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Impact of Intellectual Property Rights and Foreign Direct Investment on Exports within ASEAN-5

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Abstract: While there is clarity in the relationship between FDI and exports, that between IPR and exports is contested. This study looks at IPR and FDI and their relationships with trade for the ASEAN-5 region at SITC single digit industry level to reveal the extent of integration within the ASEAN grouping from the export angle. Using Pedroni's (2000) FMOLS method, the relationships between IPR, FDI and exports for individual countries and ASEAN-5 are found to be significant, consistent with theory but inelastic. Increases in FDI and changes in IPR levels also have only modest impact on exports from individual ASEAN-5 countries to ASEAN-5 on the whole. Although more detailed analysis is warranted, the modest impact of FDI suggests that the export-orientation of FDI in these countries to ASEAN is less than often assumed. In the case of IPR, the results suggest that IPR protection does not figure prominently in whatever technology is embodied in these countries' exports to ASEAN. Exporters are likely to be cognizant of the general lack of enforcement despite well-crafted laws. The existence of significant relationships between exports within the grouping, although with low elasticity, suggests possibilities for future collaboration that can be nurtured.

Keywords: ASEAN, foreign direct investment, FMOLS, intellectual property rights, trade
JEL classification: F21, O34, F10, F15, C23

1. Introduction

The promotion of intellectual property rights (IPR) has gained prominence in international trade and national policies especially after the institutionalisation of the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS)[1] under the World Trade Organisation (WTO). Despite this, Brander (2007) noted that it has been difficult to achieve international consensus on an appropriate international regime for IPR protection. As IPR protection levels are standardised, they may have regressive regenerative effects and unclear efficiency effects. Reliance on IPR protection is not viewed positively by many economists. Chang (2002), Markus and Penubarti (1995), Smith (1999, 2002), Liu and Lin (2005) and Rafiquzzaman (2002) argued that IPR protection discriminates against late-comer innovators and developing nations which fear the costs from effective

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[1] TRIPS was launched by WTO on 1 January 1995. The Agreement was stated to be "the most comprehensive multilateral agreement on intellectual property". It covered IPR standards, their enforcement and dispute settlement. See *http://www.wto.org/english/tratop_e/trIPRs_e/intel2_e.htm.*

implementation of IPR protection will outweigh benefits.[2] The stars of late-comer catch-up, Korea and Taiwan, both achieved their breakthroughs prior to the entrenchment of the TRIPS regime.

IPR becomes an issue of concern when multinational corporations (MNCs) establish global supply chains through foreign direct investment (FDI), which figure prominently in the manufacturing sectors of the ASEAN countries. Dunning's (1998) Ownership, Location and Internalisation (OLI) paradigm argues that MNCs must overcome the costs associated with locating in a foreign country through the ownership of some effective advantages. Intellectual property in the form of patents, trademarks and copyright, is such an ownership advantage. Effective IPR protection policies and their implementation would safeguard this advantage in conjunction with other locational advantages in the host country. However, findings of some cross-sectional studies of countries (e.g. Mansfield 1994; Lan and Young 1996) do not bear this out.

As ASEAN countries attempt to transform themselves into knowledge economies, the adoption and implementation of rules on IPR that are consonant with WTO may or may not have a direct bearing on innovation, the flow of innovative FDI, trade and the economy as a whole. This is yet to be tested. For the reasons already mentioned, this is an issue of concern.

This paper tests the above arguments against the experience of the ASEAN-5 countries, all members of a free trade area (the ASEAN Free Trade Area (AFTA))[3] since 1992, against trade with ASEAN-5 to eliminate other trade effects as the individual countries are within the same free trade zone. Controlling for other factors, this study will explore the links between IPR protection and FDI and its consequent trade effects on ASEAN countries. The analysis is undertaken up to SITC single digit level to extend the findings on the impact of IPR on the type of industry. This paper attempts to cast light on the latter by analysing trade between ASEAN countries and their partners in the regional grouping.

The discussion is divided into six sections. Section 2 presents the theoretical links between IPRs, FDI and trade. Section 3 provides a brief background of the state of IPR protection in the ASEAN-5 countries. Section 4 lays out the methodology for analysis while Section 5 discusses the empirical findings. Section 6 concludes with recommendations and suggested areas for future research.

2. IPR, FDI and Trade – Conceptual Issues

New and innovative knowledge spillovers and FDI are important elements of the new growth theory and both elements feature strongly in international trade. New ideas and innovations are realised at high cost. However, they can be easily copied and reproduced

[2] Yew *et al.* (2011) state that "with the market expansion effect, IPR protection reduces imitation in importing countries, permitting an increase in exports while slowing down technological acquisition and development in the importing country (Connolly and Valderrama, 2005). IPR protection also incentivises the development of new technologies in the exporting country. In contrast, the market power effect causes countries that receive IPR protection to curtail exports through reduced competition. In this case, there is a trade-off between the benefits to exporting countries where innovations are encouraged, and the costs to importing countries of having to pay a higher price for products for which they had no access to the requisite technology."

