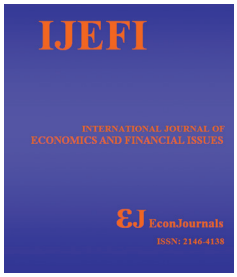

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Capital Intensity Effects on International Capital Flows and Current Account of Association of Southeast Asian Nations + 6 Countries

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ABSTRACT

One of the results of the theory of comparative advantage Heckscher-Ohlin-Mundell is the substitution relationship between trades and international capitals. This is due to the absence of incentives for capital to move if a trade has been opened. This paper attempts to examine the effect of a country's comparative advantage on international capital flows which are reflected in changes in its current account balance. The development of a new theory predicts that a country with high capital intensity will receive larger international capital flows than other countries with lower capital intensity. Using panel data from the member of Association of Southeast Asian Nations + 6 countries estimation results indicate an increase in capital inflows when a country has relatively higher capital intensity and encourage larger current account deficit. The analysis was applied to dynamic panel models with attention to heterogeneity and endogeneity problems that arise in the use of panel data.

Keywords: International Capital Flows, Current Account Adjustment, Open Economy Macroeconomics, Macroeconomic Impacts of Globalization
JEL Classifications: F21, F32, F62

1. INTRODUCTION

Heckscher-Ohlin stated differences in the ownership of resources between countries are a driving force for trade in goods. The opening of international trade will increase the demand for products that are labor intensive and lower demand for capital intensive products in countries with abundant labor resources. On the contrary, it will increase the demand for capital and make real return on capital higher in countries that have a comparative advantage in producing goods that are capital intensive. Hence trade will occur between nations that have the characteristics of different industries, namely rich countries having abundant capital (capital intensive product) with poor or developing countries that are richer in employment (labor intensive product). One of the assumptions used in the model is the inability of factors of production to move between countries. Classical theory even sees international production factors that are not able to move that becomes the basic reason for the existence of international trade (Springer, 2000).

The entrance of capital inflows in the Heckscher-Ohlin model framework was first expressed by Mundell (1957). This model predicts that trading in commodities are perfect substitutes for direct movement of factors of production, in this case capital. Mundell (1957) showed that the balance of commodity prices can be obtained through international factor mobility in the absence of

trade in goods or otherwise the balance of the price factor can be generated from the sale of goods without the mobility of capital if the obstacles in trade are abolished. However, some advanced theory study results have shown that the models formed by modification of standard assumptions of H-O model is more likely to give complementary results rather than substitutions between the factors of trade and trade in goods. In all cases, an increase in direct foreign investment can support the growing international trade (Goldberg and Klein, 1999). This shows the analysis in international trade can no longer be separated separately from other macroeconomic analysis.

Two important phenomena that develop in the global economy is increasingly integrated trade and finance as well as increased labor force or productivity in developing countries. The phenomenon that happens then is the power of these two phenomena has changed the comparative advantage of a country which, in turn, alters the structure of trade and leads to the allocation of capital globally. Open economy models predict capital flows into developing countries, but in fact it is not in accordance with the facts (Jin, 2012). Standard models for open economy is a model of growth of a single item or two items that allow movement of capital flows between countries but the proportion of trading factor does not appear in it (Backus et al., 1992; 1994). On the other hand, the model of international trade with the characteristics of the two sectors, the two countries which shows the proportion of a factor in the trade often assumes that the flow of capital cannot move across countries (Beaudry and Collard, 2006; Ventura, 1997).

The development of an interesting study in examining the interaction between trade and capital flows by allowing the movement of goods and capital was conducted by Jin (2012) who developed a general equilibrium framework that integrates paradigm of proportion or intensity factor in products traded with the flow of capital that allows them to interact with each other. The result contradicts the predictions of the macro-economic standard, that a permanent increase in the workforce or labor productivity in a country will encourage the release of capital flows. Moreover, capital will flow from developing countries to developed countries when both countries are integrated. On the other hand, the contribution of the model developed by Antras and Cabalerro (2012) describes the relationship between trades and capital inflows through the financial system development, where countries with less developed financial system will receive more capital inflows compared with countries with good financial system.

This paper attempts to estimate the interaction between a country's comparative advantage and international capital flows. Relationship between the two will appear in changes in the current account. Prediction theory states that the country relatively rich in capital will tend to specialize in products that are capital intensive. The opening of trade will push the demand for capital intensive products which then attract more capital inflows because it increases real returns. The process will create a deficit in the current account.

Using panel data of Association of Southeast Asian Nations (ASEAN) + 6 countries, the analysis results showed the consistency of the theory with the empirical testing results. Analysis of the dynamic model is expected to be able to capture the pattern of relationships among variables. Endogeneity and heterogeneity problems that usually arise in the use of dynamic panel data in this paper were solved by using the method of fixed effect and the generalized method of moments (GMM) so that the resulting estimates were valid and robust. The testing results showed consistency of the relationship between the capital intensity and the current account balance amidst the assumption of trade openness. In general, this analysis can explain the phenomenon of global capital allocation which depicts capital flows which tend to go to countries that are essentially relatively rich in capital with the industrial structure which tends to go toward capital intensive product.

