.352)	(1.092)	(0.086)
Infrastructure - Destination	0.042	0.041	0.042	0.042	0.042	0.040	-0.021	-0.015
	(1.345)	(1.321)	(1.342)	(1.342)	(1.339)	(1.289)	(-0.609)	(-0.380)
Innovation - Source	0.270***	0.270***	0.270***	0.270***	0.269***	0.268***	0.063	0.158**
	(5.393)	(5.398)	(5.396)	(5.394)	(5.390)	(5.356)	(0.985)	(2.182)
Innovation - Destination	-0.067	-0.068	-0.067	-0.067	-0.067	-0.068	-0.011	0.019
	(-1.438)	(-1.455)	(-1.446)	(-1.446)	(-1.449)	(-1.451)	(-0.188)	(0.303)
Higher Education and Training - Source	-0.471***	-0.471***	-0.471***	-0.471***	-0.471***	-0.472***	-0.205***	-0.231***
	(-7.452)	(-7.458)	(-7.455)	(-7.441)	(-7.454)	(-7.450)	(-2.699)	(-2.849)
Higher Education and Training - Destination	0.088*	0.089*	0.088*	0.089*	0.088*	0.090*	0.085	0.121
	(1.702)	(1.719)	(1.713)	(1.719)	(1.713)	(1.740)	(1.282)	(1.623)
Labour Force - Source	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
	(21.396)	(21.423)	(21.417)	(21.415)	(21.415)	(21.407)	(5.081)	(4.094)
Labour Force - Destination	0.000	0.000	0.000	0.000	0.000	0.000	0.000**	0.000**
	(0.276)	(0.229)	(0.231)	(0.226)	(0.240)	(0.227)	(1.963)	(2.081)
ASEAN-Intra Dummy		2.818***	1.389	3.503**	1.693***	3.375**		
		(2.677)	(1.252)	(1.989)	(3.489)	(2.216)		
Interaction of ASEAN-Intra dummy with Infrastructure - Source		-0.386**				-0.541***		
		(-2.562)				(-2.922)		
Interaction of ASEAN-Intra dummy with Infrastructure - Destination		0.036				0.240		
		(0.231)				(0.980)		
Interaction of ASEAN-Intra dummy with Innovation - Source			-0.073			0.279		
			(-0.323)			(1.103)		
Interaction of ASEAN-Intra dummy with Innovation - Destination			0.038			0.087		
			(0.270)			(0.254)		
Interaction of ASEAN-Intra dummy with Higher Education and Training - Source				-0.302		0.140		
				(-1.197)		(0.457)		
Interaction of ASEAN-Intra dummy with Higher Education and Training -				-0.192		-0.532		
				(-0.837)		(-1.255)		
Interaction of ASEAN-Intra dummy with Labour Force - Source					-0.000	-0.000		
					(-1.052)	(-1.599)		
Interaction of ASEAN-Intra dummy with Labour Force - Destinaton					-0.000	-0.000		
					(-0.660)	(-0.249)		
Constant	12.497***	12.429***	12.428***	12.429***	12.426***	12.426***	8.061***	-5.157
	(25.682)	(25.478)	(25.476)	(25.476)	(25.470)	(25.466)	(12.478)	(-0.743)
Observations	32,353	32,353	32,353	32,353	32,353	32,353	32,353	32,353
Number of pairid	5,614	5,614	5,614	5,614	5,614	5,614	5,614	
Time Dummies	YES	YES	YES	YES	YES	YES	YES	YES
R-squared							0.027	0.758

Robust z-statistics in parentheses, errors clustered at country-pair level
*** p<0.01, ** p<0.05, * p<0.1

