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Country Heterogeneity and Home-Market Effects under FTA: With Special Reference to AEC*

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Abstract

By the conventional home-market effects (HME), a big economy with the advantage of big domestic market size tends to have more than a proportional share in the world export markets. Through its common market integration, ASEAN as a whole forms a large economy with a population of more than 623 million and GDP of 2.48 trillion US dollars. To test the effectiveness of the HME for an integrated economy like ASEAN, the conventional gravity approach is adopted. Unlike the HME for a one-state economy like China, ASEAN's HME may not be significant, depending on the type of industries. Country heterogeneity and unobserved barriers in trade and factor flows among the member countries may explain the phenomenon of diversified HME and trade creation for ASEAN.

Key words: Home-market Effect, Region Economic Integration, PQML

JEL Classification: F12, F14, F15, O53

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I. Introduction

In the 2003 summit meeting, ASEAN officially announced the plan of forming the ASEAN Community in 2020, and then rescheduled to 2017 in the 2007's summit. Finally, the ASEAN Economic Community (AEC) was officially established on December 31, 2015, 23 years after 1992 when the ASEAN Free Trade Area (AFTA) was formed. According to the AEC blueprint, the ASEAN will establish a single market, allowing for free capital and skilled labor to move among the ten member countries in addition to free trade under FTA. Following the Europe Union (EU), AEC becomes the world's second common market (CM).

How effective is the economic integration? Can AEC glue the ten member countries into an important and influential big economy in the world trade system? As shown in Table 1, the AEC as a whole has more than 600 million population, composed of an oil rich Brunei, one global financial center of Singapore, the four-tiger of Indonesia, Malaysia, Philippines, and Thailand, the emerging high growth economy of Vietnam and the newly open Cambodia, Lao and Myanmar. By population size, AEC has 8.7% of the world total, which is greater than EU, making AEC the world's largest common market. However, in terms of the economy scale of GDP, AEC is far below EU and NAFTA. Its total GDP of 2.6 trillion US dollars accounts for only 3.2% of the world's, ranked only the 7th place in the world. It seems that ASEAN has not been successful in making advantages from forming a large economic region. Member countries are quite diversified not only in size but also in the state of development. As shown in Table 1, Singapore volume of trade is about one thousand times of Lao's, and its national income per capital is 52 times of Cambodia. In other words, there is a significant difference in the stage of economic development among ASEAN, which in turn can affect each member country's ability and willingness adapt to the economic integration under AEC. Thus, how effective is AEC to market region into a real large scale economy is an interesting issue.

Table 1. Economic Profile of ASEAN Members (2015)

Country	Area (KM^2)	Population (Thousand)	GDP (Billion)	GNI per capita (US$)	VOT (Hundred million)
Singapore	717	5,535	292	52,090	663.1
Brunei Darussalam	5,770	423.2	12.9	38,010	9.6
Malaysia	328,550	30,331	296.7	10,570	375.1
Thailand	510,890	67,959	395.3	5,720	417.1
Indonesia	1,811,570	257,563	861.9	3,440	8.87
Philippines	298,170	100,699	292.4	3,550	128.9
Vietnam	310,070	91,703	193.6	1,990	327.4
Lao PDR	230,800	6,802	12.4	1,740	6.7
Cambodia	176,520	15,577	15.5	1,070	19.6
Myanmar	653,520	53,897	62.8	1,160	29.1
Subtotal	4,326,060	630,489.2	2435.5	-	1985.47
China	9,597,000	1,371,220	11,008	7,930	39,560

Data source: http://data.worldbank.org/products/wdi and http://asean.org

ASEAN's economic integration seems to have made significant progress in regional trade. As shown in Table 2, ASEAN's intra-regional trade in 2013 has reached more than 600 billion US$, which is more than 7 times the 82 billion amount in 1983. The intra-ASEAN trade share has risen from 17.5% in 1993 to 25.9% of ASEAN's total trade volume in 2013. However, compared with the EU's 62.7% and NAFTA's 48.5%, the ASEAN's intra-regional trade of 25.9% is quite low, indicating that trade integration has been less effective under ASEAN's FTA. Compared with the big one-state economy of China, can the integrated 10 states of the AEC develop into a proportionally effective market? China has been one of the top ten trade countries since 2002, and became the world's largest export country in 2009, a signal of the China syndrome mentioned in the literature.[1] In 2002 ASEAN's total exports were greater than those of China. However, in 2013, China's exports surpassed those of ASEAN by two times.

[1] Rodrik (2006), Schott (2004, 2008), Xu and Lu (2009), and Xu (2010) illustrate that the rise in the degree of sophistication and increase in technology content in China's export goods are the main causes for China's huge growth in its exports.

