Should Southeast Asia Devalue?

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The past decade has consisted of a great deal of economic turmoil in Southeast Asia. Beginning with the depreciation of the Thai Baht on July 2, 1997, other Southeast Asian countries were affected as capital flight continually increased. Before the crisis, there were a number of warning signs including a growing trade deficit. With low interest rates, investing in Southeast Asia had become very attractive particularly in the real estate sector. As foreign debt grew, foreign investors did not see a problem since they assumed that the government would bail companies out as it always had in the past. But this was not the case; more than one loan had gone bad and investors began to panic, obviously not all the companies could pay back the loans with their current assets. They turned to the governments, first in Thailand, which made an effort to defend the Baht as long as possible. However, with the demand for foreign reserves increasing at an increasing rate, this was impossible. This soon led to the fall of the Baht and eventually a series of other Southeast Asian currencies.

The resulting recession in Southeast Asia completely reversed what had been known as the "Asian Miracle". The International Monetary Fund (IMF) instituted a program of nine clearly defined goals, one of which was to limit the extent of currency depreciation (Radelet and Sachs 41). The IMF required that Southeast Asia maintain tight fiscal and monetary policy by raising interest rates, cutting spending, and raising taxes in an effort to avoid huge budget deficits. By raising interest rates, the idea was to provide an incentive for investors to keep their money in Asia and hopefully appreciate the currency. In effect, the IMF was telling Asia to defend their currencies, which soon proved implausible. The IMF was afraid that depreciation would place pressure on the corporate and banking sectors and would eventually cause a domino effect in competitor countries. Despite this belief the crisis spread anyway (Lane 26).

The IMF blamed the failure of the policy on "unexpected contagion effects", however many well-known economists believe that it was flawed from the beginning (Radelet and Sachs 43).

Krugman (1999) first agreed that devaluation was not a plausible policy, however he believed that the IMF policy was much worse. Instead he supported capital controls as one way of retaining the money in countries. But ultimately he came back to the idea that devaluation would simply push the currency down without the side effects (164). Sachs criticized the IMF severely for its policy of defending the currencies, and suggested that reverting to a floating exchange rate would be the least harmful of policies. Furthermore, this policy would most definitely make their exports cheaper (Sachs 1997). The debate over devaluation is examined in this paper by testing whether devaluation would actually benefit the Southeast Asian countries. I expect to establish j-curve effects for four countries in Southeast Asia by estimating both the short and long run components.

By estimating these components I am going to evaluate Jeffrey Sach's claim that devaluation would be the best policy for Southeast Asia. This will actually test whether the j-curve exists for these countries. If indeed these countries exhibit the j-curve; then a floating exchange rate regime may have the power to alleviate the crisis. The first section of this paper derives the Marshall-Lerner Condition, developed during the 1940's to provide a sufficient condition for devaluation to improve the trade balance. The theory behind the j-curve is discussed as well as the sequence of events in the case of devaluation. A review of theoretical and empirical literature comprising of several papers that have used the ML Condition and examined the j-curve is provided. Next, I employ a cointegration technique suggested by Engle and Granger, which estimate the short run and long run shapes of the j-curve. Finally, the results are pieced together to evaluate Sach's claim that devaluation would be the best policy move for these countries.

2. Marshall-Lerner Condition

The Marshall-Lerner (ML) Condition (Caves 1999) defines the parameters for the devaluation of an exchange rate to improve the trade balance. When the sum of the import and export trade elasticities are greater than 1, this is sufficient for an improvement in the trade balance. The condition is based on four assumptions: a) that the price elasticities of supply for imports and exports are infinite (and the demand elasticities are not) b) that imports and exports alike adjust to an exchange rate change immediately c) there is no foreign debt. Lastly, assuming the trade balance is zero, we can begin to derive the ML Condition by saying:

$$(1)\quad TB^{*} = X_D - M_D$$

The demand for exports is expressed in foreign currency by dividing price by the exchange rate $X_D(P1/E)$. M_D, the demand for imports, can be expressed in domestic currency by multiplying the foreign price of a good by the exchange rate $(P^{*1}{*}M_D)E$. Going back to equation 1 the difference between the demands is equaled to the trade balance TB^{*} expressed in foreign currency. Withholding the exchange rate in the M_D function keeps import demand in foreign currency. Price (P) is assumed to be constant, meaning that the change in E is equal to the change in the real E. This implies that inflation is absent in the ML condition. When we substitute for X and M we get:

$$(2)\quad TB^{*} = X_D(P1/E) - (P^{*}{*}M_D)E$$

A change in the exchange rate will result in a change in the trade balance. We show this by differentiating with respect to E. Remember, since P is constant it can be ignored in equation 3.

