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Aggregate Import Demand and Bank Credit in Southeast Asia: An Empirical Study

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ABSTRACT

This study has empirically re-estimated aggregate import demand equation for five selected Southeast Asian economies, namely Malaysia, Singapore, Indonesia, Thailand and the Philippines. This study contributes to existing literature by incorporating bank credit in explaining the demand for imports for these economies. Other conventional determinants are activity variables, and relative prices for imports. The empirical results do suggest one cointegrating relation between demand for imports, relative price: of imports, activity variable, and bank credit for the case of Singapore, Indonesia, and Thailand. However, no cointegration has been suggested for the case of Malaysia, and the Philippines.

Keywords: Aggregate Import Demand, Bank Credit, Cointegration, Southeast Asia, Error Correction Model

INTRODUCTION

Following Craigwell (1994), this study aims to re-estimate aggregate import demand behaviour for Southeast Asian economies by including the bank credit variable as an additional determinant for imports. The sample countries are Malaysia, Indonesia, Thailand, Singapore, and the Philippines. The bounds testing approach (Pesaran et al., 2001) and error correction model (ECM henceforth) (Kremers et al., 1992) have been employed for cointegration, and the corresponding long run estimates of import demand function have

empirically been estimated by Autoregressive Distributed Lag (ARDL, henceforth) model.

The reason why the estimating aggregate import demand function is still popular in empirical research is because of its relevance for trade policy formulation such as with a devaluation policy. Reinhart (1995) put in earlier literature that modelled trade in developing countries commonly found evidence that relative prices play a significant role in the determination of trade flows, buttressing policies of devaluation as a way to correct trade imbalances. Their conclusion often came in the form of significant t-statistics on the relative price variable in static or long run specifications of import demand or export supplies. In fact, it requires substantial knowledge of the elasticity approach because trade flows are entirely dependent on the elasticity of determinants such as price variables. [1] One major concern of policy makers in formulating a commercial policy or an exchange rate policy is the responsiveness of trade flows to relative price changes (Bahmani-Oskooee and Niroomand, 1998). More precisely, as highlighted by Heien (1968) price elasticity (demand for imports) values of between -0.5 and -1.0 is necessary for any given country to insure the success of exchange depreciation.

Considering the statistics published in *International Financial Statistics* (International Monetary Fund, various issues), Malaysia experienced an overall trade surplus over the period of 1974-2002. with the exception of between 1981-1982 and 1995. Over the period of 1975-2002, Thailand faced trade deficits between 1975-1985 and 1987-1996. Meanwhile, Indonesia's trade accounts documented trade surplus for the period 1981-2002. The trade balance of the Philippines was in deficits for the period 1977-1998 and 2001. Singapore recorded deficit in trade accounts for the years between 1972 to 1987 and 1989 to 1993, and a surplus between 1994 and 2002.[2]

As the summary documented in Appendix 1 shows, the conventionally applied import demand equation relates the quantity of imports to real income

[1] Brooks and Fausten (1998) have provided theoretical discussions on the issues with regards to devaluation of the currency to improve a country's trade balance.

[2] The current account conditions of these countries have been briefly highlighted by Tang (2003d).

or activity variable, and the ratio of import prices to domestic prices (relative prices of imports). Generally speaking, empirical literature has documented the existence of a long run relationship or cointegration between the quantity of imports demanded (goods and services) and its determinants via real income and relative price of imports, for the case of Malaysia, and Singapore.[3] For the case of Indonesia, Thailand and the Philippines, the search for a long run relationship for the traditional import demand function is inconclusive. Based on estimated long run elasticities from some studies, import demand for Malaysia and the Philippines is found to be income elastic and price elastic. Import demand for Indonesia is found to be income inelastic, except Tang (2003a); and the elasticity ofrelative prices ofimports is also inelastic. Previous studies, except for a study by Tang (2004b), have suggested that import demand is income elastic but price inelastic for Singapore and Thailand.

This study contributes to empirical literature, in at least two ways. First, this study provides a survey on existing studies which estimated aggregate import demand for the five Southeast Asian countries. This work fills the gap of lack of comprehensive literature survey on aggregate import demand, in particular for Southeast Asian economies. A brief summary of selected studies has been documented as Appendix 1. Second, an augmented import demand function has been formulated in this study by including a financial variable, namely bank credit, as in Craigwell (1994) and Tang (2004a), and also a *correct* activity variable i.e. gross domestic product (GDP) minus real exports, as proposed by Senhadji (1998) rther than GDP as used in conventional import demand functions.

The structure of the study is as follows. Section 2 describes briefly the analytical framework and model, data, and the bounds testing procedure. The empirical results are reported in Section 3. In the last section, concluding remarks are given.

[3] Singapore as an entrept, no doubt, is far trickier to estimate a "proper" import demand function. From the literature, standard import demand function is widely applied for the case of Singapore (see Appendix 1).

ANALYTICAL FRAME WORK, DATA AND METHOD

Analytical Framework

From the literature survey, two studies have been found to have touched on the inclusion of bank credit as an additional variable in estimating the aggregate import demand function. The first study is by Craigwell (1994), who studied the relationship of bank credit as an additional determinant on the behaviour of aggregate import demand in Barbados. A standard import demand model in which only prices (relative price of imports), and real income are used as explanatory variables is found to be insufficient to confirm cointegration. This finding suggests the possibility of specification error occurances in standard import demand equations. Furthermore, Craigwell (1994) found that bank credit is an important variable in explaining the behaviour of aggregate import demand for Barbados.