2. LITERATURE REVIEW

In the HOM model trade integration reduces the need for capital to move from rich countries to countries relatively poor in capital. This is because little incentive for the capital to move to a state which undergoes an increase in the productivity of workforce or if it already has the ability to trade. Under certain conditions, capital will flow even from the state which is relatively scarce in capital and come out of the country with an increase in the labor force and productivity, which in fact is the state with low ratio of capital/labor.

The results came from a standard framework of H-O models. The first is that it allows the movement of capital and goods simultaneously. The assumption is that the cost of capital adjustment will break temporary factor price equalization and bring down the level of capital stock. Second, macro-economic model basically allows capital to adjust after a period, in which the capital in each sector is driven by investment compared with a reallocation between sectors. This means that countries that are expanding will require more investment. Third, capital stock of the world is no longer fixed but can be increased and the flow of capital is determined based on the allocation of savings.

Suppose there are two symmetrical countries, which are the countries with an open economy. If one of the countries experiences a permanent increase in the labor force, the country rich in labor will specialize in labor intensive products and become importer of capital intensive products. The opposite occurs in the country relatively rich in capital. Changes in the structure of trade lead to change in demand for capital in each country. Industry structure that tends toward capital intensive sectors will experience a larger increase in investment. Capital flow direction depends on the relative strength of the two effects that determine: (1) Composition effect, which is driven by trade in goods which encourage capital to flow into countries that tend to specialize in capital intensive products, (2) convergence effect, where capital will flow into the country which is relatively scarce in capital (Jin, 2012).

The study by Antras and Caballero (2009) divides the countries in the world into "North" and "South" based on the development of their financial systems. Results of the model they developed indicate a complementary relationship between trade and capital

mobility, especially in countries with less developed financial systems. This is due to the fact that the opening of international trade leads to increased yields on the capital so as to encourage an increase in incentives when capital is moving to the country. There are two dimensions of heterogeneity in the friction of the financial system in each country. The first is the heterogeneity between countries where the ability to deliver on the promise of returns of capital for potential investors in rich countries is higher than the developing countries. Both are inter-sectoral heterogeneity. Even though operating in the same financial system, producers in certain sectors find bigger problems in obtaining funding compared with producers in other sectors.

Developing countries or they call the "South," have less developed financial institutions and therefore have more stringent borrowing restrictions in sectors which have limitations. Imperfections in terms of financial encourage the emergence of comparative advantages that have a similar effect with a comparative advantage in H-O model after trade liberalization. Trade liberalization increases demand for goods produced by sectors that do not have constraint in borrowing in the South and encourage them to specialize in the production of such goods. Therefore, workers in the South will be allocated to sectors that do not have these limitations which then increase the aggregate demand of capital because the sector does not have limitations in borrowing. In particular, the results of the derivation of their model shows that in a world where countries differ only in the development of financial systems and different economic sectors in terms of dependence on financing, trade integration will reduce the gap between the real return of capital in the "North" and "South."

Zhang (2012) in his research on the relationship of trade liberalization and capital flows in the perspective of comparative advantage and heterogeneous enterprise showed a pattern of "S" of capital flows in response to trade liberalization. Capital outflows move from developing countries to developed countries. There are two mechanisms that are said to be the driving force of change in capital flows that accompany trade liberalization. The first is the increase in overall productivity in both countries which is one of the important benefits of trade liberalization because of the effect of export options. The higher the productivity yields the marginal result of higher capital, which in turn increases the value of returns and attracts more capital inflows, assuming the movement of labor between countries is limited. This effect is called heterogeneous effect.

The second mechanism is the reallocation of labor from capital-intensive sectors to sectors that are labor intensive. Trade liberalization increases a demand for products that are labor intensive and lower demand for capital-intensive products in countries with abundant labor. In contrast, capital demand and the real return of capital in countries that have a comparative advantage in the production of goods that are labor intensive will increase. Consequently capital is expected to move from countries that lack capital to countries rich in capital. This effect is known as the effect of comparative advantage. As a result, both mechanisms give impetus contradictory to responses of capital flows. Empirical studies in China showed both mechanisms.

The development model into a dynamic open economy also showed a similar pattern. This is because trade liberalization has two contradictory effects on the demand for capital. On the other hand, trade liberalization encourages the expansion of the market for companies in both countries and therefore attracts a growing number of other companies to enter the market. Funding the establishment of new companies requires additional capital demand, where greater expansion will be driven to labor-intensive sectors in developing countries and pressing demand for capital. Important implications in the outcome of this study are the existence of global imbalances. As shown, because the company is heterogeneous in capital intensity and each country has a comparative advantage, trade liberalization does not necessarily exacerbate global imbalances. In fact, trade liberalization could be to eliminate the imbalance.

Ju and Wei (2006) made the rigidity of the labor market as a dynamic center of attention in the framework of H-O models. They showed that the degree of labor market inequality in a country affected the current account response on the shock and the speed of adjustment in the long run. While trade in goods and capital mobility is possible, adjustment of an economy, because of the shocks. Involves a combination of changes in the composition of trade in goods (intratemporal trade) and current account (intertemporal trade). In extreme cases when labor cannot move between sectors, all adjustments due to shocks are done through intratemporal trade. Therefore, the more rigid labor rules encourage greater response to the current account and decrease the speed of adjustment of current account towards long term balance.

3. METHODOLOGY

Tests carried out to see whether countries with high capital intensity, and tend to specialize in capital-intensive products, will increase in the current account deficit as predicted by theory. There are two steps to be carried out, namely the first step is to determine the comparative advantages of each country, through the intensity factor or revealed capital intensity (RCI) of each country while the second step is to see whether changes in capital intensity is related to changes in the current account.