Source: Calculated by authors

Exhibit 26: Fundamental factors of the automotive industry

Dependent Variable: Log of auto trade	(1) Random Effect	(2) Random Effect	(3) Random Effect	(4) Random Effect	(5) Random Effect	(6) Random Effect	(7) Country Pair Fixed Effect	(8) Source Country Fixed Effect
Log (Nominal GDP) - Source	1.429***	1.431***	1.432***	1.431***	1.432***	1.432***	0.006	-0.108
	(63.104)	(63.192)	(63.229)	(63.184)	(63.155)	(63.147)	(0.071)	(-1.006)
Log (Nominal GDP) - Destination	0.923***	0.923***	0.923***	0.923***	0.923***	0.923***	1.170***	1.104***
	(42.377)	(42.408)	(42.414)	(42.385)	(42.405)	(42.391)	(12.897)	(11.205)
Log (Distance)	-1.181***	-1.165***	-1.165***	-1.164***	-1.166***	-1.164***		-1.472***
	(-28.664)	(-28.299)	(-28.301)	(-28.296)	(-28.336)	(-28.271)		(-32.564)
Common Language	0.714***	0.720***	0.720***	0.718***	0.721***	0.719***		0.909***
	(9.497)	(9.611)	(9.615)	(9.584)	(9.627)	(9.587)		(12.605)
Border	0.987***	0.919***	0.927***	0.934***	0.923***	0.932***		0.070
	(5.109)	(4.807)	(4.842)	(4.886)	(4.814)	(4.859)		(0.363)
Regional Trade Agreement	0.414***	0.400***	0.399***	0.400***	0.398***	0.400***	-0.001	0.743***
	(6.378)	(6.183)	(6.171)	(6.184)	(6.157)	(6.174)	(-0.011)	(9.129)
Infrastructure - Source	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.000*	0.000
	(5.117)	(5.169)	(5.170)	(5.181)	(5.174)	(5.191)	(1.654)	(1.615)
Infrastructure - Destination	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.000**	0.000
	(4.551)	(4.470)	(4.516)	(4.525)	(4.533)	(4.466)	(1.982)	(1.190)
Innovation - Source	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***	0.001***	0.000
	(9.469)	(9.455)	(9.416)	(9.456)	(9.445)	(9.400)	(2.980)	(1.558)
Innovation - Destination	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	0.000
	(-0.830)	(-0.878)	(-0.928)	(-0.874)	(-0.878)	(-0.905)	(-0.045)	(0.539)
Higher Education and Training - Source	-0.000*	-0.000*	-0.000*	-0.000*	-0.000*	-0.000*	-0.001***	-0.001***
	(-1.780)	(-1.760)	(-1.754)	(-1.772)	(-1.749)	(-1.776)	(-3.199)	(-2.816)
Higher Education and Training - Destination	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.000*	-0.000
	(-4.189)	(-4.103)	(-4.110)	(-4.143)	(-4.106)	(-4.093)	(-1.791)	(-1.456)
Labour Force - Source	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
	(5.844)	(5.735)	(5.722)	(5.735)	(5.737)	(5.740)	(4.501)	(4.876)
Labour Force - Destination	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.000
	(0.258)	(0.149)	(0.128)	(0.145)	(0.148)	(0.142)	(0.349)	(-0.996)
ASEAN-Intra Dummy		0.357	-0.586	-0.247	2.381***	-0.506		
		(0.353)	(-0.487)	(-0.218)	(5.034)	(-0.440)		
Interaction of ASEAN-Intra dummy with		0.001				-0.002		
Infrastructure - Source		(0.890)				(-1.608)		
Interaction of ASEAN-Intra dummy with		0.002***				0.001		
Infrastructure - Destination		(2.931)				(0.991)		
Interaction of ASEAN-Intra dummy with			0.001			0.002		
Innovation - Source			(1.431)			(1.361)		
Interaction of ASEAN-Intra dummy with			0.002***			0.001		
Innovation - Destination			(3.405)			(0.484)		
Interaction of ASEAN-Intra dummy with				0.001		0.002		
Higher Education and Training - Source				(1.253)		(0.859)		
Interaction of ASEAN-Intra dummy with				0.002***		0.000		
Higher Education and Training -				(3.199)		(0.102)		
Interaction of ASEAN-Intra dummy with					-0.000	-0.000		
Labour Force - Source					(-0.756)	(-0.960)		
Interaction of ASEAN-Intra dummy with					-0.000	-0.000		
Labour Force - Destinaton					(-0.612)	(-0.038)		
Constant	9.630***	9.463***	9.467***	9.465***	9.466***	9.463***	7.970***	14.126***
	(24.976)	(24.507)	(24.513)	(24.514)	(24.511)	(24.491)	(12.328)	(10.663)
Observations	18,818	18,818	18,818	18,818	18,818	18,818	18,818	18,818
Number of pairid	5,519	5,519	5,519	5,519	5,519	5,519	5,519	
Time Dummies	YES	YES	YES	YES	YES	YES	YES	YES
R-squared							0.063	0.828

Robust z-statistics in parentheses, errors clustered at country-pair level
*** p<0.01, ** p<0.05, * p<0.1

Source: Calculated by authors

In the general case, the results from Exhibit 25 Column 1 conform to the baseline gravity model. The coefficients on nominal GDP remain positive and significant for both source and destination countries with higher magnitude for destination country. As country becomes more prosperous, consumption will rise, thereby increasing the level of imports from other economies when domestic production cannot keep up with the increasing demands. Other variables, including distance and dummies on common

language, border and regional trade agreement still give the expected results in line with our baseline model.

For the additional variables, the regressions reveal the highly significant coefficients for the source country. A positive sign of the infrastructure variable, which is considered a basic requirement for each country, confirms that better quality of infrastructure of the exporting country induces higher trade in the textile industry. Likewise, increasing levels of innovation in the textile industry will benefit the exporting country, as higher innovations are likely to lead to technology improvements in producing textile products such as fibers, fabrics and apparels that may help reduce costs and at the same time lead to better quality or value increase in the products. Moreover, it may allow for the production of additional types of products that could meet various demands. This will result in greater exports. However, the higher education and training in source countries appears to have negative impact on textile trade. This implies higher education and training may not be much beneficial to trade in the textile industry. More precisely, the need for well-trained labour in this industry may not be that relevant as those labours will require more wages. As the findings from Wang (2013) confirm, labour costs appear to have a prominent negative impact on trade in textile industry.

We then extend the regression further to investigate how such fundamental factors interact with the ASEAN intraregional dummy. The results suggest that there is no significant difference of the impact of fundamental factors on ASEAN region as compared to the rest of the world. This may reflect the fact that the overall infrastructure of some ASEAN countries has not developed remarkably over the past 10 years. Therefore, there does not seem to be a significant impact of such fundamentals on the regional trade in ASEAN. However, we ran a separate linear combination test and found a significant negative relationship between ASEAN intraregional dummy and Infrastructure of exporters. As Brook and Menon (2008) suggests, this means the intraregional trade in the textile industry is associated with higher trade costs and also indicates that quality of exporting countries' infrastructure is considered as barrier to trade especially for trade in the region comparing to

trade across region. Therefore, an improvement of infrastructure will support the rise of the trade in the region.

In this section, we go beyond our interested industries to examine and compare different impacts on industry trades between low-skilled and high-skilled industries. In this case, we regard the textile industry as a proxy for a low-skilled industry, while viewing automotive industry as a proxy for a high-skilled one. The regression delivers similar results in line with the general gravity model. We also run a regression to confirm a highly significant intraregional trade integration in ASEAN for the automotive industry, as supported by the study of Ito and Umemoto (2004) that ASEAN is considered a strategic location for automobile production especially for Japanese automobile manufacturers and that auto parts trade within the region has risen significantly. The estimation results of the two regressions appear in the Appendix (Table 2-3).

