COMPARATIVE EXPLANATIONS OF EAST ASIA'S GROWTH USING NEOCLASSICAL AND POST-KEYNESIAN MODELS

by

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ABSTRACT

The study estimates economic growth in eight selected East Asian countries using two growth models from two competing schools of thought. The first model is the Post-Keynesian model (Balance-of-Payment Constrained growth model). In this model, demand variables from export and capital inflows determine the limit of economic growth in the long run. The study uses prior estimates income elasticity of demand for import and export using a two-stage least square technique to eliminate the endogeniety problem then it calculates the predicted growth by the definition of the Balance-of-Payment Constrained growth model. The second model is the neoclassical model developed from Solow growth model focusing on the supply side variables determining economic growth. The study relaxes the assumption of exogenous technology and makes it endogenous of capital inflows. Two predicted output growth series from two models are obtained for each country and for the balanced panel data for the whole region. The performance of each model is evaluated by two methods: the discrimination approach and the discerning approach. The study found that the output growth series defined by the augmented Solow growth model can better explain the actual growth than the output growth series from the Balance-of-Payment Constrained Model. In addition, the study hypothesized that financial structure is one of the important factors that these two models omitted. A set of financial variables representing a different part of the financial structure is used for explaining the error series from both growth models. The results show that the

selected financial variables can better explain the error from the Post-Keynesian model than the error from the neoclassical growth model.

To my family

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

GLOSSARY

BOPC	The Balance-of-Payment Constrained
FDI	Foreign Direct Investment
TW	Thirlwall and Hussain Model
ASL	The Augmented Solow Growth Model
LSDV	Least Squares with Dummy Variable
MD	Minimum Distance
AIC	Akaike Information Criterion
SIC	Schwarz Information Criterion

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CHAPTER 1

INTRODUCTION AND SUMMARY

1.1 Introduction

Different schools of thought attempt to explain economic growth, especially from regions that have experienced remarkable and sustained output growth, in order to establish appropriate policies to increase a nation's wealth. The neoclassical economics school of thought explains economic growth through supply side variables such as the growth of capital, labor growth and technology progress. The very basic neoclassical supply-side growth model that is popularly used is Solow and Swan (1956). In the steady state of this model, the level of output per capita is positively related to the saving-investment ratio and negatively related to the growth of population or labor force. However, the growth of output per capita is independent from the saving-investment ratio because of the law of diminishing marginal product of capital. Later on Mankiw et al. (1992) considered an additional important variable in the model, human capital. They found that the estimation of capital share in the Solow and Swan model is too low compared to the real share so there is some part of the capital that is left out of the model. They hypothesized this to be human capital. The empirical results of their augmented model improved the basic Solow-Swan model to estimate the growth convergence. This augmented version of the model has been widely applied in the later literature. However, the assumption of exogenous technology is unconvincing in the modern literature and is replaced by the endogenous growth model (Arrow, 1962; Romer, 1986; Sheshinski, 1967).

On the other hand, the Keynesian school of thought provides on explanation of economic growth by demand-side variables. It mainly argues that the assumption that saving is equal to investment is not necessarily true. Harrod (1939) separated investment from saving and noted that investment is determined by rate of capacity utilization rather than saving. This assumption leads to the proposition that the actual rate of growth need not coincide with the potential rate of growth determined by the supply-side variables. He noted that demand plays a central role in economic growth. The demand-led growth model was later developed by Robinson (1956), Kaldor (1955–6, 1957) and Pasinetti (1962). More recently the Kaldorian type (see, for example, Kaldor 1970, 1985; McCombie & Thirlwall, 1994; Thirlwall, 1979) and the Kaleckian type (Blecker, 2002; Dutt, 1984; Rowthorn, 1982; Thirlwall 1979) follows Kaldor's literature to explain the long run economic growth by the process of cumulative causation between output growth and productivity, which leads to a proposition opposite to that of the convergence of growth in the Solow model. Kaldor's interests in growth and the open economy came together in his famous balance-of-payments constrained growth model and what came to be known as "Thirlwall's law." Later on, when he considered his law in the context of developing countries, Thirlwall and Hussain (1982) basically augmented Thirlwall's model of balance-of-payment constrained growth theory (see Thirlwall, 1979). The augmented model focuses on the limitation of foreign exchange for financing the import content of demand components: consumption, investment and government expenditures. In order to receive foreign exchange, exports are the most important source because no other component of aggregate demand provides the foreign exchange to pay for import requirements associated with the expansion of output. However, the leakage of foreign exchange through imports also has to be considered. Thirlwall and Hussain's growth determination hence depends mainly on exports, foreign inflows, income elasticity of demand for imports, income elasticity of demand for exports of the country and the price effects from domestic economy, foreign economy and the changes in exchange rates.

In this study, the corporative performance of both the neoclassical growth model by Mankiw et al. (1992) and the balance-of-payments constrained growth model by Thirlwall and Hussain (1982) will be tested using econometric panel data analysis. The area of study includes both developed countries and developing countries in East Asia: Japan, Korea, Singapore, Indonesia, Malaysia, the Philippines, Thailand and China. The time period is 1980-2010. Both models will be modified to have the same dependent variable, namely growth in income per capita. In addition, the study relaxes the assumption of exogenous technology in the supply-side model and treats foreign inflows as an important variable to determine economic growth.

Two methods of comparing the explanatory power of the models to the actual growth series are applied: the discrimination approach (goodness-of-fit criterion), and the discerning approach (Non-nested J-test). The results from both methods indicated that the augmented Solow model with endogenous technology gives a better explanation of output growth in the selected East Asian economies.

After the study tests the explanatory power of both models, the error series from both models are obtained. The study further assumes that the financial structure is the important factor that both models omitted in explaining the output growth. Three selected financial variables are used to explain the errors of both models using the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model. The results show that the financial variables can better explain the error from the post- Keynesian model.

1.2 Objective

1) The study aims to compare the performance of the neoclassical growth model by Mankiw et al. (1992) and the balance-of-payments constrained growth model by Thirwall and Hussain (1982) using econometric data analysis for eight East Asian countries; Japan, Korea, Singapore, Indonesia, Malaysia, the Philippines, Thailand and China.

2) From the hypothesis that financial development can help to explain the growth in East Asia, the study uses three selected financial variables to test the error series from both models in order to improve the explanatory power of the models in the future.

1.3 Methodology

The study uses econometrics analysis as the main tool to estimate some parameters for calculating the growth series in the post- Keynesian (Thirlwall & Hussain's) model using a two-stage least square method. In order to test the explanatory power of the post-Keynesian and the neoclassical models, the study applied ordinary least square method to obtain the goodness-of-fit from each model. Both models are compared using the non-nested J-test. In the final stage of study, the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model is applied for explaining the error series from both models by three selected financial variables.

1.4 Structure of the Dissertation

Chapter 1 Introduction

Chapter 2 Literature Review

Chapter 3 Data and Methodology

Chapter 4 Empirical Results and Analysis

Chapter 5 Financial Variables in the Growth Models

Chapter 6 Summary and Policy Implications

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CHAPTER 2

LITERATURE REVIEW

2.1 The Balance-of-Payment Constrained Model (BOPC Model)

> In the long run, no country can grow faster than at that rate consistent with balance of payments equilibrium on current account, and if the real terms of trade do not change much, this rate is determined by the rate of growth of export volume divided by the income elasticity of demand for imports. Attempts to grow faster than this rate mean that exports cannot pay for imports, and the economy comes up against the balance of payments constraint on demand, which affects the industrial sector's ability to grow as fast as labor productivity. (Thirlwall, 1982, p. 33)

The Keynesian school of thought focuses on the effect of demand variables on the output growth. However, it does not dismiss the relevance of the supply side factors. Adherents of this school of thought simply believe that in the long run, supply factors are not binding and growth is primarily demand constrained. Supply factors for Keynesians in the long run are endogenous and, therefore, can be augmented. Labor can be increased by productivity, migration, work hours and participation rate. Improvements in technology can be derived from investment, which is stimulated by the demand for products. There are varieties of ideas within the Keynesian school that focus on different demand variables. A.P.Thirlwall (1979) pointed out that foreign exchange reserves are the important demand-side factor with the potential to constrain economic growth in the long run. This is especially true in the case of developing countries. He emphasized the crucial importance of exports as a component of demand that can provide the foreign exchange to pay for the import content for other components of demand: consumption, investment and government expenditure (Thirlwall, 1997).

The main idea of Thirwall's growth model is that growth rate is constrained by balance of payment. Therefore, in order to expand the constraint, the economy has the most important channel through export growth while the leakage through import has to be considered as well. Thirlwall's simple definition of growth is the ratio of export growth to income elasticity of demand for import. The studies on the validity of Thirlwall's growth hence have to accurately estimate income elasticity of demand for imports. There are many techniques to estimate the most accurate elasticities and they lead to different results of validity.

The demand side growth theory is derived from the principle of the multiplier. Some of the post-Keynesian theory of growth examines the influence of the balance of payment. "To complete the picture, foreign trade must be included," as Harrod (1933) had imperatively demanded for the modern theory of economic growth. In the history of economic thought, the only school that emphasized the importance of foreign exchange and a strong balance of payments for economic growth was the Mercantilists. More recently, Harrod (1933) developed the concept of the foreign trade multiplier. Later on Chenery and his collaborators (1962, 1966) developed the concept of dual gap analysis, which showed that if the foreign exchange gap achieved a target rate of growth greater than the domestic saving-investment gap, foreign inflows would need to fill the largest of two gaps. Otherwise growth would be constrained by the most limiting resource and domestic saving would go unutilized. Kaldor (1977) came up with the explanation of the

UK's poor growth performance by the weakness of the balance of payment. He noted that,

> The fact that the rise in the proportion of exports in the national output overall fully matches the rise in the proportion of imports in home sales overall is an automatic consequence of the operation of the "foreign trade multiplier"; and so far from providing a refutation of the case for import controls, it provides the strongest possible support for it. For it shows that the Harrod theory really works, and that any rise in the share of imports in total domestic expenditure causes a fall in demand for home output, which in turn leads to a reduction in both consumption and investment in successive steps until a sufficient contraction occurs in the gross domestic product relative to exports to make the spontaneous rise in the one ratio be matched by an induced increase in the other. (McCombie and Thirlwall, 1994, p. 8)

Kaldor (1975) consistently attacked neoclassical growth theory, saying that it is very aggregative, that the theory treats all sectors of the economy as if they have the same production or growth characteristics. He has argued that in order to understand growth and development processes, we have to take a sectoral approach, the disaggregate between increasing return and diminishing return activities. His basic proposition from his own theory about why growth rates differ among countries can be summarized as follows (McCombie & Thirlwall, 1994):

(i) The faster the rate of growth of the manufacturing sector, the faster the rate of growth of GDP. This is the consequence of the large transfer of labor from the low productivity agricultural sector to the high productivity industrial sector.

(ii) The faster the rate of growth of manufacturing output, the faster the rate of growth of labor productivity in manufacturing due to the economies of scale. This is the interaction that is known as Verdoon's law.

(iii) The faster the rate of growth of manufacturing output, the faster the rate of transference of labor from other sectors of the economy (where there are either diminishing returns or no relationship between employment growth and output growth), which leads to the faster rate of growth of productivity in the economy as a whole.

(iv) The degree of overall productivity growth induced by manufacturing growth is likely to diminish, with the overall growth rate correspondingly induced.

(v) The growth of manufacturing output is not constrained by labor supply but is fundamentally determined by demand from agriculture in the early stage of development and exports in the later stages. Therefore, export demand is the major component of autonomous demand in an open economy, which must match the leakage of income into imports through the process of the Harrod foreign trade multiplier.

Dixon & Thirlwall (1975) formalized Kaldor's (1970) export-led growth model using four equations;

(i) Output growth as a function of export growth

(ii) Export growth as a function of changes in relative prices and world income growth

(iii) Relative price changes as a function of wage growth and productivity growth

(iv) Productivity growth as a function of output growth (Verdoorn's law).

This model is circular and cumulative (Myrdal, 1957). An increase in export growth leads to an increase in output growth. Then the competitiveness will be raised by Verdoorn's law and will increase the export in another circular flow process. This notion leads to the dynamic Harrod trade multiplier:

$$g = \frac{x}{\pi} \tag{2.1}$$

where g is the output growth; x is the export growth and; π is the income elasticity of import. The notion of the dynamic Harrod foreign trade multiplier (of Thirlwall's law or the 45 degree rule) was pioneered by Thirlwall (1979). This notion has been heralded as one of the most significant contributions to post-Keynesian theory (Davidson, 1990-91) in its demonstration that "international payment imbalances can have severe real growth consequence" (p. 303). This is a significant contradiction to the neoclassical theory, which always assumed that money is neutral. Moreover, this theory emphasizes demand as the main vehicle of growth rather than a factor of production and technical change as in the neoclassical doctrine. It postulates that increases in the labor force, capital stock and technical change are largely endogenous, adjusting positively to the changes in the economy that are brought about by changes in demand (Thirlwall, 1979; Thirlwall & Hussain, 1982; McCombie 1985).

Earlier studies estimated an import demand function using variables in the log form (Houthakker and Magee, 1969; Goldstein & Khan, 1978), while later studies (Atesoglu, 1993, 1994, 1995; Bairam, 1988; Bairam & Dempster, 1991) used either growth rates or the first difference of log of the variables. Biram (1993) transformed his data using first difference while Anderson (1993) tested for both unit roots and cointegration and then proceeded with the error correction model to separate short run behavior of income elasticity of demand from the long run value.

McCombie (1997) used a two- step cointegration test as suggested by Engle and Granger (1987) and found that there is no cointegration between the import demand and real income time series; therefore, he used the traditional regression method to estimate the income elasticity. Bairam (1988) applied the BOPC model with 19 European and North American countries in the period 1970-1985. He tested the validity of some of the critical assumptions explicit or implicit in the specification of the Harrod foreign trade multiplier using annual time series data. For the methodology, he applied a two- stage least square (TSLS) estimation technique because he suspected simultaneity between output growth, export growth and import growth. The most estimated equations also suffer from serial correlation so he applied the TSLS technique based on the Cochrane-Orcutt procedure developed by Beach and McKinnon (1978).

Later on Bairam and Demster (1991) tested the validity of the Harrod's foreign trade multiplier again with 11 Asian countries. The results again generally support Thirlwall's specification of the multiplier, which suggests that manipulating the income elasticities of export and import can be affecting policy toward output growth. They used the basic version of Thirlwall's law ($g = \frac{1}{\pi} x$). The time series data are from the period 1961-1985 (a different country has different availability of data). They used the OLS technique in estimation and found that the estimated equations are serially correlated. Therefore, they re-estimated using the maximum likelihood technique based on the Cochrane-Orcutt procedure and it improved the estimated equations from the serial correlation problem. They used the same method to test the validity of the predicted output growth rate as in Bairam (1988). They found that the null hypothesis that $\beta_1 = 1$ can be accepted, which implies that the predicted output growth calculated by using the income elasticity of export and world income growth can accurately predict the actual series. However, when they try to use the export growth instead of the multiplication of world income growth and the export elasticity, it cannot be accepted that the null hypothesis, which shows that the predicted output, underestimates the real one. Furthermore, a high value of income elasticity of export and low value of income elasticity of import could also be regarded as the success a country has had in specializing in fast growing industries (Bairam & Demster, 1991).

Anderson (1993) reconsiders the Thirlwall's approach by applying the cointegration technique to export and import equations based on national accounts data for sixteen countries. He found that the conditions for cointegration are not satisfied and therefore the equations are misspecified and the current external accounts are nonstationary. It appears that the reasons for the apparent breakdown of the Thirlwall's law can be traced to development in the 1970s and 1980s when countries were exposed to major changes in terms of trade and real effective exchange rates.