Table 2. EU, NAFTA, ASEAN and China's Export Performance

	2002			2013		
	Total exports	Intra-regional export	Share	Total exports	Intra-regional export	Share
ASEAN	415.2	99.4	24.0	1,253	325	25.9
NAFTA	1,193.6	663.6	55.6	2,371	1,151	48.5
EU	3,345.9	2,258.5	67.5	5,803	3,637	62.7
China	354.4	-	-	2,583	-	-

Data source: UN COMTRADE Database, compiled by the author.

Table 3. Logistic Performance Index for ASEAN and EA Countries

Year / Country	2010		2012		2014	
	Index	Ranking	Index	Ranking	Index	Ranking
Singapore	4.09	2	4.13	1	4	5
Japan	3.97	7	3.93	8	3.91	10
Taiwan	3.71	20	3.71	19	3.72	19
South Korea	3.64	23	3.70	21	3.67	21
China	3.49	27	3.52	26	3.53	28
Malaysia	3.44	29	3.49	29	3.59	25
Thailand	3.29	35	3.18	38	3.43	35
Vietnam	2.96	53	3.00	53	3.15	48
Indonesia	2.76	75	2.94	59	3.08	53
Philippines	3.14	44	3.02	52	3.00	57
Cambodia	2.46	118	2.56	101	2.74	83
Lao PDR	2.37	129	2.50	109	2.39	131
Myanmar	2.33	133	2.37	129	2.25	145

Data source: World Bank (2014) Logistic Performance Index.

According to the home-market effect (HME) developed by Krugman (1979, 1980) in the new trade theory, a bigger country/economy with the advantage of a large-scale domestic market can take a more than proportional share in the global market in the industries with increasing returns to scale (IRTS), which features most manufacturing goods.[2] Can the HME apply to the big market created under an FTA or CM (common market)? Intuitively, the big domestic market under one country should be qualitatively different from an FTA/CM-induced big market. This is because of the existence of country borders between member countries, not only tangible geographical boundaries but also intangible ones in cultural and institutional regimes. More specifically, free flows in goods and services under FTA, and in addition free movement of labor and capital under CM, won't be fully realized. As a result, the effective market size under FTA/CM should not be the same as that of a one-state economy of identical population or GDP. The logistic performance index (LPI) dispersion, as shown in Table 3, reflects the existence of the intangible difference between the member countries. The more the dispersion of LPI, the greater the identical unobserved barrier to trade in goods, services and factor flows, and thus the less the effectiveness of integration and the smaller the effective market size. Consequently, the conventional advantage of HME should be discounted under the case of CM/FTA. In other words, an integrated economy under FTA/CM is in general like a "lumpy economy" in the sense of Courant and Deardorff (1992), in which the economy is segmented into many regions, and the factor flows are partially prohibited between regions. Therefore, the comparative advantage pattern is different from those of non-lumpy ones. The purpose of this paper is to conduct an empirical test on whether the FTA/CM-induced market size has improved the member countries' export in addition to the conventional HME.

In fact, ASEAN has already emerged into the global production network since 1990s. The formation of the AEC should strengthen ASEAN countries' positions in the network, such as producing and exporting more in terms of quantity and/or variety in a competing manufacturing industry.

In addition, as shown in Huang and Huang (2011, 2016), the HME differs across industries; and the less the technology content, the smaller the effect. In general, labor-intensive industries have stronger HME than capital-intensive ones, which in turn is greater than that of technology-intensive ones. Therefore, we select three groups of industries,

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[2] See Huang and Huang (2014, 2016) for the discussion, empirical evidence and the references therein.

namely technology-, capital- and labor-intensive, to conduct the empirical test. Table 4 summarizes all three industry types' total exports and intra-regional exports for ASEAN, the EU and NAFTA. As depicted in the table, ASEAN and the EU have low intra-regional trade in the electronics industry. Compared to that of the other two industries, NAFTA's intra-regional trade in electronic goods accounts for only 48% of its total exports in the industry; correspondingly the EU has 21% and ASEAN 23%. For ASEAN, the intra-ASEAN export share is only 2% in the clothing and footwear industries, far below the corresponding 23% in the electronics industry and 21% in automobiles. This fact may indicate that ASEAN as a whole is involved in a much higher range of the production process in the electronics and automobile industries in the EA production network than in the labor-intensive clothing and footwear industries. Accordingly, we would expect a different degree of FTA/CM-induced HME for different industries, from the empirical results.

The rest of this paper is organized as below: Section 2 establishes a gravity equation for deriving the HME under a common market. Accordingly, the PQML (Poisson Quasi-maximum likelihood) empirical gravity equation is designed, and the corresponding hypotheses are introduced. Section 3 provides the empirical results and section 4 concludes.