However, what we are interested to see is the impacts of fundamental variables on trade in the automotive industry. According to Exhibit 26, we found that infrastructure has a highly significant and positive impact on trade in automotive industry for both source and destination countries. This underlines the fact that logistical infrastructure is the key determinant for trade between countries in this industry. François and Manchin (2007) found that infrastructure not only determines export level, but also the likelihood to export. Hence, lack of adequate infrastructure will limit the potential growth of the industry. So, the supporting role of government to improve quality and increase numbers of infrastructure will help intensify trade as this will add on efficiency of transportation between countries which in turn reduces the transportation costs.

Moreover, the innovation variable is also significant only in the source country. As for the automotive industry, innovation to improve quality of automobile and automobile parts will add value to the products for trade and enables country to maintain its competitive edge. Developing capabilities in new technology will ensure that the country can meet demand for emerging areas including new materials, alternative fuels and electric and hybrid vehicles (Krishnan, 2011). However, higher education and training are likely to

result in negative impact for this industry. This means that state of development in this area remains an impediment for trades in automotive industry. This may also be because production of some automotive parts may not require high skills and training and that production of high-technology and high-skilled-required parts are likely to remain in the country of lead companies. In addition, the impact of number of labour force is also negligible in this case.

From Exhibit 26 Columns 2-5, as we include the ASEAN intraregional dummy, we found a positive and significant impact of infrastructure, innovation as well as higher education and training on automotive trade especially in destination country. This is because the main components of the automotive trade in ASEAN are in the automotive production-related products, accounting for over 80 percent of total exports whereby only less than 20 percent is for final product exports. This means high innovation especially automobile assembly and production of high-technology parts are likely to remain in the importing countries. Thus, the infrastructure for the destination country is crucial to ensure effective function of operations, where training will be of great importance for the economy to be able to perform complex tasks and produce more sophisticated products.

Overall, we can observe the difference impact of fundamental factors between low-skilled and high-skilled industries in ASEAN. We can conclude that for low-skilled industry like textiles, infrastructure development is crucial especially in exporting country. And, at present, the lack of sufficient infrastructure still impedes the trades between countries in the region. Also, the educational quality and training still are considered to be an obstacle for trades. Conversely, for high-skilled industry, the development of fundamental factors in ASEAN shows a greater impact in importer countries.

The role of regulation in textile industry

Our last estimation aims to investigate the role of regulations between two countries especially in the ASEAN region. According to Exhibit 27, the coefficients for the regulation quality as well as rule of law appear positive and

significant only for destination country. This points to the importance of regulatory and institutional quality in the importing country as implicit barriers to trade. Lack of solid institutional fundamentals may make one country reluctant to trade with the other country. Predictable legal procedures, equitable and enforceable competition policy and sound regulatory framework help foster friendly environment for trade (Brooks, 2008)

A more interesting finding is that differences between regulation quality and rule of law give negative and significant impacts on the trade in the textile industry. Moreover, the interaction term between ASEAN intraregional dummy and regulatory differences appears insignificant. This means that the impact from regulatory differences is similar with the rest of the world and differences in rules and regulations between two countries are considered as information costs for trade. Thus, the lack of regulatory harmonization could impair trade in textile industry.

Exhibit 27: Institutional factors

Dependent Variable: Log of textile trade	(1) Random Effect	(2) Random Effect	(3) Random Effect	(4) Random Effect	(5) Country Pair Fixed Effect	(6) Country Pair Fixed Effect	(7) Source Country Fixed Effect	(8) Source Country Fixed Effect
Log (Norminal GDP) - Source	1.002***	0.998***	1.003***	0.998***	0.064	0.093	0.012	0.039
	(46.147)	(45.688)	(46.175)	(45.708)	(0.890)	(1.353)	(0.148)	(0.501)
Log (Norminal GDP) - Destination	0.952***	0.967***	0.952***	0.967***	0.973***	1.011***	0.930***	0.979***
	(46.108)	(45.138)	(46.055)	(45.078)	(13.240)	(14.188)	(11.262)	(12.368)
Log (Distance)	-1.082***	-1.063***	-1.071***	-1.052***			-1.351***	-1.354***
	(-23.325)	(-22.360)	(-22.999)	(-22.036)			(-29.713)	(-29.694)
Common Language	0.728***	0.712***	0.732***	0.715***			0.825***	0.826***
	(8.606)	(8.394)	(8.659)	(8.431)			(12.029)	(12.050)
Border	1.233***	1.206***	1.200***	1.182***			0.217	0.223
	(6.829)	(6.596)	(6.617)	(6.426)			(1.191)	(1.223)
Regional Trade Agreement	0.219***	0.234***	0.214***	0.230***	0.091	0.089	0.657***	0.662***
	(4.082)	(4.370)	(3.983)	(4.285)	(1.528)	(1.485)	(9.229)	(9.342)
Regulation Quality - Source	0.066		0.070*		0.158**		0.165*	
	(1.598)		(1.698)		(2.000)		(1.808)	
Regulation Quality - Destination	0.157***		0.160***		0.219***		0.245***	
	(3.828)		(3.904)		(2.717)		(2.715)	
Difference in Regulation Quality	-0.313***		-0.316***		-0.064		-0.020	
	(-8.295)		(-8.337)		(-1.146)		(-0.553)	
Rule of Law - Source		0.056		0.060		0.077		0.181
		(1.439)		(1.530)		(0.707)		(1.433)
Rule of Law - Destination		0.092**		0.095**		0.278***		0.262**
		(2.284)		(2.345)		(2.722)		(2.439)
Difference in Rule of Law		-0.330***		-0.333***		-0.019		0.007
		(-8.625)		(-8.664)		(-0.249)		(0.248)
ASEAN-Intra Dummy			0.958***	0.562				
			(2.794)	(0.921)				
Interaction of ASEAN-Intra Dummy with Difference in Regulation Quality			0.163					
			(0.785)					
Interaction of ASEAN-Intra Dummy with Difference in Rule of Law				0.386				
				(1.355)				
Constant	11.767***	11.682***	11.673***	11.592***	8.460***	8.122***	22.334***	20.734***
	(27.870)	(27.369)	(27.555)	(27.052)	(15.417)	(15.008)	(20.081)	(17.778)
Observations	35,339	35,339	35,339	35,339	35,339	35,339	35,339	35,339
R-squared					0.023	0.023	0.751	0.751
Number of pairid	6,150	6,150	6,150	6,150	6,150	6,150		
Time Dummies	YES	YES	YES	YES	YES	YES	YES	YES