$$(3)\quad \frac{dTB^{*}}{dE} = -E^{-2}X_D + E^{-1}\frac{dX}{dE} - \frac{dM_D}{dE} > 0$$

In order to change the demands into elasticities, which are respectively, the ratio of a percent change in import/export quantity to a percent change in the exchange rate, we must multiply by E/M for the import elasticity and E/X for the export elasticity.

$$\in_M = \frac{dM/M}{dE/E} = \frac{dM}{dE} * \frac{E}{M} \qquad \in_X = \frac{dX/X}{dE/E} = \frac{dX}{dE} * \frac{E}{X}$$

We have now found the formula for each elasticity of demand and can substitute into our former equation. We can first multiply through by E^2/X to get our elasticity demand for exports and this yields:

$$(4)\ -1 + E/X\ (dX/dE) - E^2/X\ (dM/dE) > 0$$

A second step of multiplying through, this time by M/E to get the import demand elasticity yields:

$$(5)\ -1 + E/X\ (dX/dE) - EM/X > 0$$ [2]

This leads us to our final equation, the ML Condition, which says, if the trade balance is zero like when we began, and the sum of the export and import demand elasticities exceed one then this is sufficient for an improvement in the trade balance. Again, the trade balance is $TB^* = X - EM$, E multiplies M to give imports in foreign currency. We substitute into equation 5 and alter our equation to illustrate this condition.

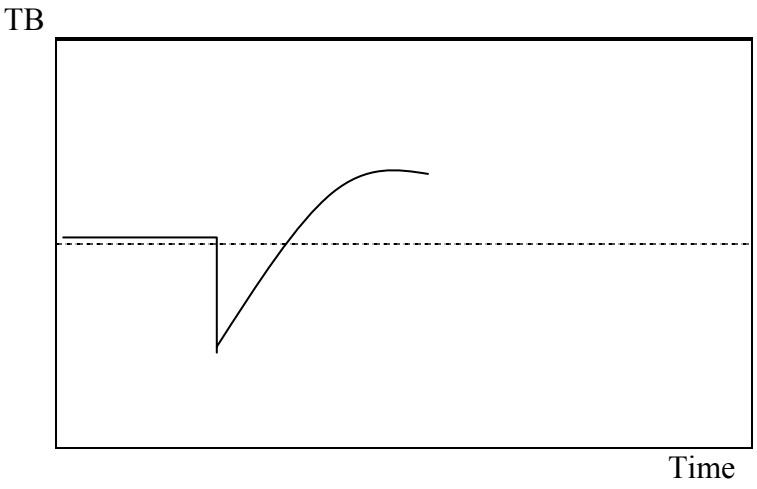
$$(6)\ \in_X - \in_M > 1$$

3. The J-Curve

There have been numerous studies conducted in order to test to see if the ML conditions are met. Past studies have suggested that the ML condition may not be met in the short run, though it may in the long run. This is known as the j-curve. The j-curve illustrates that a depreciation in the exchange rate has an immediate negative effect on a country's trading habits in the short run. On the other hand, the domestic price of foreign currency immediately becomes expensive and the demand for imports will decrease once firms are able to alter their strategies, which will eventually decrease the trade deficit. Additionally, foreign companies must first adjust to the lower price of foreign currency (our country's) in terms of contracting,

and will then have an incentive to buy more. This results in higher purchasing of the domestic countries exports, also improving their trade balance. Figure 1 demonstrates the j-curve theory; immediately following devaluation the trade balance drops, but in the long run it begins to improve. Of course it must be understood that countries vary in their ability to react to a devaluation depending on the type and volume of imports. The traditional Keynesian models explain the j-curve phenomenon as a function of the exchange rate, domestic income, and foreign income. An increase in income for a country can be predicted to worsen the trade balance since it will increase its consumption of imports. An increase in foreign income can be predicted to improve the trade balance because foreigners will buy more of that country's exports. Again, literature on the j-curve has made attempts to more fully explain it using extended models, others have tested whether or not the trade elasticities are sufficiently high to improve the trade balance.

