Immigration–Trade Relationship in ASEAN: What Does the Evidence Show?

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Abstract: The Association of Southeast Asian Nations (ASEAN) region has become more integrated through trade and migration. Yet, public policies in ASEAN do not consider the interrelations between trade and immigration policies. Therefore, the paper employs a static panel gravity model for the 10 ASEAN countries over five-year intervals between 1990 and 2020 to identify the direct connections between migration and trade (exports, imports and intra-industry trade). The empirical results support a pro-import immigrant effect but not a pro-export immigrant effect. The negative effect of the stock of immigrants on the share of bilateral intra-industry trade implies that immigration better explains one-way trade or inter-industry trade. The limited presence of the immigrant-link effects reflects the large stock of unskilled ASEAN immigrants that reduces the possibilities of creating networks between the home and host countries. The significant immigration-import links, however, is sufficient to justify the importance for ASEAN to work towards connecting migration and trade policies.

Keywords: International migration, international trade, intra-industry trade, ASEAN
JEL classification: F14, F22, O15

1. Introduction

The Association of Southeast Asian Nations (ASEAN) has witnessed a greater volume of the movement of people in the region, with intra-regional labour mobility more than quadrupling since 1980 to reach 6.9 million in 2015 (Testaverde et al., 2017). Economic disparities among the ASEAN member states (AMS) in terms of job opportunities and

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wage differentials (Kikkawa et al., 2019; Tuccio, 2017) attracted the growing number of unskilled migrant workers from the region to meet industry needs, especially for low skilled and manual jobs. For example, large wage differential exists between Myanmar and Singapore, with average monthly earnings of USD91 in Myanmar and USD2,859 in Singapore (International Labour Organization, 2015). The ASEAN unskilled[1] migrants are also attracted to neighbouring countries due to the geographical (border economies) and cultural (common language) proximities.

Alternatively, extra-regional trade continues to remain more important for ASEAN relative to intraregional trade. That said, countries like Malaysia, Singapore and Thailand are the major migrant-receiving countries and they also dominate intraregional trade. Yet, previous related studies on the region have largely focused on the drivers of intra-ASEAN migration (Testaverde et al., 2017; Tuccio, 2017) and intra-ASEAN trade, without considering the direct connections between the two. This neglect, in turn, reflects public policies in ASEAN that often work in silos and do not consider the interrelations between trade and immigration policies. Migration policies in ASEAN (unlike trade policies) are primarily handled at the national level, with limited cooperation achieved through bilateral labour agreements and memorandums of understanding (MoUs), and even within the individual ASEAN countries, the policies have been rather reactive.

In the ASEAN context, the effects of ASEAN migrants on intra-industry trade (IIT – exports and imports belonging statistically to the same industry) have also not been considered even though intraregional trade is largely driven by vertical specialisation or trade in intermediate goods. This paper therefore seeks to address the following key policy-relevant question: Does intra-ASEAN migration facilitate bilateral trade (exports, imports and IIT) within the region? The contributions of this paper are twofold: First, it contributes to the scarce empirical literature on the links between immigrant population and the host country's trade with evidence from the ASEAN region that is highly integrated both through trade and migration. Second, it tackles a relatively new subject (see Blanes, 2005) that is under researched within the immigration-trade linkages, that is the effects of immigration on IIT.

The paper proceeds as follows. Section 2 reviews the theoretical relationship between immigration and trade, and the findings from related empirical studies. Then follows a profiling of migration and trade trends in ASEAN in Section 3. Section 4 describes the empirical specification for the immigrant-trade relationship within the panel framework of an augmented gravity model. Section 5 reports the econometric results. The paper concludes with a discussion of policy implications.

2. Theoretical Exposition and Empirical Evidence: Immigration–Trade Nexus

The movement of workers between countries potentially affects international trade. The direct linkage between immigration and trade involves the identification of mechanisms on how immigrants influence both imports and exports. Gould (1994) presented two mechanisms that explain the roles of immigrants as trade intermediaries (see also Head

[1] Skilled ASEAN migrants tend to move to advanced industrial economies outside the region (see also Edes, 2019).

& Ries, 1998), namely the *preference mechanism* and the *immigrant-link mechanism* (or *transplanted home-bias effect*, see Wagner et al., 2002; White & Tedesse, 2007). Then, additional mechanisms were presented by later researchers, such as the information mechanism by Wagner et al. (2002), network effect by Rauch (2001), and uncertain trade diverging effects by Dunlevy and Hutchinson (1999).

The first explanation or preference mechanism implies that the desire of migrants consuming unavailable home country products in the host country environment will have a direct impact on imports through the consumption channel. Immigrants are more likely to demand products of their home country due to a matter of tastes or cuisine, culture and emotional attachment (Girma & Yu, 2002), thereby boosting imports. Immigrant preference effects could however dissipate with the assimilation of process of immigration with the domestic labour market (Genc, 2014; Mundra, 2005). Mundra (2005) postulated that as the stock of immigrants in the host economy becomes larger, the immigrants may either establish their own entrepreneurial activities and start producing home products in the host country, or domestic firms in the host country may start producing those products. This influences the development of the import-substitution activities (Dunlevy & Hutchinson, 1999; Girma & Yu, 2002) and a countervailing immigration substitution effect becomes plausible (Genc, 2014).

Gould's (1994) second explanation based on the immigrant-link mechanism is that immigrants increase both imports and exports through a reduction in transaction costs through three ways. First, communication barriers are lowered as immigrants and locals become familiar with each other's languages. The advantages associated with familiarity and the ability to speak the languages of the home and host countries enable immigrants to establish import business dealings from their home countries (Wagner et al., 2002). Second, informational barriers (see also Rauch 1999, 2001) are lowered as immigrants are in a good position of obtaining information on the quality, characteristics and the availability of the home products, business practices and laws, as well as home consumer preferences (see also Peri & Requena-Silvente, 2010; Wagner et al., 2002). This reduces the local producers' costs of searching for trading partners. Mundra (2005) also pointed out that upon return to their home country, migrants bring with them information on their host country products, initiating exports from the host to home countries. Third, immigrants act as "cultural bridges" to facilitate trade through serving lower cost of negotiation and enforcement of contract (see also Briant et al., 2009) by building mutual trust. The immigrant-link mechanism applies to markets in countries with weak institutions and where information is in short supply.