Robust z-statistics in parentheses, errors clusted at country-pair level

*** p<0.01, ** p<0.05, * p<0.1

Source: Calculated by authors

Exhibit 28: Summary of results

Dependent Variables:	Textile Industry	Auto Industry
Log (Nominal GDP) – Source	+	
Log (Nominal GDP) – Destination	+	
Log (Distance)	-	
Common Language	+	
Border	+	
Regional Trade Agreement	+	
Asia-Intra Dummy	+	
European Union-Intra Dummy	+	
Latin America-Intra Dummy	+	
NAFTA-Intra Dummy	+	
ASEAN-Intra Dummy	+	
Asia-Intra (excl. ASEAN) Dummy	+	
Infrastructure – Source	+	+
Infrastructure – Destination	Insignificant	+
Innovation – Source	+	+
Innovation – Destination	Insignificant	Insignificant
Higher Education and Training – Source	-	-
Higher Education and Training – Destination	+	-
Labour Force – Source	+	+
Labour Force – Destination	Insignificant	Insignificant
ASEAN-Intra*Infrastructure – Source	-	Insignificant
ASEAN-Intra*Infrastructure – Destination	Insignificant	+
ASEAN-Intra*Innovation – Source	Insignificant	Insignificant
ASEAN-Intra*Innovation – Destination	Insignificant	+
ASEAN-Intra*Higher Education and Training – Source	Insignificant	Insignificant
ASEAN-Intra*Higher Education and Training – Destination	Insignificant	+
ASEAN-Intra*Labour Force – Source	Insignificant	Insignificant
ASEAN-Intra*Labour Force – Destination	Insignificant	Insignificant
Regulation Quality – Source	Insignificant	
Regulation Quality – Destination	+	
Difference in Regulation Quality	-	
Rule of Law – Source	Insignificant	
Rule of Law – Destination	+	
Difference in Rule of Law	-	
ASEAN-Intra*Difference in Regulation Quality	Insignificant	
ASEAN-Intra*Difference in Rule of Law	Insignificant	

*indicates interaction term

6. Opportunities going forward for the ASEAN Value Chain

According to our analyses from the textile and the automotive industries, diversity and different specializations among ASEAN countries help strengthen existing ASEAN production chains and also increase competitiveness of ASEAN as a whole. However, there is so much left to be done to tap the opportunities arising from the *"Diversity with Proximity"* advantage of ASEAN. In this light, we would like to set out key policy recommendations as follows:

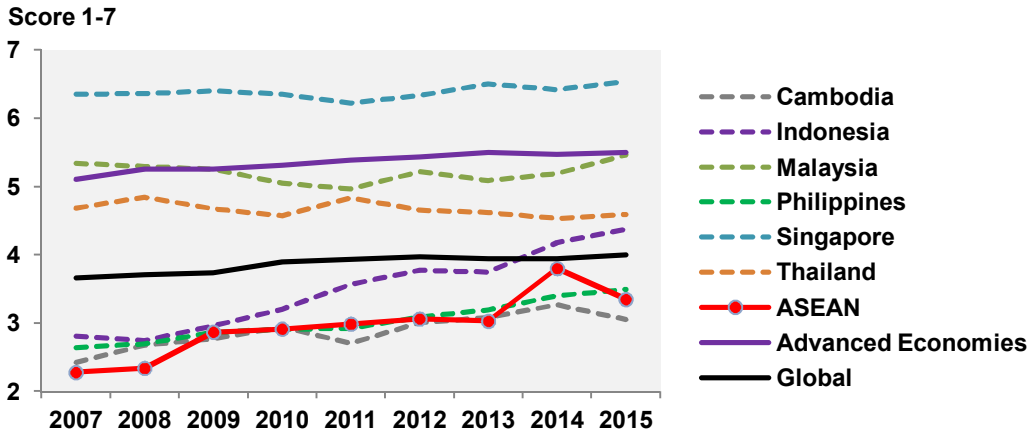
(1) Realizing ASEAN potentials and challenges

Realizing the diversification of ASEAN is one important matter, another is to realize ASEAN members' potentials as partners in the ASEAN production networks. Taking the textile industry as an example, challenges still remain. Firstly, there has been less innovation in this industry. Therefore, more investment in R&D is necessary to speed up technological advancement in this industry, which could potentially reduce production costs or create new products that are able to meet evolving consumer demands. Secondly, higher education and training are essential to be included in a long-term policy to match demand and supply in the labour market to prevent shortages of operational workers. This could also help prepare our region for changes in economic structures especially aging population problem in the near future.