The second study is by Tang (2004a). The study accounted for the possible bias occuring from omission of potential determinant(s) in Tang's (2003c) study which found no cointegrating relations between the volume of Japan's aggregate imports, activity variable and relative price of imports, by adding a set of financial variables as additional determinants. Tang (2004a) considered the inclusion of bank credit for estimating the aggregate import equation based on the work by Craigwell (1994), and an accounting identity where the trade balance (tbt) is the difference between savings (St) and investments (It), tbt=St- It. Therefore, a factor(s) that influences savings and investments may also influence the balance of trade or trade flow (exports and imports). The financial variables considered, are bank credit, lending rate, deposit rate, government bond yield and share prices. Cointegrating relations have been confirmed by a variety of cointegration tests. As noted by Perman (1991, p.20), cointegration tests can generally be used as a guide for variable selection. This finding, at least, provides empirical support for the inclusion of financial variable(s) in the Japanese aggregate import demand equation estimates.

Conceptually, the relationship between import demand and bank credit can be explained in two ways. Firstly, inclusion of the bank credit variable into an aggregate import demand equation is fundamentally justified from the

demand side. In principle, a ready source of credit is necessary to accommodate increase in spending (Craigwell, 1994) which includes spending on imported goods, which are not produced domestically. In other words, imports, likes any other form of expenditure, have to be financed, and bank credit is presumably one means by which imports are financed. On the basis of this view, the inclusion of the bank credit variable as an additional factor explaining aggregate import demand is then simply as a means of finance.[4]

Secondly, the relationship between bnk credit and the import demand equation can be justified from the supply side. Conceptually, an aggregate production function, Y=Y(K) assumes that K (total utilised fixed and working capital) is fully financed by bank loans. Ifthe output, Y, has high import contents such as imported raw material or intermediate goods which are not produced locally or lack of perfect substitutes, an increase in domestic demand might increase the need for bank loans for production via fixed and working capital financing where input is driven by output, and increased demand for imported goods, especially raw materials or intermediate goods. In fact, the knowledge of these associations enable us to obtain a more complete picture of the effects and nature of bank credit for an importing country - demand for imports. This section provides support for the view that the bank credit is simply a means of finance, and partly empirical.

A conventional formulation of the aggregate import demand function corresponds to that of the imperfect substitute model (Goldstein and Khan, 1985) that relates the quantity of imports to real income (or activity variable) and relative prices of imports (ratio of import prices to domestic prices). Conventional application of relative prices of imports is fundamentally rooted in the assumption that a demand function is homogeneous of degree zero in price. On the basis of the discussions, an augmented version of the aggregate import demand function can be written as (1).

[4] This study does not consider bank credit 'a non-traditional determinant' since this variable has been used by Craigwell (1994), and Tang (2004a) for examining the aggregate import demand function for Barbados, and Japan, respectively. Meanwhile, this study also does not treat bank credit as a proxy for financial development because for a measure of financial development, GDP is relatively a better measure. Further study where other financial variables have been taken into account in estimating the aggregate import demand function for Japan can be found in Tang (2004a).

$$Mt = M_t(YE_t, RP_t, CR_t) \quad (1)$$

where Mt is the desired quantity of imports demanded at period *t,* YE, is a 'correct' activity variable proposed by Senhadji (1998) that is calculated by real GDP minus real exports, RPt is the ratio of import price index to domestic price level (relative price of imports), and CR, is the volume of bank credit (or in real term). Under the standard assumption of infinite supply elasticity, an import demand equation can be estimated in a single equation framework. A log-linear specification of import demand equation is written as equation (2).

$$LnM_t = b_0 + b_1 LnYE_t + b_2 LnRP_t + b3\ LnCR_t + e_t \quad (2)$$

where e, is the residuals series and *Ln* is natural logarithmic form.

In accordance to economic theory, it is expected that the signs of the coefficients be as follows: $b_1>0$ o, <O, $b_2<0$ and $b_3>0$. Basically, the Keynesian line of argument shows that an increase in domestic activity will stimulate imports yielding positive income elasticity. Nevertheless, if an increase in domestic activity is due to an increase in the production of import-substitute goods, imports may actually fall, resulting in negative income elasticity. An increase in import price relative to domestic price levels will hurt import volume, yielding negative price elasticity (Bahmani-Oskooee and Niroomand, 1998). Craigwell (1994) has found that a credit variable should be positively related to import flows.

There are four clarifications concerning the estimation of equation (2):

First, annual aggregate import is used rather than imports sorted by category since one could argue that bank credits can be sensitive to the composition of imports and/or are policy sensitive, related to a country's trade and industrial policy targeting some specific industrial sectors. This study reserves this concern due to unavailability of highly disaggregated data for a sufficient sample span, as is always be the case for developing economies such as Southeast Asian economies.

Second, the use of the ratio of import price index to domestic price index (such as the GDP deflator), a restricted form of price variable, is because

estimates based on unrestricted form of relative prices proved unsatisfactory due to severe problems with multicollinearity. In addition, using aggregate import prices can provide elasticity estimates that may be related to a country's exchange rate policy. For example, Heien (1968) has suggested that for any given country a value of price elasticity (demand for imports) of between -0.5 and -1.0 is necessary to insure the success of exchange depreciation.