The empirical studies on the trade–migrant links dates as far back as the 1990s. Min (1990) found that Korean migrants in the United States (US) enhanced bilateral exports from Korea to the US. Studies by Gould (1994) and Head and Ries (1998) in the US and Canada revealed positive impacts of the stock of migrants on exports (see also White, 2007) and imports for the host countries, but with larger impacts on imports from the migrants' countries of origin. A reasonable interpretation of the larger point estimate for the import relative to the export elasticity is that the former combines a preference or taste effect and a network effect, while the latter only reflects a network effect (for ethnic network elasticity, see Dunlevy, 2006). The elasticities of trade, in turn, are also reported to reflect the nature of goods traded that lend themselves to

a reduction of transaction costs through the above effects. Dunlevy and Hutchinson (1999, 2001) explained based on their periodical analysis of the migration–trade nexus for the US that the impact of the stock of immigrants on exports dissipated earlier than it did on imports.

Using disaggregated state-level data for the US, Bardhan and Guhathakurta (2004), Co et al. (2004), Dunlevy (2004, 2006) and Herander and Saavedra (2005) found that immigrants increased US's exports to the countries of their origin (see also Wagner et al., 2002; based on sub-national level data of Canada). Co et al. (2004) identified different export elasticities for the US by categories of home countries of immigrants, that is marginally higher export elasticities for exports to developed relative to developing countries. By using the United Kingdom (UK) data, Girma and Yu (2002) showed how the information mechanism for reducing trade costs works only when the countries differ in terms of their regulatory setup. The study found that immigration from non-Commonwealth countries had a significant trade-enhancing effect with those countries. By contrast, immigration from Commonwealth countries was found to have no substantial impact on exports since the institutions in Commonwealth countries are like those of the UK given the earlier colonial connections. Immigrants from former colonies do not bring information that substantially reduces transaction costs of bilateral trade.

In the case of Asia, East Asian immigrants were found to expand trade more than immigrants from other regions, based on Head and Ries (1998). Rauch and Trindade (2002) investigated the impact of Chinese networks on bilateral trade, proxied by the product of ethnic Chinese population shares. The study found that the ethnic Chinese networks increased bilateral trade in differentiated goods by nearly 60%. However, Combes et al. (2005) found that the effects of migration on the French intra-trade system were within the range of 73% and 102%, a stronger outcome than the effect of the ethnic Chinese population based on the study by Rauch and Trindade (2002).

Head and Rise (1998) argued that the effects of immigration on trade also varies with the class and skill composition of immigrants. Their results suggested that independent immigrants had the largest influence on trade, refugees the least, with family immigrants in between. From the skilled perspective of migrants, Lim and Kim (2011) and Mundra (2010) forwarded that skilled migrants significantly improved US trade with their home countries. More recently, Kim and Lim (2016) concluded that in the case of Korean imports, skilled relative to unskilled immigrants played an important role in creating networks between home and host countries.

Most studies supported the notion that migrants facilitate bilateral trade between the host and home countries, that is migration and trade are complements (Bratti et al., 2014; Briant et al., 2009; Dunlevy & Hutchinson, 1999; Genc, 2014; Girma & Yu, 2002; Head & Ries, 1998; Peri & Requena-Silvente, 2010; Rauch & Trindade, 2002). Apart from the US, Canada and the UK, trade enhancing effects of immigration are also found for New Zealand (Bryant et al., 2005; Law et al., 2009). Recent contributions forward that the migrant effects on imports were higher than that on exports, implying a stronger presence of the preference mechanism relative to the immigrant-link effects.

The contrasting results in the literature may be attributed to different geographical areas, different samples (including national or sub-national data), periods and different estimation techniques. The size of the immigration impact on international transactions

also depends on the relevance of information, and how much information migrants bring from their home country to their host country and vice versa. It also depends on the nature of products traded (differentiated versus homogeneous products; see Blanes, 2005; Blanes & Martin-Montaner, 2006; Hatzigeorgiou, 2010) and skill composition (Hijzen & Wright, 2010) of immigrants. Differentiated products (where the reductions in transaction costs and the immigrant preference effect are expected to be more) dominated by IIT and high skilled immigrants are considered to have larger pro-trade impacts.

Most influential studies documented the immigrant–trade linkages for the Organisation of Economic Co-operation and Development (OECD) countries and even within this category, there was lack of consensus in the prior findings. Less evidence is available on the immigrant–IIT links, particularly for Asia due to limitations on bilateral migration data. Using the United Nations (UN) bilateral (origin and destination) migration database, this paper tests the following hypotheses with a particular emphasis on the intraregional trade effects of the stock of ASEAN immigrants in the region:

H_1: Immigrants have a positive effect on bilateral exports from the host country.
H_2: Immigrants have a positive effect on bilateral imports to the host country.
H_3: Immigrants has a positive effect on the share of IIT in total bilateral trade.

3. Regional Trends: Immigration Flows and Intraregional Trade

Intra-ASEAN migration flows have increased dramatically from 1.3 million in 1990 to 7.1 million in 2020. Yet, the region only represents 30% of ASEAN's global labour mobility in 2020 (Figure 1). The major migrant-sending countries of the ASEAN region are Myanmar,

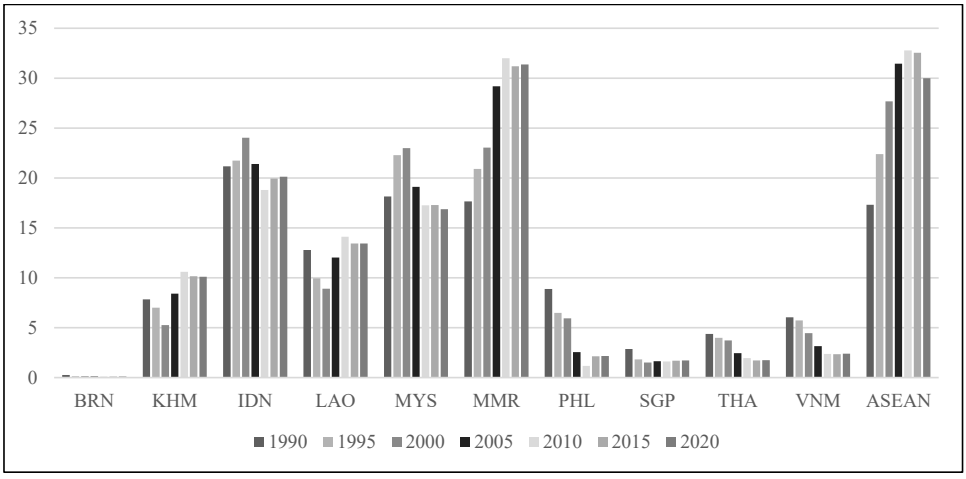

Figure 1. ASEAN – Share* of global migrant mobility, 1990-2020 (%)