Table 4. Export of Selected Regional Groups (2013)

Unit: Thousand US$; %

Industry	Electronics Industry			Textile and Footwear Industry			Automobile Industry		
	Total	Intra-regional	%	Total	Intra-regional	%	Total	Intra-regional	%
ASEAN	181,706,621	41,489,674	23	24,682,669	508,180	2	8,776,410	1,814,328	21
NAFTA	266,719,091	129,104,792	48	17,443,112	13,595,938	78	208,446,023	141,688,069	68
EU	461,527,388	322,182,851	21	97,013,900	76,955,751	79	508,507,989	379,215,258	75

Data source: UN COMTRADE Database, compiled by the author.

II. Home-market Effect under Regional Integration

1. The Gravity Equation

The gravity model has been widely adopted in the trade literature to explain bilateral trade from the determinants of geographical distance, market size represented by population, GDP and national incomes, etc., as well as the intangible distances of culture and language, and so on.[3] Use of the gravity model to examine the HME can be found in Davis and Weistein (2003), Head, Mayertt, and Ries (2002), Medin (2003), Schumacher and Siliverstovs (2006), Crozet and Trionfetti (2008), Ghazalian and Furtan (2009), and Huang and Huang (2011, 2016). Theoretically, if the advantage of domestic market size matters, then we should observe a greater effect of the export country's GDP (market size variable) than of the import country's GDP.[4] Intuitively, if the FTA/CM integrated market size does enhance the HME for member countries, then the HME-coefficient should be greater for the related member countries.

The basic gravity equation is as follows:

$$LX_{ij} = \alpha + \beta_i LY_i + \beta_j LY_j + \gamma_D LDIST_{ij} + \gamma_P LRP_{ij} + \gamma_E RGN_k + \gamma_i LTech_i + \gamma_j LTech_j + \cdots + \mu_{ij}, \quad (1)$$

where $LX_{ij} \equiv \log X$ is the log of country *i*'s export to *j*, and $LY_i \equiv \log Y_i$, and $LY_j \equiv \log Y_j$ are *i* and *j*'s output level; $LDIST_{ij}$ is the bilateral distance, $LRP_{ij} \equiv \log(P/P^*)$ is the relative price level; RGN_k is the dummy variable for regional integration, where $RGN_k = 1$ if both *i* and *j* belong to the same CM or FTA, otherwise 0; $LTech_i$ ($LTech_j$) is the log of the technology level of country *i*(*j*), and μ_{ij} are the error terms.[5]

Theoretically, if the estimated coefficient of LY_i, is significantly greater

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[3] See Tinbergen (1962) and Linnemann (1966) for the initial gravity model, followed and extended by Aitken (1973), Anderson (1979), Bergstrand (1985, 1989), Deardorff (1998), Feenstra (1998) and Feenstra, Markusen, and Rose (2001).

[4] For the theoretical derivation of HME test using the gravity model, and empirical findings, see Schumacher and Siliverstovs (2006), Crozet and Trionfetti (2008), Feenstra et al. (2001) and Huang and Huang (2011, 2016).

[5] See Huang and Huang (2011, 2016) for the discussion, empirical evidence and the references therein.

than that of LY_j, then HME is empirically supported. In addition to the conventional determinants, the regional dummy RGN_k is included to capture trade creation of the regional FTA/CM$_k$. As usual, positive γ_E represents the existence of trade creation.

The regional dummy RGN_{ki} equals one if country i is a member of RGN_k. Hence, the cross variable of LY_i times RGN_{ki}, denoted as $\mathrm{LY}_i\mathrm{RGN}_{ki}$, is to capture whether the integration of RGN_k has induced an HME. If the estimated coefficient of the variable in (2) of the $\mathrm{LY}_i\mathrm{RGN}_{ki}$, is significantly positive, then the RGN_k-induced HME is empirically supported.

$$LX_{ij} = \alpha + \beta_i LY_i + \beta_j LY_j + \gamma_D LDIST_{ij} + \gamma_P LRP_{ij} + \beta' LY_i RGN_{ki} + \gamma_E RGN_k + \gamma_i LTech_i + \gamma_j LTech_j + \cdots + \mu_{ij}, \quad (2)$$

2. Home-market Effect under Economic Integration: PQML Approach

Instead of using the OLS method, the PQML approach is adopted to estimate the revised gravity equation of Eq. (3). Practically, the bilateral trade data contain many zero observations. The usual approach to overcome the problem of taking logarithm on a zero number is to replace zero with a tiny number, or simply discard the sample points. However, this approach has been criticized for its biased result. Alternatively, the PQML approach is introduced as in Santos Silva and Tenreyro (2006), Siliverstovs and Schumacher (2009), and Santos Silva and Tenreyro (2011). By the PQML approach, the sample of zero export observations is retained, and the estimation bias from OLS can be avoided. To use the PQML on the gravity equation, Eq. (2) is rewritten in exponential form as Eq. (3) shows below:

$$E(X_{ij}|Z_{ij}) = \exp[\alpha + \beta_i LY_i + \beta_j LY_j + \gamma_D LDIST_{ij} + \gamma_P LRP_{ij} + \beta' LY_i RGN + \gamma_E RGN_k + \gamma_i LTech_i + \gamma_j LTech_j + \cdots + \mu_{ij}], \quad (3)$$

where Z_{ij} = (1, Y_i, Y_j, $DIST_{ij}$,. . .) denotes the vector of all the explanatory variables.