Third, bank credit takes the form of claims by the private sector provided by a country's commercial banks, and its cmposition in relation to a country's imports across various sectors is unequal. Since this study examines the import demand behaviour at aggregate levels, the assumption that various sectors of imports have equal composition of the bank credit component is initially made.

Last, for a four-variable based cointegration system, Mt -YEt -RP_1 -CRt is a cointegration relationship of interest, tested for. Other long run relations are growth-finance relation, exchange rate (relative prices of imports) relation (see Bahmani-Oskooee, 1998), which are not of interest in the present study.

Data

The quantity of imports demanded, M, is real imports, that is nominal import deflated by import price index. The 'correct' activity variable is based on Senhadji (1998), where YE is derived from GDP minus exports then deflated by GDP deflator yielding a variable in real terms. RP is the relative price of imports, i.e. the ratio of import prices index to GDP deflator. Real bank credit, CR is the nominal value of credit from a country's deposit banks deflated by GDP deflator. The base year for all variables is 1995. The sample period considered in this study is between1960-2000 for Malaysia; 1974-2000 for Singapore; 1960-2000 for Thailand, 1960-2000 for the Philippinesand 1960-2000 for Indonesia. The data are obtained from World Tables (World Bank, 2002).

From the literature survey, it was found that use of annual data is mainly due to the unavailability of quarterly data for sufficiently long periods. Using constructed quarterly real GDP data of annual data - Otani-Riechel's procedure, Habib and Tongzon (1998) have investigated the existence of any economic linkages among the five founding members of the ASEAN (Association of Southeast Asian Nations). However, Mohammad and Tang (2000) have warned

that measurement errors may be more serious when the data used are constructed data. In principle, however, on the basis of the number of yearly observations used in this study, cointegration tests are possible. According to Hakkio and Rush (1991), increasing the number of observations by using monthly or quarterly data does not add any robustness to the results on tests of cointegration, and what matters more is the length of the period under consideration. On the other hand, Charemza and Deadman (1992) have highlighted that *'Annual data could be used to estimate these long run parameters thereby avoiding the need to model the seasonality, and the standard testsfor cointegration applied'*.

Method -Bounds Testing Approach

The bounds testing approach for cointegration has been recently developed by Pesaran et al. (2001), which is based on an estimation of the Autoregressive Distributed Lag (ARDL) equation. The reason of choosing this method is because the bounds testing approach can be applied irrespective of whether the regressors are purely 1(0), purely 1(1) or mutually cointegrated. Thus, it is unnecessary for the order of integration of the underlying regressors to be ascertained prior to testing for the existence of a level relationship between two variables (Pesaran et al., 2001). On the other hand, the bounds testing approach is valid even when the explanatory variables are endogenous (see Alam and Quazi, 2003). Moreover, this technique is applicable for small sample study as documented by Pattichis (1999), and Mah (2000).[5]

[5]Applying bounds testing procedure, Pattichis (1999) has estimated a set of demand equations for maize, milk powder, butter, and rice imports in Cyprus via annual time series data 1975-1994 (20 observations). Similarly, Mah (2000) has estimated the disaggregated import demand func- tion for Korea (Information Technology products) by using annual data covering a period 1980 through 1997 (18 observa#on). It is noted that the finite sample property of the bounds test has not been verified through reasonably well-organized simulation works. They do not consider any Monte Carlo simulations study that compares the finite sample performances of the bounds test with those of the conventional tests. Therefore, in small samples, we do not have a definite answer to whether the bounds test performs better than the conventional tests. To this end, their argument (Pattichis, 1999; Mah, 2000) of using bounds testing approach for small sample study must be accepted with caution.

The bounds testing procedure for cointegration is essentially based on an estimate of an error correction version of the ARDL model (unrestricted error correction model - UECM, or conditional ECM). An error correction version of the ARDLequation for import demand equation (2) can be written as below.

$$DLnM_{,} = b_0 + \sum_{i=0}^{l} b_{11} DlnYE_{t-i} + \sum_{i=0}^{l} b_{21} DLnRP_{t-i} + \sum_{i=0}^{l} b_{3} DLnCR_{t-i} + \sum_{i=1}^{l} b_{41} DLnM_{t-i} + b_5 LnM_{t-1} + b_6 LnYE_{t-1} + b_7 LRP_{t-1} + b_8 LnCR_{t-1} + u, \quad (3)$$

Where D is first differenced series, X – X_ • The Ordinary Least Squares (OLS) is being as estimateor.

Basically, the test statistics for the bounds test is a Wald test (F-statistic) for the jointly significant coefficients oflagged levels of the included variables in the error correction version of the ARDL model. That is to test the null hypothesis of no cointegrating relation (H_O: $b_5 = b_6 = b_7 = b_8 = 0$) against the alternative hypothesis of a cointegrating relation, (H_A: $b_5 \neq 0, b_6 \neq 0, b_7 \neq 0, b_8 \neq 0$).

The asymptotic distribution of the bounds test (F-statistic version) is non-standard under the null hypothesis of no cointegrating relation between the examined variables, irrespective of whether the explanatory variables are purely /(0), purely /(1), or mutually cointegrated.