Figure 1



Risager and Gylfason (1984) examined the decision to devalue for sixteen countries with balance of payments difficulties. By predicting several consequences of devaluation the authors attempted to show that the resulting improvement of the trade balance was based on the income, wealth, trade, and debt effects. They projected that national income and spending would immediately decrease, and that the trade balance would deteriorate simultaneously. As a result

of a depreciated currency, interest payments would be higher, an opportunity cost for a devaluing nation. Gylfason and Risager simulated a 10% devaluation in the currency for sixteen countries. They found that it did indeed improve the trade balance in all but one country, Argentina. The largest improvement was in Brazil at 12% of GNP and in industrial countries at an average of 2.2%. Developing countries seemed to have more trouble, improving about 1.2% of GNP. The authors subsequently reasoned that some countries may react more to a devaluation if they depend heavily upon imports. Some of these countries were Kenya, Ireland, and Korea, which will be looked at in this study. They also concluded that devaluation may have significant effects on the GNP of a nation. In industrial nations, GNP was positively affected but in developing nations it declined, thus it is a possible opportunity cost of devaluing.

In contrast, Nguyen (1993) analyzed the short run component of the J-curve specifically for a small open economy. By adjusting the original ML assumptions, he suggests they might be more applicable to such an economy. Nguyen suggests that these assumptions may be more realistic. Instead of price elasticities of supply of exports and demand for imports being assumed to be infinite, he assumes they are not, but that the price elasticity of supply of imports and demand for exports is infinite. Secondly he assumes that the country or countries begins with a trade deficit, rather than being initially balanced. He estimates the short run to be approximately two years in contrast to the ML assumption of instantaneous reaction to an exchange rate change. Lastly, Nguyen assumes that a country has a great deal of net foreign liabilities, in contrast to none at all. A foreign debt in addition to a trade deficit implies that a country will incur high interest payments. This may be much more realistic than the original ML assumptions for a developing country, and may be important in determining how an exchange rate change will affect countries with such conditions. He suggests that in the short run, in which the BOP has usually been known to deteriorate, this period depends on the size of

the trade elasticities, lag-coefficients, and unhedged foreign debt in foreign currency, interest rates, and the current account deficit.

Nguyen argues in support of the short term weakening of the economy for a country suffering from a balance of payments deficit and/or foreign debt. He concludes that a country does indeed contract as a result from devaluation in the short run assuming that it begins with a trade balance deficit or foreign debt. Nguyen estimates that for a small economy with imports comparable to Australia, eight months may be the minimum for the trade balance to show improvement. In comparison to such a short-term analysis, this paper is looking at the long run effects on the trade balance that affect the short run. Nonetheless, I will look for the ML condition to be satisfied.

In a 1996 paper "The J-curve hypothesis and currency devaluation: Cases of Egypt and Ghana", Kishore Kulkarni considers a case of continuous devaluations instead of a single devaluation in both Egypt and Ghana. In addition to extending the J-curve theory, Kulkarni theoretically shows that in these instances successive devaluations result in a constant balance of payments (BOP) deficit. A BOP deficit would imply that a country is financing its current account with debt. For the current account to be in deficit, the capital account must be in surplus, which means a significant amount of foreigners investing in a country. Thus, for a country that continues to devalue, the long run may not improve the BOP.

In a 1985 empirical analysis Bahmani-Oskooee did a very similar study to the one presented in this paper. Looking at Greece, India, Korea, and Thailand, all of which have and have had different exchange rate regimes, he examined the relationship between their respective exchange rates and trade balances using quarterly data from 1973-1980. He extended the standard function of exchange rate and income to also include world income, high-powered money, domestic high-powered money, and a lag structure on the exchange rate.