Hieke (1997) and Atesoglu (1997) also tested for stationary and cointegration and found that variables have cointegration and obtained elasticity of demand from a cointegration equation. Before testing the stationary, Atesoglu (1997) transformed his data to natural log except the relative price, which is defined as the difference between growth rate of foreign price and domestic price. Then he tests for the existence of the long run equilibrium relationship using Johansen and Juselius (Johansen, 1988; Johansen &

Juselius, 1990). He then concluded that variables are not cointegrated because they have different orders of integration.

Hussain (1999) studies the BOPC model and growth differences among African and East Asian economies, aiming at explaining growth rate differences by quantifying the individual and combined contributions of export growth, capital flows and changes in terms of trade in each country's case. He applies a log-linear equation for the import demand function estimation and assumes that it takes time for import to adjust to the desired level (Thirlwall & Gibson, 1992). The adjustment to equilibrium specification allows for the estimation of short run and long run import elasticities. To test the validity of the model's prediction, he uses the regression method introduced by McGregor and Swales (1985) and modified by McCombie (1989) and the individual country method introduced by McCombie (1989). He criticized that the independent variable g^* (predicted output growth) is itself calculated using an estimated parameter and hence is subject to error in variable problem. The test will yield a biased estimate of the coefficient. He suggests the modification of the test by using the inverse least square that is regressing y^* on y and testing whether or not the coefficient is unity and the constant is zero. Hussain applied this method and found that the low growth rates in African countries are explained by low export expansion relative to the import required for the process of growth and development. This fact is represented in the low dynamic Harrod foreign trade multiplier. He found that some of the Asian countries rely heavily on capital imports whereas others have passed this stage and have managed to accumulate huge BOP surpluses and/or become capital exporters. The rapid growth in East Asia was made good by the promotion of manufactured exports, which have high income elasticities of demand in the world market. In other words, for North Africa and Asian countries, Hussain found that the extended model of Thirlwall's law (capital inflows included) performed better than the basic model and that the BOP constituted a structural problem in the context of African countries.

Ansari et al. (2000) examine the applicability of Thirlwall's proposition to the economic experiences of four southeast Asian countries: Indonesia, Malaysia, Thailand, and the Philippines. They used the main idea from Young (1994), which argues that Asian tigers' growth (Hong Kong, Korea, Singapore and Taiwan) was not very high if we consider the output per worker instead of output per capital. Output per worker should better represent productivity than does the output per capital. Young (1994) concludes that the gains that these countries got from the output growth were more from the factor accumulation and sector reallocation rather than from dynamic gain from an outward-oriented policy. This proposition contradicted the export-led growth hypothesis of Thirlwall (1979).

Ansari et al. (2000) use more recent data and a sample period different from that used by Young (1994). They expand on the earlier studies by Thirlwall and Hussain (1982) and Bairam and Dempster (1991) by adding an additional country, Malaysia. They address the statistical properties of input data before proceeding with testing the hypothesis to correct the nonstationary variance and possible differences or detrend to correct for nonstationary means. They firstly calculated a simple Thirlwall's predicted growth rate and used a *t*-test to measure the statistical difference between two means. They found that growth in Indonesia, Malaysia and the Philippines can be statistically explained by the predicted Thirlwall's growth.

However, Thirlwall's proposition does not seem to hold in the case of Thailand. Therefore, the main policy implication is that three countries (Indonesia, Malaysia and the Philippines) should continue to follow the outward-looking growth strategy. For Thailand, the simple model considerably under predicts the growth rate of real income. One explanation may be that during the 1970-1996 period, Thailand's foreign trade experienced extreme volatility and started to deteriorate from 1983 and continued until 1995, which resulted in a decline in earnings from exports.

This study expands the number of countries to include some of the East Asian countries, Japan, Korea and China, and one additional southeast Asian country, Singapore, in order to compare developing and developed countries within this region. The data are tested if there is a nonstationary problem before calculating the predicted Thirlwall's growth. In addition, the study uses Thirlwall and Hussain's proposition of growth constraint, which includes the capital inflows to calculate the predicted growth.

2.2 The Augmented Solow Growth Model

The studies of supply-side variables determining the output that becomes the basic of the modern neoclassical growth model are the classic articles of Ramsey (1928), Harrod (1939), Domar (1946) and Solow and Swan (1956). Ramsey (1928) explicitly models the choice of consumption at a point in time and so endogenizes the saving rate. He focuses on the question of how much a nation should save and concludes that the saving rate may not be constant along the transition to the long run growth steady state. Harrod (1939) shows the dynamic equation demonstrating the inherent tendency of the system to instability. While the actual growth departs from the warranted level, the warranted level itself moves to chase the actual one (Harrod, 1939). Harrod also introduces the natural rate of growth, which is the maximum rate of growth allowed by the increase of population, accumulation of capital, technological improvement and the work/leisure preference schedule. The system cannot advance more quickly than the natural rate allows. He argues Keynes's view about the propensity to save, that trouble will arise if the rate of growth that is warranted is greater than that of the increase of population and the increase of technical capacity. The higher propensity to save hence actually warrants a higher rate of growth.

Domar (1946) studies the relation between capital accumulation and employment. He noted that the employment should be a function of the ratio of national income to productive capacity, which is mainly from investment. In fact, the investment has a dual character; it generates income and also generates productive capacity, which makes the approach to the equilibrium rate of growth from the investment (capital) point of view. Solow and Swan (1956) mainly argue that countries with the same labor growth, capital depreciation rate and saving rate will converge to the same rate of the output growth. Only technological progress can shift the growth path to the higher path. Therefore, the long run per capita growth rate is determined entirely by the rate of technological progress. Cass (1965) and Koopman (1965) later used Ramsey's analysis of consumer optimization to provide the explanation of the endogenous determination of the saving rate but the model still does not dilute the logic of exogenous technological progress as a source of long-run growth.

However, the technology is not normally given in the real world. It can be considered as one type of the public goods, which the returns to scale tend to be increasing if the nonrival ideas are included as a factor of production. Arrow (1962) and Sheshinski (1967) construct models including the learning-by-doing process. Each discovery immediately affects the economy. Romer (1986) shows later that the competitive framework of the growth model can be maintained to determine an equilibrium rate of technological progress, but the results will not be Pareto optimum so the neoclassical growth model needs to incorporate an analysis of imperfect competition. Therefore, after the mid-1980s, the studies of economic growth become more endogenous growth models.

Romer (1986), Lucas (1988) and Rebelo (1991) construct their models based on the models of Arrow (1962), Sheshinski (1967) and Uzawa (1965). The definition of capital goods is changed to include human capital, which is not characterized by diminishing returns as in the original Solow and Swan growth model. Romer (1987, 1990), Aghion and Howitt (1992) and Grossman and Helpman (1991) come up with the model including technological progress resulting from R&D, which is rewarded from the power of monopoly. They have a proposition opposite to that of the Solow and Swan (1956) model: that it is possible to have a positive growth rate in the long run. The long-term growth rate depends on many factors, including government actions such as taxation, the regulations on international trade and protection of property rights, financial markets and other aspects of the economy.

2.2.1 Empirical Studies on the Augmented Solow Model

Economists have extended the Solow model to allow for additional variables that affect capital per worker and real GDP per worker in the steady state. For example, productivity can be from the degree of market efficiency, government policy in the openness of trade in goods and service. The empirical research on the determinant of economic growth has been lively since the early 1990s. There are many hypotheses about the factors determining output growth. The research shows that the growth rate of real GDP/person rises in response to a higher saving rate, lower fertility rate, better law enforcement mechanism, greater openness and better terms of trade, better quality and quantity of education and healthcare and lower inflation. These empirical studies have raised our understanding of the determinants of economic growth.

In the 1960s, many East Asian countries, such as Korea and Taiwan, were poor and, therefore, had a lower value of capital and real GDP per worker. However, these countries have comparably good legal systems and satisfactory programs in education and healthcare, and relative high openness to international trade. From those factors, these countries in East Asia had a high steady state value of capital and output growth per worker. At the same time, the sub-Saharan African countries were also poor in 1960s. However, they had poorly functioning legal and political systems, weak education and health programs, a high rate of population growth and a very high rate of corruption. Thus, the steady state value of the capital-labor ratio was very low and the sub-Saharan countries were failing to grow (Barro, 2010).

Kendrick (1976) estimates that over half of the total U.S. capital stock in 1969 was human capital. Lucas (1988) assumes that there are decreasing returns to physical-capital accumulation when human capital is held constant. Mankiw et al. (1992) expand the Solow model to include human capital and the production function becomes:

$$Y(t) = K(t)^{\alpha} H(t)^{\beta} (A(t)L(t))^{1-\alpha-\beta} \qquad (2.2)$$

where H is the stock of human capital and all other variables are defined as before. Let s_k be the fraction of income invested in physical capital and s_h the fraction invested in human capital. In addition, assume that labor grows by $L(t) = L(0)e^{nt}$ and technological improvement is exogenously determined by $A(t) = A(0)e^{gt}$. Therefore, the number of the effective unit of labor, $A(t)L(t)$, grows at the rate $n+g$. The model assumes that a constant fraction of output, $s = s_k + s_h$, is invested. Defining k as the stock of capital per effective unit of labor, $k = \frac{K}{L}$, and y as the level of output per effective unit of labor, $y = \frac{Y}{L}$, the evolution of k and h are governed by

$$\begin{aligned} \dot{k}(t) &= s_k y(t) - (n+g+\delta)k(t) \\ \dot{h}(t) &= s_h y(t) - (n+g+\delta)h(t) \end{aligned} \qquad (2.3)$$

where n is the labor force growth, g is the growth rate of technology and δ is the depreciation rate of capital. They assume that $\alpha + \beta < 1$, which implies that there are decreasing returns to all capital. (If $\alpha + \beta = 1$, then there are constant returns to scale in the reproducible factors. There is no steady state for this model.) It implies that the economy converge to a steady state defined by

$$\begin{aligned} k^* &= \left(\frac{s_k^{1-\beta} s_h^{\beta}}{n+g+\delta} \right)^{1/(1-\alpha-\beta)} \\ h^* &= \left(\frac{s_k^{\alpha} s_h^{1-\alpha}}{n+g+\delta} \right)^{1/(1-\alpha-\beta)} \end{aligned} \qquad (2.4)$$

Substituting the steady state values into the production function and taking logs gives an equation for income per capita;

$$\ln\left[\frac{Y(t)}{L(t)}\right] = \ln y_t = \ln A(0) + gt - \frac{\alpha+\beta}{1-\alpha-\beta}\ln(n+g+\delta) + \frac{\alpha}{1-\alpha-\beta}\ln(s_k) + \frac{\beta}{1-\alpha-\beta}\ln(s_h) \tag{2.5}$$

where y_t is the income per capita. This equation shows how income per capita depends on population growth and accumulation of physical and human capital. For the steady state level of human capital, income is a function of the rate of investment in physical capital, the rate of population growth and the level of human capital. Using this specification, Mankiw et al. (1982) found that the augmented Solow model, which includes the human capital, can better predict the output growth than the basic Solow model, holding capital accumulation and population growth constant.

There are many empirical studies that apply the augmented Solow growth model using human capital as another determinant of growth. Hoeffler (2000) uses the model with African growth panel data. His results indicate that the model can account for Africa's low growth performance, provided country specific effect and endogeneity of investment in estimating the parameters of the model. He notes that for a dynamic panel data model as well as within groups, estimations are likely to suffer from biases due to endogeneity and unobserved country specific effects. Therefore, he uses a generalized method of moment (GMM) estimator as his preferred estimation method for panel growth regression. His specification in the augmented Solow model is the following:

$$\ln y(t) - \ln y(0) = -(1-e^{-\psi t})\ln y(0) + (1-e^{-\psi t})\ln A(0) + gt + (1-e^{-\psi t})\frac{\alpha}{1-\alpha-\beta}\ln(s_k) + (1-e^{-\psi t})\frac{\beta}{1-\alpha-\beta}\ln(s_h) - (1-e^{-\psi t})\frac{\alpha+\beta}{1-\alpha-\beta}\ln(n+g+\delta)$$

(2.6)

where ψ denotes the rate of convergence to the steady state. He exploits the time-series data for each country and considers repeated observations for shorter periods. This provides a panel data set for the study of economic growth. Also, it can explicitly account for permanent unobserved country specific effects, , η_i and provides a panel data model of the form:

$$g_{i,t} = \alpha + \beta y_{i,t-1} + \gamma x_{i,t} + \eta_i + v_{1t} \qquad (2.7)$$

where g_i denotes the growth rate of real GDP/worker averaged over 25 or 30 years, and i denotes a country index. $g_{i,t}$ may reflect the average growth rate over a series of 5- year periods, with $y_{i,t-1}$ being the level of income/worker at the beginning of each period, or as an average over each of the 5-year periods. The specification hence can be represented by

$$\begin{aligned} y_{i,t} - y_{i,t-1} &= \alpha + \beta y_{i,t-1} + \gamma x_{i,t} + \eta_i + v_{i,t} \\ y_{it} &= \alpha + \beta^* y_{i,t-1} + \gamma x_{i,t} + \eta_i + v_{i,t} \quad ; \beta^* = \beta + 1 \end{aligned} \qquad (2.8)$$

The model is transformed by subtracting out the time series means of each variable for each country so that the country specific effect is eliminated. OLS, however, also provides biased and inconsistent estimates in a dynamic panel model with a fixed time period. The problem can be addressed by using a first differenced GMM estimator. Using sub-Saharan African countries' data to estimate both the basic Solow model and augmented Solow model, Hoeffler found that the estimated coefficient on the lagged dependent variable appeared to be biased downward. However, a system GMM estimator was shown to produce more precise and more reasonable coefficient estimates. He concluded that the basic growth models are unable to account for Africa's low growth performance. The augmented Solow model can fully account for sub-Saharan Africa's low growth performance and provided unobserved country specific effects for the endogeniety of investment in estimation.

McQuinn and Whelan (2007) argue that this regression result of Mankiw et al. (1992) relies on the identifying assumption that the level of a country's total factor productivity (TFP) is uncorrelated with the investment share and rate of population growth, which is not reasonable from their view. They use information on capital shares to calibrate α and then calculate a series for $A(t)$. They carried out the calculation using data from version 6.1 of the Penn World Tables and using the standard value of $\alpha = \frac{1}{3}$ with the labor shares calculated by Bernanke and Gurkaynak (2002). The results show almost no change in the estimated correlations. Also, variations in the assumption underlying the capital stock calculations also have essentially no impact on the results. They conclude that the level of total factor productivity is systematically positively correlated with the variable in the Solow model. Therefore, the regression will produce an upward biased estimated of α. They hence argue that what is actually being rejected when the specification equation of the basic Solow model is estimated is a specific identifying assumption about technology that is uncorrelated with investment shares or population growth, rather than the failure of the basic Solow model. The value of g used to define each country's target capital-output ratio was based on the average growth rate of A_{it} for that country over 1960-2000. Therefore, $A(t)$ or level of technological progress is not constant across the country anymore. They show the results of the convergence rate of capital-output ratio and conditional convergence speed for output per worker are slightly higher than predicted by the Solow model. Their estimating equation can be re-expressed in terms of output per worker as:

$$y_{it} = a_{it} - e^{-\lambda r} a_{i,t-r} + \frac{\alpha(1-e^{-\lambda r})}{1-\alpha} x_{it}^{*} + e^{-\lambda r} y_{i,t-r} + \upsilon_{it} \qquad (2.9)$$

However, traditional literature has not gone this way. Instead, it has used the restrictive Mankiw et al. (1992) approach of assuming that all differences in technology level across countries are due to fixed country-specific factors. They argue that this approach provides some important econometric advantages even when the identifying assumption of common technology growth across countries is correct because it does not require estimation of country-specific fixed effects. The country-specific fixed effects in Mankiw et al. (1992) and Barrow and Sala-i-Martin (1992) were included in the error terms and positively correlated with the lagged output, and finally led to an upward bias on the coefficient of $y_{i,t-r}$.The panel technique acknowledges the existence of the fixed effects but do not eliminate the biases. Another solution for the bias coefficient is to take the first difference. This approach eliminates fixed effects from the specification but the transformed error term is negatively correlated with the transformed lagged dependent variables, so OLS still yields an upward biased convergence speed. The empirical results cited that the speed of conditional convergence is slower than predicted by the Solow model, which comes from the inaccurate assumption about technology rather than due to a failure of the model itself.