By Eq.(3), we would expect $\beta_i > \beta_j$ to see the existence of the conventional HME; and $\gamma_D < 0$ (distance effect); $\gamma_E > 0$ (trade creation under regional integration); $\gamma_T > 0$ (direct technology effect); and $\gamma_P > 0$ (relative price level effect). More importantly, $\beta' > 0$ implies the existence of the RGN-induced HME.

To summarize, the main hypotheses to be examined in this paper are the following:

(i) $\beta_i > \beta_j$ for the existence of conventional HME,

(ii) $\beta' > 0$ for enhanced HME under regional integration, and

(iii) γ_E >0 for conventional trade creation effect under regional integration.

III. Empirical Method and the Results

1. Empirical Strategy

To focus on the most recent decade's integration effect, we select the years of 2002 and 2013 as the observation windows. Strategically, we run the gravity regression on each individual year, and analyze whether the HME has changed during the period, as described below.

Two types of model are designed. Firstly, Model (a) is the base model, in which only the basic gravity variables are included. In addition to LY_i, LY_j, LDIST_{ij}, and LRP_{ij}, we use LPTN_i (export country's patent stock registered in USPTO) and LPTN_j (importer's patent stock in USPTO) to capture the technology difference between trade partners. Theoretically, a country with better technology should be able to export more. Accordingly we expect the estimated coefficient of LPTN_i to be positive, and the coefficient of LPTN_j to be negative.

Model (b) extends Model (a), by including two types of FTA/CM dummy variables. The first type is the nominal FTA/CM dummy, including the EU, NAFTA and ASEAN. As defined before, the FTA/CM dummy takes a value of one if both the import and export countries are members of the underling FTA/CM, otherwise a value of zero. The second type is a cross variable between the FTA/CM dummy and the exporter's national income, $\text{LY}_i \cdot \text{RGN}_k$, to estimate the effect of the FTA/CM-induced market size effect. In addition, we consider China a "one-state" economic region, and the cross variable can apply to the "FTA/CM" of China. More specifically, dummy CHN=1, if i refers to China, otherwise CHN=0. Accordingly, we have the corresponding cross variable LY_iCHN. If the estimated coefficient β' is positive, then the FTA/CM-induced HME is empirically supported. Accordingly, the empirical equation for a one-year sample is as below:

$$E(X_{ij}|Z_{ij}) = \exp[\alpha + \beta_i LY_i + \beta_j LY_j + \gamma_D LDIST_{ij} + \gamma_P LRP_{ij} + \sum_{k\in\{RGN\}} \beta'_k LY_i \cdot RGN_k + \sum_{k\in\{RGN\}} \gamma_{Ek} RGN_k + \gamma_i LPTN_i + \gamma_j LPTN_j + \mu_{ij}. \quad (4)$$

In addition, to capture the industry-specific difference in HME, the samples are separated according to the factor intensities. They are the labor-intensive industries of clothing and footwear industries (SITC84 and 85); the capital-intensive industries of vehicles and other transport equipment (SITC78 and 79); and the technology-intensive industries of electronics, optical goods and electrical components (SITC75, 76, 77 and 87).

Table 5. Variable Description

Variables	Description
Y_i	Export Country *i*'s GDP, retrieved from World Development Indicators, WDI, World Bank. $LY_i = \log(Y_i)$
Y_j	Import country *j*'s GDP, sourced from WDI.
$DIST_{ij}$	Bilateral distance.
EU	Regional integration (RI) dummy, Europe Union, member countries Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, United Kingdom.
NAFTA	RI dummy. North American Free Trade Area, including US, Canada and Mexico.
ASEAN	RI dummy. Association of Southeast Asian Nations, including Brunei, Darussalam, Cambodia, Laos, Indonesia, Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam.
CHN	RI dummy, China.
$LY_i \cdot RGN_k$	EI cross variable of LY_i and RGN_k, denoted as $LY_i \cdot RGN_k$, RGN=EU, NAFTA, ASEAN, CHN.
RP_{ij}	The ratio of country *i*'s real exchange rate and country *j*'s real exchange rate, sourced from the World Development Indicators, World Bank. That is, the relative real exchange rate between country *i* and *j*.
PTN_{ki}	Country *i*'s U.S. patent stock registered in the United States Patent and Trademark Office (USPTO).