Notes: * Total migrants of each individual ASEAN country destined to the region as a percentage of its own stock of global migration. BRN – Brunei Darussalam, KHM – Cambodia, IDN – Indonesia, LAO – Lao PDR, MYS – Malaysia, MMR – Myanmar, PHL – Philippines, SGP – Singapore, THA – Thailand, VNM – Viet Nam.
Source: Calculated from UN (2020).

followed by Indonesia, Malaysia, Lao PDR and Cambodia. Myanmar migrants to ASEAN represented 34.4% of its own total global migrant stock in 1990 before increasing to 59.7% in 2020, and thereby emerging as the top ASEAN migrant-sending country to the region. For sending their workers to other AMS, some countries have made special government to government (G2G) arrangements through MoUs (source countries given first, followed by destination countries): Cambodia–Malaysia (1999), Cambodia–Thailand (2003), Indonesia–Malaysia (2004 and 2006); Indonesia–Philippines (2003), Lao PDR–Thailand (2002), Myanmar–Thailand (2003) and Vietnam–Malaysia (2003).

The distribution of ASEAN immigrants in the region is highly concentrated. Thailand (49.5%), Malaysia (27.5%) and Singapore (18.8%) are migrant-receiving countries, accounting for a combined 95.8% of total migrant stock in ASEAN in 2020 (see Table 1). Of the three migrant-receiving countries, Malaysia and Singapore highly regulate (unskilled) migrant inflows with short-term work permits. In Singapore, the government has a dual track policy on foreign labour with unrestricted inflow for the highly skilled and a managed inflow for lower and unskilled workers. The inflows of unskilled migrants in Singapore are regulated with both short-term duration of permits and security bonds to guarantee repatriation upon expiry of the work permit.

Table 1. ASEAN – Distribution* of ASEAN migrant stock, 1990-2020 (%)

ASEAN	1990	1995	2000	2005	2010	2015	2020
BRN	4.5	3.2	2.4	1.8	1.4	1.2	1.3
KHM	2.3	3.8	4.1	2.3	1.3	1.0	1.0
IDN	1.1	0.5	0.1	0.5	0.8	0.8	0.8
LAO	1.3	0.8	0.4	0.3	0.4	0.4	0.4
MYS	33.1	30.2	32.2	27.5	23.8	27.1	27.5
MMR	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PHL	2.6	2.2	0.2	0.1	0.1	0.1	0.1
SGP	16.4	21.9	23.3	20.4	19.2	19.3	18.8
THA	36.8	35.4	36.0	46.3	52.5	49.4	49.5
VNM	1.9	2.1	1.2	0.7	0.6	0.6	0.6
	100	100	100	100	100	100	100

Notes: * Total number of ASEAN migrants in each country as a percentage of total ASEAN migrant stock. BRN – Brunei Darussalam, KHM – Cambodia, IDN – Indonesia, LAO – Lao PDR, MYS – Malaysia, MMR – Myanmar, PHL – Philippines, SGP – Singapore, THA – Thailand, VNM – Viet Nam.

Source: Calculated from UN (2020).

As for observed patterns in ASEAN labour mobility, overall, the trade flows of ASEAN reflect less of a regional focus. The region only represented 21.3% and 20.9% of ASEAN's global exports and imports in 2020 respectively (Figure 2). Singapore followed by Malaysia and Thailand contributed the largest shares of intraregional exports and imports (see Table 2). Conversely, the trade of Lao PDR and Myanmar, as shown in Figure 2 is relatively more reliant on the regional market. Not surprisingly, IIT is also prominent in the two major trading nations of the region, Singapore and Malaysia. The IIT indices of 42.4% and 39.6% in Singapore and Malaysia, respectively, exceeded the ASEAN average of 30.6% in 2020.