[3] The ASEAN-5 countries, together with Brunei, were the original signatories of AFTA on January 28, 1992. Newer members of ASEAN signed the Agreement when they joined ASEAN, but were allowed a longer time frame to implement the AFTA's provisions.

by others at lower cost. The result is erosion of potential profit streams that would have accrued to innovators (Grossman and Helpman 1990). Not surprisingly, knowledge 'piracy' activities are increasing in scale and frequency (Sood and Miller 1996) and IPR protection and increases in tariff protection have been instituted to prevent such piracy.

Supporters of increased IPR protection argue that it is needed to preserve the incentive to innovate. Its opponents believe that IPR serves simply to prevent late-start innovators from catching up with early starters (see, for example, Chang 2002). This debate extends the role of IPR and trade. Exporting countries are eager to protect innovations embodied in their exports, and importing countries wish to have greater access to these innovations at lower prices. Innovations can lead to the creation of new markets or the expansion of existing ones (market expansion effect). This effect occurs when IPR protection reduces imitation in foreign countries and thus increases the home country's exports. In addition, if the home country undertakes FDI abroad, stronger IPR protection can increase the stock of technological knowledge in destination (host) countries through innovations embodied in FDI. A host country with low innovation but strong IPR protection can attract FDI from multi-national corporations (MNCs) to establish production bases and thus increase not only its own technological capability but also exports (Blyde 2006). This, it is claimed, builds a win-win platform for both exports and imports for FDI destination countries.

On the other hand, the enforcement of IPR protection also allows exporting firms to raise prices and restrict output as well as slow the technological acquisition and development of the importing or FDI destination country (Connolly and Valderrama 2005). This is the market power effect, which works in the opposite direction of the market expansion effect. Which effect dominates is a matter that can only be empirically determined.

3. ASEAN and IPR Protection

The ASEAN situation with respect to IPR protection has two major features. First, thanks to member countries' openness to (if not dependence on) FDI, and leaving aside the issue of enforcement, Hu (2009) found that IPR protection in ASEAN countries to be on par with high-income countries (Singapore) or converging with them (Malaysia, the Philippines and Vietnam) although a few are still below the world average. At the ASEAN level, the impetus for compliance has come from initiatives like the ASEAN Project on Intellectual Property Rights (ECAP III), launched in 2009, with Phase 2 beginning in December 2012[4], and the ASEAN IPR Action Plans[5] 2011-2015. Not a great deal of information on IPR protection exists at the country level, with much of what is written focused on laws and rules rather than on implementation.[6]

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[4] ECAP III Phase 2 has as its specific objective "to further upgrade and harmonise the systems for IP creation, protection, administration and enforcement in the ASEAN region, in line with international IP standards." *(http://www.ecap-project.org/)*.

[5] To date, two plans have been implemented, one for 2004-2010 and the second for 2011-2015, the latter part of the ASEAN Economic Community (AEC) Blueprint. These plans are developed by the ASEAN Working Group on Intellectual Property Cooperation established in 1996.

[6] See, for instance, the webpage for the Malaysian Industry Development Authority, *http://www.mida.gov.my/env3/index.php?page=iP-protection*. However, periodic reports on implementation come from the US Trade Representative who is responsible for the "Special 301" Report.

On enforcement, however, Reynolds (2003) paints a much less optimistic picture. Endeshaw (2007:166) explains this gap between compliance with IPR laws and their enforcement in terms of countries' reluctance to confront foreign nations but at the same time anxious to keep the cost of acquiring IPR low to help local businesses. That said, there is also a very limited supply of human resources with IPR expertise and institutional capacity in ASEAN member countries, with a sizable gap between the original and new members of ASEAN.

The second feature is the very low level of patents and other innovations that require IPR protection that are filed by ASEAN countries (except Singapore) in offices like the US Patent and Trademark Office, as well as national offices. This is clear from Table 1. Even for the modest number of applications, a substantial proportion of applications has been filed by foreign enterprises located in these countries (see below) implying that applications by locals are fewer still. This feature, combined with growing IPR compliance but lagging enforcement, appears to confirm Endeshaw's (2007) explanation. The small number of applications also suggests that enhanced legal compliance coupled with lax enforcement has not given foreign enterprises much confidence in bringing new technology to ASEAN countries.