This study used the period of time of 23 years from 1990 to 2012. All data had their sources from the publication of World Development Indicator (WDI) of the World Bank, Penn World Table (PWT) 8.0, and UNComtrade covering all ASEAN countries (except Myanmar because of limited data) and the other six countries, namely Australia, New Zealand, China, Japan, Korea, and India.

RCI was calculated here to see the comparative advantage of a country in general relatively rich in capital compared with other countries (Shirotori et al., 2010):

$$RCI_j = \sum_i \omega_j^i \frac{K_i}{L_i} \quad (1)$$

Where K_i is the capital stock of country i, and L_i is the total labor force. While ω_j^i is a variant of the index revealed comparative advantage (RCA), where:

$$\omega_j^i = \frac{X_j^i / X^i}{\sum_i (\frac{X_j^i}{X^i})} \quad (2)$$

In order to eliminate the problem because of the RCA index value (ranging from zero to infinity) resulting from the value of the denominator tends to get close to zero (the portion of a product in world trade) on the smallest data level, then ω_j^i is assumed to be equal to one. Capital intensity value indicates the amount of capital used by one person workforce. The greater the intensity of capital shows the country is relatively rich in capital and assumed to tend to have a capital-intensive industry.

In general, capital stock data series for each country is not available, so it must be calculated first. There are two ways to obtain a series of capital stock (Shirotori et al., 2010), namely (1) direct measurement of the survey, and (2) the perpetual inventory method (PIM). This paper employed the PIM method used by the World Bank, the WDI to calculate proxy capital stock in each country:

$$K_t = (1-\delta)\, K_{t-1} + GFK_t \quad (3)$$

Where K_t is the capital stock in period t, GFK_t is gross fixed capital formation in period t, and δ is the depreciation rate. The problem that often arises is the initial capital stock estimates and assumptions of depreciation rate. The approach used here to calculate the initial capital stock is disequilibrium approach. This approach uses a neoclassical growth theory and is based on the assumption that the economy is often in the position adjustment in the equilibrium path. Because the adjustment process of investment and capital accumulation tends to follow a systematic pattern, this assumption is considered more plausible than the assumption that the economy is in a steady state (Berlemann and Wesselhöft, 2012). Initial capital stock can be calculated with the following formula (Hall and Jones, 1999):

$$K_0 = \frac{GFK_0}{\delta + g_{GFK}} \quad (4)$$

Where K_0 is the initial capital stock, GFK_0 is gross fixed capital formation in the early period, g_{GFK} is the growth rate of gross fixed capital formation, and δ is depreciation. The growth rate of gross fixed capital formation is calculated from the average growth of gross fixed capital in the initial period of 10 years. Depreciation rate is generally assumed to be constant and the same between countries. However this is not considered appropriate due to the fact that countries richer in capital will have a higher depreciation rate. The analysis in this paper used the data depreciation of the total capital stock of the PWT 8.0 which varies between countries and time periods (Inklaar and Timmer, 2013).

Changes in capital intensity over time are then used to see if this change is related to changes in the current account. The economic relationship between the current account and the determinant may be dynamic, such as economic relations in general, and one of the advantages of panel data is a better understanding of the dynamics of adjustment in a model (Baltagi, 2005). Dynamic relationship is represented by the lagged dependent variable among the independent variables in a model.

$$CA_{it} = \alpha CA_{it-1} + \delta RCI_{it} + \beta_k X_{it}^k + \eta_i + \upsilon_{it} \quad (5)$$

Where CA is the current account to gross domestic product (GDP) ratio, RCI reflects the growth of country-owned capital intensity i in the period t, while X_{it}^k is the main explanatory variable sets commonly known as the determinant of the current account as used in Chinn and Prasad (2003); and Gruber and Kamin (2005). The explanatory variables are GDP growth in country i in the period t, the ratio of trade (total exports plus imports) to GDP that reflects the economic and trade openness of a country. Another variable used is the ratio of the working age population (aged 15-64 years) to total population as a reflection of the influence of demographics on the current account and the ratio of M2 to GDP in country i in the period t. This variable is intended to look at the effect of the development of institutions of financial institutions on the current account.

There are two sources of problems in dynamic panel model above, i.e., the autocorrelation due to the presence of lag dependent variables between the independent variables, CA_{it-1} and the appearance of the effects of individual heterogeneity, η_j. A technique often used to overcome this problem is fixed effect method and the GMM. The advantages of this method are the ability to overcome the problems caused by individual effects which are not observed and endogeneity that appears in the lag variables.

The u_{jt} value is assumed to have a finite moment and $E(u_{jt}) = E(u_{jt}u_{js}) = 0$ for $t \neq s$. That means the assumed absence of serial correlation but it must not be independent at all times. Because of this assumption, the value of lag y in two periods or more can be a valid instrument in the first derivative equation. On the model with $T \geq 3$, then the restriction linear torque = (T-2)(T-1)/2 is:

$$E\left[\bar{y}_{jt} - \alpha \bar{y}_{j(t-m)}\right] = 0 \,(m=2,\ldots,(t-1);t=3,\ldots,T) \quad (6)$$

Because of the independent variables are assumed to be exogenous, all independent variables can be a valid instrument in every equation. Equation above and then converted into the first derivative (Baltagi, 2015):

$$\Delta CA_{it} = \gamma \Delta CA_{it-1} + \theta \Delta RCI_{it} + \tau_k \Delta X_{it}^k \quad (7)$$

The equation model would eliminate the individual effects, η_j, because it does not vary between the time that the estimated value obtained is valid and not biased.