Using Johansen's cointegration analysis, Bahmani-Oskooee and Niroomand (1998) use stationary data to produce trade elasticities for 30 countries. This study is most relevant in that it employs similar procedures to this paper in order to produce import and export demand models. Most of their annual data was found to be first-differenced stationary, which by the Johansen and Juselius (1990) cointegration technique, says that if "a linear combination of a set of nonstationary variables is found to be stationary, then it is said to be cointegrated". This paper did indeed find that the trade elasticities for almost all of the countries involved did satisfy the ML condition, meaning that devaluation could improve the trade balance.

5. Methodology

This study examines the Southeast Asian countries of Malaysia, Korea, Singapore, and the Philippines. The data used was taken from International Monetary Fund (IMF) time series quarterly data beginning in varying years (International Financial Data 2000). Much of the data had to be calculated and some countries had to be excluded because of lack of specific data.

In order to test the effect of the exchange rate on the trade balance, or the j-curve theory we use the traditional trade balance function, using the exchange rate, domestic income, and foreign income.

$$7.)\quad \Delta RTB_t = \beta_0 + \beta_1 \Delta RE_t + \beta_2 \Delta RGDP_t + \beta_3 \Delta RGDP_t^* + \varepsilon_t$$

The change in the real trade balance (ΔRTB) is our dependent variable. RE is defined as the real exchange rate for a given country, real domestic income is measured by a country's real gross domestic product (GDP), and real foreign income is defined as real foreign GDP. For the purposes of this test I have used the GDPs of both Japan and the United States, considering their important role in world trading. Unlike the Keynesian trade balance function that is in level form this model is in first differenced form denoted by Δ. This time series is differenced once in an effort for the data to become stationary. Ordinary least squares regression assumes that

time series is stationary, however in most cases the data is nonstationary (Gujarati 729). A nonstationary time series has varying means, variances, and autocovariance at various lags (Gujarati 714). The data used here is tested for stationarity and found to be rejected at the .01 level for each of the variables (Appendix A).

The respective time series data for each variable is now in first difference form, however they remain nonstationary. Due to the first differenced form, economic theory holds that a long-term relationship might be lost (Gujarati 725). According to the j-curve hypothesis it is only in the long run that the ML Condition holds because this is the point where the trade elasticities will exceed 1. In effect the long run may not completely be explained in equation seven due to the first difference form of the variables. However, the linear combination of the variables may be stationary. If this is the case then the variables have a long run relationship, or they are cointegrated (Gujarati 726). But remember equation seven does not fully explain the short run or the long run; this disequilibria can be traced to its error term (ε_t). By using this error term we can connect the short run behavior of the trade balance to its long run value, ultimately explaining some sort of j-curve theory for these countries. This error term simply becomes another independent variable, the error correction term (EC_{t-1}), and this leads us to equation eight. The error correction term is the one-period lagged value of the residual from an OLS level regression. (Gujarati 728-29).

$$(8)\quad \Delta RTB_t = \beta_0 + \beta_1 \Delta RE_t + \beta_2 \Delta RGDP_t + \beta_3 \Delta RGDP_t^* + \beta_4 EC_{t-1} + \varepsilon_t$$

In order to estimate this error correction term we use the Engle-Granger methodology (Gujarati 726) and first estimate a standard OLS regression with level form.

$$(9)\quad RTB_t = \beta_0 + \beta_1 RE_t + \beta_2 RGDP_t + \beta_3 RGDP_t^* + \varepsilon_t$$

The estimates of the Engle-Granger test for all four countries are given in table 1. Consistent with the j-curve theory we can predict that the exchange rate will have a negative sign since

devaluation will make RE negative and thus cause an improvement in the trade balance. Domestic GDP should also have a negative sign since an increase in income should cause a country to increase its imports, effectively worsening the trade balance. Foreign GDP (RGDP*) should have a positive sign since an increase in foreign income should increase its purchase of the domestic country's exports, improving its trade balance.