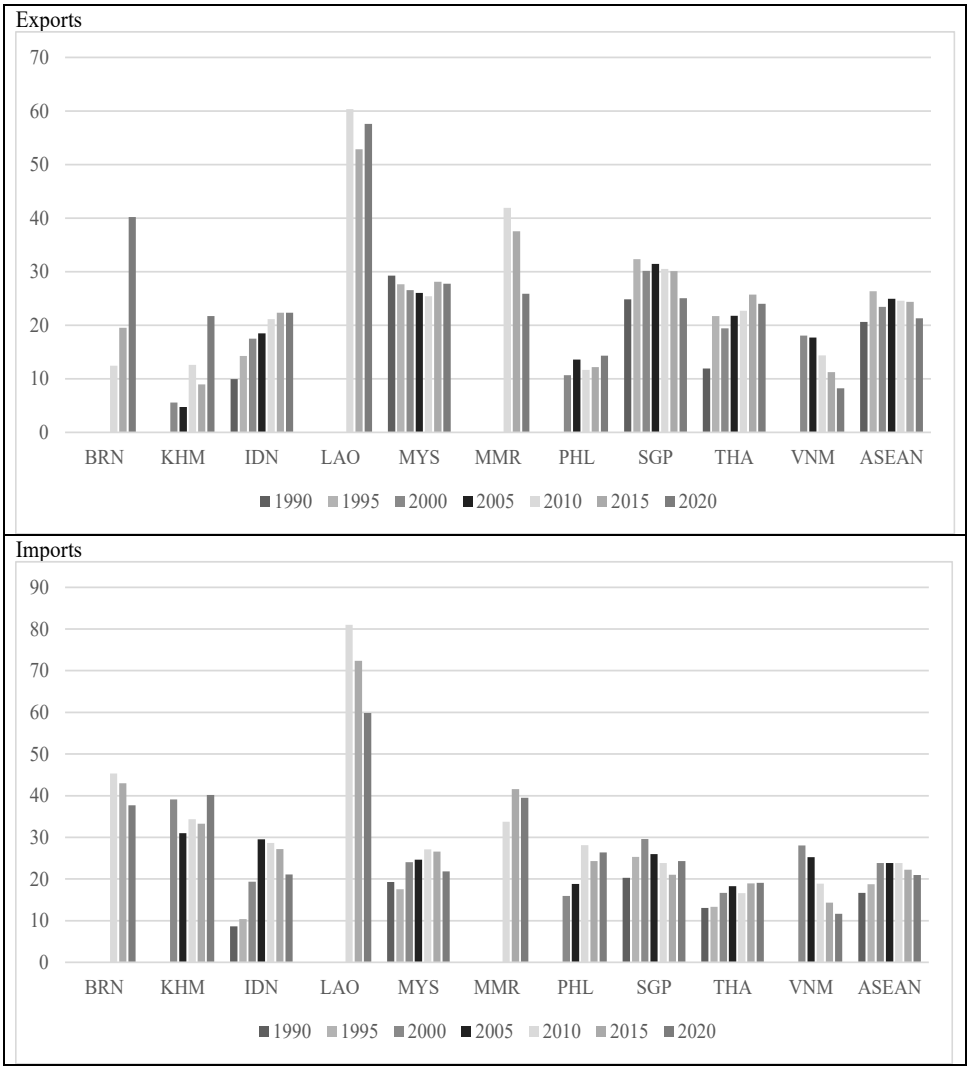

Figure 2. ASEAN – Share* of global trade, 1990-2020 (%)

Notes: * Total exports (imports) of each individual ASEAN country to the region (from the region) as a percentage of its own global exports (imports). BRN – Brunei Darussalam, KHM – Cambodia, IDN – Indonesia, LAO – Lao PDR, MYS – Malaysia, MMR – Myanmar, PHL – Philippines, SGP – Singapore, THA – Thailand, VNM – Viet Nam.

Source: Calculated from UN Comtrade (2022).

Table 2. ASEAN – Distribution of exports and imports, 1990-2020 (%)

	Exports						
ASEAN	1990	1995	2000	2005	2010	2015	2020
BRN	0.0	0.0	0.0	0.0	0.4	0.4	0.9
KHM	0.0	0.0	0.1	0.1	0.3	0.3	1.3
IDN	9.5	8.4	10.9	9.8	12.9	11.7	12.3
LAO	0.0	0.0	0.0	0.0	0.4	0.5	1.0
MYS	31.9	26.4	25.9	22.9	19.5	19.6	21.8
MMR	0.0	0.0	0.0	0.0	1.6	1.5	1.5
PHL	0.0	0.0	4.3	3.7	2.8	2.5	3.1
SGP	48.4	49.4	41.8	44.8	40.9	37.5	31.5
THA	10.2	15.8	13.6	14.8	16.9	19.2	18.6
VNM	0.0	0.0	2.9	3.5	3.9	6.3	7.8
	100	100	100	100	100	100	100
	Imports						
ASEAN	1990	1995	2000	2005	2010	2015	2020
BRN	0.0	0.0	0.0	0.0	0.5	0.6	0.8
KHM	0.0	0.0	0.6	0.6	0.7	1.5	2.9
IDN	7.8	7.2	7.4	12.3	17.2	15.9	11.2
LAO	0.0	0.0	0.0	0.0	0.7	1.1	1.1
MYS	23.3	23.0	22.6	20.4	19.6	19.1	15.6
MMR	0.0	0.0	0.0	0.0	0.7	2.9	2.7
PHL	0.0	0.0	6.8	6.7	7.2	7.0	9.4
SGP	50.9	53.7	45.7	37.7	32.9	26.5	30.0
THA	18.0	16.1	11.8	15.6	13.4	15.7	14.9
VNM	0.0	0.0	5.0	6.7	7.1	9.7	11.4
	100	100	100	100	100	100	100

Notes: * Total exports (imports) of each ASEAN member as a percentage of total intra-ASEAN exports (imports). BRN – Brunei Darussalam, KHM – Cambodia, IDN – Indonesia, LAO – Lao PDR, MYS – Malaysia, MMR – Myanmar, PHL – Philippines, SGP – Singapore, THA – Thailand, VNM – Viet Nam.

Source: Calculated from UN Comtrade (2022).

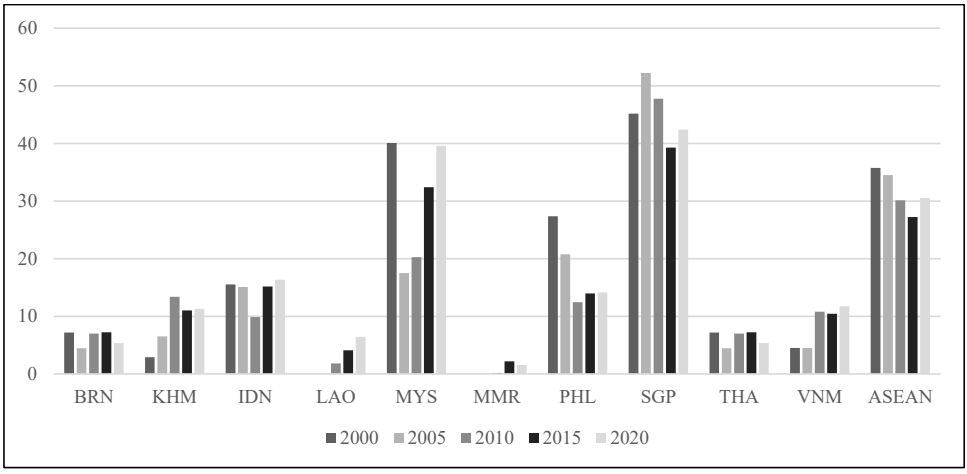

Figure 3. ASEAN – IIT indices, 2000-2020 (%)

Notes: The yearly IIT indices are calculated at the product (HS6-digit) level for each country-pair prior to aggregation for each AMS to the region. BRN – Brunei Darussalam, KHM – Cambodia, IDN – Indonesia, LAO – Lao PDR, MYS – Malaysia, MMR – Myanmar, PHL – Philippines, SGP – Singapore, THA – Thailand, VNM – Viet Nam.

Source: Calculated from UN Comtrade (2022).

Overall, intraregional mobility, intra-regional exports and intra-regional imports only accounted for slightly less than one-third of the region's global labour mobility, global exports and global imports, respectively. The patterns of intra-ASEAN mobility have changed somewhat between 1990 and 2020, namely with the expansion of the Greater Mekong Subregion (GMS) labour from Cambodia, Lao PDR and Myanmar to Thailand. This contrasts with the intraregional trade (exports, imports) patterns that did not see any dramatic shifts for the same period of review. Two stylised facts are observed from both the heterogeneous patterns of migrant and trade in individual AMS. First, the major recipients of ASEAN migrants are also the major trading nations within the region, and they are Malaysia, Singapore and Thailand. Second, Singapore and Malaysia, the two major migrant receiving countries from the region, are also the most highly engaged in IIT.