4. Model Specification and Data

This study uses panel data analysis on a statistical model to assess the impact of IPR and FDI on exports for each of the five countries that formed ASEAN in 1967, the ASEAN-5. The period of analysis is from 1993, the year after the establishment of AFTA, to 2007. Panel estimation increases the power of the tests by exploiting cross-sectional information and taking into account the degree of heterogeneity in cross-section dynamics. In addition, the fixed effects model is employed as the interest of the study is on specific N individual countries (Gujarati, 2003: 650). The unit root tests are carried out using Im-Pesaran-Shin (IPS) (2003) tests while the cointegration tests are undertaken using Pedroni's (2004) method. Model parameters are estimated using Pedroni's (2000) fully modified ordinary least squares (FMOLS) method.

Empirical analyses of aggregate export demand are conventionally carried out within the partial-equilibrium framework and based on the Marshallian demand function. We have extended the empirical model in this framework to incorporate real GDP per capita,

Table 1. Resident patent applications filed through the Patent Cooperation Treaty procedure

Country/Region	2004	2006	2008	2010
ASEAN	2,573	2,904	3,288	4,114
China	65,786	122,318	194,579	293,066
India	4,014	5,686	6,425	8,853
Japan	368,416	340,060	330,110	290,081
Korea	105,250	125,476	127,114	131,805

Source: World Bank database

foreign direct investment and an intellectual property index as explanatory variables. Thus, the export demand equation is expressed as:

$$X_{ijt} = \beta_0 + \beta_1 Y_{ijt} + \beta_2 R_{ijt} + \beta_3 FDI_{ijt} + \beta_4 IPR_{ijt} + \mu_{ijt},\ j = 1,2,3,4,5 \text{ and } t = 1,...15 \quad (1)$$

where

X_{ijt} is the natural logarithm of the total real exports of respective ASEAN countries to ASEAN5 disaggregated by single digit SITC sector

Y_{ijt} is the natural logarithm of the real GDP per capita of respective ASEAN countries

R_{ijt} is the natural logarithm of the relative price (import price x (1/ (GDP deflator x real exchange rate)) of the respective ASEAN countries,

FDI_{ijt} is the natural logarithm of FDI inflow into the respective ASEAN countries

IPR_{ijt} is the natural logarithm of the IPR index of respective ASEAN countries

μ_{ijt} is the residual term

β's are the vectors of parameters

j represents the trading partners of the exporting country (Indonesia, Malaysia, Philippines, Singapore and Thailand)

t denotes time.

The expected sign for β_1 is positive, indicating that higher incomes in ASEAN5 countries will increase the exports from the ASEAN5 member country to ASEAN5. β_2 is expected to have a negative sign, implying a higher demand for a country's exported goods is associated with depreciation of that currency.

The sign of β_3 depends on the motive of FDI. Efficiency-seeking FDI will have a complementary relationship with exports based on differences in factor endowments in the two countries. The production process can be decomposed by stages according to resource intensities in these countries. An investing country's exports to its FDI host country rises because it supplies the inputs for the production of goods in the host country. Therefore the expected sign of β_3 is positive if FDI is efficiency-seeking. Market-seeking FDI will have a substitution relationship with exports based on the improvement of market access in the host country. The firm sets up abroad to produce similar products which lead to a reduction of exports to the home country. Therefore the expected sign of β_3 is negative if FDI is market seeking.

The sign of β_4 depends on the FDI home country's strategy in the FDI host country. A positive sign would be expected for β_4 if the home country adopts the efficiency-seeking strategy in the host country. This is because IPR enforcement increases the imitation costs in the importing country and ultimately increases the demand for goods from the exporting county. A negative sign would be expected for β_4 if the home country adopts the market-seeking strategy in penetrating the market of the importing country. This is because of the market power effect where the home country firm would like to maintain a higher market price and hence profit. The expected sign of β_4 in each situation is presented in Table 2.

The dependent variable in (1) is the real export volume which is nominal exports (measured in millions of US dollars) deflated by exports price (2000=100). The real GDP

Table 2. The expected sign for β_4

Host Country	Level of technology demand		
Home Country	High	Moderate	Low
Efficiency-seeking strategy	Positive Market expansion effect	Mix Market expansion or market power effects	Positive Market expansion effect
Market-seeking strategy	Negative Market power effect	Mix Market expansion or market power effects	Negative Market power effect

per capita is nominal GDP per capita (measured in millions of US dollars) deflated by the GDP deflator (2000=100). The role of FDI and its complementary or substitution effects with trade (Markusen 1984; Helpman 1984) need to be considered in order to assess the impact of market expansion and market power effects. Hence, it is necessary to include FDI as the explanatory variable in the empirical model. IPR enforcement is measured by the IPR index with the highest score value being 10 and lowest score value 0. A higher score indicates greater IPR protection. Although the Ginarte and Park (1997) indices have been commonly used as the measure of the strength of IPR protection, this study employs the IPR index from the Economic Freedom of the World for several reasons. Firstly, the IPR index is from the Global Competitiveness Reports and it takes into consideration financial assets protection. Secondly, the IPR index is available annually since year 2000.