Table 1: Cointegration Results

Malaysia

Variable	Estimate	St. Error	T stat
Intercept	-25039	40646	-0.62
RE	-272.769	93.55777	-2.92***
GDP	-0.64377	0.20477	-3.14***
GDPUS	12.15354	2.59044	4.69***
GDPJAPAN	-0.00281	0.10413	-0.03

R^2 = .7985
DF = 30

Singapore

Variable	Estimate	St. Error	T stat
Intercept	-860.066	3508.818	-0.25
RE	9.46495	27.10387	0.35
GDP	-99.8487	49.35297	-2.02**
GDPUS	4.50156	0.88104	5.11***
GDPJAPAN	-0.05353	0.00562	-9.52***

R^2 = 0.6754
DF = 55

Philippines

Variable	Estimate	St. Error	T stat
Intercept	7725.591	1773.213	4.36***
RE	-50.8229	8.22829	-6.18***
GDP	-2.09932	3.22841	-0.65
GDPUS	1.3051	0.49395	2.64**
GDPJAPAN	-0.02682	0.00461	-5.82***

R^2 = 0.4541
DF = 71

Korea

Variable	Estimate	St. Error	T stat
Intercept	-10466	1985.999	-5.27***
RE	8.3805	2.02888	4.13***
GDP	-0.03389	0.0072	-4.7***
GDPUS	5.25992	1.00365	5.24***
GDPJAPAN	-0.04867	0.01107	-4.4***

R^2 = 0.6492
DF = 90

This is indeed the case for both Malaysia and the Philippines, notably both coefficients on the real exchange rate are negative and significant. This implies that they may have sufficiently high import and export elasticities of demand to satisfy the ML condition in the long run. Korea and Singapore each have positive betas and are significant for the real exchange rate, meaning that their long run elasticities do not satisfy the ML condition. On the other hand the respective coefficients for domestic income in these countries are negative and significant, which would improve the trade balance. The Philippines are the one exception to the results. Again, the GDPs for the United States and Japan are included as a measure of foreign income and may say something about their trading habits with Southeast Asia. Interestingly all four countries exhibit

a negative and significant sign for Japanese income possibly indicating a high-income elasticity of demand for Japan. In contrast the US has a positive and significant β, which means they might trade more with Southeast Asia as their income increases.

Following the results of this cointegration regression, we now take the residuals and subject them to the Dickey-Fuller unit root test to see if they are stationary (Appendix B). The results indicate that in each country the t-statistic is significant at least at the .1 level. This rejects the stationary hypothesis, however this may be due to the lack of observations in the data since the residuals appear to be mean reverting. Assuming this is the case, the next step will be to include the error correction term in our equation and estimate both the short run and long run value of the exchange rate and its effect on the trade balance.

In this model we expect to see evidence of the j-curve where the trade balance deteriorates in the short run but improves over the long run. This implies that the exchange rate variable should have a positive coefficient because j-curve theory says that devaluation causes a decline in the trade balance at first. Foreign and domestic income may be difficult to determine since the short run is typically undefined. The error correction term should exhibit a negative sign, we can infer this by looking at the function of $EC_{t.}$

$$EC_t = RTB_t - \beta_0\text{-}\beta_1 RE - \beta_2 GDP\text{-}\beta_3 GDP^*$$

Assuming that the increase in domestic income does not outweigh the positive effects of the decline in RE and the increase in GDP*, then RTB_t requires a negative β on the EC term for it to improve (increase).

Table 2: Error Correction Model Results

Malaysia				**Singapore**			
Variable	Estimate	St. Error	T stat	Variable	Estimate	St. Error	T stat
Intercept	-194.989	1644.548	-0.12	Intercept	284.5248	471.7643	0.6
ΔRE	-105.403	110.6346	-0.95	ΔRE	-137.017	73.8979	-1.85*

ΔGDP	-0.18704	0.18489	-1.01
ΔGDPJap	-0.01455	0.10321	-0.14
ΔGDPUS	9.37878	14.52756	0.65
EC_{t-1}	-0.54639	0.17043	-3.21***