Given a set of commonly used level of significance (a = 0.01, 0.05, or 0.1), if the computed F-statistic lies above the upper bounds of the critical value band, then the null hypothesis of no cointegration relationship can be rejected. Thus, the existence of a long-run relation between variables under investigation can be made. If the computed F-statistic lies below the lower bounds of the critical value, the null of no cointegration relationship cannot be rejected implying no cointegration. In the case that the computed F-statistic falls within the critical value band, a conclusive inference cannot be made. Hence, the order of integration, *I(*d) of the explanatory variables must be known before any conclusion can be drawn (see Pesaran et al., 2001). Meanwhile, long run elasticity is derived from the coefficient of the lagged level explanatory variable divided by the coefficient of the lagged level dependent variable, than multiplied by a negative sign (Pesaran et al., 2001).

THE RESULTS

The computed F-statistics of the bounds test for cointegration are reported in Table 1. The F-statistics for Indonesia and Thailand are both above the 0.10 upper bounds, 3.77 and the null hypothesis of no cointegrating relation can be rejected suggesting long run relations between volume of imports, domestic real activity, relative price of imports and bank credit. Nevertheless, it is not the case for Malaysia, Singapore and the Philippines as the test statistics are below the critical value of 3.77. Thus, there is no empirical evidence on the existence of a cointegrating relation between import demand and its determinants for Malaysia, Singapore and the Philippines.[6] In practice, even if the F-test rejects cointegration, we still cannot draw any conclusion because a more powerful test for cointegration in this set-up is the coefficient obtained for lagged error correction term (see Kremers et al., 1992). As noted by Bahmani-Oskooee and Brooks (1999), if the lagged error-correction term turns out to be negative and significant, cointegration is supported.

Table 1 The Test Statistics for Bounds Testing Approach for Cointegration

Country:-	F-statistic:-	Cointegration:-
Malaysia	1.683(2)	No
Singapore	3.473 (3)	No
Indonesia	4.777 (3)	Yes
Thailand	5.527 (1)	Yes
The Philippines	2.595 (3)	No

Notes: The 0.10 upper-and lower- critical value bounds for the F-statistic version of the test are 2.72 and 3.77 (Pesaran et al., 2001, p.300, Table CI (iii) Case Ill: Unrestricted intercept and no trend, k=3 (three regressors). The value in O is the number oflags, l selected based on AIC with maximum three years lag as common practice of using annual data.

[6] The Johansen's multivariate cointegration tests (trace statistics) do suggest one cointegrating relation among Mt, YEt, RPt, and CRt for all five Southeast Asian economies, except the Philippines. The tests are based on assumptions oflinear deterministic trend, and lag intervals of one. The results are not reported here but is available upon request. However, a reservation for not using the Johansen's multivariate approach is that the tests fail to ascertain whether the suggested cointegrating relation is M, -YE, -RP, -CR,, or otherwise, among the variables.

In this context, an error correction representation for the ARDL model suggested by AIC (Akaike information criterion) has been estimated.[7] As illustrated in Table 2, the ARDL models pass a battery of diagnostic tests, except that a problem of serial correlation occurs for Singapore and the Philippines. Following Bahmani-Oskooee and Kara (2003), the stability of the coefficient estimates of an error-correction model can be tested by means of CUSUM and CUSUM Square tests. The plots of the CUSUM and CUSUM of Squares tests are illustrated in Appendix 2, where it is seen that all the countries pass the CUSUM test while Malaysia and Singapore fail the CUSUM squares test for the periods 1993-1995 and 1996-1998, respectively.[8]

Table 2 Diagnostic Tests for ARDL Estimated Selected Based on AIC

Country:-	(1) Serial correlation	(2) Function form	(3) Normality	(4) Heteroscedasticity
Malaysia	0.061 [0.805]	0.231 [0.631]	0.375 [0.829]	1.70 [0.192]
Singapore	2.989 [0.084]	0.0196 [0.889]	0.267 [0.875]	2.319 [0.128]
Indonesia	0.959 [0.327]	0.007 [0.935]	0.898 [0.638]	0.00005 [0.994]
Thailand	0.026 [0.872]	2.383 [0.123	0.765 [0.682]	0.137 [0.711]
The Philippines	4.914 [0.027]	0.132 [0.716]	0.7707 [0.68]	0.497 [0.481]

Notes: (1) Lagrange multiplier test of residual serial correlation. (2) Ramsey's RESET test using the square of the fitted values. (3) Based on a test of skewness and kurtosis of residuals. (4) Based on the regression of squared residuals on squared fitted values. The order used for (1), (2) and (4) is one. The value in [ ] is p-value (LM version).

[7] The estimates of the error correction models are not reported here since this study is aimed at examining a cointegrating relation of import demand function. However, the estimates are available on request from the author.

[8] We run the Chow's breakpoint test on the suggested break periods. For Malaysia, the p-value for the year of 1993 is 0.1039. However, for the case of Singapore, there are insufficient observations for the Chow's breakpoint test on the year of 1996.

The estimated coefficient of the lagged error correction term and its probability value (p-value) are reported in Table 3. The significance of the lagged error correction term at l0 per cent level with a negative sign, confirms a cointegrating relation for $M_t - YE_t - RP_t - CR_t$ for the case of Singapore Indonesia, and Thailand. This finding is in line with previous studies for Singapore (Bahmani-Oskooee, 1998; Tang, 2003b), Indonesia (Tang, 2003a; Tang, 2002a), and Thailand (Sinha, 1997). The estimated coefficient of the lagged error correction term indicates that 100 percent, 53 percent, and 54 percent of the disequilibrium (short run) is corrected for Singapore, Indonesia, and Thailand, respectively within a year.[9] In addition, the significance of the error correction term suggests long run causality, in Granger's view, from real income, relative prices to imports, and bank credit to imports demand in Singapore, Indonesia, and Thailand.