Gundlach (2005) also supports the basic Solow growth model that the different technology across countries is the determinant of the output per worker differences, even in the basic two goods, two-factor model such as that of Hecksher-Ohlin. Gundlach shows that by using a measure of institutional technology and treating the capital-output ratio as part of the regression constant, in other words, using Harrod-neutral technology change notion as presumed in the Solow model, it can explain why countries with different factor intensities may end up in different cones of specialization. He assumes that "A" or technology variables are determined by various factors X_i such that

$$A_i(t) = A(0)e^{gt}e^{\phi_k X_{ik}} \qquad (2.10)$$

where $A(0)$ stands for the initial level of a narrow concept of technical knowledge that is the same for all countries, and X_k may capture such factors as institutions and other potential determinants of development that differ across countries but remain fairly stable over time. The equation of technology change suggests that persistent differences in X across countries would explain persistent difference across country-specific production functions, which in turn would shift over time owing to the common constant rate, g. Therefore the specification equation becomes:

$$\ln y_i = \ln A(0) + gt + \frac{\alpha}{1-\alpha}\ln(k / y) + \phi_k X_{ik} + \varepsilon_i \qquad (2.11)$$

This specification essentially reproduces the basic structure of the regression equations used by Hall and Jones (1999), Acemoglu et al. (2001), Easterly and Levine (2003) and Rodrik et al.(2004), which also reproduces the nonparametric accounting result of Klenow and Rodriguez-Clare (1997) with a parametric methodology. From his empirical results, there is a large positive effect of variation in the institutional quality on the level of development and an increase in the institutional quality by 1%. There will be differences in the output per worker by 0.71%. In sum, he suggests from his empirical results that the cross-country data on output per worker can be conditional on a constant capital-output ratio and come from the difference in technology like that assumed in the Solow model.

Islam (1995) also uses the panel data approach to study the growth convergence by testing the dynamic panel data model. The model allows for differences in the aggregate production function across economies. His objective is to consider the growth convergence evidence since the controversy has given rise to the concept of "conditional convergence," which means convergence will exist when we control the steady state across countries using an identical aggregate production function. The panel approach makes it possible to allow for differences of the country effect; in other words, differences of production function. He uses the comparison made by Mankiw et al. (1992) in their results and the case of panel data estimation. He claims that the country specific effect is ignored in single cross-section regression, is correlated with the included explanatory variables and creates omitted variable bias.

The panel approach allows us to isolate the effect of "capital deepening" (Islam, 1995) and technological and institutional differences. He uses the Least Squares with Dummy Variable (LSDV) estimator and Minimum Distance (MD) estimator proposed by Chamberlain (1982, 1983), which is robust to any presence of serial correlation and found that single cross-section and the pooled regression produce very similar results. When he uses the panel estimation, it leads to a twofold change in the results. First, he obtained much higher rates of convergence and second, he obtained more empirically plausible estimates of the elasticity of output with respect to capital. Traditionally, only the saving and population growth rate were thought to be the variable for the direction of output growth. However, Islam's study highlights the role of the $A(0)$ term as a determinant of the steady state level of income. Therefore, a country can directly improve its long-run economic position by bringing about improvements in the components of $A(0)$. The restricted form of specification equation becomes:

$$\ln y(t_2) = (1-e^{-\lambda\tau})\frac{\alpha}{1-\alpha}\left[\ln(s) - \ln(n+g+\delta)\right] + (1-e^{-\lambda\tau})\frac{\varphi}{1-\alpha}\ln(h^*) + e^{-\lambda\tau}\ln y(t_1)$$
$$+ (1-e^{-\lambda\tau})\ln A(0) + g(t_2 - e^{-\lambda\tau}t_1)$$

(2.12)

where h^* is the steady state level of human capital, and φ is the exponent of the human capital variable in the augmented production function of Mankiw et al. (1992). The main usefulness of the panel approach is its ability to allow for differences in aggregate production function across economies. Islam (1995) points out that the neoclassical growth empirics meets development economics in the process of identifying the individual country effect.

Islam's study makes an additional assumption about technology: that it is mainly determined by capital inflows by applying the general form of technology hypothesis in Gundlach (2007), which assumes that $A_i(t) = A(0)e^{gt}e^{\phi_k X_{ik}}$. This study assumes that $X_{ik} = K_{fi}$, which represents capital inflows of each country. Therefore, the assumption about the technology determination becomes:

$$A_i(t) = A(0)e^{gt}e^{\phi_k K_{fi}} \qquad (2.13)$$

This assumption is put into the augmented Solow model specification. It is estimated using individual country and panel data analysis such as that in Islam (2005).

2.2.2 Literature on Human Capital and Growth

> Education can add the value of production in the economy and also to the income of the person who has been educated. But even with the same level of income, a person may benefit from education-in reading, communicating, arguing, in being able to choose in a more informed way, in being taken more seriously by other and so on. (Amartya Sen, Development as Freedom, 1999, p. 294)

Education plays a large role in developing countries in the absorption of new technology and the development of self-sustaining growth and development. In recent decades, we have witnessed a historically unprecedented extension of literacy and other basic education in the developing world. The effectiveness of the education system and economic growth are linked through human capital investment. Higher income and better health conditions allow people to escape from the vicious circles of poverty. Also, people will spend more on human capital when income is higher. Therefore, the economic growth and human capital reinforce one another. For the definition of human capital, early studies tended to rely on enrollment rates (flows) for primary or secondary education. More recent studies focus on the stock definition of education such as total mean years of schooling.

The influential work of Mankiw et al. (1992) proved quite successful in establishing a robust link between enrollment rates (proportion of adults enrolled in secondary education) and growth of per capita GDP. Klenow and Rodriguez-Clare (1997) have questioned the Mankiw et al. (1992) conclusion about the proportion of the variation in per capita income that can be explained by variation in human capital. They extended the definition of human capital to include other level of education, the variables for health conditions and other socio-economic variables that were assumed to be affecting human capital in the model as an alternative measurement. Barro (1996) uses the standard growth model but a different definition of capital that includes human components and allows for spillover effects (Lucas, 1988; Rebelo, 1991; Romer, 1986). A country that starts with a high ratio of human to physical capital tends to grow rapidly because physical capital is more amenable than human capital to rapid expansion. A supporting force is that the adaptation of foreign technologies is facilitated by a large endowment of human capital (see Benhabib & Spiegel, 1994; Nelson & Phelps, 1966). Also, there are interaction effects whereby a country's growth rate is more sensitive to its starting level of per capita output when its initial stock of human capital is greater. In this model, growth may go on indefinitely because the returns to investment in a broad class of capital goods, which includes human capital, do not necessarily diminish as economies develop. Pantelis Kalaitzidakis et al. (2001) provide a systematic investigation of human capital-economic growth. They incorporate the impact of human capital on economic growth according to the Mankiw et al. (1992) framework. They employ a general econometric framework that allows the effect of human capital on economic growth to differ both intra- and intertemporally. They apply nonparametric estimation techniques that allow for the well-known nonlinear convergence effect and investigate nonlinearities in the relationship between economic growth and various measures of human capital. They conclude that the relationship between human capital and growth is quite complex, and differs according to a country's level of human capital. Also, there may be important differences in the way human capital affects economic growth as far as educational attainment by gender is concerned. Their evidence is consistent with models that focus on the beneficial growth effect of human capital at the postprimary level as a result of the absorption of the new technologies.

However, more recent studies have exploited the time dimension of economic growth by constructing a panel data set and have found that there is less evidence of a positive effect of human capital accumulation on growth. Benhabib and Speigel (1994) and Pritchett (1996) find that the accumulation of human capital exerts an insignificant or even negative effect on economic growth. Krueger and Lindahl (2000) and Islam (1995) have pointed out that whenever researchers have attempted to incorporate the temporal dimension of human capital variables into growth regression, outcomes of either statistical insignificance or negative sign have surfaced. Kumar (2006) notes that he could not find conclusive evidence of how human capital affects economic growth and income level both quantitatively and qualitatively. The innovation effect of human capital seems to be dominating the catch-up effect in affecting the total factor productivity of a country. He also noted that the estimation of human capital should include schooling, quality of education, vocational training and health and institutional variables. He argues that the system GMM is a better approach to study growth empirics, as it takes care of potential endogeneities of the regressors. The lower values of convergence as observed go beyond the stylized Solow model, suggesting that the positive externalities of physical and human capital should not be ignored. Also the growth model should include the effect of experience and on- the- job training. He first estimates the panel specification that is used in Islam (1995). He uses Scheffe's (S) method for the hypothesis testing of the significance of human capital variables, Solow- restricted variables and the no-conditional convergence variable. He estimates panel data to consider the catching up and innovation channels of human capital. Overall he observes that the innovation effect dominates (relatively), which implies that growth rates may differ across countries for a long time due to differences in levels of human capital.

From both sides of the literature about the relationship between human capital and economic growth, there is no prior hypothesis about the sign of the relationship. The study uses the completion rate of tertiary education (ratio of people who complete a college degree to the total number in the labor force) as a proxy for human capital level.

2.3 The Non-nested J Test

In order to test two separate models developed from different school of thoughts, the study needs statistical procedures for testing separate families of hypotheses. The normal F-test can be applied to test only nested hypotheses, which come from related models. This idea of non-nested models testing started with Cox (1961, 1962) and was later developed by Pesaran (1974) to test single-equation linear regression models with autocorrelated and non-autocorrelated disturbances. Pesaran (1974) tries to find the appropriate explanations for a given dependent variable. In 1978, Pesaran and Deaton examined the testing of non-nested nonlinear regression models in order to find an appropriate functional form by relaxing the assumption of linearity of the models. They allow formal comparisons of different explanatory variables, of different functional forms and of the interactions between the two, which in turn allows the test to be applied to non-nested simultaneous equation models as well as to systems of regression equations.

Since the study is faced with a body of data and a set of alternative hypotheses that are non-nested by assumption, we will not be able to rank the models. Pesaran and Deaton (1978) made pairwise tests of each pair of hypotheses and ask the question, is the performance of H_i against the data consistent with the truth of H_i? The hypotheses are responsible for organizing data in order to yield meaningful information. The observations are meaningless without such organization. The non-nested test considers whether an alternative hypothesis contains sufficient information to reject the currently maintained hypothesis. It is thus important that tests between hypotheses or models should encompass the possibility of rejecting both since we are studying economics models.

According to Pesaran and Deaton,

> In natural sciences, at least historically, theories have tended to be rejected only in the face of strong evidence in favor of a particular alternative. In economics, where firmly established models are much less frequent, this has been less true. (1978, p. 679)

They calculated the Cox statistic using the log of the maximum likelihood ratio. We have non-nested models or hypotheses as follows:

$$H_0: y = f(\theta_0; X) + u_0$$

$$H_1: y = g(\theta_1; Z) + u_1 \qquad (2.14)$$

where y is the $nT \times 1$ vector of observations on all the n dependent variables, $f(\cdot) and\ g(\cdot)$ are the corresponding $nT \times 1$ vectors of predictions, $u_0 and\ u_1$ of errors, and X and Z are metrics of predetermined variables. Pesaran and Deaton (1978) denote the complete parameter sets of each model by the vectors α_0 and α_1 so that

$\alpha_0' = \{\theta_0', st(\Omega_0)'\}$ and $\alpha_1' = \{\theta_1', st(\Omega_1)'\}$

where $st(\Omega_0)$ and $st(\Omega_1)$ are the vectors formed by stacking the metrics Ω_0 and Ω_1 by columns. Pesaran and Deaton prove that if we maintain H_0 against H_1, the Cox statistic is given by

$$T_0 = \hat{L}_{10} - T\left[\underset{T\to\infty}{\text{plim}_0}\left(\frac{\hat{L}_{10}}{T}\right)\right]_{\alpha_0=\hat{\alpha}_0} \tag{2.15}$$

where $p\lim_{0}$ denotes the probability limit when H_0 is true, $\hat{L}_{10} = L_0(\hat{\alpha}_0) - L_1(\hat{\alpha}_1)$, $L_0(\hat{\alpha}_0) and L_1(\hat{\alpha}_1)$ are the log likelihood functions of H_0 and H_1, respectively.

For application, they used the analysis of the relationship between consumption and income using U.S. quarterly data seasonally adjusted, including observations on real, 1958 prices, on consumers' expenditures on nondurable goods and on personal disposable income. They use a variety of models, embodying alternative functional forms and alternative specifications of the lag structure between income and expenditures. The first model is the linear relationship among consumption, income and wealth. Their estimation gives the following results:

$$c = 26.510 + 0.84960y + .0084700w, R^2 = 0.997959 \; and \; \hat{\sigma}^2 = 17.3915$$

(9.766) (0.03592) (.0057178)

(2.16)

Another hypothesis is based on a natural variant of Duesenberry's relative income hypothesis, which states that the expenditure is a function of income and lagged consumption (Bc), and with the alternative hypothesis estimation results

$$c = 5.6294 + 0.33838y + 0.62827Bc, R^2 = 0.998722 \; and \; \hat{\sigma}^2 = 10.8887$$

(2.17)

Taking the first hypothesis as the maintain hypothesis, they fit the predicted values of the first result into the second results. Then, they reverse the procedure and take the second hypothesis as the maintain hypothesis. They found that the second hypothesis cannot be rejected against the evidence of the data and the first hypothesis combined. Thus, they concluded that the first hypothesis should be rejected in favor of the second.

Davidson and MacKinnon (1981) show procedures for testing the specification of an econometric model in the presence of one or more other models that purport to explain the same phenomenon. They noted that these procedures are closely related to the non-nested hypothesis tests proposed by Pesaran and Deaton (1978) based on the earlier work of Cox (1961, 1962) and Pesaran (1974).

They consider the case of a single-equation and test the hypothesis:

$$H_0: y_i = f_i(X_i, \beta) + \epsilon_{0i} \quad (2.18)$$

where y_i is the ith observation on the dependent variable, X_i is a vector of observations on the exogenous variable, β is a k vector of parameters to be estimated, and the error term $\epsilon_{0i}$is assumed to be $NID(0, \sigma_0^2)$. Suppose that economic theory suggests an alternative hypothesis, though not one in which we need have any faith:

$$H_1: y_l = g_i(Z_i, \gamma) + \epsilon_{1i} \quad (2.19)$$

where Z_i is a vector of observations on exogenous variables, γ is an l vector of parameters to be estimated, and ϵ_{li} is $NID(0, \sigma_1^2)$ if H_1 is true. They assumed that H_1 is not nested within H_0 and that H_0 is not nested within H_1. Thus the truth of H_0 implies the falsify of H_1, and vice versa.