2. Data

To estimate the gravity equation, the following data are collected as listed in Table 5. The common gravity variables include bilateral trade, X_{ij} the exports from country *i* to *j*; gross domestic production, GDP_i and GDP_j to represent the output level of country i and j; the relative price level between country i and j, RP_{ij}; and the technology level of each country $Tech_i$ and $Tech_j$. Export data of X_{ij} are retrieved from the dataset of COMTRADE, UN. GDP_i and GDP_j are from the World Development Indicators (WDI) dataset released by the World Bank; Taiwan's data are from Taiwan Statistical Data Book, CEPD. Moreover, the relative price levels are computed on the basis of the real exchange rate to the US dollar (purchasing power parity) in the WDI, that is, RP_{ij} $=PPP_i/PPP_j$ and taking the logarithm to yield LRP_{ij}. The bilateral distance $DIST_{ij}$ is computed according to the marine routes between pair countries' major ports plus the inland distance from the port to the capital. Average distance is taken for the case of multiple routes.

The patent stock data are from United States Patent and Trademark, USPTO, denoted as PTN_i for country i. In other words, variable Tech is replaced by PTN in the empirical model. More specifically, we compute the total number of patents registered in USPTO for country i as the PTN_j, to represent country i's technology level. Variables to be used in the regression and their statistics are reported in Tables 5 and 6 respectively.

Table 6. Descriptive statistics of country-specific variables

2002	Number	Mean	Std. Dev.	Maximum	Minimum
GDP (million US$)	126	742,875.3	1,782,463	10,383,100	203.4
PTN	126	1,882.5	5,617.4	34,858	0
PPP	126	0.7	0.3	1.1	0.1
X_{ij8485} (thousand US$)	35,363	8,150.8	73,944.9	5,804,902	0
X_{ij7879} (thousand US$)	35,190	26,072.2	38,4947.8	37,991,780	0
X_{ijICT} (thousand US$)	71,985	20,094.9	182,183.8	10,659,240	0
2013	**Number**	**Mean**	**Std. Dev.**	**Maximum**	**Minimum**
GDP	170	1,776,557.4	3,116,390.4	14,451,509	383.2
PTN	170	4,118.9	8,800.9	51,919	0
PPP	170	0.9	0.3	1.6	0.3
X_{ij8485}	68,597	7,748.3	60,508.4	4,789,090	0
X_{ij7879}	38,471	38,147.7	494,459.4	43,717,400	0
X_{ijICT}	150,054	19,344.3	350,735	61,391,200	0

3. Empirical Results

The empirical results for three different groups of industries are reported in Table 6 (labor-intensive industries of SITC84 and 85), Table 7 (capital intensives, SITC78, 79) and Table 8 (technology intensives, SITC75, 76, 77, 87). As expected, all the basic gravity variables affect the export flows as normal in all the regression models, that is, there are positive estimated coefficients for $LGDP_i$ and $LGDP_j$, and negative ones for the bilateral distance $LDIST_{ij}$, and the relative price level of the export country to the import countries LRP_{ij} is positive for $LPTN_i$ and negative for $LPTN_j$.

Table 7. Empirical Results for Labor-intensive Industries (SITC 84, 85)

Dependent Variable X_{ij}

Explanatory Variable	2002 (a) Coefficient	2002 (a) Z-value	2002(b) Coefficient	2002(b) Z-value	2013 (a) Coefficient	2013 (a) Z-value	2013(b) Coefficient	2013(b) Z-value
Intercept	-20.65*	(-18.2)	-34.06*	(-20.2)	-21.7*	(-22.05)	-28.4*	(-23.4)
LY_i	0.695*	(16.25)	0.755*	(22.78)	0.695*	(26.04)	0.91*	(23.8)
LY_j	0.619*	(24.25)	0.533*	(25.67)	0.567*	(30.53)	0.612*	(30.11)
$LPTN_i$	0.013*	(3.66)	0.001*	(-0.48)	0.046*	(18.08)	0.051*	(19.66)
$LPTN_j$	-0.006*	(-1.66)	-0.014*	(-3.36)	-0.015*	(-5.93)	-0.009*	(-3.21)
LRP_{ij}	-1.34*	(-7.11)	-0.528*	(-5.33)	-1.29*	(-20.75)	-1.4*	(-24.21)
$LDIST_{ij}$	-0.53*	(-18.88)	-0.575*	(-18.43)	-0.365*	(-19.31)	-0.424*	(-17.93)
LY_iEU			-0.006*	(-1.61)			-0.317*	(-7.85)
LY_iNAFTA			-0.054*	(-8.11)			-0.342*	(-3.8)
LY_iASEAN			0.028*	(6.7)			0.369*	(3.73)
LY_iCHN			0.07*	(12.91)			-0.03*	(-6.79)
EU			0.485*	(5.49)			8.63*	(7.89)
NAFTA			2.12*	(5.85)			9.56*	(3.87)
ASEAN			-1.02*	(-6.32)			-9.6*	(-3.56)
Observations	33111		33111		65642		65642	
Pseudo R^2	0.509		0.577		0.570		0.589	

Note: 1. Superscripts * denote significance level of 5%.
2. Numbers in parentheses are Z-value in PQML.