An estimator that uses lag as an instrument, under the assumption of white noise errors, would lose their consistency if there is a serial correlation between errors. Therefore it is important to report the test statistics of the validity of the instrument variables with parameter estimates. There are three methods used (Arellano and Bond, 1991) (1) testing directly to the second- order

correlation coefficient residuals, (2) Sargan test of over-identifying restrictions, and (3) Hausman specification test.

4. RESULTS AND DISCUSSION

Economy in the region of the ASEAN has become part of the East Asian miracle (Park et al., 2008). Singapore is a new industrial economy together with Hong Kong, Korea, and Taipei while Indonesia, Malaysia and Thailand have also been transformed from an agricultural economy to an economy that is stagnant dynamic manufacturing through sustainable growth and industrialization. Other ASEAN economy, particularly Vietnam has also begun to achieve relatively fast growth consistently. The ten members of ASEAN have a good difference in size, the rate of economic growth, resources, and technological and industrial capabilities (Yue, 2004).

The model in this paper gives predictions about the capital intensity of the industrial structure of a country and its relationship with the current account. Ideally, empirical studies should be based on the structure of the industry which is directly linked to the current account. However, due to data limitations, the focus is done on the pattern of trade, and not on the production. It is assumed if the pattern of production can be referenced from the pattern of exports, whereby if a country possess greater specialization in one sector, the export of these products tend to be greater (Romalis, 2004). Therefore, empirical studies here are based on the pattern of trade (exports) as shown in Table 1a.

Table 1b shows the industrial countries tend to be a net exporter of the products that enter the classification of capital intensive products, and become a net importer of labor intensive products. By contrast, developing countries tend to be a net exporter of labor intensive products. But in its development, there is a shift of trading patterns of developing countries which begin to enter a few capital intensive products that become part of manufactured products, such as the Machinery and transport equipment (SITC 7), manufactured goods are classified chiefly by material (SITC 6), and miscellaneous manufactured Articles (SITC 8). Growth of export products in category SITC 7 reaches 644%, export growth SITC 6 reaches 406%, while for SITC 8 reaches 361% while the growth of similar product classification of industrial countries reaches an average of 103%. This shows the tendency of changes in export patterns of developing countries or types of products manufactured by developing countries are according to stages of different industrialization. Newly industrializing countries, for example, can gradually change their exports towards capital intensive product, and replaced by other country with the stage of slower industrialization as found in the study of Yeats (1989).

Whereas in the group of ASEAN countries, since they are relatively developing countries, except Singapore, the trend is seen as a net exporter of labor-intensive products. Change trend looks quite striking in the trade of products in the code SITC 7. ASEAN countries which had previously been a net importer in the last 10 years turned into a net exporter. The highest export growth

Table 1a: Trading trend of ASEAN+6 countries period 1990-2012 in one digit SITC classification (in millions USD) - Export value

Product	Export value 1990-2000				Export value 2001-2012			
	ASEAN[1]	Trading partner[2]	Industrialized countries[3]	Developing countries[4]	ASEAN	Trading partner	Industrialized countries	Developing countries
Capital intensive product								
Machinery and transport equipment (SITC 7)	1,413,403	4,065,176	4,346,092	1,132,487	3,912,270	13,428,354	8,913,435	8,427,190
Commodity not classified elsewhere in the SITC (SITC 9)	78,975	194,699	204,469	69,205	342,180	704,600	857,801	188,979
Chemicals and related products (SITC 5)	130,004	495,909	452,844	173,069	706,659	2,030,401	1,523,652	1,213,407
Manufactured goods classified chiefly by material (SITC 6)	300,498	1,230,856	873,158	658,196	797,388	4,309,625	1,775,633	3,331,380
Miscellaneous manufactured articles (SITC 8)	376,187	1,164,508	622,789	917,907	1,008,279	4,479,399	1,259,434	4,228,244
Labor intensive product								
Beverages and tobacco (SITC 1)	21,786	23,597	27.108	18.274	45,787	71,465	67,949	49,303
Mineral fuels, lubricants and related materials (SITC 3)	332,325	230,646	270,962	292,009	1,385,702	1,391,299	1,352,639	1,424,362
Crude materials, inedible except fuels (SITC 2)	125,458	239,672	196,245	168,884	351,284	849,829	667,813	533,299
Food and live animals (SITC 0)	202,687	358,873	228,685	332,875	507,286	907,869	446,247	968,908
Animal and vegetable oil, fats and waxes (SITC4)	66,567	8,554	7,962	67,158	278,758	17,394	11,443	284,708

Including [1]Brunei, Cambodia, Indonesia, Lao, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam, [2]Japan, India, Australia, New Zealand, China, and Korea, [3]Japan, Australia, New Zealand, Korea, and Singapore, [4]Brunei, Cambodia, China, India, Indonesia, Malaysia, Philippines, Lao, Thailand, and Vietnam, Classification of capital intensive products are products with capital-labor ratio is higher than the average ratio across all sectors, while labor intensive product is one that has capital-labor ratio that is lower than the average (Ohno and Imaoka, 1987; Das and Kalita, 2009). Labor capital ratio index drawn from RCI ranking industry which has been calculated based on the UNCTD method (Shirotori et al., 2010), RCI: Revealed capital intensity