Consider the possible nonlinear regression

$$y_i = (1 - \alpha) f_i(X_i, \beta) + \alpha \hat{g}_i + \epsilon_i \quad (2.20)$$

where $\hat{g}_i = g_i(Z_i, \hat{\gamma})$ and $\hat{\gamma}$ is the ML estimate of γ. If H_0 is true, then the true value of α is zero. Now $\hat{g}_i$ is simply a function of the exogenous variables Z_i and the parameter estimates $\hat{\gamma}$. The former are independent of ϵ_i by assumption. An even simpler way to test the truth of H_0 would be to estimate

$$y_i = (1 - \alpha)\hat{f}_i + \alpha \hat{g}_i + \epsilon_i, or\ y_i - \hat{f}_i = \alpha(\hat{g}_i - \hat{f}_i) + \epsilon_i, \quad (2.21)$$

where $\hat{f}_i = f_i(X_i, \hat{\beta})$.

Davidson and MacKinnon (1981) suggested three procedures for testing the validity of H_0. The first procedure, based on (3), will be referred to as the J test, since it involves estimating α and β jointly. It is extremely easy to use when H_0 is linear. The second procedure, based on (4), will be referred to as the C test, since it involves estimating α conditional on $\hat{\beta}$. They recommend the J test when H_0 is linear. They apply the test procedures to the data and models investigated by Paseran and Deaton, which considered five simple models of the relationship between real consumption and real personal disposable income using U.S. quarterly seasonally adjusted data for 1954-2 to 1974-3. They calculated a test statistics for the J test where the hypothesis being tested is linear. This is simply the t statistic associated with the estimate of α. Where the hypothesis being tested is nonlinear, this is the square root of twice the difference between the log-likelihood function evaluated at the maximum and evaluated at $(0,\hat{\beta})$, a quantity that is asymptotically distributed as $N(0,1)$ if the hypothesis under test is true. They conclude that those tests behave very much like the Cox-Pesaran-Deaton test, except that they less often produce enormous test statistics. Since the tests are trivially easy to implement, and since finding alternative models is rarely difficult, this method should be in widespread use in applied econometric work. This study mainly uses the J-test to compare the explanatory power of both models.

2.4 Financial Development and Economic Growth

The relationship between financial variables and economic growth can be traced back to Schumpeter (1911). He noted that the efficient allocation of saving through identification and funding of entrepreneurs with the best chances of successfully implementing innovative products and production processes is the tool necessary to achieve the economic growth. A better functioning financial system can ease the external financing constraint that impedes firm and industrial expansion. Goldsmith (1969) and McKinnon (1973) illustrate the close ties between financial and economic development for a few countries. McKinnon and Shaw (1973) show that theoretically an economy with an efficient financial system can achieve growth and development through efficient capital allocation. They argue that historically, many countries have restricted competition in the financial sector with government interventions and regulations. Then financial intermediaries do not function at their full capacity and fail to channel saving into investment efficiently. They also hypothesized that in developing countries the demand for money broadly defined is complementary to the demand for physical capital.

Bencivenga and Smith (1990) developed an endogenous growth model using multiple assets. They introduce financial intermediation into the environment and found that it shifts the composition of saving toward capital, causing intermediation to be growth promoting and also reduce socially unnecessary capital liquidation again promoting growth. They conclude from their model that it validates the view that the development of financial intermediation will increase real growth rates. This result is consistent with Greenwood and Jovanovic (1990). They also study the effect of financial intermediation and the rate of economic growth and find that financial intermediation promotes growth because it allows a higher rate of returns to be earned on capital, and growth in turn provides the means to implement costly financial structures. Their study addresses both issues of the linkage between economic growth and the distribution of income and the connection between financial structure and economic development. They found that growth provides the financial structure development, while financial structure in turn allows for higher growth when the investment is more efficiently undertaken. Their model yields a development process consistent with casual observation. As income levels rise, financial structure becomes more extensive, economic growth becomes more rapid and income inequality is widened. This result is confirmed by Levine and Zervos (1993), who found a robust correlation between financial development and economic growth.

The influential study on finance and growth is by King and Levine (1993). They used cross-country data for 80 countries over 1960-1989 to see if the financial system can promote economic growth. They investigated whether higher levels of financial development are significant and robustly correlated with faster current and future rates of economic growth. They constructed four indicators of financial variables that became widely used in the later literature. The first variable is the traditional measure of financial depth, which equals the overall size of the formal financial intermediary system or the ratio of liquid liabilities to GDP. The second variable is the importance of deposit banks relative to the central bank in allocating domestic credit. The third is the variable reflecting the distribution of credit using credit issued to nonfinancial private firms divided by total credit. The last variable reflects the ratio of credit distributed to nonfinancial private firms by GDP. Using various measures of financial development, they found that financial development is strongly correlated with real per capita GDP growth, the rate of physical capital accumulation and the improvements in the efficiency with which economies employ physical capital. They confirmed Schumpeter (1911), who argued that the services provided by financial intermediaries are essential for technological innovation and economic development.

Economic growth can be derived from the enhancement of the nation's technology and also the increase in the nation's factor stock or "primitives," labor, physical and human capital. If this hypothesis is true, we should not expect indicators of financial development to appear in the standard growth accounting exercise that already incorporates factor accumulation as explanatory variables.

Benhabib and Spiegel (2000) tested the role of financial development in economic growth by introducing first a variety of specifications for the base-growth equation and then the indicators of financial development into the specification and examining whether they contain any further explanatory power with and without allowing for country-specific fixed effect. They found that the indicators of financial depth and credit allocation have significant coefficients in both neoclassical and endogenous growth specification. These variables enter significantly with their predicted positive signs with fixed effects included. The performances of both variables are the same in the neoclassical and the endogenous growth models. Therefore, financial variables play some role in income growth. They all have positive influences through rates of investment and total factor productivity growth.

One of the latest studies on the growth of the financial sector is by Greenwood and Scharfstein (2013). They study the financial sector in the U.S. and find that share of financial sector to GDP has increased at a faster rate since 1980 than it did in the prior 30 years. Their study questions if the society has benefited from the recent growth of the financial sector. One main finding of Greenwood and Scharfstein (2013) is that much of the growth of finance is associated with two activities: asset management and the provision of household credit. A large part of growth from asset management has come from the increase in the value of financial assets, which is driven by an increase in stock market valuation. On the household credit side, the growth comes from fees on loan origination, underwriting of asset-backed securities, trading and management of fixed income products and derivatives trading. They conclude that the main benefit has been that it facilitated an increase in financial market participation and diversification, which lowered the cost of capital to corporations.

Literature on the relationship between financial sector and overall economic growth indicates that they affect one another in a positive relationship. When financial markets and intermediation can function more efficiently, the facilitation of the flow of funds will stimulate the efficient channel from saving to investment, which leads to higher levels of economic growth. Therefore, this study uses financial variables for a crucial explanation of the economic growth in the East Asian countries.

CHAPTER 3

DATA AND METHODOLOGY

3.1 Demand-side Model

For the developing countries, Thirlwall and Hussain (1982) introduced the role of capital inflows into the simple Harrod foreign trade multiplier since it has played a larger role in economic performance in recent decades. They found that since some developing countries have experienced the bottleneck of foreign exchange, their ever growing current account deficits are financed by capital inflows, which allow these countries to grow permanently faster than otherwise (Thrilwall & Hussain, 1982). The balance of payment constrained growth rate in their model is defined by:

$$y^* = \frac{\left(\frac{E}{R}\alpha + \phi\right)(p_{dt} - e_t - p_{ft}) + (p_{dt} - p_{ft} - e_t) + \frac{E}{R}(\beta(w_t)) + \frac{C}{R}(c_t - p_{dt})}{\pi} \qquad (3.1)$$

$y*$ is the GDP growth which calculated from Thirlwall and Hussain's model. $\left(\frac{E}{R}\right) and \left(\frac{C}{R}\right)$ represent the share of exports and capital flows as a proportion of total receipts (or the proportion of the import bill financed by export earnings and capital flows). p_{dt} is the rate of change in domestic price of exports; p_{ft} is the rate of change in foreign price of imports; e_t is the rate of change in exchange rate (measured as the domestic price of foreign currency); and c_t is the rate of change in the value of capital flows. Net capital inflows will increase import capacity and raise income. Income elasticities of exports and imports are β and π, respectively. α and ϕ are the price elasticity of export and import. w represents the change in income of the export market.

The estimation of income elasticity of demand for import in this study is estimated by the two-stage least square method. To test this idea, this study uses a sample of East Asian countries and employs the elasticity of demand for import and export estimate using the two-stage least square technique over the period 1980-2010. After calculating the predicted growth rate from this balance-of-payment constrained model, I compared them with the actual growth series to explain the convergence of two series using the regression by the following specification:

$$y_i = \beta_i y_i^* \tag{3.2}$$

where y_i^* is the predicted growth of output from the model that we have mentioned and y_i is the actual growth rate of country i. Then the hypothesis that $\beta_i = 1$ is tested. This study examines not only the single country, but also the overall region using pooled time series data and compares the region's estimation results with the augmented Solow model estimation.

3.2 Supply-side Model

Using both individual country data and panel data analysis to estimate the specification from augmented Solow growth model,

$$\ln\left[\frac{Y_i(t)}{L_i(t)}\right] = \ln A_i(t) - \frac{\alpha+\beta}{1-\alpha-\beta}\ln(n_i + g_i + \delta_i) + \frac{\alpha}{1-\alpha-\beta}\ln(s_{ki}) + \frac{\beta}{1-\alpha-\beta}\ln(s_{hi})$$

(3.3)

where i represents the country; s_k is the fraction of income invested in physical capital; s_h is the fraction invested in human capital (this study uses the completion rate of tertiary education or ratio of people complete the college degree to the total number of labor force as a proxy of human capital since the data on human capital investment are not available); α is the share of physical capital in total income; β is the share of human capital in total income; and $\alpha + \beta < 1$ or assumes diminishing returns on capital.

In addition, assume that labor force grows atT $L(t) = L(0)e^{nt}$. This study assumes that technology depends on capital inflows or K_f by assuming that the foreign direct investment has a large role in technology $A(t) = A(0)e^{gt}e^{\phi K_f}$. The constant fraction of output; $s = s_k + s_h$, is invested. The specification can be rewritten by:

$$\ln\left[\frac{Y_i(t)}{L_i(t)}\right] = \ln A_i(0) + gt + \phi K_f - \frac{\alpha+\beta}{1-\alpha-\beta}\ln(n_i + g_i + \delta_i) + \frac{\alpha}{1-\alpha-\beta}\ln(s_{ki}) + \frac{\beta}{1-\alpha-\beta}\ln(s_{hi})$$

(3.4)

This model will be estimated using both panel data analysis and single time series of each country. After obtaining the predicted growth series from the model, the study calculates some goodness-of-fit criterion. Processes of the J-test of the estimation result will be compared with the demand-side model.

3.3 Testing Two-competing Model by the Non-nested J-test

The non-nested J-test used in this study compares two competing model specifications. Using different explanations, both the augmented Solow model and the Thirlwall and Hussain growth model are theoretically plausible in describing the behavior of the output growth. The J-test requires estimating four regression equations. In the first step, the augmented Solow model is estimated and the predicted values of the dependent variables, $\widehat{log\left[\frac{Y_\iota(t)}{L_\iota(t)}\right]}$, are obtained. The second step is analogous to the first step in that Thirlwall and Hussain's model and the predicted values from this model, $\widehat{y_{BOPC}}$, are also derived.

In the third step, the predicted values from Thirlwall and Hussain's model are included as an explanatory variable in the augmented Solow model, and the predicted value from the augmented Solow model is included in the Thirlwall and Hussain model specification in the fourth step. The critical idea is whether the predicted values from one model add significant explanatory power to the other model. The specifications of the third and fourth steps are the following:

$$y_i = \lambda_0 + \lambda_1 y^*_{BOPC} + \lambda_2 \widehat{y_{ASL}} \tag{3.5}$$

$$ln\left[\frac{Y_i(t)}{L_i(t)}\right] = \gamma_0 + \gamma_1 K_f - \gamma_2 \ln(n_i + g_i + \delta_i) + \gamma_3 \ln(s_{ki}) + \gamma_4 \ln(s_{hi}) + \gamma_5 log\left[\widehat{\frac{Y_\iota(t)}{L_\iota(t)}}\right]_{BOPC} \tag{3.6}$$

where $\widehat{y_{ASL}}$ is the output growth that calculated from the series of $\widehat{log\left[\frac{Y_\iota(t)}{L_\iota(t)}\right]}$, which is obtained from the augmented Solow model. $\widehat{log\left[\frac{Y_\iota(t)}{L_\iota(t)}\right]}_{BOPC}$ is the log of output per capita calculated based on the Thirlwall and Hussain model.

3.4 Data

The data are in the form of both individual country's time series data and pooled time series data from selected East Asian countries: Japan, Korea, China, Singapore, Philippines, Thailand, Indonesia, Malaysia, 1980-2010. The details of data used for each variable in the study follow.

3.4.1 The Augmented Solow Model

$$\ln\left[\frac{Y_i(t)}{L_i(t)}\right] = \ln A_i(0) + gt + \phi K_{fi}(t) - \frac{\alpha+\beta}{1-\alpha-\beta}\ln(n_i + g_i + \delta_i) + \frac{\alpha}{1-\alpha-\beta}\ln(s_{ki}) + \frac{\beta}{1-\alpha-\beta}\ln(s_{hi})$$

(3.7)

$Y_i(t)$ is the Gross Domestic Product (GDP) at the current price in USD of country i.

$L_i(t)$ is the number of people in the labor force of country i.

$K_{fi}(t)$ is separated into three cases: Retained Profit (RP_i), Foreign Loans (FL_i) and Foreign Equities (FE_i). Each is measured in USD in country i.

RP_i is the primary income on foreign direct investment measured in current US dollar. It covers payments of direct investment income (debit side), which consists of income on equity (dividends, branch profit and reinvested earnings) and income on the intercompany debt (interest). Please note that these variables data are not available for Japan, Korea and Singapore (according to databank.worldbank.org).

FL_i is represented by the external debt stocks measured in current USD. Total external debt is debt owed to nonresidents repayable in foreign currency, goods or service. Total external debt is the sum of public, public guaranteed and private non-guaranteed long-term debt, use of International Monetary Fund (IMF) credit and short-term debt. Short-term debt includes all debt having an original maturity of 1 year or less and interest in arrears on long-term debt.

FE_i is represented by portfolio equity, net inflows in the balance of payments, measured in current USD. It includes net inflow from equity securities other than those recorded as direct investment and also includes shares, stocks, depository receipts and direct purchases of shares in local stock markets by foreign investors.

n_i is the growth rate of labor force (age 15-60) of country i, measured as a percentage.

g_i is the total factor productivity, calculated from the growth accounting approach and measured as a percentage.

δ_i is the depreciation rate, represented by the percentage change of consumption of fixed capital.

s_{ki} is the share of physical capital invested to total capital, represented by the share of fixed capital to total investment.

s_{hi} is the fraction invested in human capital. This study uses the completion rate of tertiary education or ratio of people who complete a college degree to the total number in the labor force as a proxy of human capital since the data on human capital investment are not available. Data are obtained from Barro R. and J.W. Lee (2010). Since the data are for a 5-year period, the study uses the interpolation technique to generate the missing data.

3.4.2 The Balance-of-Payment Constrained Model

$$y^* = \frac{\left(\frac{E}{R}\alpha + \phi\right)(p_{dt} - e_t - p_{ft}) + (p_{dt} - p_{ft} - e_t) + \frac{E}{R}(\beta(w_t)) + \frac{C}{R}(c_t - p_{dt})}{\pi} \quad (3.8)$$

y^* is the predicted output growth from the BOPC model.

$\left(\frac{E}{R}\right) and \left(\frac{C}{R}\right)$ represents the share of exports and capital flows as a proportion of total receipts (or the proportion of the import bill financed by export earnings and capital flows). The study uses the ratio of value of exports of goods and services at the current price to total income. Total income is calculated by the aggregation of the private capital flows and values of exports of goods and services both measured in current US dollar.