(2) Physical connectivity

As all regressions have strongly confirmed, the development of infrastructure could help intensify trades among countries. The construction of new roads, airports and seaports is an essential factor for trade facilitation and would reduce the barriers to trade between countries.

Exhibit 29: Infrastructure development in ASEAN



Source: World Economic Forum (2007-2015)

As the figure above illustrates, it emphasizes that quality of overall infrastructure of ASEAN is still below the global average according to the

Global Competitiveness Report 2015. Therefore, there is still room for improvement in physical connectivity of ASEAN to enhance its competitiveness. In light of this, ASEAN can also take on existing initiatives to improve physical infrastructure in the region including the North-South Corridor connecting Yunnan in China with Myanmar, Lao PDR and Thailand, the East-West Corridor connecting Vietnam, Lao PDR, Thailand and Myanmar. Another ambitious initiative is the “One Belt One Road” that connects China with countries in Asia. With this initiative, the whole ASEAN would benefit from greater interconnectedness to Chinese market as well as its strategic location linking up China, India and European continent. However, all these initiatives will not be successful without proper mechanisms of infrastructure financing. Financial cooperation among ASEAN members such as Asian Bond Markets Initiative or ASEAN Investment fund is viable to tap regional savings and match with much-needed investment in infrastructure.

(3) Institutional connectivity

Differences in rules and regulations impose costs to businesses especially when they have their presence in many countries and this fact is in line with the results of our regression. The AEC may be a platform to deal with this issue. After its success in the tariff reduction, AEC should step up its effort in harmonization of rules and regulations. The ASEAN Single Window is a prominent case that would help streamline customs procedures and expedite cargo clearance. This will allow traders to save both costs and time for customs clearance region-wide.

(4) Riding the wave of regional and global trends

Last but not least, ASEAN needs to stand ready for adapting itself to any possible external challenges. Some possible challenges, as mentioned earlier, include the rising wage in other regions which gives opportunity for ASEAN to become a labour-intensive industry hub, particularly for textile industry. Furthermore, not only that ASEAN is a home to over 600 million people, there has been a significant rise of middle class population. The Asian Development Bank also estimates that the share of ASEAN’s middle class is expected to increase to 65 percent by 2030. The rising regional demand will

support the regional production network as well as generate own regional strength for ASEAN. In this light, each member should ensure that such growth is sustainable by maintaining its economic and financial stability and fostering business friendly environment.

7. Conclusion

ASEAN is a major supply chain hub which has tapped largely on its "diversity with proximity" advantage. These supply chains are referred here as "ASEAN Value Chains (AVC)". With the upcoming AEC, they would knit ASEAN in even tighter trade and production linkages and strengthen competiveness of the region. Therefore, this paper aims to demonstrate the dynamism of the AVC and how the integration can be supported by the AEC.

On the evolution of the regional value chains, the AVC has well established on the back of two key fundamentals. The first factor involves economic fundamentals. ASEAN economies vastly differ in terms of factor endowment and patterns of production which reflects in the different export structure and wage diversification. The second factor is institutional fundamentals which were largely driven by the 1985 Plaza Accord, the opening up of some ASEAN countries as well as trade and investment policies.

Next, the textile and automotive industry were selected and explored to illustrate sample structures of the AVCs, the current stage of ASEAN countries in the chains and key enabling factors for further enhancing the chains. The selection criteria were based on four factors, namely: 1) major export products of ASEAN with high growth potential, 2) competitiveness of ASEAN, 3) prospects in world markets and 4) high regional value-added. In this section, we found that there is no individual country having comparative advantage for the entire production chain of the textile. These results produce meaningful implications to ASEAN that individual ASEAN countries are not able to compete in the world market without regional integration. Increasing ASEAN integrated production network will enhance the region comparative advantage that each country alone does not have.

The standard “gravity model” is used here to approximate the bilateral trade relationships between any two countries in the textile and automotive industries. We then extended the model further to examine the key fundamental factors driving or remain impediments on bilateral trades in such industries especially in ASEAN. The key findings are as follows:

1) The baseline regression reveals that bilateral trade will be greater if the countries become richer but less if two countries are distant. Moreover, if two countries have connected borders or speak the same language, they tend to trade more between them. Also, formation of bilateral trade agreement helps to boost trade.
2) In the textile industry, better quality of infrastructure and sufficient innovation matter for textile exporters as they allow for production of new types or high-tech products. Well-trained labour might not be necessary as this would raise labour costs and potentially deteriorate competitiveness in this industry. However, textile trade within ASEAN is associated with high trade costs especially for exporters which act as barrier to trade.
3) For the automotive industry, all fundamentals matter more for ASEAN importers as high innovation especially automobile assembly and high-tech parts production is likely to remain in the importing countries.
4) Regulatory harmonization is very beneficial since differences in regulations between two countries will impose costs for businesses.

The findings provide meaningful policy recommendations to move the AVCs forward with the AEC. Firstly, ASEAN has to realize members’ potentials as partners and leverage on their different comparative advantages in the ASEAN production networks. Secondly, improvement in quality of overall infrastructure of ASEAN is essential to reduce trade costs. Thirdly, AEC should intensify its effort in harmonization of rules and regulations. Lastly, ASEAN needs to stand ready for adapting itself to any possible external challenges.

References

Abonyi, 2006, “Linking Greater Mekong Subregion Enterprises to International Markets: The Role of Global Value Chains, International Production Networks and Enterprise Clusters.”, Studies in Trade and Investment, 59. (Bangkok: Economic and Social Commission for Asia and the Pacific.)

ASEAN Secretariat, 2014, “ASEAN Investment Report 2013-2014,” October 2014, (Jakarta: ASEAN Secretariat).