(1) Conventional Home-market Effect ($\beta_i - \beta_j$)

The difference between the estimated coefficient of the export country's market size, represented by GDP_i and of the import country's (GDP_j) revealed the HME, and the greater the difference ($\beta_i - \beta_j$), the bigger the HME. The empirical results of $\beta_i - \beta_j$ for the three industry groups are depicted in Figure 1. As shown in the figure, in Model (a), the HME is empirically supported for the Labor- and Capital-intensive industries, but not in the technology-intensives. In Model (b) when the trade creation effects of economic integration of the EU, ASEAN and NAFTA are considered, the HME appears in all three industry groups, and becomes larger, as shown in the right panel of Figure 1. However, the trend of HME differs across industries. For labor-intensives the HME has increased from 2002 to 2013. In contrast, for the capital-intensives and technology-intensives, the HME has decreased during the same period.

Table 8. Empirical Results for Capital-intensive Industries (SITC 78, 79)

Dependent Variable X_{ij}

Explanatory Variable	2002 (a)		2002 (b)		2013 (a)		2013 (b)	
	Coefficient	Z-value	Coefficient	Z-value	Coefficient	Z-value	Coefficient	Z-value
Intercept	-35.99*	(-14.88)	-35.72*	(-12.25)	-25.9*	(-12.66)	-23.05*	(-12.26)
LY*i*	1.085*	(17.77)	1.075*	(12.43)	0.765*	(16.3)	0.754*	(14.01)
LY*j*	0.859*	(18.59)	0.7891*	(18)	0.737*	(6.01)	0.665*	(16.12)
LPTN*i*	0.034*	(5.52)	0.031*	(2.99)	0.02*	(2.83)	0.03*	(4.11)
LPTN*j*	-0.0121*	(-1.79)	-0.0134	(-1.78)	-0.016*	(-2.23)	0.01	(-0.01)
LRP*ij*	-0.087*	(-2.14)	-0.051	(-1.06)	-0.077	(-1.09)	-0.185*	(-2.5)
LDIST*ij*	-0.763*	(-15.23)	-0.556*	(-13.05)	-0.622*	(-9.91)	-0.704*	(-9.01)
LY*i*EU			0.002	(0.23)			-0.113	(-1.47)
LY*i*NAFTA			-0.022	(-1.56)			0.211	(1.17)
LY*i*ASEAN			-0.01	(-1.32)			-0.153	(-1.74)
LY*i*CHN			-0.037*	(-3.53)			0.015	(1.48)
EU			0.636*	(5.82)			2.9	(1.36)
NAFTA			2.18*	(6.8)			-5.078	(-1.02)
ASEAN			1.037*	(3.89)			4.921*	(2.04)
Observations	33110		33110		36502		36502	
Pseudo R^2	0.590		0.620		0.525		0.543	

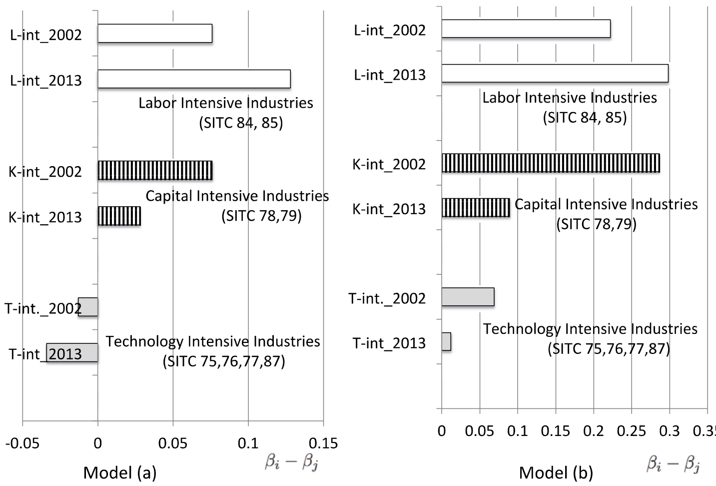
Note: Refer to Table 7.