Data on GDP, the GDP deflator, real exchange rate and import price are from the International Financial Statistics, Direction of Trade Statistics. Data on exports at country level and SITC single digit sectoral level are obtained from Personal Computer – Trade Analysis System of UNCTAD (PC-COMTRADE),[7] while FDI statistics are obtained from UNCTAD.

5. Empirical Findings

The results of the unit root tests based on the Im, Pesaran and Shin (IPS) (2003) tests are presented in Table 3. The null hypothesis of stationarity is rejected in the two cases (with and without trend) at first difference and are verified to be integrated of order one or I(1) and expedient for cointegration analysis.

The Pedroni (2004) cointegration test was used for testing the existence of cointegration of the variables. As shown in Table 4, the null hypothesis of no cointegration is easily rejected at least at the 5% significance level. The tests suggest that the variables are cointegrated.

[7] The single digit SITC levels are: SITC 0 – Food and Live Animals; SITC 1 – Beverages and Tobacco; SITC 2 – Crude Materials, Inedible; SITC 3 – Fuels, Lubricants, etc.; SITC 4 – Animal, Vegetable Oils, Fats, Wax; SITC 5 – Chemicals, Related Products not elsewhere classified; SITC 6 – Manufactured Goods; SITC 7 – Machines, Transport Equipment; SITC 8 – Miscellaneous Manufactured Articles; SITC 9 – Goods not classified by kind.

Table 3. Unit root test results

Unit root test results at level using IPS tests								
Panel	Variable							
	XP		GDP		FDI		IPR	
	Without Trend	With Trend	Without Trend	With Trend	Without Trend	With Trend	Without Trend	With Trend
Indo-ASEAN	-0.230(1)	2.219(1)	2.699(1)	0.328(1)	0.091(1)	0.010(1)	0.768(1)	0.370(1)
Mal-ASEAN	0.227(1)	0.714(1)	2.957(1)	0.056(1)	-0.900(1)	0.926(1)	0.960(1)	0.549(1)
Phil-ASEAN	0.467(1)	0.918(1)	1.752(1)	0.465(1)	-0.794(1)	0.900(1)	0.873(1)	0.437(1)
Sin-ASEAN	0.469(1)	0.470(1)	2.650(1)	0.014(1)	-1.158(1)	0.528(1)	1.383(1)	0.051(1)
Thai-ASEAN	0.106(1)	2.313(1)	2.712(1)	0.146(1)	-1.234(1)	0.718(1)	1.375(1)	0.053(1)
Unit root test results at first-order difference using IPS tests								
Panel	Variable							
	XP		GDP		FDI		IPR	
	Without Trend	With Trend	Without Trend	With Trend	Withou Trend	With Trend	Without Trend	With Trend
Indo-ASEAN	3.239(1)*	2.926(1)*	1.967(1)*	-1.437(1)*	3.565(1)*	-2.009(1)*	-2.162(1)*	-3.955(1)*
Mal-ASEAN	2.568(1)*	1.838(1)*	2.472(1)*	-1.353(1)*	3.707(1)*	2.135(1)*	1.860(1)*	-3.563(1)*
Phil-ASEAN	2.102(1)*	-1.913(0)*	2.532(1)*	-1.439(0)*	3.927(1)*	2.399(1)*	2.132(1)*	-3.946(0)*
Sin-ASEAN	1.971(1)*	-1.990(2)*	2.343(1)*	-6.117(3)*	3.450(1)*	1.859(1)*	-2.175(0)*	-3.495(0)*
Thai-ASEAN	-2.214(0)*	-2.359(0)*	2.630(1)*	-1.677(0)*	4.260(1)*	-5.892(0)*	2.512(1)*	-3.481(0)*

1. ***, **, * - reject the null hypothesis of unit root at 10%, 5% and 1% levels respectively.
2. Numbers in parentheses are optimal lag lengths.

The results of the sector analysis based on SITC single digit levels are shown in Table 5. For individual ASEAN countries, there are significant relationships between IPR, FDI and exports and the ASEAN-5 region as a whole. At the sectoral level, the findings are similar for all individual ASEAN countries in relation to the ASEAN-5 region as a whole. The Philippines' IPR coefficients are generally higher for SITC 0, 1, 2, 4, 5 and 6. Even for an important sector such as SITC 7 which generates the bulk of the manufactured exports from all the ASEAN-5 countries, the findings are similar, i.e., although the IPR and FDI coefficients are significant, their values are far from elastic.

From the FMOLS analysis, β_1 values are generally higher than those of β_2, β_3 and β_4 for all SITC classes of exports. However, GDP per capita is not consistently significant in its relationship with exports of individual countries to ASEAN-5. Only for SITC 3 and 6 are all the country relationships between exports to the grouping significant in terms of GDP per capita.