Table 1b: Trading trend of ASEAN+6 countries period 1990-2012 in one digit SITC classification (in millions USD) - Import value

Product	Import value 1990-2000				Import value 2001-2012			
	ASEAN	Trading partner	Industrialized countries	Developing countries	ASEAN	Trading partner	Industrialized countries	Developing countries
Capital intensive product								
Machinery and transport equipment (SITC 7)	1,556,621	2,084,828	2,100,201	1,541,246	3,672,926	7,902,739	5,019,353	6,556,311
Commodity not classified elsewhere in the SITC (SITC 9)	74,292	154,471	123,943	104,820	217,684	724,435	330,205	611,914
Chemicals and related products (SITC 5)	261,059	641,817	487,532	415,344	765,422	2,526,309	1,292,054	1,999,678
Manufactured goods classified chiefly by material (SITC 6)	416,893	999,664	740,810	675,747	1,082,504	2,807,221	1,555,696	2,334,029
Miscellaneous manufactured articles (SITC 8)	236,550	740,477	789,935	187,092	497,546	2,357,249	1,683,192	1,171,603
Labor intensive product								
Beverages and tobacco (SITC 1)	22,349	60,909	71,903	11,354	43,847	119,994	120,117	43,725
Mineral fuels, lubricants and related materials (SITC 3)	257,296	1,055,664	990,957	322,003	1,562,270	5,759,938	4,065,635	3,256,572
Crude materials, inedible except fuels (SITC 2)	100,066	557,099	442,558	214,608	241,183	2,399,391	804,065	1,836,509
Food and live animals (SITC 0)	134,132	558,514	539,381	153,265	376,481	1,031,638	882,965	525,155
Animal and vegetable oil, fats and waxes (SITC4)	8,845	35,760	17,074	27,531	34,036	159,076	37,084	156,028

Source: UNComtrade, Based on the product classification scheme of the United Nations, manufacturing products are included in SITC 5 (chemicals), SITC 6 (manufactured goods classified by material), SITC 68 (non-ferrous metals), SITC 7 (machinery and transport equipment), and SITC 8 (miscellaneous manufactured articles) (Yeats, 1989)

lies is in the group SITC 8. The six countries of ASEAN trading partners are likely to become net exporters of three products that are capital intensive (SITC 6 SITC 7, and SITC 8) and almost for the whole labor-intensive products except beverages and tobacco (SITC 1).

If seen more in the flow of international capital of each country, China is the country that receives the largest capital flows compared to other countries, including developed countries such as Australia, Japan, Korea and New Zealand. This is not surprising since China is the second largest after the United States. In addition to China, India and Japan may also be categorized as a country if it is seen from the figure of gross domestic product. Capital inflows to ASEAN countries, China and India are likely to increase, inversely proportional to Australia and New Zealand which are fluctuating. Surprising conditions are visible from capital inflows into Japan and Korea. Capital inflows into Japan have consistently shown the size of capital outflows exceeds inflows while Korea, after the period 2006, capital outflows began to exceed inflows (Figure 1).

Australia, Japan, Korea, New Zealand and Singapore are the countries that fall into the category of industrialized countries. Hence they have a comparative advantage in terms of capital so they tend to specialize in products that are capital intensive but the pattern that emerges shows capital outflows which are greater than inflows. This could be an indication of the expansion of the domestic industry that has been at the maximum stage, thus requiring investors to look elsewhere for expansion. This is intended to avoid a drop in income if the production is still being done in the home country.

Different conditions can be seen from the pattern of capital flows in a group of ASEAN countries, China and India. The three economies have relatively more labor than capital, with the exception of Singapore. Products they produce should tend to be labor intensive. However, as shown in Table 1, there is a shift in the pattern of trade of developing countries which were seen as sufficiently significant.