Looking at the data on the regional distribution of the stock of ASEAN immigrants and the concentration of intraregional and IIT trade shares, ASEAN seems to be a suitable case study for examining the immigrant–trade links.

4. Model Specification and Data

4.1 The Gravity Model

The gravity model, which has been used in a variety of international trade applications due to its empirically tractable framework, has also been employed in related studies on the migration–trade nexus. The basic model[2] assumes that bilateral trade flows are

[2] There are several variants and extensions of the gravity model.

a positive function of economic mass, measured as the product of two countries' gross domestic product (*GDP*), and a negative function of the geographical distance (*DST*) between the two.

The trade gravity model specification for investigating the immigration–trade nexus[3] in ASEAN takes the following form:

$$\ln EX_{ijt} = \beta_0 + \beta_1 \ln GDP_{it} + \beta_2 \ln GDP_{jt} + \beta_3 \ln DST_{ij} + \beta_4 \ln POP_{it} + \beta_5 \ln POP_{jt} + \beta_6 \ln ER_{ijt} + \beta_7 \ln MS_{jit} + \beta_8 \ln DBR_{ij} + \beta_9 \ln DCL_{ij} + \beta_{10} \ln DLL_{i,j} + \alpha_i + \lambda_j + \gamma_t + \varepsilon_{ijt} \quad (1)$$

$$\ln IM_{jit} = \beta_0 + \beta_1 \ln GDP_{it} + \beta_2 \ln GDP_{jt} + \beta_3 \ln DST_{ij} + \beta_4 \ln POP_{it} + \beta_5 \ln POP_{jt} + \beta_6 \ln ER_{ijt} + \beta_7 \ln MS_{jit} + \beta_8 \ln DBR_{ij} + \beta_9 \ln DCL_{ij} + \beta_{10} \ln DLL_{i,j} + \alpha_i + \lambda_j + \gamma_t + \varepsilon_{ijt} \quad (2)$$

$$IIT_{ijt} = \beta_0 + \beta_1 \ln GDP_{it} + \beta_2 \ln GDP_{jt} + \beta_3 \ln DST_{ij} + \beta_4 \ln POP_{it} + \beta_5 \ln POP_{jt} + \beta_6 \ln ER_{ijt} + \beta_7 \ln MS_{jit} + \beta_8 \ln DBR_{ij} + \beta_9 \ln DCL_{ij} + \beta_{10} \ln DLL_{i,j} + \alpha_i + \lambda_j + \gamma_t + \varepsilon_{ijt} \quad (3)$$

where EX_{ijt} is total exports from country i (reporter) to country j (partner) at time t; $lnIM_{jit}$ is total imports from country j to country i; IIT_{ijt} is the intra-industry trade index between country i and j; GDP_{it} and GDP_{jt} are GDPs of country i and country j respectively; DST_{ij} is distance between the capital cities of country i and country j, measured by using the weighted distance between the capital cities of countries i and j; POP_{it} and POP_{jt} is total population of country i and country j respectively; ER_{ijt} is the bilateral exchange rate between country i and j. MS_{jit} is the stock of migrants from country j in country i. *DBR* and *DCL* are dummy variables representing contiguous border and common language between country i and country j, respectively. *DLL* is a dummy variable indicating a landlocked economy for country i and/or country j. α_i denotes exporter country effects, λ_j importer country effects, γ_t time effects and ε_{ijt} is the error term. All variables (excluding the dummy variables) are expressed in logarithmic values.

The above equations follow from the standard gravity model with two core arguments, *GDP* and *DST*. The GDPs of both reporter and partner countries, a proxy for country size, are supposed to positively affect trade, and they are applied as two separate explanatory variables in equations (1) to (3) (see Gould, 1994; Kim & Lim, 2016). A large country is more likely to achieve economies of scale, increase exports and simultaneously possess the capacity to absorb imports. The next core argument, the *DST* variable, considers trade costs, namely transport costs (Egger, 2000), transaction costs (Bergstrand, 1985; Edmonds et al., 2008), information costs and timeliness in delivery (see also Rojid, 2006). Thus, the expectations are for $\beta_3 < 0$.

Population, a proxy for market size, was also added to the model as an explanatory variable based on economies of scale and specialisation through a greater division of labour. Having said that, population increases in the exporting country expands domestic demand and may have a negative influence on exports, while population increases in

[3] The objective of this paper is not to confirm a causal relationship between trade and migrant stock. In the context of ASEAN, intraregional mobility is not based on the pre-existing trade relations between the AMS, making immigration exogenously determined (see also Hatzigeorgiou, 2010)

the importing (partner) country magnifies potential demand in the destination market and increases exports. However, the dominance of the absorption effect could result in a negative sign for the population not just for the reporter country, as the partner country may lower its import demand with higher self-sufficiency (Cheng & Wall, 2005).

Other explanatory variables such as the exchange rate (Bergstrand, 1985) have also been considered in the gravity model. An increase in *ER* or a depreciation of the exchange rate would make goods cheaper relative to those of foreign partners, and thus encourage exports. Therefore, the coefficient for *ER* is expected to have a positive sign for equation (1). The opposite would hold in the case of imports.

Distance has been expanded from geographical distance to consider other factors that influence transactions costs, such as border trade (*DBR*), cultural affinity (common language: *DCL*) and landlocked (*DLL*) economies. For example, when two countries speak the same language, it makes communication easy and reduces transaction costs between them. The dummy variables for *CL* and *LL* take the value one if both trading partners share these common features and zero otherwise. *DLL* is another dummy, which takes the value of one for countries with no sea nor ocean access (only Lao PDR in the sample). Since landlocked economies cannot easily use ship transport for their goods, the expected sign for β_{10} is negative.

The key independent variable in the above equations is the ASEAN immigrant[4] stock (*MS*). It is expected that higher migrant stock in the host country increases bilateral exports to and imports from the home country of the immigrants (see Bandyopadhyay et al., 2008; Dunlevy, 2006; Herander & Saavedra, 2005; Jansen & Piermartini, 2009) by decreasing transactions costs between the two countries. According to Gould (1994) and Hatzigeorgiou (2010), the decrease in transaction costs is associated with obtaining foreign market information (politics, business culture, consumer preferences) and establishing trade relationships. Likewise, it is also expected that higher migrant stock expands trade complementarities through *IIT*.