The most consistent finding is the overall significance of FDI in driving exports to ASEAN as a whole for all ASEAN-5 countries and across all sectors. However, their elasticities are very low, ranging from 0.001 to 0.47 with the exception of one outlier for Philippines for SITC 9. It is apparent from these results that although FDI does influence intra-ASEAN trade, the impact is not substantial. With an open and trade-based regime in

Table 4. Cointegration test results

Panel	Panel v	Panel rho	Panel PP	Panel ADF	Group rho	GroupPP	Group ADF
SITC 0							
Indo-ASEAN	-1.2803	0.7929***	-2.0139*	2.8184*	2.2689**	-7.3750*	-2.5895**
Mal-ASEAN	-0.0460	0.7038	-2.1807*	0.9320	1.4029	-6.2723*	0.24931
Phil-ASEAN	-0.6861	1.1433	-2.024	3.4182*	2.0483**	-1.2884	4.0531*
Sin-ASEAN	1.2285	1.7993	-0.2934*	-1.0807*	2.4178**	-6.0880*	-2.5767*
Thai-ASEAN	-1.4493**	1.6370***	-2.6755*	-3.8499*	2.3892**	-3.1032**	-4.0386*
SITC 1							
Indo-ASEAN	-1.8105**	1.7051	-2.3189*	-1.4549*	2.3101**	-5.8886*	-2.3197**
Mal-ASEAN	-0.7542	1.4366	-1.4089	2.6687*	2.2236**	-0.4659	3.2808*
Phil-ASEAN	-0.8229	1.4632	-2.5767*	1.6170***	1.7602***	-4.7277*	2.2174**
Sin-ASEAN	0.5537	0.8563	-4.0116***	-3.4035***	1.0796	-4.0331*	-3.7217*
Thai-ASEAN	-0.2868	0.2778	-6.7711*	-5.7853*	1.0401	-6.6565*	-5.1532*
SITC 2							
Indo-ASEAN	-1.0511	1.2612	-5.2135*	-2.9506*	2.1231**	-7.8152*	-3.8002*
Mal-ASEAN	-1.5973	1.1662	-3.4094*	-1.8780*	1.9411***	-6.4597*	-2.6925
Phil-ASEAN	-1.8661***	1.6185	-0.5606***	3.7003*	2.2863**	-0.2831	3.5444*
Sin-ASEAN	-1.8526**	1.9978**	-3.3603*	-1.9652**	2.4755**	-3.3382*	-0.6326
Thai-ASEAN	-2.0670***	0.6710	-4.2653*	-3.7309*	1.8323***	-2.7336*	-2.3362**
SITC 3							
Indo-ASEAN	0.3737	0.3146	-1.5654	-4.0631*	2.1506**	-1.1734	-5.2217*
Mal-ASEAN	-1.5905**	1.4633	-1.3821**	0.6437**	2.0071***	-2.6518*	0.2648
Phil-ASEAN	-0.9574	1.3854	-2.2065*	3.3641*	1.9461***	-5.2173*	2.5883**
Sin-ASEAN	-0.8862	2.4073**	1.3631	2.6583*	3.1192**	2.0292***	3.6488*
Thai-ASEAN	-0.7623	0.7032	-5.1803*	-4.3307*	1.8012***	-3.5590*	-3.7691*
SITC 4							
Indo-ASEAN	-0.3337	0.7868	-5.0264*	-2.5744*	2.0422**	-3.1065*	-2.2610**
Mal-ASEAN	-0.6078	1.1179***	-2.2108	-0.8387**	1.9975***	-2.3196**	-1.0541
Phil-ASEAN	0.1567*	0.8873	-5.7947*	-2.3363**	1.4312	-10.3823*	-2.0848**
Sin-ASEAN	-0.7106	1.8897***	-0.7192***	1.7803	2.5058**	-1.1368	2.1656**
Thai-ASEAN	-0.1272	2.0960***	-4.6369*	-4.5911*	2.8769*	-4.4948*	-4.3258*
SITC 5							
Indo-ASEAN	-1.4207**	1.8257**	-1.4295*	-4.2229*	2.6985**	-3.1120*	-4.5900*
Mal-ASEAN	-0.5471	1.3276	-2.9991**	2.9229*	1.7041***	-2.8779*	4.0910*
Phil-ASEAN	-1.0521	1.6626	-1.2465**	1.1246**	2.0258***	-4.2466*	-2.1696**
Sin-ASEAN	1.1319***	1.3638***	-2.5852**	-1.4515**	2.330**	-2.8475*	-1.1879
Thai-ASEAN	-1.8352	1.8245***	-3.6437*	-3.8505***	2.3319**	-3.7654*	-4.0600*
SITC 6							
Indo-ASEAN	-0.7154	1.9284***	-0.5892	-2.0909**	2.7963*	-0.0716	-2.0891**
Mal-ASEAN	-1.2750	1.7495***	-0.9732	2.2416**	2.4951**	-0.4399	2.4592**
Phil-ASEAN	-0.4323**	0.9433	-1.7498*	-0.1688*	1.9152***	-2.8789*	-2.2015**
Sin-ASEAN	0.7338	1.4277	-0.5529	2.3664**	2.3353**	0.2595	3.3985*
Thai-ASEAN	-1.2053	1.0479	-3.9566*	-1.8061*	1.9610***	-6.4419*	-2.7886*