Athukorala, P., 2010, “Production Networks and Trade Patterns in East Asia: Regionalization or Globalization?.” ADB Regional Economic Integration Working Paper Series. No.56.

Australia and New Zealand Banking Group Limited, 2015, “Positioning For Profit: Navigating the Asian Textile & Garment Supply Chain.” April 2015.

Balassa, B., 1965, "Trade liberalization and Revealed Comparative Advantage", The Manchester School of Economic and Social Studies, 33, pp. 92-123.

Baldwin, R., 2006, “Globalisation: the great unbundling(s), Research paper of the project “Challenges of globalisation for Europe and Finland", September 2006, Secretariat of the Economic Council of Finland

Baldwin, R. and Lopez-Gonzalez, J. (2014), ‘Supply-chain trade: A portrait of global patterns and several testable hypotheses’, The World Economy (Forthcoming).

Brooks, D. H., and J. Menon, eds., 2008, “Infrastructure and Trade in Asia”. (Cheltenham: Edward Elgar.)

Brooks, D. H., 2008, “Linking Asia’s Trade, Logistics, and Infrastructure.” ADBI Working Paper # 128. ADBI, Tokyo.

Brooks, D. H., 2008, “Regional Cooperation, Infrastructure, and Trade Costs in Asia.” ADBI Working Paper # 123. ADBI, Tokyo.

Cheewatrakoolpong, Sabhasri and Bunditwattanawong, 2013, “Impact of the ASEAN Economic Community on ASEAN Production Networks”. February 2013.

François, J. and Manchin, M., 2007, “Institution, Infrastructure and Trade.” World Bank Policy Research Working Paper No. 4152. (Washington, DC: World Bank.)

Gereffi and Fernandez-Stark, 2011, “GLOBAL VALUE CHAIN ANALYSIS: A PRIMER”, May 2011

Gujarati, D. N., 2003, “Basic Econometrics (4th ed.)” (New York, NY: The McGraw-Hill.)

Ito and Umemoto, 2004, “Intra-Industry Trade in the ASEAN Region: The Case of the Automotive Industry” September 2004.

Jones, R. and Kierzkowski, H., 1990, “The role of services in production and international trade: a theoretical framework”, In Jones, R. and Krueger, A. (Eds.), “The Political Economy of International Trade: Essays in Honor of Robert E. Baldwin, Oxford, Blackwell: 31-48.

Kilduff, P., & Chi, T., 2007, “Analysis of comparative advantage in the textile complex: a study of East European and former Soviet Union nations.” Journal of Fashion Marketing and Management, 11(1), 82-105.

Kohpaiboon, A., and et al., 2014, “Thai manufacturing and Regional Comprehensive Economic Partnership (RCEP).” October 2014, (Bangkok: The Office of Industrial Economics and Thammasat University).

Krishnan, 2011, “Innovation in the Indian Automotive Industry: Role of Academic and Public Research Institutions.” June 2011.

Krugman, P.R. & Obstfeld, M., 2005, “International economics: Theory and Practice. (7th ed.)” (Boston, MA: Addison-Wesley.)

Menon, 2012, “Narrowing the Development Divide in ASEAN: The Role of Policy”

Ricardo David, 1817, “On the Principles of Political Economy and Taxation.” Piero Sraffa (Ed.) Works and Correspondence of David Ricardo, Volume I, Cambridge University Press, 1951, p.135

World Economic Forum, 2007, “The Global Competitiveness Report 2007-2008.” (Geneva: World Economic Forum)

World Economic Forum, 2008, “The Global Competitiveness Report 2008-2009.” (Geneva: World Economic Forum)

World Economic Forum, 2009, “The Global Competitiveness Report 2009-2010.” (Geneva: World Economic Forum)

World Economic Forum, 2010, “The Global Competitiveness Report 2010-2011.” (Geneva: World Economic Forum)

World Economic Forum, 2011, “The Global Competitiveness Report 2011-2012.” (Geneva: World Economic Forum)

World Economic Forum, 2012, “The Global Competitiveness Report 2012-2013.” (Geneva: World Economic Forum)

World Economic Forum, 2013, “The Global Competitiveness Report 2013-2014.” (Geneva: World Economic Forum)

World Economic Forum, 2014, “The Global Competitiveness Report 2014-2015.” (Geneva: World Economic Forum)

World Economic Forum, 2015, “The Global Competitiveness Report 2015-2016.” (Geneva: World Economic Forum)

Xinxin Wang, 2013, “The determinants of textile and apparel export performance in Asian countries”

Appendix

Methodology

The standard "gravity equation" based on theoretical framework developed by Krugman and Obstfield (2005) is used for our analysis. Apart from the original inclusion of only two independent variables, GDP and distances, the equation is then extended to include other factors perceived to affect the bilateral trade flows. Our standard gravity equation is estimated in the logarithm form as follows:

$$log(Trade_{ijt}) = constant + \beta_1 log(GDP_{it}) + \beta_2 log(GDP_{jt}) + \beta_3 log(dist)_{ij} + \beta_4 comlang_{ij} + \beta_5 border_{ij} + \beta_6 RTA_{ij} + Time\ dummies + \varepsilon_{ijt}$$

where *i* is a source country (exporter), *j* is a destination country (importer), *t* represents year from 2001 to 2012, $Trade_{ijt}$ is the bilateral trade flows in nominal terms from country i to j in year t, GDP_{it} is country i's nominal Gross Domestic Product (GDP) in year t, GDP_{jt} is country j's nominal GDP in year t, $dist_{ij}$ is distance in miles between country i and j as measured by log of geographical distance between two capital cities, $comlang_{ij}$ is a dummy taking value 1 if country i and j share the same language and 0 otherwise, $border_{ij}$ is a dummy taking value 1 if country i and j have connected border and 0 otherwise, RTA_{ij} is a dummy taking value 1 if there exists regional trade agreement between country i and j and 0 otherwise, $Time\ dummies$ is a dummy taking value 1 for year t and 0 otherwise, ε_{ijt} is an error term.