Private capital flows consist of net foreign direct investment and portfolio investment. Foreign direct investment is net inflows of investment to acquire a lasting management interest (10% or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital. The FDI included here is total net, that is, net FDI in the reporting economy from foreign sources less net FDI by the reporting economy to the rest of the world. Portfolio investment excludes liabilities constituting foreign authorities' reserves and cover transactions in equity securities and debt securities.

p_{dt} is the rate of change in domestic price of exports. The study uses the export value index as a proxy. Export values are the current value of exports (f.o.b) converted to US dollar and expressed as a percentage of average for the base period. The data available on the World Bank database are based on year 2000 data. This study changes the base to be a year on year base.

p_{ft} is the rate of change in foreign price of imports. The study uses the import value index as a proxy. Import value indexes are the current value of imports (c.i.f.) converted to US dollar and expressed as a percentage of the average for the base period. The data available on the World Bank database are based on 2000. This study changes the base to be a year on year base.

e_t is the rate of change in exchange rate (measured as the domestic price of foreign currency).

c_t is the rate of change in value of private capital flows.

β is the income elasticity of demand for export from the export market. The study estimates this parameter using ordinary least square analysis and based on the assumption that the export value of a country depends on price and income using the following specification:

$$expg_i = \alpha + \beta wig_i + \emptyset(inf_i - e_i - p_{fti}) \qquad (3.9)$$

where wig_i is the rate of growth of (world income-country i's income), inf_i is the inflation rate in country i, $p_{fti}$is the change in import value index of country i.

π is the income elasticity of demand for import of country i. The study estimates this parameter using a two-stage least square technique to eliminate the endogeniety problem and assumes that import values depends on domestic income and import price using the following specification:

$$impg_i = \mu + \pi growth_i + \alpha(p_{fti} + e_i - inf_i) \qquad (3.10)$$

where $growth_i$ is the income growth of country i. The instrumental variables are p_{fti}, e_i, inf_i and the constant term.

α is the price elasticity of demand for imports

ϕ is the price elasticity of demand for export

W is the change in income of the export market. This study uses the change of (world income-country i's income) as a proxy for export market income growth.

3.5 Explaining the Errors of the Growth Models by Financial Variables

After comparing the goodness-of-fit criteria of both models, the study also found that there are some gaps between the actual output growth and the fitted growth from the models. The study hypothesized that financial development variables are crucial for explaining this region's growth. The hypothesis is based on the assumption that the financial sector facilitates other sectors' flow of funds, and leads to an increase in efficiency of the overall economy.

The study adds each single financial variable and also the respective interaction terms to consider which financial variable has the most influential impact on growth. The dummy variables for each break are also included. The technique for estimation is Autoregressive Conditional Heteroschedasticity (ARCH). Each country's specifications for estimation are the following:

$$(y*-y) = c + \beta_1 DEPTH + \beta_3 dum1 + \beta_4 dum2 + \beta_5 dum3 \quad (3.11)$$

$$(y*-y) = c + \beta_1 BANK + \beta_3 dum1 + \beta_4 dum2 + \beta_5 dum3 \quad (3.12)$$

$$(y*-y) = c + \beta_1 PRIVY + \beta_3 dum1 + \beta_4 dum2 + \beta_5 dum3 \quad (3.13)$$

$$(y*-y) = c + \beta_1 (DEPTH * BANK) + \beta_3 dum1 + \beta_4 dum2 + \beta_5 dum3 \quad (3.14)$$

$$(y*-y) = c + \beta_1 (DEPTH * PRIVY) + \beta_3 dum1 + \beta_4 dum2 + \beta_5 dum3 \quad (3.15)$$

$$(y*-y) = c + \beta_1 (BANK * PRIVY) + \beta_3 dum1 + \beta_4 dum2 + \beta_5 dum3 \quad (3.16)$$

where y is the actual output growth and y* is the fitted growth from both models. The selected financial variables are the following:

DEPTH: Liquid Liabilities to GDP is a traditional indicator of financial depth. It equals currency plus demand and interest-bearing liabilities of banks and other financial intermediaries divided by GDP, which is the broadest available indicator of financial intermediation (Beck and Demirguc-Kunt, 2009).

BANK:; The ratio of deposit money bank domestic assets to deposit money bank domestic assets plus central bank domestic assets shows the size of service provided by deposit money banks in financial service. However, this variable does not measure to whom the financial system is allocating credit.

PRIVY: This is the proportion of credit allocated to private enterprise by the financial system. This measure equals the ratio of claims on private sector to GDP. It represents credit allocation and overall size of the private sector and degree of private sector borrowing, which indicates the share of credit funneled through the private sector.

Following the standard literature, the theoretical literature predicts DEPTH, BANK and PRIVY to be positive determinants of real income.

dum1 is the dummy variable representing the period 1991-1996

dum2 is the dummy variable representing the period 1997-2001

dum3 is the dummy variable representing the period 2002-2009

3.5.1 Autoregressive Conditional Heteroskedasticity

In conventional econometric models, the variance of the disturbance term is assumed to be constant. However, many econometric time series exhibit periods of unusually large volatility followed by periods of relative tranquility. Figure 3.1 shows the fluctuation of the GDP growth of the countries selected for this study. In such situations, the assumption of a constant variance (homoscedasticity) is inappropriate. One approach to forecasting the variance is to explicitly introduce an independent variable that helps to predict the volatility.

From Figure 3.1 which shows GDP growth rate series of seven East Asian countries, we can see some large fluctuations and some relatively constant periods; therefore we decided to put the condition on the variance of the disturbance terms.

The variance of y_{t+1}conditional on the observable value of x_t is

$$Var(y_{t+1}|x_t) = x_t^2\sigma^2 \tag{3.17}$$

Engle (1982) shows that it is possible to model the mean and variance of series simultaneously. If the variance of $\{\epsilon_t\}$ is not constant, we can estimate any tendency for sustained movements in the variance using an ARMA model (Autoregressive Moving Average Model). For example, let $\{\widehat{\epsilon_t}\}$ denote the estimated residuals from the model $y_t = a_0 + a_1 y_{t-1} + \epsilon_t$, so that the conditional variance of y_{t+1} is

$$Var(y_{t+1}|y_t) = E_t[(y_{t+1} - a_0 - a_1 y_t)^2] = E_t\epsilon_{t+1}^2 = \sigma^2 \tag{3.18}$$

Now suppose that the conditional variance is not constant. One simple strategy is to model the conditional variance as an AR(q) process using the square of the estimated residuals:

$$\hat{\epsilon}_t^2 = \alpha_0 + \alpha_1\hat{\epsilon}_{t-1}^2 + \alpha_2\hat{\epsilon}_{t-2}^2 + \cdots + \alpha_q\hat{\epsilon}_{t-q}^2 + v_t \tag{3.19}$$

where v_t = a white-noise process.

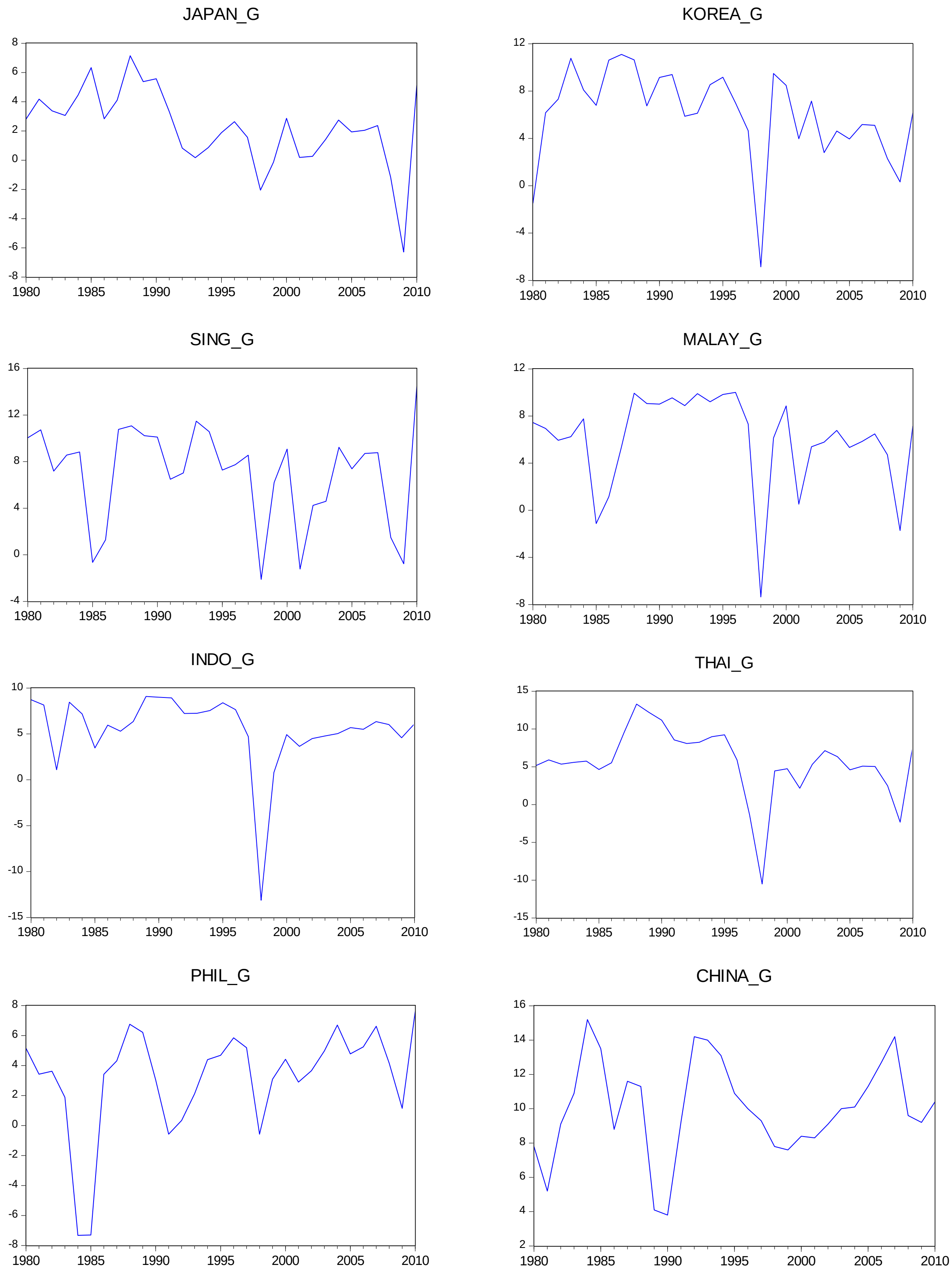


Figure 3.1 GDP growth of selected East Asian countries

Now suppose that the conditional variance is not constant. One simple strategy is to model the conditional variance as an AR(q) process using the square of the estimated residuals:

$$\hat{\epsilon}_t^2 = \alpha_0 + \alpha_1 \hat{\epsilon}_{t-1}^2 + \alpha_2 \hat{\epsilon}_{t-2}^2 + \cdots + \alpha_q \hat{\epsilon}_{t-q}^2 + v_t \qquad (3.19)$$

where v_t = a white-noise process.

If the values of $\alpha_1, \alpha_2, \dots, \alpha_n$ all equal zero, the estimated variance is simply the constant α_0. Otherwise, the conditional variance of y_t evolves according to the autoregressive process. Bollerslev (1986) extended Engle's original work by developing a technique that allows the conditional variance to be an ARMA process. Now let the error process be such that

$$\epsilon_t = v_t \sqrt{h_t} \qquad (3.20)$$

where $\sigma_v^2 = 1$

and $$h_t = \alpha_0 + \sum_{i=1}^{q} \alpha_i \, \epsilon_{t-i}^2 + \sum_{i=1}^{p} \beta_i h_{t-i} \qquad (3.21)$$

Since $\{v_t\}$ is a white-noise process that is independent of past realization of ϵ_{t-i}, the conditional and unconditional means of ϵ_t are equal to zero.

Taking the expected value of ϵ_t we get,

$$E\epsilon_t = E v_t \sqrt{h_t} = 0 \qquad (3.22)$$

The generalized ARCH (p,q) model can be called GARCH(p,q). It allows for both autoregressive and moving average components in the heteroskedastic variance. The key feature of GARCH models is that the conditional variance of the disturbances of the $\{y_t\}$ sequence constitutes an ARMA process. The ACF (Autocorrelation Function) of the squared residuals can help identify the order of the GARCH process.

The presence of heteroskedasticity can cause invalidation in the usual standard error, t statistics and F statistics. In order to cope with these two problems, we apply the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model, which includes autoregressive terms as well as the moving average terms in the variance equation using the following specification in our study:

$$\sigma_t^2 = \alpha_0 + \alpha_1 \epsilon_{t-1}^2 + \cdots + \alpha_q \epsilon_{t-q}^2 + \beta_1 \sigma_{t-1}^2 + \cdots + \beta_p \sigma_{t-p}^2$$

$$= \alpha_0 + \sum_{i=1}^{q} \alpha_i \epsilon_{t-i}^2 + \sum_{i=1}^{p} \beta_i \sigma_{t-i}^2 \qquad (3.23)$$

The mean value and the variance will be defined relative to the past information set. The dependent variable in the present will be equal to the mean value of itself based on the past information plus the standard deviation times the error terms for the present period. The GARCH model with one autoregressive lag and one moving average lag is typically called GARCH (1,1). In this study we try among GARCH (0,1), GARCH(1,0), GARCH(1,1) to choose the best model to fit each country and each financial variable.

CHAPTER 4

EMPIRICAL RESULTS AND ANALYSIS

4.1 Empirical Results of Thirlwall and Hussain's Growth Model

Using the two-stage least square technique of estimation, we eliminate the endogeniety problem between import growth and output growth in the income elasticity of demand for import estimation. Also, the study calculates different elasticities by different period of structural breaks. The results of income elasticities and price elasticitites are shown in Table 4.1, 4.2 and 4.3, respectively.

Table 4.1 Income Elasticity of Demand for Import : Entire Period (1979-2010)

Income Elasticity of Demand for Import	1979-2010
Japan	1.632253
Korea	1.270034
Singapore	0.996048
Indonesia	1.320153
Malaysia	0.797457
The Philippines	1.963297
Thailand	0.598586
China	4.046345

Table 4.2 Income Elasticity of Demand for Import: Structural Breaks

Income Elasticity of Demand for Import	1979-1990	1991-1996	1997-2001	2002-2010
Japan	1.149566	3.620605	2.584544	2.270952
Korea	1.131219	1.537146	1.399799	1.445734
Singapore	0.991888	0.514582	1.314029	0.724521
Indonesia	0.81634	1.290093	1.199061	0.865785
Malaysia	0.590237	0.577229	1.307095	0.57387
The Philippines	2.938893	4.193908	1.843644	0.759517
Thailand	0.560599	0.648447	3.146129	-0.06819
China	10.01010	4.955543	-0.728812	1.849178

Table 4.3 Price Elasticity of Demand for Import: Structural Breaks

Price Elasticity of Demand for Import	1979-1990	1991-1996	1997-2001	2002-2010
Japan	0.177759	0.177759	0.177759	0.177759
Korea	0.038796	0.050142	0.143917	-0.054963
Singapore	0.343635	1.504223	-0.246198	0.35087
Indonesia	0.363771	0.955832	0.600160	0.465368
Malaysia	0.213876	0.716220	0.475615	0.564869
The Philippines	0.341277	0.228062	0.115673	0.433648
Thailand	0.540556	0.319155	1.251485	0.249615
China	0.12776	-0.303876	0.079848	0.139278

Almost all income elasticity of demand for import values in 1980-2010 follows the theoretical sign (positive). For the entire period of estimation, all countries in the study have income elasticity of demand for import greater than zero, which means if the income increases one percent, imports will increase. Among all countries and periods, China's economy has the highest elasticity at 4.96 during 1991-1996 and Singapore's has the lowest one at 0.515 during 1991-1996. For more developed countries, Japan, Korea and Singapore's elasticity increased from the first period to the third period, and then dropped in the last period. ASEAN-4 countries all had fluctuation in elasticity for the four periods. In two cases income elasticities are lower than zero: China 1997-2001 and Thailand 2002-2010.