On the basis of the significance of error correction terms as reported in Table 3, however, there is no long run relation for the aggregate import demand function in Malaysia and the Philippines. It is in line with a study by Senhadji (1998) for the Philippines, and a study by Tang (2003a) for Malaysia. A possible explanation with respect to no cointegration of aggregate import demand function for these two countries is that a cointegrating relation may be formed from other than the import demand relation, $M_t - YE_t - RP_t - CR_t$
On the other hand, it can possibly be related to specification errors which may be due to the exclusion of the exports component from the domestic real activity variable (such as real GDP or gross national product (GNP)). Senhadji (1998) has excluded the exports component in forming a 'correct' activity variable, as used in this study.[10] Using the components of final demand expenditure (public and private consumption expenditure, investment expenditure and exports), Mohammad et al. (200 l) have found that the import demand is cointegrated

[9] Consistent with a study by Tang (2003b), the estimated parameter of the error correction term for Singapore's aggregate import demand function is greater than unity. According to the study, this sometimes can be justified when the "unit" of dependent variable and independent variable are significantly different in size, and this situation can also be related to a country's trade liberalization policies and openness.

[10] Xu (2002) has proposed a 'national cash flow' variable for aggregate import demand analysis that is GDP minus the sum of exports, government spending and investment.

with its determinants for the ASEAN-5 countries including Malaysia and the Philippines by using the Johansen's multivariate test. [11]

Table 3 The Lagged Error-Correction Term, ECt-1 (t-test) from Error Correction Model

Country:-	Lag Structure of ARDL-Error Correction Mode}Pl	Estimated coefficient of EC,_I [p-value] f2l:-	Cointegration:-
Malaysia	(2,0,3,0)	-0.203 [0.135]	No
Singapore	(2,3,1,3)	-1.055 [0.01]	Yes
Indonesia	(l,l,0,3)	-0.531 [0.000]	Yes
Thailand	(2,2,1,2)	-0.537 [0.000]	Yes
The Philippines	(1,3,3,2)	-0.01 [0.866]	No

Notes:

[l]The lag structure of the ARDL model for error correction representation is selected based on AlC *(LnM,, LnY E,, LnRP,, LnCR,)*. The maximum lag is set to three years due to the use of annual data in this study.

[2]The estimated long run coefficients of cointegrating equation (see Table 4) that used to derive the error correction term (EC,) are estimated using the ARDL approach.

Table 4 presents the estimates of long run coefficient - elasticities of aggregate import demand function for Singapore, Indonesia, and Thailand, by the way that the variables are cointegrated based on the significance of the error correction term of error correction model. Several findings can be derived from the empirical estimates as follows. Firstly, the activity variable (GDP minus exports) is found to be significantly different from zero, at least at 5 percent level. Consistent with Tang's (2002a) study, Indonesia's income (activity variable) elasticity is inelastic, but is in positive sign. However, in contrast

[11] The estimated long run exports elasticities *to* import demand for Malaysia, and the Philippines are inelastic but statistically different from zero, and are 0.379 (t-ratio is 4.69) and 0.33 (t-ratio is 4.85), respectively. Meanwhile, Tang (2002b) has found a cointegrating relation for disaggregated import demand for Malaysia viz. consumption goods, investment goods and intermediate goods. The study has also used the final components of expenditure such as Mohammad, et al. (2001). These studies used annual observations. It probably tells us that the exports variable is a major determinant to import demand, particular in developing nations that implemented export-led growth policy. The exports require imported goods as input for production such as raw material for manufactures. Thus, more exports might lead to more imports.

with previous studies, as illustrated in Appendix 1, the estimated income elasticities for Singapore, and Thailand are in negative sign, and closer to unity. Itcan possibly be explained by the argument that an increase in domestic activity is due to increases in production of import-substitute goods, thus imports may actually fall, resulting in negative income elasticity.[12]

Secondly, price elasticity is significantly different from zero, and with an expected sign (negative). Inconsistent with findings by Tang (2003a) and Tang (2002a), the Indonesian import is found to be price elastic, in the long run. However, the price variable is inelastic to import demand for Singapore and Thailand, which is supported by existing studies (see Appendix 1).

Finally, there is a positive effect of the bank credit on the import demand for Singapore, Indonesia, and Thailand. In general this finding is consistent with the view by Craigwell (1994), Beck (2002), and Tang (2004a), that finance does influence trade flows. The import demand is found to be elastic in respect to bank credit for Thailand (1.15), and it is inelastic for Singapore (0.42) and Indonesia (0.29). Broadly speaking, this study suggests that the major determinant of Thailand's aggregate import demand function is bank credit - its elasticity is the highest among the examined determinants. The domestic real activity and relative price of imports are the most important determinants for Singapore and Indonesia, respectively.

[12] More precisely, income (or activity variable) elasticity of negative unity is virtually unheard of, and hard to justify. To a certain extent, it may suggest serious problems exist in the long-run relationships; perhaps a break, or likely several breaks over the long, and often tumultuous periods which these countries have experienced in the last 40 or so years. However, as the results of CUSUM tests show, this is probably not the case. Infact, this is tentatively due to the use of GDP minus exports as activity variable rather than of GDP as used in a conventional framework.