4.2 Empirical Strategy

The common fixed effects (FE) and random effects (RE) estimation techniques are employed for estimating intraregional exports, intraregional imports and IIT trade in the static[5] gravity model. The Hausman test is then employed to distinguish between the fixed and random effects. For purposes of comparison, the pooled ordinary least squares (OLS) method is also used, and the Breusch-Pagan (1980) Lagrange Multiplier (LM) test is employed to determine whether the RE Generalized Least Squares (GLS) is appropriate and the simple pooling can be rejected.

Given that zero trade values constitute 27.3% and 28.9% of the total number of observations in the dataset for intraregional exports and intraregional imports

[4] We only consider legal immigrants as direct information on the stocks of immigrants with illegal status is not available.

[5] We do not consider dynamic adjustments to trade flows as we are using time interval data. Egger et al. (2022) challenged the practice of estimating a dynamic gravity equation that uses time-interval data as it may lead to biased estimates of the short- and long-run magnitudes of the estimates.

respectively, the Poisson-Pseudo Maximum Likelihood (PPML)[6] method is also fitted to the gravity model. The PPML estimator is employed, in this case, to avoid the problem of sample selection bias arising from the exclusion of zero bilateral trade observations. Burger et al. (2009) and Santos Silva and Tenreyro (2006) confirmed that in the presence of heteroskedasticity and (excessive) zero trade values, the PPML estimator provides a viable alternative to the standard log normal specification of the gravity trade model and is considered a robust approach.

For all estimations, we apply a three-way model to a panel of 10 ASEAN countries for the 1990 to 2020 (five-year interval) period. The three-way model, that is the inclusion of exporting country, importing country and time effects, is suitable since the focus of the study is on the specific effect of bilateral migrant stock on bilateral trade.

4.3 Data Description

Panel data[7] is employed in this study with two different datasets: (i) Trade flows for the 1990 to 2020[8] (five-year interval) period for equations (1) and (2), and (ii) IIT indices for the 2000 to 2020 (five-year interval) period for equation (3). The data for the panel estimations are compiled consistently for 90 bilateral trade pairs within ASEAN, comprising 630 observations (90 country-pairs x 7 years).

Data on exports and imports are sourced from the UN Commodity Trade Database (UN Comtrade, 2020). The yearly *IIT* indices are computed at the detailed product-level *k* (HS6-digit) data (sourced from UN Comtrade, 2020) and then aggregated for all *n* products for each country-pair (*i* and *j*) based on the aggregate Grubel-Lloyd (AGL, 1975) index, as shown below:

$$IIT_{ijt} = \left[\sum_{k=1}^{n} \left(X_{ijt} + M_{ijt} \right) - \sum_{k=1}^{n} \left| X_{ijt} - M_{ijt} \right| \right] / \sum_{k=1}^{n} \left(X_{ijt} + M_{ijt} \right)$$

where IIT index is expressed in percentage, $0 \leq IIT_{ijt} \leq 100$. The closer the value of the index to 100, the greater the *IIT*, and the closer the value to 0, the greater the inter-industry trade (IT).

Data on GDP (constant 2015, USD), *ER* (local currency per USD) and population are retrieved from the *World Development Indicators* of the World Bank (2020). Distance between AMS is measured in kilometres by using the weighted distance between capitals of the member countries, while dummies for contiguous border (*DBR*), official language (*DCL*) and landlocked economies (*DLL*) are collected from data provided by the Centre d'Etudes Prospectives et d'Informations Internationales (CEPII, 2020).

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[6] The PPML method, widely used in the international trade and migration literature to estimate the gravity equation, requires count data (levels of trade as the dependent variable), thereby avoiding any loss of information contained in the data due to zero trade observations.

[7] Panel data is considered appropriate for this study to ensure that the impact of immigrants is not overestimated.

[8] The study is based on a five-year interval, 1990, 1995, 2000, 2005, 2010, 2015 and 2020 (latest), as it is governed by data availability from the United Nations (UN Comtrade, 2020).

Data on the total bilateral migrant stock (by destination and origin) is sourced from the *International Migrant Stock 2020* of the UN Population Division of the Department of Economic and Social Affairs database (2020). The measure of migrant stock (MS_{jit}) refers to the stock of migrants *j* in country *i* in year *t*. The shortcomings of the UN database are that the stock of migrant data is only available for 5-year intervals and there is no breakdown of the migrant stock by destination and origin based on skill levels (occupational categories), which limits the sample size and the empirical analysis to an aggregate level.

The descriptive statistics and correlation matrix for both data sets are presented in Tables 3a and 3b, and Tables 4a and 4b respectively. As the absolute correlation coefficients are all less than 0.65 and 0.67 in Tables 4a and 4b respectively, it can be concluded that multicollinearity is not present.

Table 3a. Descriptive statistics (first dataset: 1990-2020)

Variable	Observations	Mean	Std. dev.	Min	Max
lnEX_{ij}	458	19.079	3.475	3.584	24.470
lnIM_{ij}	448	18.909	3.598	5.489	24.454
lnGDP_i	630	24.923	1.593	21.730	27.658
lnGDP_j	630	24.923	1.593	21.730	27.658
lnDST_{ij}	630	7.257	0.471	6.226	7.982
lnPOP_i	630	16.840	1.814	12.464	19.427
lnPOP_j	630	16.840	1.814	12.464	19.427
lnER_{ij}	630	0.000	5.255	-9.730	9.730
lnMS_{ji}	406	8.220	2.595	2.485	14.430

Table 3b. Descriptive statistics (second dataset: 2000-2020)

Variable	Observations	Mean	Std. dev.	Min	Max
lnIIT_{ij}	391	1.004	1.886	-5.473	4.327
lnGDP_i	450	25.179	1.530	22.329	27.658
lnGDP_j	450	25.179	1.530	22.329	27.658
lnDST_{ij}	450	7.257	0.472	6.226	7.982
lnPOP_i	450	16.923	1.797	12.716	19.427
lnPOP_j	450	16.923	1.797	12.716	19.427
lnER_{ij}	450	0.000	5.497	-9.730	9.730
lnMS_{ji}	290	8.364	2.632	3.638	14.430