R^2 =.1709
DF = 28

ΔGDP	-52.7079	52.78506	-1.00
ΔGDPJap	-0.07433	0.03258	-2.28**
ΔGDPUS	1.01501	4.40239	0.23
EC_{t-1}	-0.71894	0.12877	-5.58***

R^2 = .406
DF = 53

Philippines

Variable	Estimate	St. Error	T stat
Intercept	-5.23463	154.6656	-0.03
ΔRE	-3.41353	9.38848	-0.36
ΔGDP	-0.35041	1.40498	-0.25
ΔGDPJap	-0.02313	0.01303	-1.77*
ΔGDPUS	1.46478	1.48625	0.99
EC_{t-1}	-0.19565	0.06683	-2.93***

R^2 = 0.11
DF = 69

Korea

Variable	Estimate	St. Error	T stat
Intercept	320.4272	442.3452	0.72
ΔRE	7.43457	2.87358	2.59**
ΔGDP	-0.05113	0.02744	-1.86*
ΔGDPJap	-0.04467	0.04098	-1.09
ΔGDPUS	2.07665	4.37609	0.47
EC_{t-1}	-0.37412	0.08615	-4.34***

R^2 = .247
DF = 88

6. Results

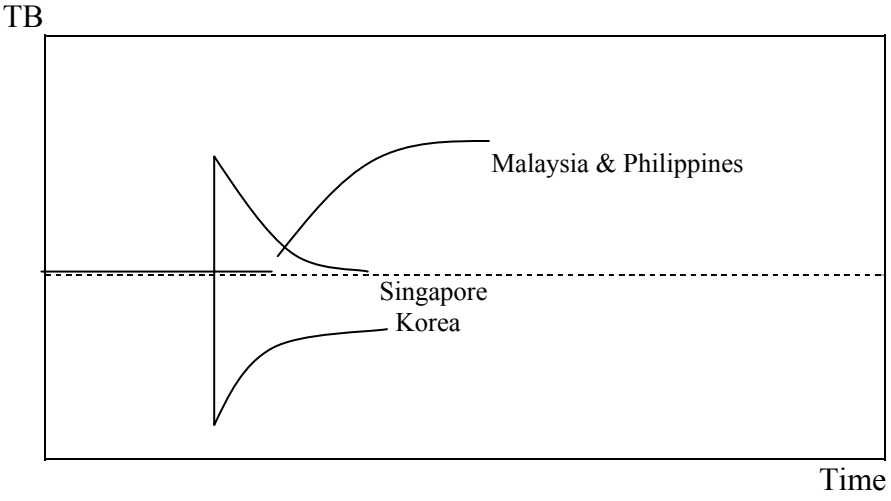
This is indeed the case in all four countries where the error correction term is significant. However the parameter estimates are extremely low, which imply that the trade elasticities are barely sufficient to satisfy the ML condition. This has various implications for each country if both the cointegration and error correction regressions are examined. For Malaysia and the Philippines the only variable that is significant is the error correction term, meaning that their trade balances would improve in the long run. The exchange rate variables in the cointegration regression (Table 1) support this finding with significance. Without any significant variables for the short run, we can infer that there is no change in the trade balance for Malaysia and the Philippines. Similarly, domestic and foreign income cannot be held in much importance in the error correction model for most of the countries.

Singapore and Korea have very different results; Singapore has a negative β on the real exchange rate variable, which means that the trade balance would actually improve in the short run. Its error correction term is negative and significant, however the cointegration exchange rate variable has no significance. Intuitively, this means that Singapore's trade balance will

improve at first and then return to its original position in the long run. The income variables in the cointegration analysis support this (Table 1); both the parameters for domestic GDP and Japan's GDP proved significant and negative, which would outweigh the positive effects of US GDP in the long run.

Korea's results were very clear especially through the cointegration analysis (Table 1). All of the variables here were significant; in particular a positive exchange rate β shows that the trade balance gets larger in the long run. The exchange rate variable in the error correction model is consistent with the j-curve theory in that its coefficient is positive and significant. The error correction term supports the long run increase in the trade balance, however the parameter estimate is low, implying that the trade balance may not actually improve.