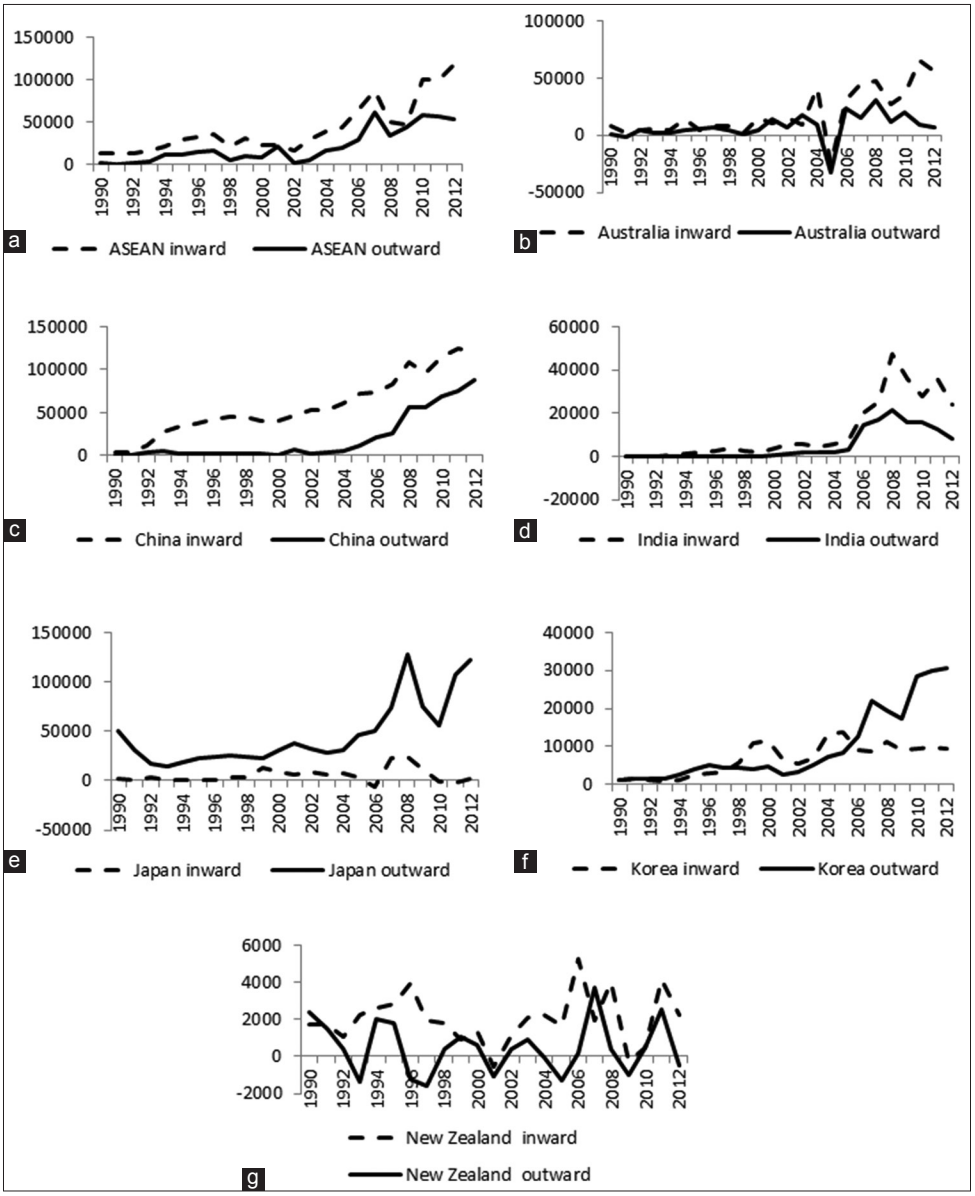
Prior to testing, it would need to look at the variables of descriptive statistics which will be used to look at the range of all variables used in the estimation (Table 2).

Descriptive statistics above indicate the difference in the range of values for various variables used in a range that is quite striking. The current account ratio is between −27.738% up and 71.904%. Capital intensity also showed a fairly wide range, from 0.1570 billion USD/person workforce of up to 287.996 billion USD/person. The range of other variables is also quite large, such as trade ratio that indicates the openness of a country's economy and the ratio of M2 is an indicator of the development of financial institutions in each country. This quite large range can be used as an early indication that the variation of macro indicators ASEAN+6 countries is quite significant.

Before conducting the analysis, it must be ascertained first that whole variables used not having problems of roots units via unit root test. Testing the unit root test results in Table 3 indicate that all variables have been free from unit root so that it can be used in subsequent analysis.

Due to the nature of the stationary variables, the regression model using data at a rate level will result in estimates that are not valid and cannot be interpreted. The method that can be used is the autoregressive distributed lag (ARDL), the dynamic equation models that incorporate a lag of the dependent variable and lag of

Figure 1: (a-g) Foreign direct investment flows of Association of Southeast Asian Nations + 6 countries 1990-2012 (in Million USD)



Source: UNCTAD

Table 2: Descriptive statistics variables

Variable	Mean	Maximum	Minimum	SD	Observed
Current account to GDP ratio	2.999244	71.904	−27.738	13.18874	345
Capital intensity (RCI)	54.29862	287.996	0.157016	67.35501	345
GDP growth	5.164325	14.78079	−13.12672	3.724854	345
Productive age population ratio	64.63845	73.78318	41.68819	5.78144	345
Trade to GDP ratio	98.02945	444.1004	15.23902	84.63879	345
Ratio of M2 to GDP	83.26141	241.2344	1.930334	51.99423	345

GDP: Gross domestic product, RCI: Revealed capital intensity

free variable as part of regression. Pesaran et al. (1998) examined the use of ARDL models for the analysis of long-term relationships when a combination of variables are I (1) and found that ARDL models have advantages in providing a constant long-term coefficients estimation regardless of whether the regression variables are integrated in I (1) or I (0). ARDL models used in this paper are:

$$CA_{it} = \mu_i + \lambda_i CA_{i,t-j} + \beta_k X_{it}^k + \gamma_j X_{i,t-j}^j + \varepsilon_{it} \quad (8)$$

Where j is the lag length used. ARDL optimal results in the model are using the same lag length for each variable. Based on the test results with the SIC method, the maximum lag length of each variable used is three. Results of analysis with fixed effect method are presented in Table 4.