Table 4a. Correlation matrix (first dataset: 1990-2020)

	lnEX_{ij}	lnIM_{ij}	lnGDP_i	lnGDP_j	lnDST_{ij}	lnPOP_i	lnPOP_j	lnER_{ij}	lnMS_{ji}
lnEX_{ij}	1								
lnIM_{ij}	0.863	1							
lnGDP_i	0.540	0.388	1						
lnGDP_j	0.450	0.615	-0.120	1					
lnDST_{ij}	-0.162	-0.154	0.215	0.138	1				
lnPOP_i	0.190	0.147	0.649	-0.101	0.175	1			
lnPOP_j	0.231	0.324	-0.085	0.639	0.158	-0.100	1		
lnER_{ij}	-0.062	-0.002	-0.077	0.077	0.027	0.404	-0.332	1	
lnMS_{ji}	0.411	0.323	0.206	-0.032	-0.461	-0.201	0.137	-0.410	1

Table 4b. Correlation matrix (second dataset: 2000-2020)

	lnIIT_{ij}	lnGDP_i	lnGDP_j	lnDST_{ij}	lnPOP_i	lnPOP_j	lnER_{ij}	lnMS_{ji}
lnIIT_{ij}	1							
lnGDP_i	0.302	1						
lnGDP_j	0.482	-0.009	1					
lnDST_{ij}	0.025	0.256	0.311	1				
lnPOP_i	0.084	0.671	-0.190	0.208	1			
lnPOP_j	0.143	-0.082	0.600	0.273	-0.167	1		
lnER_{ij}	0.048	-0.137	0.070	-0.025	0.294	-0.316	1	
lnMS_{ji}	0.159	0.225	0.032	-0.446	-0.199	0.161	-0.402	1

5. Results and Discussion

5.1 Fixed Effects and Random Effects Estimations

The results of the unbalanced panel of the gravity model for the pooled OLS, FE and RE are presented in Table 5. They include exporter and importer specific fixed effects (see Anderson & van Wincoop, 2003) and year dummies. The Breusch-Pagan LM statistics are overwhelmingly significant and support the appropriateness of the RE GLS model for all specifications. The FE model is found to be consistent for all specifications. Since the FE estimator drops all the time invariant explanatory variables (*DST*, *DBR*, *DCL* and *DLL*) from the model, the RE estimation results are reported for all three specifications to identify the effects of these variables that are theoretically relevant.

Most of the coefficients bear the expected signs for all specifications. Economic size (GDP_i and GDP_j) and distance (DST_{ij}) are found to have a positive and negative effect respectively on trade (exports and imports) and for shaping trade flows (IIT_{ij}). The impact of the economic size of the reporter country relative to the partner country is significant and larger for trade (exports, imports) based on the FE model.

Table 5. Pooled OLS, fixed effects and random effects estimates of gravity model

	Dependent variables								
	(1) $\ln EX_{ij}$			(2) $\ln IM_{ij}$			(3) $\ln IIT_{ij}$		
Variables	OLS	FE	RE	OLS	FE	RE	OLS	FE	RE
$\ln GDP_i$	1.722***	1.828**	1.704***	1.060***	1.741**	1.536***	0.677***	0.806	0.555***
	(0.103)	(0.741)	(0.216)	(0.110)	(0.701)	(0.273)	(0.101)	(0.554)	(0.160)
$\ln GDP_j$	1.325***	0.317	1.372***	1.725***	0.515	1.437***	0.896***	0.864	0.813***
	(0.102)	(0.539)	(0.222)	(0.088)	(0.702)	(0.266)	(0.082)	(0.531)	(0.114)
$\ln DST_{ij}$	-1.075***		-1.325***	-1.560***		-2.108***	-0.961***		-0.734**
	(0.228)		(0.390)	(0.257)		(0.525)	(0.224)		(0.365)
$\ln POP_i$	-0.644***	-3.801*	-0.620***	-0.121	-1.956	-0.417**	-0.108	-3.299**	-0.023
	(0.091)	(2.103)	(0.172)	(0.105)	(1.378)	(0.199)	(0.106)	(1.388)	(0.186)
$\ln POP_j$	-0.258**	0.515	-0.265	-0.234*	-2.322*	0.058	-0.030	-3.287*	0.055
	(0.109)	(2.035)	(0.227)	(0.132)	(1.346)	(0.337)	(0.096)	(1.824)	(0.178)
$\ln ER_{ij}$	0.045**	0.245**	0.024	-0.004	-0.002	-0.030	0.004	0.067	0.011
	(0.022)	(0.122)	(0.048)	(0.026)	(0.104)	(0.047)	(0.019)	(0.065)	(0.022)
$\ln MS_{ji}$	**0.126****	**-0.048**	**0.001**	**-0.117*****	**0.235****	**-0.138**	**-0.122****	**-0.151**	**-0.052**
	(0.040)	**(0.125)**	**(0.072)**	**(0.043)**	**(0.102)**	**(0.088)**	**(0.046)**	**(0.122)**	**(0.061)**
DBR_{ij}	0.801***		1.181**	0.332		0.882	0.311		0.251
	(0.207)		(0.488)	(0.231)		(0.551)	(0.191)		(0.288)
DCL_{ij}	-0.155		-0.185	0.284		0.459	1.154***		1.202**
	(0.285)		(0.494)	(0.299)		(0.681)	(0.269)		(0.535)
$DLL_{i,j}$	-0.010		-0.286	-0.494		-1.393	-0.974***		0.745
	(0.421)		(0.805)	(0.567)		(1.050)	(0.354)		(0.455)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Exporter fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Breusch-Pagan LM test			χ^2 = 127.11 (0.000)			χ^2 = 156.89 (0.000)			χ^2 = 60.59 (0.000)
Hausman test		χ^2 = 26.56 (0.009)			χ^2 = 27.36 (0.007)			χ^2 = 22.92 (0.011)	
No. of observations	322	322	322	317	317	317	272	272	272
No. of groups		58	58		58	58		58	58
R-squared	0.825	0.679	0.814	0.782	0.672	0.754	0.528	0.090	0.519

Notes: Robust standard errors are reported in parentheses. ***, ** and * denote significance at the 1%, 5% and 10%, respectively.

An increase in population of the home country reduces bilateral exports and IIT. According to the estimation results, a depreciation of the exchange rate significantly matters for exports [FE model for specification (1)] at the 5% level of significance. The evidence suggests that the changes in the exchange rates, though significant for exports, do not have the potentials to disrupt imports and complimentary trade relationships within the region.