Baseline Regression

We first run a baseline regression including the dependent variable being bilateral trade flows between two countries in the textile industry and other main explanatory variables under the standard gravity model specified above. We also include time dummies in the regression to control shocks that are common across country-pair at each point in time. Moreover, we also control for robust standard errors clustered at country-pair level. Also, we employ various econometric estimation methods namely the pooled OLS,

between effects, random effects[5], source-country effects, fixed effects (within) and Hausman-Taylor[6] methods to confirm for the robustness of the estimates.

To perform estimations for the other parts, we firstly decide the main model based on the results obtained from each estimation techniques as well as considering the properties of the data. The empirical analysis in later parts will also include factors that may be country-specific characteristics, such as the quality of infrastructure. Therefore, the pooled OLS estimates may be unbiased and inefficient as it does not allow for the estimation of unobserved individual heterogeneity that may be correlated with the regressors as well as simply ignoring the panel effect. Moreover, for the between-effect estimator, though using cross-sectional information in the data, it completely disregards the time variation in the data, while the random-effect model employs both cross-sectional and time variation information in the data. We also perform a separate Breusch-Pagan LM test[7] and found the strong evidence for choosing random-effect model over the pooled OLS. However, the estimated results from the random-effect model will be efficient only if the country-pair specific effects as well as the error terms do not correlate with other explanatory variables. According to Gujarati (2003), the fixed-effect model is more appropriate if there exists some correlation between country-pair specific effects and independent variables as it will control any country-pair unobserved heterogeneity. It will also allow for the estimation of the net effect of each explanatory variable. The Hausman test also reveals strong evidence towards choosing fixed effect model. Nevertheless, our research interest also focuses on estimating the effects of time-invariant factors such as common language and border, the Hausman-Taylor estimation is theoretically perceived to provide the best outcome in comparison to both random and fixed-effect models since it allows for the estimation of both purely cross-

[5] The random effect estimators are indeed the GLS estimators, suitable when there is no correlation between unobserved heterogeneity and explanatory variables.

[6] Hausman-Taylor estimator uses the method of instrumental variables and fits panel-data random-effects models in which some of the covariates are correlated with the unobserved individual-level random effect.

[7] The Breusch-Pagan test is used to test for heteroskedasticity. So, in this case, it can help us to decide between a random effects regression and a pooled OLS regression. The null hypothesis in the LM test is that variances across entities are zero. There is no significant difference across units (i.e. no panel effect). If the null is rejected, the random effect model is more preferred.

sectional and time-invariant coefficients. However, as can be seen from results in Exhibit 23 column 5, the Hausman-Taylor estimation tends to produce volatile and insignificant results. Therefore, the random effect estimation is a viable option. Thus, for the rest of our analysis, we then rely on the random effect estimation and also perform country-effect and fixed-effect regressions to check for robustness of the estimates.

Intraregional trade integration in textile industry

In order to assess the level of intraregional integration, we extend our standard gravity model by including the dummy variables for intraregional trade which would take value 1 if both source and destination countries are in the same region and 0 otherwise. Firstly, the dummies for the intraregional bilateral trades in Asia, European Union (EU), Latin America and NAFTA are included to compare the degree of integration in each region. Next, we drop the previous intraregional dummies and include dummies for intraregional trade in ASEAN instead when both source and destination countries belong to ASEAN 10 including Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Vietnam (Brunei Darussalam is excluded due to data limitations). We compared these to the dummies for intraregional trade in Asia excluding countries in ASEAN.

Fundamental factors supporting trade in textile and automotive industries

For our next empirical analysis, we expand the baseline regression to include additional explanatory variables that are supposed to be the key fundamental pillars fostering the intraregional trade in the textile industry namely, quality of infrastructure, innovation, higher education and training and

labour force[8]. We then extend the regression further to investigate how such fundamental factors interact with the ASEAN intraregional dummy.

In this section, we go beyond our interested industries to examine and compare different impacts on industry trades between low-skilled and high-skilled industries. In this case, we regard the textile industry as a proxy for a low-skilled industry, while viewing automotive industry as a proxy for a high-skilled one. The baseline regression is done using the logarithm of the automotive industry trade as dependent variables. We also expand the regression to include the ASEAN intraregional dummy to examine the impact of fundamental factors in ASEAN.

The role of regulation in the textile industry

To examine the impact of regulation quality as well as the existence of rule of raw on bilateral trade in textile industry, we extend the baseline regression to include additional variables including quality of regulation and rule of law for both source and destination countries. We also include here the difference between quality of regulation and rule of law between each country pair to the impact from such differences on trade. We also expand the regression to include the ASEAN intraregional dummy to see the impact of those factors in ASEAN.

[8] 1) Quality of Infrastructure includes the measurement of effective modes of transport including high-quality roads, railroads, ports and air transport as well as access electricity supplies and solid and extensive telecommunications network. 2) Higher Education measures secondary and tertiary enrollments rates and quality of education, while Training measures the extent of staff training. 3) Innovation measures sufficiency of investment in R&D, presence of high-quality scientific research institutions and extensive collaboration in research and technological developments between universities and industry as well as protection of intellectual property.