Table 4 Estimated Long Run Elasticities using the ARDL Approach

Country:-	*LnYE,*	*LnRP,*	*LnCR,*	Constant
Singapore	-1.077*	-0.463*	0.416*	9.916*
Indonesia	0.603**	-1.15*	0.292*	5.214*
Thailand	-0.917**	-0.782*	1.151*	8.803*

Notes: * and ** denote significance at 1% and 5% respectively. The estimated long run coefficients of cointegrating equation are estimated by using the ARDL approach based on AIC. The maximum lag is set to three years due to the use of annual data in this study. The estimated cointegration vectors based on ARDL approach for Malaysia and the Philippines are *LnM* +o.082LnYE *+l.77LnRP -0.79LnCR** -9.85, and *LnM* -3.302LnYE +34.58LnRP -0.818LnCR - 77.44 respectively. However, these cointegration vectors are excluded here since no cointegration is found among the examined series based on the significance of the lagged error-correction term.

CONCLUDING REMARKS

By incorporating the bank credit variable, this study is aimed at re-examining the long run relationship of aggregate import demand function in the five Southeast Asian economies, namely Malaysia, Indonesia, Thailand, Singapore and the Philippines; The results of the bounds testing procedure (Pesaran et al., 2001) for cointegration, and the ECM modelling approach, do suggest that the volume of imports, relative price of imports, real income, and bank credit are cointegrated in Singapore, Thailand, and Indonesia. Broadly speaking, this supports an inclusion of bank credit in estimating aggregate import demand for those economies. However, no cointegration has been confirmed for the case of Malaysia, and the Philippines.

Several implications are available. Firstly, in the long run, bank credit can possibly be considered as one of instruments for monetary policy used to improve a country's external balances by reducing imports since a decrease in bank credit will lead to decrease of import demand, especially in Singapore, Thailand and Indonesia. Bank credit, however, is found to be insufficient as a policy instrument for long term import demand in Malaysia, and in the Philippines.

Secondly, for the case of Singapore, Indonesia, and Thailand, a devaluation

policy is feasible in order to improve the countries' trade balances in the long run.[13] Their estimated price elasticities (-0.5, -1.15 and -0.78) are in line with the range suggested by Heien (1968) which is between -0.5 and -1.0. However, based on the findings of cointegration between exports and imports, Tang (2003d) has suggested that the combined effects of all polices, as well as devaluation, are favourable for improving trade balance for Malaysia and Singapore, but not Indonesia, Thailand and the Philippines. This issue is reserved for further study.

Another implication is that domestic inflation needs to be kept in check, especially in Indonesia. The elastic long run price elasticity in Indonesia, indicate that the quantity of import demanded is sensitive to increases in domestic price levels. Any increase in domestic inflation rates would trigger higher volume of imports.

Lastly, empirically speaking, for the case of Singapore and Thailand, strategies for promoting domestic activity is feasible to improve trade balances since their income elasticity is negative. On the other hand, the long run elasticity of real activity is 0.6 for Indonesia, and it indicates that domestic activity may create a negative impact on trade balance. So, in principle, the country may be forced to cut income growth by raising taxes or reducing government expenditures.

In short, a combination of various policy prescriptions both fiscal and monetary should be used judiciously so as to improve the country's external balance by making export more competitive, and stimulate output in the Southeast Asian economies.

REFERENCES

Alam, M. I. and Quazi, R.M. (2003) Determinants of Capital Flight: An Econometric Case Study of Bangladesh, *International Review of Applied Economics*, **17,** 85-103.

Bahmani-Oskooee, M. and Kara, 0. (2003) Relative Responsiveness of Trade Flows to a Change in Prices and Exchange Rate, *International Review of Applied Economics,* 17, 293-308.

[13] Devaluation is appropriate to reduce large external imbalance, correct perceived overvaluations of the real exchange rate, increase international competitiveness and promote export growth.

Bahmani-Oskooee, M. and Brooks, T. J. (1999) Bilateral J-curve between U.S. and her Trading Partners, *Weltwirtschaftliches Archiv (Review of World Economics),* **135,** 156-165.

Bahmani-Oskooee, M. and Niroomand, F. (1998) Long-run Price Elasticities and the Marshall-Lerner Condition Revisited, *Economics Letters,* **61,** 101-109.

Bahmani-Oskooee, M. (1998) CointegrationApproach to Estimate the Long-run Trade Elasticities in LDCs', *International Economic Journal,* **12,** 89-96.

Beck, T. (2002) Financial Development and International Trade: Is there a Link?, *Journal of International Economics, 51,* 107-131.

Brooks, R. and Fausten, D. (1998) *Macroeconomics in the Open Economy.* Addison Wesley: Malaysia.

Charemza, W.W. and Deadman, D.F. (1992) *New Directions in Econometric Practice.* Edward Elgar Publishing Limited: England.

Craigwell, R. (1994) Modelling Aggregate Import Demand in Barbados. Working paper of Central Bank of Barbados.

Doroodian, K., Koshal, R. K. and Al-Muhanna, S. (1994) An Examination of the Traditional Aggregate Import Demand Function for Saudi Arabia, *Applied Economics,* **26,** 909-915.

Goldstein, M. and Khan, M.S. (1985) Income and Price Effects in Foreign Trade, in *Handbook of International Economics* (Ed.) R.W. Jones, **2,** 1041-105.

Habib A., and Tongzon, J.L. (1998) An Investigation of Economic Linkages among the ASEAN Group of Countries, *ASEAN Economic Bulletin,* **15,** 121-136.

Hakkio, C.S. and Rush, M. (1991) Cointegration: How Short is the Long Run? *Journal of International Money and Finance,* **10,** 571-581.