Table 9. Empirical Results for Technology-intensive Industries (SITC 75, 76, 77, 87)

Dependent Variable X_{ij}

Explanatory Variable	2002(a) Coefficient	2002(a) Z-value	2002(b) Coefficient	2002(b) Z-value	2013(a) Coefficient	2013(a) Z-value	2013(b) Coefficient	2013(b) Z-value
Intercept	-26.1*	(-30.35)	-29.1*	(-33.37)	-20.4*	(-28.12)	-18.8*	(-22.94)
LYi	0.757*	(31.12)	0.863*	(28.94)	0.632*	(22.58)	0.662*	(21.5)
LYj	0.77*	(32.83)	0.794*	(36.9)	0.666*	(27.86)	0.65*	(36.32)
LPTNi	0.01*	(3.66)	0.023*	(6.49)	0.006*	(2.52)	0.01*	(4.59)
LPTNj	0.67	(0.21)	0.005*	(1.66)	-0.006*	(-2.13)	0.005*	(1.72)
LRPij	-0.032	(-0.61)	0.107*	(2.69)	-0.228*	(-4.13)	-0.465*	(-8.12)
LDISTij	-0.561*	(-22.59)	-0.665*	(-24.4)	-0.592*	(-32.1)	-0.827*	(-28.52)
LYiEU			-0.019*	(-6.63)			-0.005	(-1.69)
LYiNAFTA			-0.009*	(-2.23)			0.054*	(13.88)
LYiASEAN			0.068*	(14.5)			0.088*	(19.62)
LYiCHN			0.031*	(5.82)			0.039*	(6.54)
EU			-0.023	(-0.36)			-0.692*	(-8.86)
NAFTA			1.16*	(6.56)			-1.1*	(-8.82)
ASEAN			0.594*	(2.46)			-1.4*	(-9.6)
Observations	67567		67567		141079		141079	
PseudoR^2	0.517		0.586		0.519		0.577	

Note: Refer toTable 7.



Notes: L-int denotes Labor-intensive, K-int denotes Capital-intensive, T-int denotes Technology-intensive.

Figure 1. Estimated HME ($\beta_i - \beta_j$) under Models (a) and (b)

(2) HME under Regional Economic Integration

The FTA/CM-induced HME under NAFTA, ASEAN and the EU are captured by the cross variable LY_iNAFTA, LY_iASEAN and LY_iEU respectively. If the FTA/CM does induce HME for the member countries then we should observe significantly positive coefficients of the variables. The empirical results are reported in Model (b), reflected by the variables of LY_iEU, LY_iNAFTA and LY_iASEAN. To single out the case of the China syndrome, the cross variable of LY_iCHN is also included in the regression.

For the ease of comparison, the estimated coefficients of these variables are summarized in Table 10. Firstly, for the case of the EU, all the estimated coefficients for are negative, except that for the sample of capital-intensive industries in 2002, which is positive but not significant. The result implies the EU hasn't induced a positive HME for its member countries; instead its HME was below the world average. For the labor-intensives, the negative HME under the EU worsened dramatically, as reflected by coefficients of -0.006 (2002) to -0.317 (2013). For the capital-intensives, EU-induced HME is not significant in both years. For the technology-intensives, the EU-induced HME in 2002 was significantly negative, and has become smaller and insignificant in 2013.

Secondly, a similar pattern of downward effect on HME occurs for NAFTA, as in the case of the EU. Except the case of technology-intensives, the estimated coefficient of LY_iNAFTA changed to significantly positive (0.054) in 2013 from negative (-0.009) in 2002.

Table 10. Summary on the HME under Regional Economic Integration (Coeff. of LY_iRGN)

	2002			2013		
	Labor-intensive	Capital-intensive	Technology-intensive	Labor-intensive	Capital-intensive	Technology-intensive
LY_iEU	-0.006*	0.002	-0.019*	-0.317*	-0.113	-0.005
LY_iNAFTA	-0.054*	-0.022	-0.009*	-0.342*	0.211	0.054*
LY_iASEAN	0.028*	-0.01	0.068*	0.369*	-0.153	0.088*
LY_iCHN	0.07*	-0.037*	0.031*	-0.03*	0.015	0.039*

Note: Superscript* denotes a significance level of 5%.

For the case of ASEAN, the AFTA-induced HME appears in various results. (1) The estimated coefficients of LY_iASEAN are all significantly positive for the labor-intensive industries of clothing and footwear, indicating the AFTA does bring into the region the advantage of market size enlargement and positive HME under ASEAN FTA. The same AFTA-induced HME occurs in the technology-intensive industries as well. The estimated coefficient is 0.068 for the year 2002 and rises to 0.088 in 2013. However, for the capital-intensive industries, which are the automobile and other transport equipment sectors in our sample, the AFTA does not present any significant HME, and the estimated coefficients of LY_iASEAN are negative but not significant in the two sampling years of 2002 and 2013.

Finally, for the case of China, we observe a significant change in its HME. (1) China's labor-intensive industries show a strong HME in 2002, as reflected by the significant estimated coefficient of 0.07. However the pattern has changed dramatically to negative HME in 2013 as reflected by the significant estimated coefficient of -0.03. (2) In contrast, China's HME in the capital-intensive industries rises from negative (-0.037) in 2002 to positive (0.015) in 2013, a significant change over time. This result indicates China has experienced the HME in the capital-intensive industries. (3) For the technology-intensive industries, China's HME is higher than the world average, as reflected by the significant estimated coefficient of 0.031 in 2002, and 0.039 in 2013 and a significant trend of 0.002.