Continued next page

Table 4. Continued from previous page

SITC 7							
Indo-ASEAN	-0.7880	0.9547	-2.8100*	2.7497**	1.5378	-4.0561*	2.6671**
Mal-ASEAN	-1.4995	1.8317***	-0.1609	1.9853*	2.5724**	0.4319	3.9886*
Phil-ASEAN	-1.5459	0.9961	-1.4992**	3.1883*	1.6196	-2.0665**	3.1680*
Sin-ASEAN	-0.5255	1.7299	0.0158	2.1224**	2.4969**	0.2881	2.9368*
Thai-ASEAN	-0.1987	1.3316	0.1536	-0.9219***	2.1565**	-0.3922	-1.1876*
SITC 8							
Indo-ASEAN	-0.6124	1.6882***	-0.4980	-2.3709*	2.5590**	-0.4612	-3.5589*
Mal-ASEAN	-0.8183	1.4817***	-1.5711	1.7197***	2.2809**	-1.4952	2.3077**
Phil-ASEAN	-2.3148**	0.6569	-5.0563*	-1.7491*	1.6540	-7.2685*	-3.5652*
Sin-ASEAN	0.8757	1.4211	-0.4968	2.0886**	2.2158**	0.0800	3.3262**
Thai-ASEAN	-1.2158	0.4790	-41384*	-3.912*	1.3857	-4.2668*	-4.0336*
SITC 9							
Indo-ASEAN	-1.3291	1.7676	-1.3818	-2.1227***	2.4121**	-1.0682	-1.2867
Mal-ASEAN	-1.4476***	1.6974	-0.0993	2.8377*	2.4175**	0.1304	3.7371*
Phil-ASEAN	-2.1658**	0.8844	-4.5547*	-0.6071	1.7593***	-5.5979*	0.8945
Sin-ASEAN	1.2948	1.4159**	-2.7752	-2.0094*	2.9529*	-0.7021	-3.3862*
Thai-ASEAN	-1.2761	0.7717	-5.3863-	-2.1753***	1.7497***	-5.0220*	-4.2422*

1. ***, **, * - reject the null hypothesis of unit root at 10%, 5% and 1% level respectively.
2. Four panel statistics (i.e., variance ratio, rho statistic, Phillips and Perron (PP) statistic and Augmented Dickey Fuller (ADF) statistic) and three group panel statistics (i.e., rho statistic, Phillips and Perron (PP) statistic and Augmented Dickey Fuller (ADF) statistic) are employed to test the null hypothesis of no cointegration.

most of the ASEAN-5 countries, FDI-driven exports appear to be directed more towards outside the region than within the region. An increase in FDI does not increase exports in any substantial manner from individual countries to ASEAN as a whole. As seen from Table 5, the elasticities of the major external export sector SITC 7 for ASEAN5 countries are low. It is clear that in recent years MNCs in ASEAN are becoming a part of global supply chains in which goods are exported for final assembly in China or elsewhere outside ASEAN. The higher elasticities for GDP per capita suggest that the exports from ASEAN-5 countries to ASEAN as a whole are more market driven and affected more by rising income in these countries.

The results show that IPR impacts are larger than those of FDI across countries and sectors. However, IPR is not uniformly significant for all the countries and across sectors. For example, IPR is not significant for the Philippines except for SITC 1 and 5 while Singapore and Malaysia show a significant relationship between IPR and exports to ASEAN for most sectors, with Thailand and Indonesia falling in between. In sectoral terms, it is surprising to note that the impact of IPR on ASEAN trade is not affected by whether an industry embodies the necessary technology or intellectual property to warrant additional IPR protection. The elasticities of industries such as SITC 5, 6, 7 and 8 are generally lower than SITC 4 which is for animal and vegetable oils, fats, wax, etc. Similar to the findings for FDI, IPR relationships with exports to ASEAN are also low in elasticities. With a lower extent of significance by sector and country, the impact of IPR on intra-ASEAN export trade from ASEAN-5 countries to ASEAN is not substantial.