Table 3: Summary of unit root test results

Method	Variables					
	Current account to GDP ratio	Capital intensity	Ratio of M2 to GDP	GDP growth	Trade to GDP ratio	Productive age population ratio
LLC	−2.199**	−7.569***	−9.962***	−9.401***	−15.386***	−1.464*
IPS	−2.332***	−10.441***	−8.411***	−8.404***	−13.912***	−3.899***
ADF	51.698***	160.127***	125.410***	124.414***	207.201***	79.566***
PP	49.647**	362.588***	134.522***	130.264***	263.697***	23.833

LLC: Levin, Lin and Chu, IPS: Im, Pesaran and Shin, ***, **shows significant at α=1%, 5%, and 10%. The whole variable indicates rejection of the null hypothesis, but at different levels, GDP: Gross domestic product

Table 4: Results of estimation with fixed effect

Dependent variable: Current account	Fixed effect method	
	Cross section fixed effect	Cross section+time fixed effect
Short term coefficients		
Capital intensity	−0.067135***	−0.050149**
GDP growth	−0.387999***	−0.411501***
Productive age population ratio	−0.150253	−0.205251
Trade to GDP ratio	−0.017851	−0.02424
Ratio of M2 to GDP	−0.059106*	−0.075037**
Long term coefficients		
Capital intensity	−0.36975	−0.31534
GDP growth	−0.97322	−0.95899
Productive age population ratio	0.38230	0.27506
Trade to GDP ratio	0.02213	0.00122
Ratio of M2 to GDP	−0.02746	−0.02441
λ	0.534979	0.537864
Speed of adjustment	0.465021	0.462136
R^2	0.943716	0.950055
F stat	118.7292***	82.54186***
Akaike info criterion	5.274703	5.281887

***means significant at α=1%, **significant at α=5%, *significant at α=10%, GDP: Gross domestic product

Pesaran et al. (1998) in his analysis stated that the short term ordinary least squares estimator in the model ARDL is consistent. Covariance matrix estimator has a perfect limit i.e., singular asymptotic so that estimator of α, β* and β' is perfectly correlated with the dependent variable of lag estimator, λ. These results provide interesting implications, namely the long-term coefficients obtained from β/((1-λ)) converge to the actual value faster than with short-term estimator. ARDL approach can be justified by its use in the case of regression variables with stationary trend, even valid if the variable regression stationary at first instance.

Slackness coefficient of dependent variable in this case is in line with expectations, situated on the 0<λ<1, which shows the short-term models will converge towards the long term. This value relates to the speed adjustment obtained by (1-λ). Therefore, the predicted speed adjustments are 0.465 and 0.462. This value can be interpreted if it is almost 46% of gap in the current account will return to its balance patterns within a year, by controlling the variations between countries and time.

In general, the results obtained estimates of the fixed effect method was satisfactory and in accordance with the predictions of the theory. However, ARDL is a dynamic equation so that the fixed effect method does not take into account the endogeneity that arises because of the lag variable in the regression model. The analysis that can be used to overcome this problem is a method of GMM. Results of analysis with GMM are presented in Table 5.

The validity of the instrument used in the GMM models can be tested for consistency by using the Sargan test. The null hypothesis in this test assumes orthogonal condition of instrumental variables used have been met. The test results show if the one step GMM model has not met the test of validity for rejecting the null hypothesis, but it also can be said to be weak because the probability value is approaching 0.10. Unlike the case with two-step GMM that meets this assumption, so the instrument on the model can be said to be valid. Tests on the second order correlation of the error term are also not able to reject the hypothesis that there is no correlation between the error terms so that the GMM estimator can be said to be valid (Arellano and Bond, 1991).

The speed of adjustment of the two-step GMM totaled 0.459368, which means that approximately 45.37% of gap in the current account will be closed within 1 year. Estimation with GMM and fixed effect methods indicates if the movement of the current account in the ASEAN + 6 countries tend to be less dynamic because the speed of adjustment is <0.50.

Results of the analysis here provide results that correspond to theoretical predictions that the higher capital intensity of a country, it will encourage the expansion of the current account deficit (in ratio to GDP) from time to time. Comparative advantages of a country relative to other countries in the form of capital intensity will show the specialization of products that can be manufactured efficiently by that country. The higher the capital intensity possessed, relative to other countries; then specializing in capital-intensive products is the right choice. A shift in the orientation of the product may occur if there is a change in the intensity of capital owned, which in this case is influenced by the investment and the labor force. The high capital intensity leads to higher investment requirements and a portion of investment in GDP is higher than the portion of domestic savings, thereby attracting capital inflows from abroad. Difference in investment and higher savings will be reflected in the growing current account deficit. Even though the value is relatively small in the short term, but in the long term, the increase of 1% of capital intensity will push the current account deficit reaching 0.3%.

Model development is done to test the robustness of the model. Estimates done by inserting a dummy variable are integrated with capital intensity. Included in the developed countries here are Singapore, Japan, Korea, Australia, and New Zealand. It is intended to see if there is a difference between the increases

in capital intensity in the developed countries and developing countries. Results of analysis are presented in Tables 6 and 7.

Results of analysis using the fixed effect showed no significant difference between the effect of capital intensity of the current account in the developed and developing countries. The model is then tested by GMM in order to obtain valid results.

The coefficient of the interaction between dummy variables that explain differences in the effect of capital intensity between industrialized countries and developing countries, the return is not significant on the model of one step GMM, but significant at the two-step GMM. These results indicate if the effect of capital intensity in the developed countries and developing countries is quite significant. Changes in capital intensity in the developed countries will encourage a greater deficit in the current account in developed countries compared with developing countries totaling 0.07%. These results demonstrate why the current account deficit in developed (industrial) countries tends to persist in the long term with a magnitude higher than those experienced by developing countries.