For price elasticity of demand for import, almost all countries in the study have a positive relationship between changes in price and changes in imports, which means when there is an increase in price, imports will also increase. For the export markets of each country, the study estimates the income and price elasticity of demand for export and gets the results shown in Tables 4.4 to 4.6.

Normally the studies testing the BOPC model use the single value of import elasticity and export elasticity. However, in this study, there are significant changes in the structure of international trade of these countries during the different periods so different values of elasticity are applied. The changes of income elasticities of demand for import and export in this region can be explained by the rise in the intraindustry trade, which has grown since the 1980s.

Table 4.4 Income Elasticity of Demand for Export: Entire Period

Income Elasticity of Demand for Export	1979-2010
Japan	1.14322
Korea	1.730096
Singapore	1.348549
Indonesia	0.738299
Malaysia	0.943222
The Philippines	1.064364
Thailand	1.741901
China	4.391184

Table 4.5 Income Elasticity of Demand for Export: Structural Breaks

Income Elasticity of Demand for Export	1980-1990	1991-1996	1997-2001	2002 2010
Japan	0.810654	-0.34043	9.484376	1.572465
Korea	1.544625	1.229632	7.718635	2.187472
Singapore	0.582172	1.183122	5.348774	2.111627
Indonesia	-0.68096	0.929866	7.090995	1.690206
Malaysia	0.702484	1.318194	6.212981	1.054025
The Philippines	0.333795	1.655026	6.977884	1.527519
Thailand	1.811437	0.871036	4.113006	1.69839
China	4.032886	5.198991	10.93715	6.641418

Table 4.6 Price Elasticity of Demand for Export: Structural Breaks

Income Elasticity of Demand for Export	1980-1990	1991-1996	1997-2001	2002 2010
Japan	-0.404225	-0.404225	-0.404225	-0.404225
Korea	-0.643160	-1.051063	-0.847731	-0.314625
Singapore	-1.137449	-1.147535	-1.278648	-0.533242
Indonesia	-0.464111	-0.293844	0.034956	-0.301779
Malaysia	-0.388677	-0.342188	-0.110628	-0.384061
The Philippines	-0.213193	-0.040648	-0.169777	-0.479431
Thailand	-0.420710	-0.813604	-0.432737	-0.208173
China	0.092166	-0.221885	-0.489728	-0.040517

Grant et al. (1993) find indicators that intraindustry trade has continued to grow as a share of overall national trade, most rapidly for the rapidly developing countries of East and Southeast Asia.

Multinational corporations from Japan, Korea and Taiwan became large players in international trade especially in the manufacturing sector. Manufacturing trade showed strong growth during 1965-1990. By contrast, trade in agricultural and other primary commodities has been weakening. From this phenomenon in trade, the compositions of trade both import and export are shifting toward goods with more advanced technologies, toward heterogeneous goods (away from homogenous goods), and toward producer goods (away from consumer goods) (Grant et al., 1993). Also, this region especially in ASEAN countries has increased in its openness ratio (exports of goods and nonfactor services to GDP multiplied by 100) compared to 1965 (World bank, 1992). The openness ratio of selected countries in East Asia comparing between 1965 and 1990 is shown in Table 4.7.

Since the import and export composition has been changed from primary products to intrafirm and intraindustry trade in technological manufacturing products driven by multinational corporations, the value of products in trade has increased by the character of the commodities.

In addition, the share of export to GDP increased dramatically from 1965 to 1990 by trade liberalization and therefore the income elasticity of demand for export of these countries (except Japan) also increases in the first three periods of study, especially during the Asian crisis since the exchange rates of this region were depreciated and gained competitiveness in their exports. These reasons explain why income elasticities of demand for both imports and exports in this region have risen.

4.1.1 Thirlwall and Hussain's Growths

The study uses the elasticity values from the estimation by different periods and calculates the BOPC growth using Thirlwall and Hussain (1982);

$$y^* = \frac{\left(\frac{E}{R}\alpha + \phi\right)(p_{dt} - e_t - p_{ft}) + (p_{dt} - p_{ft} - e_t) + \frac{E}{R}(\beta(w_t)) + \frac{C}{R}(c_t - p_{dt})}{\pi} \qquad (4.1)$$

Table 4.7 Openness Ratio, 1965 and 1990

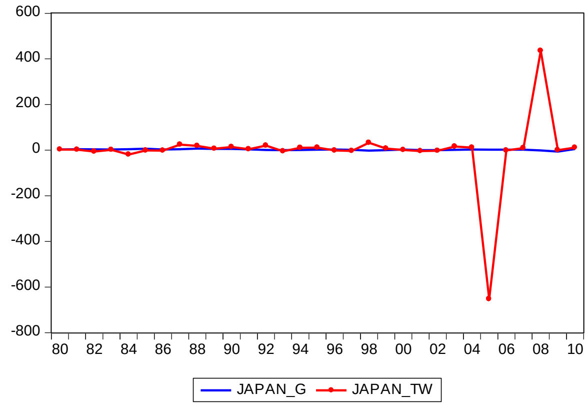
Country	1965	1990
Japan	11	11
Korea	9	32
Singapore	123	190
Indonesia	5	26
Malaysia	16	38
The Philippines	17	28
Thailand	16	38

Source: World Bank (1992), table 9, 234-35

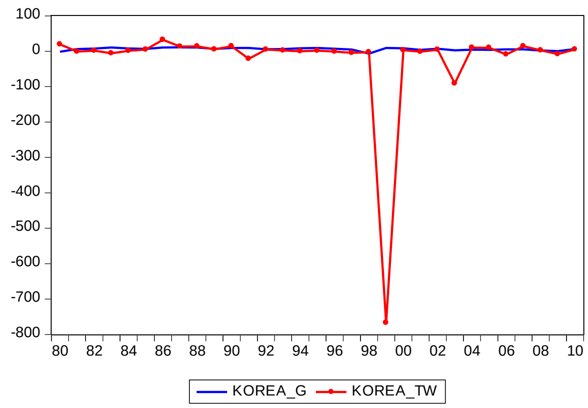
where y* is the growth rate of GDP calculated from Thirlwall and Hussain's model. $\left(\frac{E}{R}\right) and \left(\frac{C}{R}\right)$ represents the share of exports and capital flows as a proportion of total receipts (or the proportion of the import bill financed by export earnings and capital flows). p_{dt} is the rate of change in domestic price of exports; p_{ft} is the rate of change in foreign price of imports; e_t is the rate of change in exchange rate (measured as the domestic price of foreign currency), and c_t is the rate of change in value of capital flows. Net capital inflows will increase import capacity and raise income. Income elasticities of exports and imports are β and , π respectively. α and ϕ are the price elasticities of export and import. w represents the change in income of the export market.

The calculated growth series of each country can be compared to the actual output growth, as shown in Figure 4.1.

Japan



Korea



Singapore

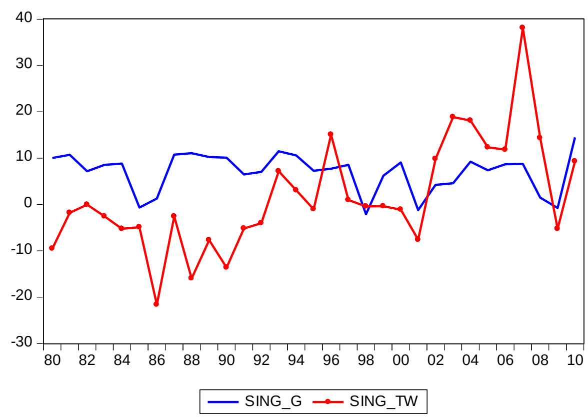
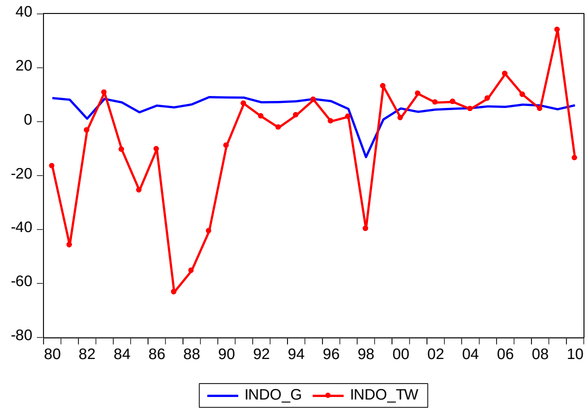
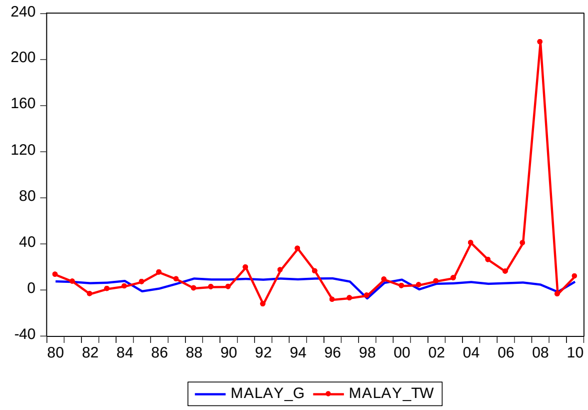


Figure 4.1 Thirlwall and Hussain's Predicted Growth and the Actual Growth

Indonesia



Malaysia



The Philippines

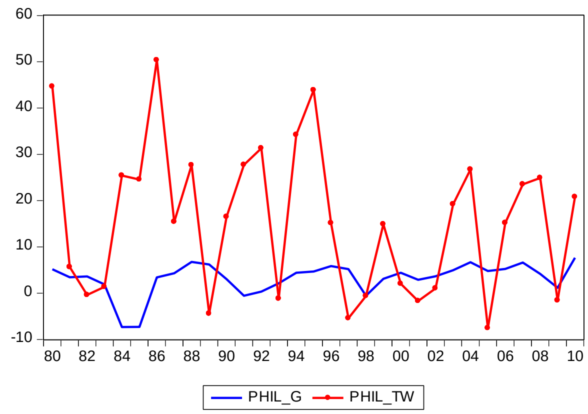
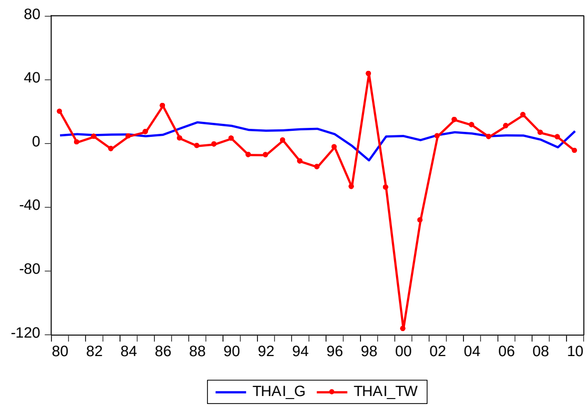


Figure 4.1 Continued

Thailand



China

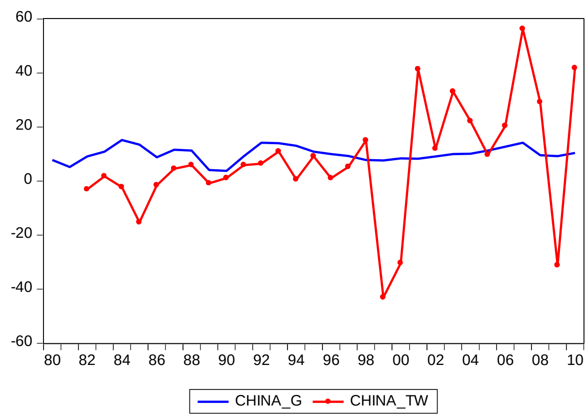


Figure 4.1 Continued

4.1.2 Testing Validity of Thirlwall and Hussain's Growth and the Actual Growth

After I obtained the growth series calculated from Thirlwall and Hussain's definition in each country, I used econometric techniques to test whether the calculated growth can explain the actual growth rate by significant statistical inferences. The testing uses the following specification:

$$y_i = \alpha + \beta_i y_i^* \qquad (4.1)$$

where y_i is the actual growth rates of countries i, y_i^* is the calculated growth series from Thirlwall and Hussain's definition. Using simple ordinary least square to estimate this specification, the null hypothesis, that the coefficient $\alpha = 0, \beta_i = 1$ at the same time, is then tested. The estimation result of the actual growth and the Thirlwall and Hussain's growth is presented in Table 4.8 and 4.9.

The result of the WALD test from the structural break panel data analysis is that it rejects the null hypothesis of , $\alpha = 0, \beta_i = 1$ which means again that Thirlwall and Hussain's hypothesis of growth cannot explain the growth series in this region. However, the limitation of this test is that g_i^* are derived using estimated parameters, which implies that each observation of g_i^* has an associated standard error, meaning that g_i^* is a stochastic variables and the use of OLS will lead to bias in estimates.

Table 4.8 Estimating Results

	Constant	Thirlwall and Hussain's growth	R^2
Japan	2.247489***	-0.002056	0.012282
S.E.	0.483765	0.003423	
Korea	6.019811***	-0.003701	0.017768
S.E.	0.710742	0.005109	
Singapore	6.946066***	0.042718	0.014670
S.E.	0.771591	0.065011	
Indonesia	5.597470***	0.023201	0.016462
S.E.	0.759173	0.033300	
Malaysia	6.014461***	-0.000128	0.000002
S.E.	0.785657	0.018823	
The Philippines	3.316875***	-0.006127	0.000797
S.E.	0.898150	0.040275	
Thailand	5.565149***	-0.018511	0.012259
S.E.	0.817063	0.030854	
China	10.07416***	0.026870	0.044709
S.E.	0.531101	0.023903	

Table 4.9 Panel Data Analysis with Fixed Effects

	Constant	Thirlwall and Hussain's growth	Dummy 1980-1990	Dummy 1991-1996	Dummy 1997-2001	R^2
Panel	5.30644***	-0.004592	1.274334**	1.930771***	-2.577326***	0.388618
S.E.	0.407893	0.003053	0.552105	0.643233	0.688190	

4.2 Empirical Results of the Mankiw et al. (1992) Model of Economic Growth with Human Capital

Based on the hypothesis that the supply-side variables are the determinants of economic growth, Mankiw et al. (1992) add the human capital variables to the Solow growth model and have the following specification in their study:

$$\ln\left[\frac{Y_i(t)}{L_i(t)}\right] = \ln A_i(t) - \frac{\alpha+\beta}{1-\alpha-\beta}\ln(n_i + g_i + \delta_i) + \frac{\alpha}{1-\alpha-\beta}\ln(s_{ki}) + \frac{\beta}{1-\alpha-\beta}\ln(s_{hi}) \quad (4.2)$$

where i represents the country; s_k is the fraction of income invested in physical capital; s_h is the fraction invested in human capital, which in this study is represented by the rate of completion of the tertiary level of education ; α is the share of physical capital in total income; β is the share of human capital in total income; and $\alpha + \beta < 1$ assumes diminishing returns on capital. In addition, assume that $L(t) = L(0)e^{nt}$. For technology, this study assumes that it depends on capital inflows or K_f by assuming that the foreign direct investment has a large role in technology in the form of ; $A(t) = A(0)e^{gt}e^{\phi K_f}$. The model assumes that a constant fraction of output, $s = s_k + s_h$, is invested. The specification can be rewritten by:

$$\ln\left[\frac{Y_i(t)}{L_i(t)}\right] = \ln A_i(0) + gt + \phi K_f - \frac{\alpha+\beta}{1-\alpha-\beta}\ln(n_i + g_i + \delta_i) + \frac{\alpha}{1-\alpha-\beta}\ln(s_{ki}) + \frac{\beta}{1-\alpha-\beta}\ln(s_{hi}) \quad (4.3)$$

The study uses this specification to estimate the power of determination of economic growth from the supply-side variables. In addition, K_f or capital inflows, is categorized into three groups: retained profits (RP), foreign loans (FL) and foreign equities (FE). The first specification uses only retained profits as foreign capital inflows, the second specification uses retained profits plus foreign loans as foreign capital inflows and the last one uses all categories together. This set of specifications is estimated using the least square method.