In sum, whether an economic integration can induce HME for its member countries or not is uncertain, depending on the industry features and the development stage of the region. For the labor-intensive industries a significant FTA/CM-induced HME occurs for ASEAN, but not the EU and NAFTA. While the AFTA has experienced a rising HME, China in contrast has experienced a decline in HME during the same period. For the capital-intensive industries, it seems that the HME is irrelevant to whether a country has joined an FTA/CM or not. For the EU, NAFTA and ASEAN, the empirical results shows no FTA/CM-induced HME. In the technology-intensive industries, the FTA/CM-induced HME occurs for ASEAN and the trend is rising, but not for the EU. A pattern of rising HME occurs for NAFTA, changing from negative HME in 2002 to positive in 2013.

(3) Trade Creation under Regional Economic Integration

The trade creation effect of an FTA/CM is reflected by the coefficient of the regional dummy for the EU, NAFTA and ASEAN. Trade creation is supported if the estimated coefficient is positive for the related FTA/CM. For the EU the trade creation is empirically supported for the labor and capital intensive industries, but not for the technology-intensives. For NAFTA, the trade creation is significant in all three industry groups in 2002. However, in 2013 the positive trade creation appears only in the labor-intensive industries. Finally, for ASEAN in 2002 the trade creation effect occurs only for the capital- and technology-intensive industries, signaling the vertical specialization of the two industries among the ASEAN members. For the year 2013, ASEAN's trade creation appears only in the capital-intensive industries, i.e. automobiles and other transport equipment.

IV. Implication for the AEC and Concluding Remarks

Member countries in the AEC are highly diverse in terms of their resource endowment, social and cultural differences, economic development, and institutional regimes. The heterogeneity of FTA/CM members on one hand is more likely to create trade within the region (conventional trade creation effect under FTA), simply due to the complementary economic and market status. On the other hand, the effectiveness of integrating into a large-scale market is in doubt, due to the existence of intangible barriers to the free flow of goods and production factors.

Using 2002 and 2013's worldwide trade data, we have established a modified gravity model by considering FTA/CM of ASEAN, the EU and NAFTA as regional dummies and designing an FTA/CM-induced HME variable. In addition, instead of using the commonly adopted OLS estimation, we apply the PQML approach to estimate the gravity equation to overcome the problem of large numbers of zero-export observations.

The empirical results show that not only the intra-regional trade creation (TC) but also the FTA/CM-induced HME is not guaranteed, depending on the industry characteristics and the stage of economic development of the region.

For ASEAN, intra-regional trade creation does not appear in the labor-intensive footwear and clothing industries. Instead, the intra-ASEAN trade for these labor-intensives was significantly below the global average in 2002, and even more so in 2013, indicating the bilateral complementarity in these sectors among ASEAN members. However, the ASEAN FTA-induced HME was positive in 2002 and significantly increased in 2013, very likely due to the rising inward FDI in the sectors. Interestingly, an opposite pattern of TC- and REI-induced HME occurs in the capital-intensive sectors of vehicles and other transport equipment for ASEAN. That is, a positive TC occurred in 2002 and more so in 2013; but little ASEAN-induced HME was found in both years. This indicates the complementarity among the ASEAN members in the capital-intensive industries. Finally, for the case of technology-intensives of electronics, optical goods, and electrical components, the trade creation effect did occur in 2002, but became negative in 2013. Also a significant AFTA-induced HME was found for both years with a slightly rising trend.

Although the sample years of 2002 and 2013 may not fully represent the ASEAN economy after the AEC, the empirical results are still worth referring to, should we believe that the economic situation within the region will remain as before for the coming years. Accordingly, the AEC-induced HME is likely to occur for the labor-intensive and the technology-intensive sectors, but not in the capital-intensive ones.

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FTA 下的國家異質度與在地市場效果：兼論 AEC

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摘要

傳統的在地市場效果，較大的國家其具大規模經濟產業，貿易上會因在地市場優勢而得到比國家規模更大的市占率。由經濟共同體組成大市場，是否能發揮此作用？東協透過共同市場整合，形成 6.23 億人口以及 2.48 兆美元國內生產毛額的大經濟體（AEC）。本文利用 PQML 引力模型，測度共同市場與一般國家在地市場效果之有效度。根據不同產業，東協的在地市場效果並不顯著，不若單一國家，如中國。從國家異質度和會員國家間因貿易或要素移動等無法觀察的障礙，可解釋東協不同的 HME 和貿易創造現象。

關鍵字：在地市場效果、區域經濟整合、卜瓦松準最大概似估計

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