Table 5. FMOLS regressions for exports to ASEAN by sector and country for single digit SITCs

Country	Coefficients (t-statistics in parentheses)					
	XP	GDP	FDI	IPR	R^2	$\bar{R}^2$
SITC 0						
Indonesia	-0.04 *(-20.63)	1.13 * (3.47)	0.26 * (16.49)	-0.42 * (-7.17)	0.7934	0.7772
Malaysia	-0.25 *(-10.17)	1.66 (1.18)	-0.11 * (-43.23)	0.50 * (12.63)	0.7958	0.7798
Singapore	-0.02 * (-2.67)	0.96 * (3.74)	-0.02 * (-72.71)	-0.04 * (-13.76)	0.6987	0.6547
Thailand	-0.36 * (-10.79)	1.61 * (5.77)	0.05 * (20.03)	-0.33 * (-5.70)	0.6156	0.5595
SITC 1						
Indonesia	-0.24 * (-8.60)	0.18* (8.52)	0.07 * (7.42)	1.34 (0.91)	0.5357	0.4679
Malaysia	-0.11* (-9.78)	2.22 (0.96)	0.11 * (13.85)	1.17 (0.24)	0.7667	0.7327
Philippines	-2.71 * (-2.25)	6.23 * (7.38)	-0.47 * (-9.50)	2.50 * (3.41)	0.6354	0.5823
Singapore	-0.53 * (-8.94)	0.56 (1.52)	0.03* (66.26)	0.14 * (8.55)	0.7760	0.7433
Thailand	-0.78 * (-8.17)	1.91 * (2.07)	-0.06 * (-15.91)	0.03 (1.37)	0.2932	0.1899
SITC 2						
Indonesia	-0.26 * (-29.23)	2.73* (12.42)	0.14 * (32.80)	0.44 * (6.17)	0.7353	0.7145
Malaysia	0.99 * (2.59)	0.61 (1.16)	0.07 * (27.63)	-0.43* (-12.39)	0.8103	0.7826
Philippines	2.42 * (2.09)	4.45 * (5.58)	-0.13 * (-9.79)	-0.13 (-1.57)	0.7686	0.7349
Singapore	-0.22 * (-4.41)	0.45 * (4.56)	-0.02 * (72.48)	-0.14 * (-11.69)	0.8852	0.8685
Thailand	-0.48 * (-4.65)	2.85 * (6.87)	-0.01 * (-29.93)	0.05 * (4.24)	0.9032	0.8891
SITC 3						
Indonesia	-0.01* (-15.83)	2.96 * (7.69)	0.03 * (15.47)	-0.07 * (-4.26)	0.6684	0.6424
Malaysia	-0.16 * (-4.65)	3.23 * (10.68)	0.05 * (23.74)	-0.24 * (-7.87)	0.6817	0.6567
Philippines	-3.50 (-1.07)	2.71 * (2.97)	0.37 * (3.44)	1.92 (0.90)	0.6013	0.5700
Singapore	-0.43 (-0.97)	1.66 * (2.57)	0.05 * (32.23)	-0.42 * (-8.40)	0.7814	0.7495
Thailand	-2.29 * (-11.22)	6.53 * (9.34)	0.28 * (8.72)	-0.04 * (-2.50)	0.8234	0.7976
SITC 4						
Indonesia	-0.04 * (-11.02)	5.31 * (9.87)	0.12 * (9.76)	-2.20 * (-9.11)	0.5389	0.5027
Malaysia	-1.10 * (-1.87)	2.87 * (6.65)	0.06 * (17.14)	-0.49 * (-7.10)	0.7424	0.7222
Philippines	5.92 * (1.99)	-1.39 (-1.69)	-0.41 * (-6.85)	2.51 (0.71)	0.6796	0.6329
Singapore	-0.44 (-3.33)	0.47 * (4.81)	-0.04 * (-58.50)	-0.25 * (-9.89)	0.5286	0.4918
Thailand	-0.34 * (-2.42)	3.07 * (3.34)	-0.21 * (-10.56)	1.02 (0.31)	0.7384	0.6977
SITC 5						
Indonesia	-0.27 * (-31.74)	1.82 * (4.26)	0.01 * (23.83)	-0.02 * (-7.19)	0.6378	0.6093
Malaysia	-0.51 * (-25.15)	2.95 * (23.28)	-0.04 * (-53.10)	0.11 * (14.44)	0.6952	0.6712
Philippines	-0.25 * (-3.05)	2.79 * (5.90)	-0.13 * (-20.92)	1.19 * (-9.30)	0.6526	0.6019
Singapore	-0.09 * (-10.32)	1.07 (0.35)	0.01 * (109.02)	-0.10 * (-22.51)	0.9239	0.9128
Thailand	-0.24 * (-8.93)	2.98 * (7.30)	-0.09 * (-25.54)	0.59 * (2.41)	0.6808	0.6342
SITC 6						
Indonesia	-0.02 * (-17.63)	2.59 * (6.10)	0.06* (17.72)	-0.14 * (-5.66)	0.8191	0.8049
Malaysia	-0.42 * (-5.37)	2.31 * (7.83)	0.17 * (30.69)	-0.30 * (-11.52)	0.8525	0.8410
Philippines	-0.98 (-0.04)	2.85 * (5.08)	0.25 * (11.81)	0.35 * (2.50)	0.7754	0.7427
Singapore	0.73 (0.25)	0.86 * (2.77)	0.01 * (19.71)	-0.16 * (-21.06)	0.9359	0.9265
Thailand	-0.41 * (-8.86)	2.37 * (6.63)	0.001 * (49.29)	0.14 * (7.17)	0.7875	0.7565