Figure 2



7. Summary and Conclusion

Policy decisions certainly do not have a "one answer fits all" answer. The IMF encouraged Southeast Asia to defend their currency by raising interest rates. On the other hand Sachs suggested that devaluation would be the best policy. This was most likely the best solution. However the results presented in this paper demonstrated that devaluation would not work for all the countries either. Only two countries, the Philippines and Malaysia were found to actually improve their trade balances permanently (Figure 2). This means that only these countries had trade elasticities sufficiently high enough to satisfy the ML condition, in which the elasticities must exceed 1 for an improvement in the trade balance. The results indicated that Korea would experience an increase in its trade balance in the long run, but only after deteriorating in the short run and never actually improve upon its original position. We can infer this through the short run β coefficient in the error correction model, which had a positive sign and thus a negative effect on the trade balance (Table 2). Singapore demonstrates the most surprising results of the four countries in that the estimates show that the trade balance improves in the short run and returns to its original position in the long run. Singapore's results are completely contrary to the j-curve theory further demonstrating that countries have distinct characteristics.

Because countries have varying trade elasticities and subsequently different looking "j-curves" the IMF should not be so quick to provide one definitive answer to countries with similar problems. Further research should expand on the question of why countries have differing trade elasticities and what this depends on, such as their import demand functions. Additionally studies such as this paper should be performed again in the future, not only to examine other countries' j-curves but because the data available at this point is incomplete. This raises another question in that how is it possible for the IMF or other world policy organizations to recommend specific answers without sufficient and reliable data?

Appendix

A. Unit Root Test for Stationarity

Time series data is said to be stationary if its mean and variance are constant over time and the value of covariance between two time periods depends only on the distance or lag between the two time periods. The unit root test for stationarity tests the null hypothesis that $\rho = 0$, if the results show that $\rho = 1$ or that ρ is significantly away from zero then there is a unit root. We regress: $Y_t = \rho Y_{t-1} + \varepsilon_t$ where Y is variable being tested for stationarity. The results show that each variable is significant at least the .1 level, which means that we reject the hypothesis that $\rho = 0$ (Table 3). We can now assume the time series is non-stationary.

Table 3: Unit Root Test of Stationarity for Variables

Unit Root Test of Stationarity for Variables

Variable	Estimate	Error	T stat
REMal	0.99446	0.00333	298.42***
RTBMal	0.99777	0.03004	33.21**
RGDPMal	0.98594	0.03005	32.81**
RESing	1.00024	0.00205	488.72***
RTBSing	0.94948	0.02591	36.65**
RGDPSing	1.0111	0.01274	79.39**
REPhil	0.99641	0.00558	178.68***
RTBPhil	0.95247	0.03075	30.98**
RGDPPhil	1.0251	0.02235	45.87**
RTBKorea	0.87157	0.05457	15.97*
RGDPKorea	1.01794	0.00273	372.19***
REKorea	1.00011	0.00502	199.2***
RGDPJapan	1.00242	0.00136	738.97***

B. Dickey-Fuller Test for Stationarity of the Error Correction Term

Using the error correction term (the lagged residuals) obtained from the Engle-Granger cointegration regression we now test for stationarity of the error correction term. Simply another unit root test, the lagged error correction term is regressed on its first differenced form of the error correction term. This yields: $\Delta EC = \Delta EC_{t-1} + \varepsilon_t$ and results in significant tau statistics for each test at least at the .1 level.

Table 4: Dickey-Fuller Estimates

Korea

Variable	Estimate	Error	T stat
R1	0.6295	0.08097	7.77***
R2 = .387			
DF = 93			

Malaysia

Variable	Estimate	Error	T stat
R1	0.33275	0.16469	2.02*
R2 = .083			
DF = 33			

Philippines

Variable	Estimate	Error	T stat
R1	0.77872	0.07571	10.29***
R2 = .582			
DF = 74			

Singapore

Variable	Estimate	Error	T stat
R1	0.23561	0.12761	1.85*
R2 = .039			
DF = 58			

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Notes

[1] P^* is foreign price of imports.

[2] EM/X is equaled to the value of imports demanded in foreign currency.