Various control variables used in the analysis herein can explain both the movement and direction of change in the current account. When compared with other variables, growth in gross domestic product provides the greatest influence in explaining the movement of the current account. It is the same as that predicted by Gruber and Kamin (2005) which focuses on strong economic growth and the proper institutional environment will be an important element in attracting foreign investment.

Table 5: Results of GMM estimation method

Dependent variable: Current account	GMM	
	1 step	2 step
Short term coefficients		
Capital intensity	−0.050102*	−0.05003***
GDP growth	−0.411511***	−0.39342***
Productive age population ratio	−0.205443***	−0.22356***
Trade to GDP ratio	−0.024182	−0.02240***
Ratio of M2 to GDP	−0.075098***	−0.06898***
Long term coefficients		
Capital intensity	−0.31573	−0.31613
GDP growth	−0.95989	−0.91236
Productive age population ratio	0.27477	0.29599
Trade to GDP ratio	0.00114	−0.00174
Ratio of M2 to GDP	−0.02435	−0.02309
λ	0.539081	0.540632
Speed of adjustment	0.460919	0.459368
J statistic (P value)	0.092479	0.414331
AR 1 (P value)	0.6577	0.675
AR 2 (P value)	0.398	0.392

***Means significant at α=1%, **significant at α=5%, *significant at α=10%, GMM: Generalized method of moments, GDP: Gross domestic product

Table 6: Results of fixed effect regression with dummy variables

Dependent variable: Current account	Fixed effect method	
	Cross section fixed effect	Cross section+time fixed effect
Short term coefficients		
Capital intensity	−0.062326**	−0.048392*
GDP growth	−0.389743***	−0.414864***
Productive age population ratio	−0.147683	−0.199902
Trade to GDP ratio	−0.020937	−0.026151
Ratio of M2 to GDP	−0.061322*	−0.076093**
D*RCI	−0.103664	−0.045155
Long term coefficients		
Capital intensity	−0.34816	−0.30788
GDP growth	−0.97157	−0.97135
Productive age population ratio	0.41498	0.28936
Trade to GDP ratio	0.01092	−0.00339
Ratio of M2 to GDP	−0.02830	−0.02432
D*RCI	−0.04515	−0.09796
λ	0.535432	0.539087
Speed of adjustment	0.464568	0.460913
R^2	0.9439	0.950085
F statistic	115.5638	80.81145
Akaike info criterion	5.278095	5.287949

(D=1, industrialized country, D=0, developing country), ***means significant at α=1%, **significant at α=5%, *significant at α=10%, GMM: Generalized method of moments, GDP: Gross domestic product, RCI: Revealed capital intensity

5. CONCLUSION

The assumption in the classical trade theory restricts the movement of capital between countries if international trade is opened into question. Several previous empirical studies indicate if their relationship is complementary, the flow of capital will be even greater if international trade is opened. However, the pattern of international capital flows that has emerged tends to spin between industrialized countries or from developing countries to developed countries, is opposed to the theory of open macro economy.

This paper examines the effect of capital intensity that reflects the comparative advantage of a country on the flow of global capital. Prediction theory suggests that countries with greater capital intensity will tend to specialize in products that are capital

Table 7: Regression results GMM with dummy variables

Dependent variable: Current account	GMM	
	1 step	2 step
Short term coefficients		
Capital intensity	−0.048369***	−0.047891***
GDP growth	−0.414566***	−0.386706***
Productive age population ratio	−0.201016	−0.230301***
Trade to GDP ratio	−0.025746	−0.024289***
Ratio of M2 to GDP	−0.07609**	−0.06922***
D*RCI	−0.038658	−0.069177**
Long term coefficients		
Capital intensity	−0.31051	−0.31066
GDP growth	−0.97350	−0.86214
Productive age population ratio	0.28577	0.341154
Trade to GDP ratio	−0.00313	−0.00953
Ratio of M2 to GDP	−0.02395	−0.01745
D*RCI	−0.08491	−0.15365
λ	0.54472	0.54978
Speed of adjustment	0.45528	0.45022
J statistic (P value)	0.09568	0.45969
AR 1 (P value)	0.6958	0.7431
AR 2 (P value)	0.4095	0.406

(D=1, industrialized country, D=0, developing country), ***means significant at α=1%, **significant at α=5%, *significant at α=10%, GMM: Generalized method of moments, GDP: Gross domestic product, RCI: Revealed capital intensity

intensive, so it will attract more capital because of large real rate of return that can be obtained. The analysis showed the consistency between theory and empirical data. Using data from the ASEAN + 6, it is seen that the greater the intensity of the capital of a country it is likely to attract more international capital flows and encourage the growing current account deficit.

Other interesting results which are also emerging is a shift change in the pattern of exports of developing countries which tends towards capital intensive product which can indicate the types of products manufactured by developing countries according to stages of the industrialization. Newly industrializing countries are slowly changing their exports towards capital intensive products, while their role is replaced by another country with the stage of industrialization behind it. Results of this analysis can explain why the phenomenon of global capital allocation tends to flow from developing countries to countries that are relatively rich in capital.

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