The specification of the study is presented by equation 4.4-4.6.

$$\ln\left[\frac{Y_i(t)}{L_i(t)}\right] = \ln A_i(0) + gt + \phi_1 RP_i - \frac{\alpha+\beta}{1-\alpha-\beta}\ln(n_i + g_i + \delta_i) + \frac{\alpha}{1-\alpha-\beta}\ln(s_{ki}) + \frac{\beta}{1-\alpha-\beta}\ln(s_{hi}) + \upsilon_{1i}$$

(4.4)

$$\ln\left[\frac{Y_i(t)}{L_i(t)}\right] = \ln A_i(0) + gt + \phi_1 RP_i + \phi_2 FL_i - \frac{\alpha+\beta}{1-\alpha-\beta}\ln(n_i + g_i + \delta_i) + \frac{\alpha}{1-\alpha-\beta}\ln(s_{ki})$$

$$+ \frac{\beta}{1-\alpha-\beta}\ln(s_{hi}) + \upsilon_{2i}$$

(4.5)

$$\ln\left[\frac{Y_i(t)}{L_i(t)}\right] = \ln A_i(0) + gt + \phi_1 RP_i + \phi_2 FL_i + \phi_3 FE_i - \frac{\alpha+\beta}{1-\alpha-\beta}\ln(n_i + g_i + \delta_i)$$

$$+ \frac{\alpha}{1-\alpha-\beta}\ln(s_{ki}) + \frac{\beta}{1-\alpha-\beta}\ln(s_{hi}) + \upsilon_{3i}$$

(4.6)

The results of these specifications of each country are separated in section 4.2.1 and 4.2.2 and the results of the estimation are shown in Tables 4.10 to 4.13.

The retained profit data in Japan, Korea and Singapore are not available. Therefore, the study estimates only the third case for these countries. The dependent variable is $\log|GDP\ per\ capita|$ of each country. The result of the augmented Solow model is presented in Table 4.10, 4.11 and 4.12. For the panel data estimation, the result is shown in Table 4.13. The predicted growth from this model are compared with the actual growth in Figure 4.2.

Table 4.10 Estimation Results when Using Retained Profit (RP) as the Capital Inflow

	Constant	**T**	**Retained Profit**	$\ln(n_i + g_i + \delta_i)$	$\ln(s_{ki})$	$\ln(s_{hi})$	R^2
Japan	N/A	N/A	N/A	N/A	N/A	N/A	N/A
S.E.							
Korea	N/A	N/A	N/A	N/A	N/A	N/A	N/A
S.E.							
Singapore	N/A	N/A	N/A	N/A	N/A	N/A	N/A
S.E.							
Indonesia	5.205791***	0.032939***	-1.77E-11***	0.000851	0.418146***	-0.027348	0.978122
S.E.	0.204798	0.002311	3.64E-12	0.006417	0.060472	0.038051	
Malaysia	7.185440***	0.036920***	5.49E-12**	0.007995	0.249910***	-0.080933	0.991266
S.E.	0.095681	0.002488	2.58E-12	0.010866	0.025759	0.051534	
The Philippines	8.001476***	0.029944***	6.51E-11*	-0.015516*	0.356529***	-0.752476***	0.937268
S.E.	0.276447	0.007494	3.48E-11	0.007694	0.035467	0.143922	
Thailand	6.290230***	0.047895***	-7.86E-12	0.001837	0.333851***	-0.234585***	0.990409
S.E.	0.153243	0.001674	7.82E-12	0.008456	0.38128	0.057477	

Table 4.10 Continued

	Constant	**T**	**Retained Profit**	$\ln(n_i + g_i + \delta_i)$	$\ln(s_{ki})$	$\ln(s_{hi})$	R^2
China	5.397513***	0.047284***	1.55E-12***	0.006850	0.141389*	0.329027**	0.998780
S.E.	0.327373	0.009500	3.81E-13	0.008562	0.082011	0.121428	

Table 4.11 Estimation Results when Using Retained Profit and Foreign Loans as the Capital Inflow

	Constant	**t**	**Retained Profit**	**Foreign Loans**	$\ln(n_i + g_i + \delta_i)$	$\ln(s_{ki})$	$\ln(s_{hi})$	R^2
Japan	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Korea	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Singapore	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Indonesia	5.173020***	0.027620***	-1.41E-11***	7.96E-13	0.000869	0.427363***	-0.019496	0.979553
S.E.	0.203647	0.004695	4.54E-12	6.14E-13	0.006331	0.060089	0.038030	
Malaysia	7.126674***	0.031198***	7.14E-12***	2.34E-12**	0.011371	0.260693***	-0.065848	0.993067
S.E.	0.090136	0.003220	2.44E-12	9.36E-13	0.009973	0.023819	0.047251	

Table 4.11 Continued

	Constant	**t**	**Retained Profit**	**Foreign Loans**	$\ln(n_i + g_i + \delta_i)$	$\ln(s_{ki})$	$\ln(s_{hi})$	**R^2**
Philippines	8.073197***	0.025186***	5.79E-11*	3.65E-12**	-0.009218	0.339734***	-0.794559***	0.952103
S.E.	0.247938	0.006907	3.12E-11	1.34E-12	0.007240	0.032224	0.129276	
Thailand	6.251125***	0.036315***	2.31E-11***	2.05E-12***	0.000452	0.324969***	-0.162445***	0.997304
S.E.	0.083070	0.001733	5.79E-12	2.61E-13	0.004579	0.020662	0.032435	
China	5.567570***	0.044491***	1.48E-12	2.82E-14	0.002170	0.101203	0.374545***	0.998787
S.E.	0.386803	0.011010	1.01E-12	3.38E-13	0.009206	0.094809	0.132363	

Table 4.12 Estimation Results When Using Retained Profit, Foreign Loans and Foreign Equities as the Capital Inflow

	Constant	**Retained Profit**	**Foreign Loans**	**Foreign Equities**	**t**	$\ln(n_i + g_i + \delta_i)$	$\ln(s_{ki})$	$\ln(s_{hi})$	R^2
Japan	8.182440***	N/A	N/A	9.93E-14*	0.018703***	-0.003580	0.562386***	0.185856***	0.996740
S.E.	0.107375			5.37E-14	0.000984	0.002546	0.032467	0.017881	
Korea	6.599764***	N/A	N/A	-5.26E-13	0.029575***	-0.006256	0.341951***	0.498573***	0.997415
S.E.	0.160588			4.05E-13	0.002869	0.008000	0.048220	0.069570	
Singapore	9.384386***	N/A	N/A	1.68E-12	0.030517***	0.025404	0.010491	0.127530	0.981262
S.E.	0.372864			2.66E-12	0.006313	0.020552	0.103338	0.063922	
Indonesia	5.149858***	-1.36E-11**	1.29E-12*	8.41E-12	0.027987***	-0.001979	0.434267***	-0.028910	0.979250
S.E.	0.210357	5.50E-12	7.29E-13	5.75E-12	0.006143	0.006600	0.060604	0.065682	

Table 4.12 Continued

	Constant	**Retained Profit**	**Foreign Loans**	**Foreign Equities**	**t**	$\ln(n_i + g_i + \delta_i)$	$\ln(s_{ki})$	$\ln(s_{hi})$	R^2
Malaysia	7.079163***	2.11E-12	4.16E-12***	2.17E-12	0.030374***	0.019099	0.265778***	-0.85701*	0.995379
S.E.	0.082664	5.74E-12	1.11E-12	2.69E-12	0.003528	0.011140	0.021326	0.048854	
The Philippines	8.090845***	5.56E-11	3.63E-12**	7.51E-13	0.025723***	-0.009234	0.340483***	-0.804056***	0.952133
S.E.	0.292632	3.75E-11	1.38E-12	6.24E-12	0.008348	0.007395	0.033490	0.153824	
Thailand	6.246029***	2.42E-11***	2.08E-12***	-1.15E-12	0.036204***	0.000115	0.327185***	-0.163411***	0.997329
S.E.	0.085163	6.35E-12	2.76E-13	2.47E-12	0.001779	0.004711	0.021539	0.033042	
China	5.52693***	1.50E-12	6.76E-14	-5.18E-13	0.045406***	0.002173	0.110410	0.358334**	0.998685
S.E.	0.419387	1.06E-12	3.60E-13	9.23E-13	0.011858	0.009674	0.101676	0.142927	

Table 4.13 Panel Data Analysis Results

	Constant	**Inward foreign direct Investment (annual stock)**	**t**	$\ln(n_i + g_i + \delta_i)$	$\ln(s_{ki})$	$\ln(s_{hi})$	**Dummy for 1980-1990**	**Dummy for 1991-1996**	**Dummy for 1997-2001**	R^2
Panel	6.0402109 ***	1.49E-06 ***	0.016288 ***	0.001140	0.445364 ***	0.201940 ***	-0.073146	-0.011921	0.021208	0.990867
S.E.	0.227679	2.07E-07	0.004269	0.012062	0.060022	0.051050	0.078277	0.054590	0.039063	

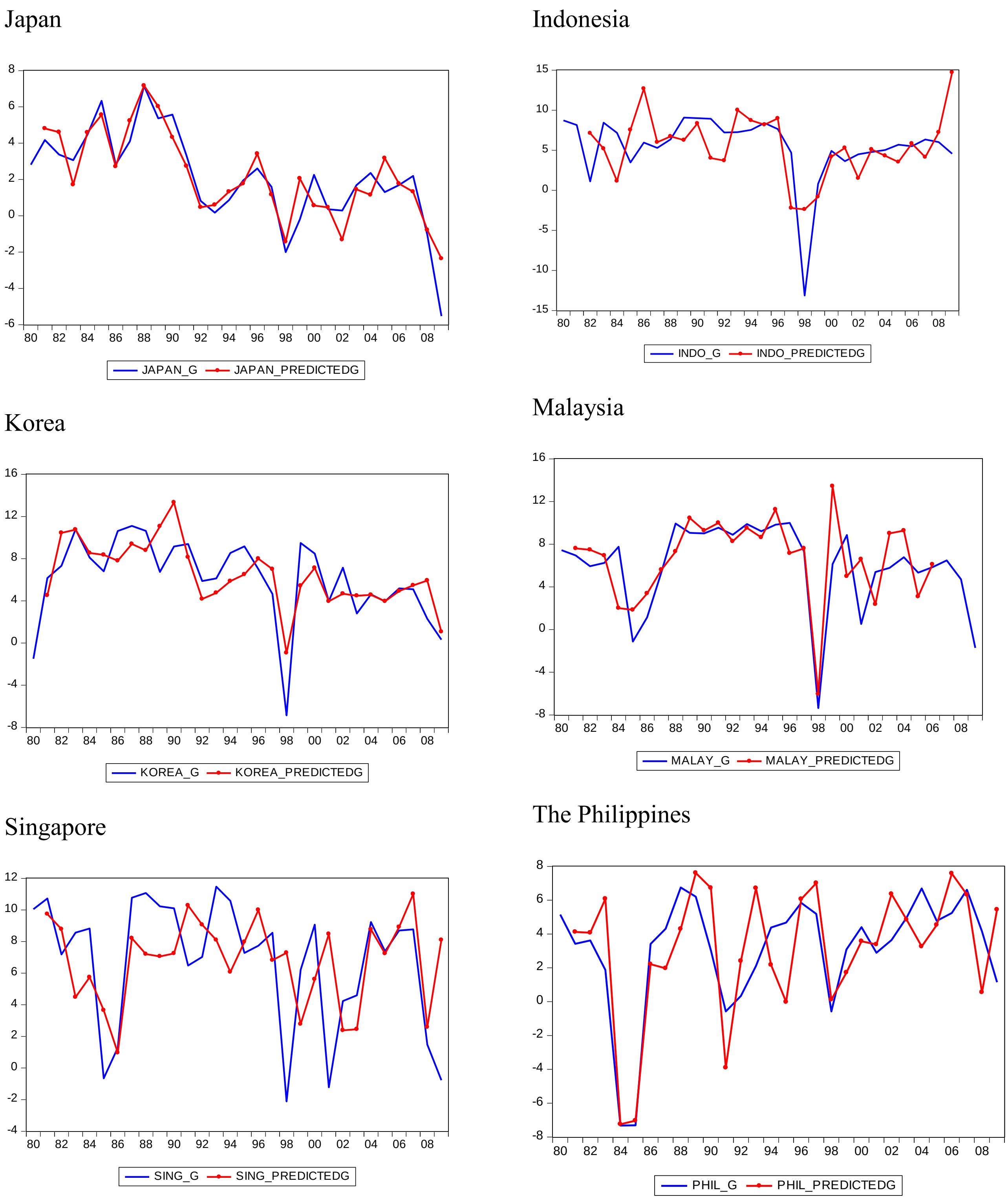
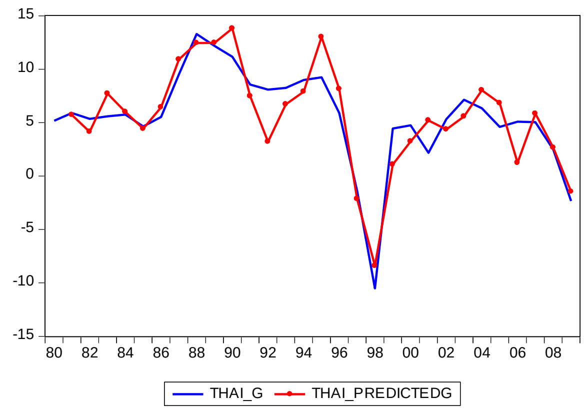


Figure 4.2 The Augmented Solow Predicted Growth and the Actual Growth

Thailand



China

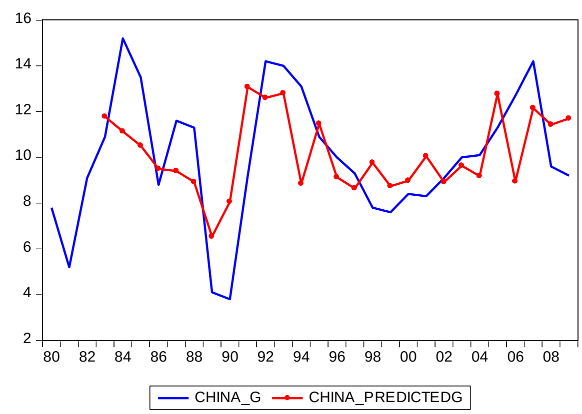


Figure 4.2 Continued

4.3 Comparing the Predicting Power of Two Models

4.3.1 Discrimination Approach

Since both models involve the same dependent variable, we can choose between two (or more) models based on some goodness-of-fit criterion. In this study, R^2, Adjusted-R^2, Akaike Information Criteria (AIC) and Schwarz's Information Criteria (SIC) are applied as the criterion.