Concerning the focus of the paper, there is limited evidence on the immigrant impacts of trade. From the FE model for specification (2), the stock of migrants is only significant for intraregional imports, that is, a 1% increase in the stock of migrants induces imports to increase by 0.24%. Conversely, the stock of migrants is found to be negative, albeit insignificant, for both exports and IIT. The result is not surprising since most of the ASEAN migrants are unskilled, which reduces the possibilities of creating networks between the home and host countries. Trade creation generally follows skilled or business migrants. Based on the 2017 (latest) *International Labour Migration Statistics (ILMS) Database in ASEAN*, 74.8% of the ASEAN migrant stock in the region was employed as plant/machine operators and assemblers and in other elementary occupations (ILMS, 2020). The unskilled guest workers (temporary) are less integrated into the labour markets of the host countries and therefore less likely to have a significant impact on exports. The ineffective export-inducing impacts of migrants in ASEAN is also plausible given that a sizeable unskilled migrant community has already been established in the region over the years. Though ASEAN unskilled mobility is of the temporary and nonfamily migration channel, the continued reliance on migrants by the major receiving countries in the region have made them a perpetual feature of those economies. Genc (2014) forwarded the case where immigrant increases can become ineffective or negative beyond a certain level if the stimulating trade effects of immigrants are subject to decreasing returns.

Finally, while border effects matter for intra-regional exports, common language is found to be significant for *IIT* at the 5% significance level. As expected, the landlocked issue discourages trade, particularly *IIT*.

5.2 Alternative Method

The results of the PPML gravity model are presented in Table 6. Importantly, the p-values of the heteroscedasticity-robust Ramsey (1969) RESET test reveal that the null hypotheses cannot be rejected at the 5% significance level in Table 6. This points to the appropriateness of the PPML for our dataset.

The PPML results are overall robust to the FE and RE methods.[9] The key variable of interest, $\ln MS_{ji}$, remains positive and significant for specification (2) of the PPML estimation, thereby confirming the pro-import immigrant effect [hypotheses (2)] in

[9] Worth noting here is that there are various estimation techniques that accommodate zero trade values using Monte Carlo simulations, such as zero inflated models, sample selection models, feasible generalized least square and Tobit model, but the choice of the most appropriate estimation is contingent on the dataset, in this case, the use of interval data, the small sample size and the presence of zero trade observations.

Table 6. PPML estimates of gravity model

Variables	Dependent variables		
	(1) EX_{ij}	(2) IM_{ij}	(3) IIT_{ij}
lnGDP_i	1.446***	1.084***	0.579***
	(0.063)	(0.060)	(0.117)
lnGDP_j	0.910***	1.188***	0.493***
	(0.064)	(0.052)	(0.081)
lnDST_{ij}	-1.129***	-0.647***	-0.377**
	(0.114)	(0.100)	(0.180)
lnPOP_i	-0.441***	-0.314***	-0.284***
	(0.037)	(0.038)	(0.092)
lnPOP_j	-0.238***	-0.221***	-0.078
	(0.039)	(0.040)	(0.066)
lnER_{ij}	0.019**	-0.034***	0.001
	(0.009)	(0.010)	(0.016)
ln$\boldsymbol{MS_{ji}}$	**-0.039***	**0.070*****	**-0.074***
	(0.022)	**(0.020)**	**(0.043)**
DBR_{ij}	0.238***	0.390***	0.269*
	(0.077)	(0.078)	(0.149)
DCL_{ij}	0.181**	0.232**	0.495**
	-0.092	(0.096)	(0.180)
$DLL_{i,j}$	-0.450**	-0.621***	-0.213
	(0.251)	(0.230)	(0.430)
Year dummies	Yes	Yes	Yes
Exporter fixed effects	Yes	Yes	Yes
Importer fixed effects	Yes	Yes	Yes
RESET (p-value)	0.591	0.674	0.575
No. of observations	406	406	272
R-squared	0.914	0.917	0.729

Notes: Standard errors, clustered by country-pair, are reported in parentheses. ***, ** and * denote significance at the 1%, 5% and 10%, respectively.

the ASEAN case. Since there is no evidence of a pro-export immigrant effect, it is not surprising to note that the stock of migrants does not explain two-way trade flows or IIT (lnMS_{ji} is only significant at the 10% level in specification (3) of Table 6). The findings contribute to the recent empirical literature on a stronger presence of the preference mechanism relative to the immigrant–link effects.

6. Conclusion and Policy Implications

There is evidence of a pro-import impact of ASEAN immigrants. The result is robust across different estimation methods, namely the FE and RE and PPML estimators. One

plausible reason is the ASEAN migrant stock in the region is largely low skilled[10] guest workers that are less integrated with the labour market, which does not encourage export creation and IIT. Alternatively, the sizeable unskilled migrant community in the region may have reached a saturation level, thereby diminishing their support for exports. Though both hypotheses cannot be verified directly from the aggregate-level analysis in this paper, the argument pertaining to the threshold effects of unskilled migrant stock on exports may in fact be compelling for further research once disaggregated and consistent datasets related to migrant stocks in ASEAN are made available for a longer period.

The key question then is – should economic/trade policies factor in immigration to ensure it supports trade? The answer to this question has important policy implications.

Given the positive and significant immigration–import link in the region, the role of immigration as an instrument for regional integration can no longer be underestimated. Considering this finding, we argue for increased focus on immigration in trade and economic policies to ensure that immigration is used as an effective instrument to further enhance intraregional trade, particularly for exports and IIT. For that, the controversial debate over whether to be liberal or less liberal in migration policies in AMS should be abandoned. Instead, the focus should be on the management of dominant labour flows, the unskilled, to meet tangible labour needs across economic sectors (Devadason, 2021). As labour market integration is not an option given the temporary nature of the unskilled migrants, better managed temporary schemes are instead needed to ensure significant positive impacts of the unskilled for trade. In moving forward with formulating policies that directly encourage the mobility of the high skilled, ASEAN should not restrict nor neglect the unskilled migration channel that will continue to remain a reality in the region. What is needed is policy coordination to balance the interests of unskilled migrants' countries of origin and destination. This is of relevance to ASEAN since there is a distinct divide between labour sending (source) and labour receiving (destination) countries.

Towards this end, ASEAN should work towards connecting migration and trade policy, as the silo approach through unilateral migration policies and regional co-ordination in migration policies has either not worked well or at best stalled. It is therefore timely that ASEAN considers other alternatives, such as mobility provisions in trade negotiations where reciprocity works and impediments to migration do not contrast with the pro-trade stance of AMS.

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[10] Despite the envisions of the ASEAN Economic Community (AEC) for the free flow of skilled labour, technical and political barriers at national levels have impeded skills mobility in the region.

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