Heien, D. M. (1968) Structural Stability and the Estimation of International Import Price Elasticities in World Trade, *Kyklos,* **21,** 695-711.

International Financial Statistics, International Monetary Fund. Various issues.

Johansen, S. (1988) Statistical Analysis of Co-integrating Vectors, *Journal of Economic Dynamics and Control,* **12,** 231-254.

Kremers, J.J.M., Ericsson, N.R. Schmidt, **P.** and Shin, Y. (1992) The Power of Cointegration Tests, *Oxford Bulletin of Economics and Statistics,* **54,** 325-348.

MacKinnon, J.G. (1991) Critical Values for Cointegration Tests, in *Long-run Economic Relationships: Readings in Cointegration* (Ed.) R.F. Engle and C.W.J. Granger. Oxford University Press.

Mah, J. S. (2000) An Empirical Examination of the Disaggregated Import Demand of Korea - The Case of Information Technology Products, *Journal of Asian Economics,* **11,** 237-244.

Mohammad H. A., Tang, T.C. and Jamal, 0. (2001) Aggregate Import Demand and Expenditure Components in Five Asean Countries: An Empirical Study, *Jurnal Ekonomi Malaysia,* **35,** 37-60.

Mohammad H. A. and Tang, T.C. (2000) Aggregate Imports and Expenditure Components in Malaysia: A Cointegration and Error Correction Analysis, *ASEAN Economic Bulletin,* **17,** 257-269.

Pattichis, C.A. (1999) Price and Income Elasticities of Disaggregated Import Demand: Results from UECMS and an Application, *Applied Economics,* **31,** 1061-1071.

Pesaran, H., Shin, Y. and Smith, R. **J.** (2001) Bounds Testing Approaches to the Analysis of Level Relationships, *Journal of Applied Econometrics,* **16,** 289-326.

Perman, R. (1991) Cointegration: An Introduction to the Literature, *Journal of Economics Studies,* **18,** 3-30.

Phillips, P.C.B. and Ouliaris, S. (1990) Asymptotic Properties of Residual Based Tests for Cointegration, *Econometrica,* **58,** 165-193.

Reinhart, C. M. (1995) Devaluation, Relative Prices, and International Trade: Evidence from Developing Countries, *IMF Staff Papers,* **42,** 290-312.

Schwert, G. W. (1989) Tests for Unit Roots: a Monte Carlo Investigation, *Journal of Business and Economic Statistics,* **7,** 147-159.

Senhadji, A. (1998) Time-series Estimation of Structural Import Demand Equations: A Cross-country Analysis, *IMF Staff Papers,* **45,** 236-268.

Sinha, **D.** (1997) Determinants of Import Demand in Thailand, *International Economic Journal,* **11,** 73-83.

Tang, **T.** C. (2004a) Does Financial Variable(s) Explain the Japanese Aggregate Import Demand? A Cointegration Analysis, *Applied Economics Letters,* **11,** 775-780.

Tang, T. C. (2004b) A Reassessment of Aggregate Import Demand Function in the Asean-5: A Cointegration Analysis, *International Trade Journal,* **18,** 239-268.

Tang, T. C. (2003a) Aggregate Import Demand Function for Eighteen OIC Countries: A Cointegration Analysis, *llUM Journal of Economics and Management,* **11,** 167-195.

Tang, T. C. (2003b) Singapore's Aggregate Import Demand Function: Southeast Asian Economic Compared, *Labuan Bulletin of International Business and Finance,* **1,** 13-27.

Tang, T. C. (2003c) Cointegration Analysis for Japanese Import Demand: Revisited, *Applied Economics Letters,* **10,** 905-908.

Tang, T. C. (2003d) Are Imports and Exports of the Five ASEAN Economies Co-integrated? *International Journal of Management,* **20,** 88-91.

Tang, T.C. (2002a) Aggregate Import Demand Behavior for Indonesia: Evidence from the Bounds Testing Approach, *IIUM Journal of Economics and Management,* **10,** 179-198.

Tang, T. C. (2002b) Disaggregated Import Demand and Expenditure Components in Malaysia: an Empirical Analysis, *Malaysian.Journal of Economic Studies,* 34, 47-63.

Tang, T. C., and Nair, V. (2002) A CointegrationAnalysis of Malaysian Import Demand Function: Reassessment from the Bounds Test, *Applied Economics Letters,* 9, 293-296.

Tang, T.C. and Mohammad, H. A. (2000) An Aggregate Import Demand Function for Malaysia: A Cointegration and Error Correction Analysis, *UtaraManagement Review,* **1,** 43-57.

World Bank (2002) *World Tables.* Dx for Windows version 3.0 (The Time Series Data Express), EconData Pty. Ltd. (Released data: February 28; 2002).

Xu, X. (2002) The Dynamic-optimizing Approach to Import Demand: A Structural Model, *Economics. Letters,* **74,** 265-270.