Table 1: List of variables

*s= Source country, d= Destination country

	Variable	Label
Dependent	ltextile	Log of trade in textile industry (import in USD)
Independent	s_lngdpusd	Log of nominal GDP (USD)
	d_lngdpusd	
	ldist2	Log of distance in miles
	border	Land border dummy
	comlang	Common Language dummy
	rta	Regional Trade Agreement dummy
	s_Infra	GCI: Infrastructure
	d_Infra	
	s_Inno	GCI: Innovation
	d_Inno	
	s_Het	GCI: Higher education and training
	d_Het	
	s_Labour	WDI: Labour force
	d_Labour	
	s_regqual	ICRG: Regulation Quality (higher, better)
	d_regqual	
	s_rulelaw	ICRG: Rule of Law (higher, better)
	d_rulelaw	
	dif_regqual	Difference in regulation quality between source and destination countries
	dif_rulelaw	Difference in rule of law between source and destination countries
	L.s_polrisk	ICRG: political risk rating
	L.d_polrisk	
	L.s_econrisk	ICRG: Economic risk rating
	L.d_econrisk	
	L.s_finrisk	ICRG: Financial risk rating
	L.d_finrisk	
	asia_intra	Intra-Asia dummy
	asean_intra	Intra-ASEAN dummy
	nonasean_intra	Intra-non ASEAN dummy
	eu_intra	Intra-EU dummy
	latin_intra	Intra-Latin America dummy
	nafta_intra	Intra-NAFTA dummy

Table 2: Baseline regressions of automotive industry

Dependent Variable: Log of auto trade	(1) Pooled OLS	(2) Between Effect	(3) Random Effect	(4) Source Country Fixed Effect	(5) Country Pair Fixed Effect	(6) Hausman-Taylor
Log (Nominal GDP) - Source	1.746***	1.795***	1.684***	0.049	0.121*	0.222***
	(93.761)	(93.477)	(90.304)	(0.511)	(1.844)	(3.784)
Log (Nominal GDP) - Destination	0.823***	0.839***	0.853***	1.040***	1.143***	1.134***
	(47.397)	(49.280)	(52.158)	(11.572)	(16.922)	(18.379)
Log (Distance)	-0.953***	-0.943***	-1.199***	-1.486***		-9.307***
	(-19.374)	(-19.514)	(-27.524)	(-33.827)		(-3.434)
Common Language	0.752***	0.804***	0.794***	0.920***		-30.793***
	(8.918)	(10.319)	(10.070)	(12.942)		(-3.913)
Border	0.834***	0.912***	0.911***	0.083		-97.443***
	(4.641)	(4.020)	(3.976)	(0.426)		(-2.636)
Regional Trade Agreement	1.052***	1.360***	0.439***	0.743***	-0.021	-0.019
	(11.630)	(13.747)	(7.559)	(9.435)	(-0.300)	(-0.290)
Constant	8.081***	9.945***	10.189***	25.655***	8.785***	0.000
	(18.165)	(14.768)	(25.830)	(23.485)	(16.969)	(.)
Observations	19,736	19,736	19,736	19,736	19,736	19,736
R-squared	0.645	0.676		0.827	0.055	
Time dummies	YES	YES	YES	YES	YES	YES
Number of pairid		5,867	5,867		5,867	5,867

Robust t-statistics in parentheses, errors clustered at country-pair level
*** p<0.01, ** p<0.05, * p<0.1

Source: Calculated by authors

Table 3: Regional trade integration of automotive industry

Dependent Variable: Log of auto trade	(1) Random Effect	(2) Random Effect	(3) Random Effect	(4) Random Effect	(5) Source Country Fixed Effect	(6) Country Pair Fixed Effect
Log (Nominal GDP) - Source	1.628***	1.677***	1.652***	1.684***	-0.016	0.121
	(91.509)	(96.574)	(87.281)	(96.496)	(-0.167)	(1.523)
Log (Nominal GDP) - Destination	0.827***	0.832***	0.880***	0.849***	1.035***	1.143***
	(49.334)	(49.836)	(50.659)	(50.982)	(11.520)	(13.968)
Log (Distance)		-0.985***		-1.182***	-1.352***	
		(-21.472)		(-28.143)	(-25.844)	
Common Language		0.692***		0.790***	0.627***	
		(8.670)		(10.341)	(8.405)	
Border		0.658***		0.848***	-0.091	
		(3.690)		(4.819)	(-0.524)	
Regional Trade Agreement		0.355***		0.434***	0.796***	-0.021
		(5.527)		(6.767)	(10.027)	(-0.281)
Asia-Intra Dummy	2.623***	1.695***			-0.299**	
	(16.198)	(11.634)			(-1.994)	
European Union-Intra Dummy	3.135***	1.207***			-0.129	
	(39.448)	(11.963)			(-1.234)	
Latin America-Intra Dummy	2.966***	1.327***			1.902***	
	(16.471)	(7.975)			(10.322)	
NAFTA-Intra Dummy	3.374***	1.149			0.911	
	(7.725)	(1.516)			(1.111)	
ASEAN-Intra Dummy			4.111***	1.911***		
			(12.827)	(5.234)		
Asia-Intra (excl ASEAN) Dummy			1.218***	0.962***		
			(4.551)	(4.249)		
Constant	0.690***	8.446***	0.608***	10.049***	25.231***	8.785***
	(4.474)	(20.562)	(3.749)	(26.069)	(22.890)	(14.238)
Observations	22,460	19,736	22,460	19,736	19,736	19,736
R-squared					0.831	0.055
Number of pairid	6,583	5,867	6,583	5,867		5,867
Time Dummies	YES	YES	YES	YES	YES	YES

Robust z-statistics in parentheses, errors clustered at country-pair level

*** p<0.01, ** p<0.05, * p<0.1