Continued next page

Table 5. Continued from previous page

SITC 7						
Indonesia	-0.47 * (-23.56)	2.56 * (4.75)	0.03 * (16.20)	0.59 (1.80)	0.9043	0.8968
Malaysia	-0.64 * (-21.01)	1.67 * (6.02)	0.04 * (46.61)	-0.22 * (-12.34)	0.9469	0.9427
Philippines	-2.70 * (-6.38)	2.27 (0.82)	0.21 * (6.26)	1.49 (0.57)	0.6937	0.6696
Singapore	-0.41 * (-7.26)	1.03 (1.40)	-0.01 * (-65.17)	-0.001 * (-12.54)	0.6557	0.6287
Thailand	-0.28 * (-10.98)	3.29 * (3.77)	0.04 * (26.67)	0.30 * (4.66)	0.8735	0.8550
SITC 8						
Indonesia	-0.13 * (-11.90)	1.48 * (3.33)	-0.06 * (-15.15)	0.35 (1.57)	0.8755	0.8658
Malaysia	-0.32 * (-9.10)	2.89 * (15.02)	0.02 * (30.86)	-0.19 * (-10.57)	0.9161	0.9095
Philippines	-1.06 * (-4.86)	2.40 * (2.91)	0.21 * (9.46)	0.52 (0.92)	0.7475	0.7277
Singapore	-0.001 * (-6.05)	1.16 (0.43)	0.04 * (79.14)	-0.08***(-13.55)	0.9024	0.8881
Thailand	1.24 (0.97)	2.19 * (2.81)	-0.12 * (-26.61)	-0.07 * (-3.60)	0.8226	0.7968
SITC 9						
Indonesia	-2.06 * (-5.22)	-4.13 * (-2.22)	0.26 * (2.02)	-1.66 * (-2.08)	0.5032	0.4307
Malaysia	-0.35 * (-3.45)	3.46 * (7.87)	0.04 * (23.14)	0.08 * (3.31)	0.8743	0.8644
Philippines	10.02 * (4.58)	3.09 (1.81)	-2.07 * (-8.11)	0.18 (0.45)	0.2332	0.1190
Singapore	-0.70 (-1.90)	1.13 (1.19)	-0.05 * (-61.60)	-0.01 * (-9.12)	0.9047	0.8908
Thailand	-2.01 * (-12.10)	3.22 * (3.74)	-0.06 * (-13.90)	0.06 * (2.51)	0.8397	0.8197

***, ** and * indicate significance levels of 90%, 95% and 99% respectively. *t*-statistics are in parentheses. The long-run covariance structure is estimated based on Bartlett Kernel with a user bandwidth of 2.

Although more detailed analysis would be needed, the results point to the possibility that the technology embodied in exports is not of a level where IPR protection is important, companies exporting their products are cognizant of the indifferent enforcement record in ASEAN countries. From both the findings for FDI and IPR, ASEAN-5 internal trade may not have reached a level of maturity or integration to substantially affect each and every individual country within the grouping. The level of significance of the export and FDI- and IPR- relationships indicate the existence of relationships that can be tapped and build upon in the future. At this moment, it is not possible to assess the time needed to achieve significance and substantiality.

6. Conclusions

The above findings revealed poor linkage between exports to ASEAN-5 as a group from the individual countries. Except for a few outliers, the country results are quite similar. These findings point clearly to a comparatively low level of intra-regional trade among the ASEAN-5 countries. The relationships between IPR and FDI and their relationships with exports are significant. These significant relationships but with low elasticities suggest that there is room to forge closer trade links through higher integration levels in all sectors within the free trade zone. The current lack of trade integration is a major concern in economic integration of ASEAN, which needs to be addressed economically and swiftly through the premises of the ASEAN Investment Area agreement. Being relatively open economies and not regionally bound by strong trade links, the individual economies of ASEAN-5 countries will be subjected to severe shocks arising from changes in external demand. AFTA risks becoming a poorly integrated area with member countries

individually integrated with external free trade areas. This is already the case, especially for Singapore. Singapore had, since 2000, free trade agreements with New Zealand, Japan, European Free Trade Association (EFTA) European Union, Australia, USA, India and Korea. Other individual member countries are not far behind. The important question, outside the scope of this paper, is how this integration can be strengthened. With the maturing of the economies and improved availability of data, this study can be extended to assess the impacts on trade either from a global perspective or inter-free trade zone perspective.

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