Appendix 1 Summary of Selected Empirical Studies

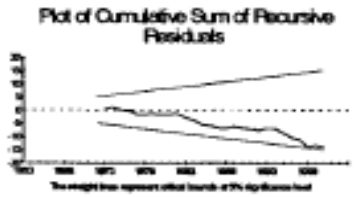
Authors:-	Cointegration techniques:-	Results of cointegration:- *LnY*	Long run elasticity:-	*LnRP*	*LnNER*
1. Tang & Mohammad (2000)	-Johanses test [1] (annual: 1970-1998)		1.5 (real GDP)	-1.8	
2. Tang & Nair (2002)	-Bounds test [2] (annual: 1970-1998)	-Cointegration	1.5 (real GDP)	-1.3	
3. Tang (2003a)	-Bounds test [2] (annual: 1960-2000)	-No Cointegration	(Xu, 2002)	-2.14	
4. Tang (2004b)	-Bounds test [2] (annual: 1960-1999)	-Cointegration	0.21 (Xu, 2002)		
Singapore					
1. Bahmani-Oskooee (1998)	-Johansen test [**1]** (quarter: 1973-1990)	-Cointegration	1.26 (real GNP)	0.15	-1.657
2. Tang (2003b)	-Bounds test [2] (annual: 1974-1998)	-Cointegration	1.16 (real GDP)	-0.35	
3. Tang (2004b)	-Bounds test [2] (annual: 1974-1996)	-Cointegration	-0.28 (Xu, 2002)	-0.25	
Indonesia					
1. Reinhart (1995)	-Johansen test **[l]** (annual: 1970-1992)	-No cointegration	(real GDP)		
2. Senhadji (1998)	-Phi!lips-Ouliaris test [3] (annual: 1960-1993)	-No cointegration	(GDP -exports)		
3. Tang (2002a)	-Bounds test [2) (annual: 1960-1999)	-Cointegration	0.98 (real GDP)	-0.4	
4. Tang (2003a)	-Bounds test [2] (annual: 1960-2000)	-Cointegration	-1.25 (Xu, 2002)	-0.6	
5. Tang (2004b)	-Bounds test [2] (annual: 1960-1999)	-No cointegration	(Xu, 2002)		
Thailand					
1. Sinha (1997)	-Johansen test [**1]** (annual: 1953-1990)	-Cointegration	2.15 (real GDP)	-0.77 (Price) 0.3 (Cross price)	
2. Senhadji (1998)	-Phillips-Ouliaris test [3] (annual: 1960-1993)	-No cointegration	(GDP-exports)		
3. Tang (2004b)	-Bounds test [2] (annual: 1960-1999)	-No cointegration	(Xu, 2002)		

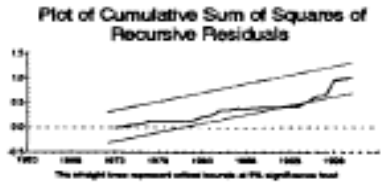
The Philippines				
1. Senhadji (1998)	-Phillips-Ouliaris test [3] (annual: 1960-1993)	-No cointegration	(GDP-exports)	
2. Bahmani-Oskooee & Niroomand (1998)	-Johansen test [**1]** (annual: 1960-1992)	-Cointegration	1.35 (real GDP or GNP)	-1.01
3. Tang (2004b)	-Bounds test [2] 2002) (annual: 1960-1999)	-No cointegration	(Xu,	

*Notes: Ln*Y is domestic real activity variable; *LnRP* is relative price of imports; and *LnNER* is Nominal effective exchange rate. **[1]** Johasen (1988), [2] Pesaran, *et al.* (2001) and [3] Phillips and Ouliaris (1990).

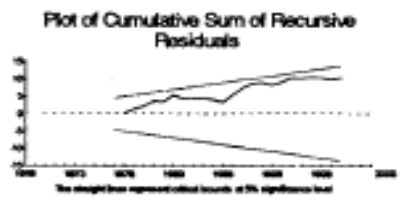
Appendix 2 Plots of CUSUM and CUSUM of Squares

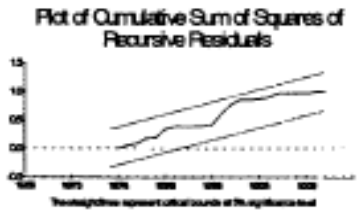
Malaysia:-



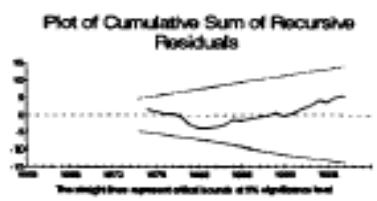


Indonesia:-

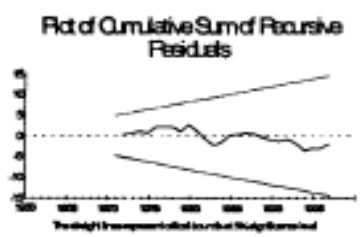


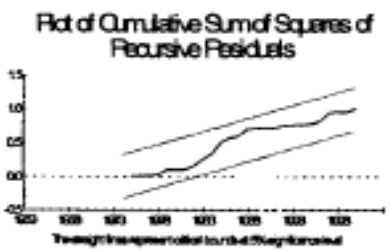


The Philippines:-

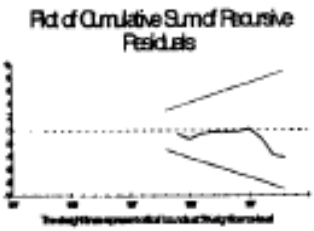


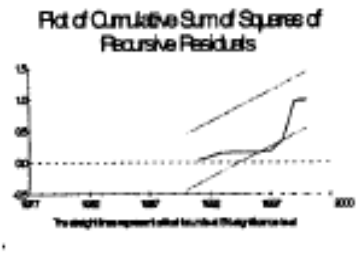
Thailand:-





Singapore:-





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