The goodness of fit criterion, which here is obtained from the estimation results of both models using the same form of specification:

Thirwall and Hussain's BOPC model:

$$y = \alpha_0 + \alpha_1 y^*_{BOPC} \qquad (4.7)$$

The Augmented Solow growth model:

$$y = \beta_0 + \beta_1 y^*_{ASL} \qquad (4.8)$$

where y^*_{BOPC} is the predicted output growth from the BOPC model, y^*_{ASL} is the predicted output growth from the augmented Solow growth model and y is the actual output growth series. The results for individual country are presented in Table 4.14 and the pane data analysis is presented in Table 4.15.

4.3.2 Discerning Approach

The study estimated the nested or hybrid models between Thirlwall and Hussain's growth hypothesis and the augmented Solow growth model following Davidson and McKinnon's (1981) J- test by adding the fitted values of one model into another model and then testing if the coefficients of that fitted value are statistically significant.

Table 4.14 Comparing Goodness-of-Fit of Both Models

Japan

	R^2	Adjusted-R^2	AIC	SIC
Thirlwall and Hussain's Model	0.005532	-0.028760	4.801749	4.894264
Augmented Solow Growth Model	0.717262	0.707164	3.579171	3.672584

Korea

	R^2	Adjusted-R^2	AIC	SIC
Thirlwall and Hussain's Model	0.017768	-0.016102	5.620679	5.713194
Augmented Solow Growth Model	0.554179	0.538257	4.725127	4.818540

Singapore

	R^2	Adjusted-R^2	AIC	SIC
Thirlwall and Hussain's Model	0.014670	-0.019307	5.798151	5.890666
Augmented Solow Growth Model	0.111207	0.079464	5.714146	5.807559

Table 4.14 Continued

Indonesia

	R^2	**Adjusted-R^2**	**AIC**	**SIC**
Thirlwall and Hussain's Model	0.016462	-0.017453	5.712400	5.804915
Augmented Solow Growth Model	0.194166	0.164320	5.548981	5.643277

Malaysia

	R^2	**Adjusted-R^2**	**AIC**	**SIC**
Thirlwall and Hussain's Model	0.000002	-0.034481	5.695033	5.787549
Augmented Solow Growth Model	0.551851	0.533178	4.942456	5.039233

The Philippines

	R^2	**Adjusted-R^2**	**AIC**	**SIC**
Thirlwall and Hussain's Model	0.000797	-0.033658	5.425283	5.517798
Augmented Solow Growth Model	0.628577	0.615312	4.462098	4.555511

Table 4.14 Continued

Thailand

	R^2	Adjusted-R^2	AIC	SIC
Thirlwall and Hussain's Model	0.012259	-0.021801	5.918990	6.011505
Augmented Solow Growth Model	0.818075	0.811578	4.263917	4.357330

China

	R^2	Adjusted-R^2	AIC	SIC
Thirlwall and Hussain's Model	0.044709	0.009327	4.897642	4.991938
Augmented Solow Growth Model	0.325178	0.299223	4.583287	4.678444

Table 4.15 Comparing Goodness-of-Fit of Both Models in the Panel Data Analysis

	R^2	Adjusted-R^2	AIC	SIC
Thirlwall and Hussain's Model	0.388618	0.359878	5.362863	5.533855
Augmented Solow Growth Model	0.489848	0.465235	5.186962	5.360994

If the hypothesis is not rejected (the coefficient is not statistically significant), the model is considered a true model. In other words, that model encompasses the other one, which gives the fitted values that are not significant in determining the real output growth series.

$$y = \lambda_0 + \lambda_1 y^*_{BOPC} + \lambda_2 y^*_{ASL} + u_i \tag{4.9}$$

$$\ln\left[\frac{Y_i(t)}{L_i(t)}\right] = \gamma_0 + \gamma_1 K_f - \gamma_2 \ln(n_i + g_i + \delta_i) + \gamma_3 \ln(s_{ki}) + \gamma_4 \ln(s_{hi}) + \gamma_5 \ln\left[\frac{Y}{L}\right]^*_{BOPC} + \gamma_6 t + \vartheta_i \tag{4.10}$$

Since the tests are performed independently, the study has the likely outcome listed in Table 4.16. The results of the non-nested J-test are presented in Table 4.17.

Table 4.16 Possible Outcomes

	Hypothesis : γ_5 =0	
Hypothesis : λ_2 =0	Do not reject	Reject
Do not reject	Accept both BOPC and ASL	Accept BOPC, reject ASL
Reject	Accept ASL, reject BOPC	Reject both BOPC and ASL

Table 4.17 Summary of the Non-nested J-test Results

Country	Results	Implications
Japan	Do not reject that γ_5 =0 Reject that λ_2=0 (at 1%)	Accept ASL, reject BOPC
Korea	Do not reject that γ_5 =0 Reject that λ_2=0 (at 1%)	Accept ASL, reject BOPC
Singapore	Do not reject that γ_5 =0 Reject that λ_2=0 (at 10%)	Accept ASL, reject BOPC
Indonesia	Reject that γ_5 =0 (at 10%) Reject that λ_2=0 (at 5%)	Reject both BOPC and ASL
Malaysia	Do not reject that γ_5 =0 Reject that λ_2=0 (at 1%)	Accept ASL, reject BOPC
The Philippines	Do not reject that γ_5 =0 Reject that λ_2=0 (at 1%)	Accept ASL, reject BOPC
Thailand	Do not reject that γ_5 =0 Reject that λ_2=0 (at 1%)	Accept ASL, reject BOPC

Table 4.17 Continued

Country	Results	Implications
China	Do not reject that γ_5 =0 Reject that λ_2 =0 (at 1%)	Accept ASL, reject BOPC

CHAPTER 5

FINANCIAL VARIABLES IN THE GROWTH MODELS

Since both models, especially Thirlwall and Hussain's, have some errors in explaining East Asian growth, to improve their model's predictability, this study hypothesized that financial development variables are crucial for explaining this region's growth. The hypothesis is based on the assumption that the financial sector facilitates other sectors' flow of funds, and leads to an increase in efficiency of the overall economy. If the country has a higher level of financial development, it will also help the overall economy to grow faster. Therefore, in this section, selected financial variables are used to explain the errors of both models.

In order to show that these variables are correlated, the study calculated the correlation between the financial variables and GDP as shown in Table 5.1 and the correlations among the financial variables are presented in Table 5.2.

5.1 Financial Variables in the Balance-of-Payment Constrained Model

Before we add all three financial variables in the model, we test for their correlation to GDP growth and find that all three financial variables have a high correlation with GDP and growth.

Table 5.1 Correlation Between Financial Variables and GDP

	Correlation		
	DEPTH and GDP growth	BANK and GDP growth	PRIVY and GDP growth
Japan	-0.461918768	0.39864952	0.080415769
Korea	-0.347119604	-0.106366872	-0.427836965
Singapore	-0.420577806	-0.536541941	-0.565195715
Indonesia	-0.366718314	0.080660265	-0.122897544
Malaysia	-0.426890893	0.151312811	0.151312811
The Philippines	0.26526121	0.163322594	0.046802082
Thailand	-0.368618807	0.037553311	-0.445908106
China	0.073473	-0.114359	-0.055029

Table 5.2 Correlation Between Financial Variables

	Correlation		
	BANK and DEPTH	BANK and PRIVY	DEPTH and PRIVY
Japan	-0.432968	0.579438	0.418211
Korea	0.684811	0.657324	0.909983
Singapore	0.838475	-0.627486	-0.171513
Indonesia	-0.014825	0.703403	0.572011
Malaysia	-0.046846	-0.193223	0.741699
Philippines	0.387798	0.436314	0.553618
Thailand	0.756314	0.720345	0.724520
China	0.695883	0.757465	0.956063

The dependent variable of the result in Table 5.3 is y*-y. We use y*-y to represent the gap between predicted Thirlwall and the actual growth rate series. The mean equations for which the coefficients of financial variables are statistically significant are shown in Table 5.3. Please note that ***,**,* in Table 5.3 show statistically significant at 1%, 5% and 10%, respectively.

5.2 The Financial Variables in the Augmented Solow Growth Model

When the study adds financial variables to explain the augmented Solow growth model, the dependent variable is y*-y which represents the gap between predicted $log\left(\frac{Y}{L}\right)$ and the actual growth rate series. The mean equations for which the coefficients of financial variables are statistically significant are shown in Table 5.4. Please note that the dependent variables are (y*-y) of each country and ***,**,* are statistically significant at 1%, 5% and 10%, respectively.

The error of the Thirlwall and Hussain model can be explained by the financial variables in 26 cases whereas the error of the augmented Solow model can be explained by the financial variables in 18 cases. Table 5.5 is a summary of the significant financial variables that can explain the errors of both models. Therefore, the financial indicators have some explanatory power over both models. We can imply that there are still some channels where financial development can promote growth rather than only through the variables in both models. This result is consistent with Benhabib and Spiegel (2000), who found that DEPTH and PRIVY appear to enter in the growth regression even after accounting for disparities in the rate of factor accumulation.

Table 5.3 Estimation Results of the Balance-of-Payment Constrained Model's Error and the Financial Variables

Japan

	Mean Equations							Variance Equations		
	Constant	Financial Variables	Dum1	Dum2	Dum3	AR(1)	AR(2)	Constant	(residual)^2	GARCH (-1)
(1)	−9208.120***	9357.694(BANK)***	12.71569***	354.2731***	682.3202***	−0.349814***	−0.191076*	-91.63910	3.108860**	
S.E.	1482.410	1506.373	3.299930	48.69061	167.6429	0.059642	0.100291	1456.672	1.554073	
(2)	189.3375***	-130.4833(DEPTH)***	75.52652***	133.0140 ***	-60.78619*	-0.831280***	-0.628439***	250.9316	2.412718**	-0.145626
	53.76440	35.56650	20.47674	28.78998	34.08492	0.144953	0.167288	274.7749	0.979500	0.092793
(3)	-301.4207***	227.3008 (PRIVY)***	-107.9575	-84.40907	-231.0678***	0.295014	-0.98.800*	58965.49	1.753450	-0.975097
S.E.	156.2017	122.7685	71.43001	81.49816	51.98220	0.356933	0.538549	26729.14	1.499385	0.05667
(4)	-115.8354***	82.85224 (PRIVY*BANK)***	-24.19384	-35.30054 ***	-107.8847	-0.966215 ***		66349	6.275547	-0.972184 ***
S.E.	27.62244	22.96524	16.59377	4.377803	66.01506	0.014859		43196.13	4.909046	0.024703

Korea

	Mean Equations							Variance Equations	
	Constant	Financial Variables	Dum1	Dum2	Dum3	AR(1)	AR(2)	Constant	(residual)^2
(1)	1086.151***	-1135.892(BANK)***	-11.57682	-266.4969***	30.97155***	-0.172528**	-0.206278***	0.278182	4.750154***
S.E.	152.1358	159.9181	16.02563	46.40467	9.737118	0.082478	0.048301	15.48485	1.787456
(2)	112.5265***	-314.7952(DEPTH)***	-50.89623***	-225.3574***	82.24373***	-0.172778**	-0.168957***	3.302191	4.238441***
S.E.	24.61352	68.21533	11.65527	49.08115	22.71105	0.078109	0.028304	25.15794	1.638411
(3)	49.07166*	-284.8706(PRIVY*DEPTH)*	-54.41738***	-180.8993***	112.7055	-0.141055	-0.146396***	-14.00259	5.132367**
S.E.	26.85505	163.4017	9.782724	55.58730	78.59002	0.136398	0.041261	52.41090	2.232.72

Table 5.3 Continued

Korea (Continued)

	Mean Equations							Variance Equations	
	Constant	**Financial Variables**	**Dum1**	**Dum2**	**Dum3**	**AR(1)**	**AR(2)**	**Constant**	**(residual)^2**
(4)	92.80648*	-205.2703 (PRIVY*BANK)*	-48.21074***	-214.3068***	80.65392	-0.152372	-0.178043***	-26.62551	4.272792**
S.E.	49.96126	116.0773	16.048465	38.61621	58.46388	0.092859	0.047636	83.23644	1.880533

Singapore

	Mean Equations							Variance Equations		
	Constant	**Financial Variables**	**Dum1**	**Dum2**	**Dum3**	**AR(1)**	**AR(2)**	**Constant**	**(residual)^2**	**GARCH (-1)**
(1)	26.38153***	-22.69696(PRIVY)***	-14.25684***	-10.80123***	2.584712*	0.442271***	-0.717582***	0.001033	4.430071*	
S.E.	2.574956	3.577258	1.417594	1.423441	1.424129	0.044811	0.034840	0.156004	4.430071	
(2)	16.96884***	-12.63300 (DEPTH*PRIVY)**	-16.07029***	-11.82484***	4.819312*	0.475066***	-0.857739***	4.960717	1.161744	-0.027510
S.E.	4.030892	5.267744	2.423901	3.003728	2.494984	0.117976	0.086994	9.504973	0.828002	0.494424

Indonesia

	Mean Equations							Variance Equations		
	Constant	**Financial Variables**	**Dum1**	**Dum2**	**Dum3**	**AR(1)**	**MA(1)**	**Constant**	**(residual)^2**	**GARCH(-1)**
(1)	-22.63990**	23.68817(BANK)*	-1.779882	4.352157	4.327064	-0.202862		11.37593	-0.169360	0.829829
S.E.	11.50617	13.64173	9.558085	3.125184	2.862518	0.160222		12.20790	0.070508	0.257619
(2)	-6.744584 ***	26.50177(PRIVY)***	-8.159420	-1.291572	2.454331	-0.385701 ***		9.613655	-0.181412	0.848243***
S.E.	2.408257	9.008558	6.517330	2.536441	1.853460	0.090296		7.577023	0.135325	0.170848

Table 5.3 Continued

Indonesia (Continued)

	Mean Equations							Variance Equations		
	Constant	**Financial Variables**	**Dum1**	**Dum2**	**Dum3**	**AR(1)**	**MA(1)**	**Constant**	**(residual)^2**	**GARCH(-1)**
(3)	-9.524486**	37.19315(BANK*DEPTH)*	-7.318269	-5.331942	-0.642799	0.057710	-0.948352 ***	12.51235	0.422333	
S.E.	4.242270	19.32375	4.774429	3.559238	2.156409	0.246012	0.049572	12.81182	0.664773	
(4)	-5.157832 ***	73.14183 (PRIVY*DEPTH)***	-11.26922 ***	-8.423335 ***	1.101429	-0.238961	-0.977993 ***	23.26746**	-0.165376	
S.E.	1.419557	23.44120	4.287202	2.265368	1.027160	0.260025	0.038282	11.65745	0.373178	

Malaysia

	Mean Equations							Variance Equations		
	Constant	**Financial Variables**	**Dum1**	**Dum2**	**Dum3**	**AR(1)**	**AR(2)**	**Constant**	**(residual)^2**	**GARCH (-1)**
(1)	-660.0188***	689.0188 (BANK)***	-23.18195***	5.659251	19.71218**	-0.610281***		146.9454	2.837720*	-0.160603
S.E.	154.0323	160.0732	7.310477	4.831993	8.679262	0.219575		130.6451	1.560001	0.138586
(2)	-11.95135	25.75418(PRIVY)**	-17.46514***	-27.53801***	17.38741***	-0.616254**	-0.267817	19.65778	3.154638**	-0.080640
S.E.	8.806002	10.84456	2.327772	7.036954	6.307820	0.278576	0.276493	93.04824	1.461058	0.186966
(3)	25.08663***	-11.50614 (BANK*DEPTH)***	-16.19791***	-17.76388***	19.86613***	-0.574241***		-0.123097	4.758963**	
S.E.	3.826959	3.968922	1.285705	2.314945	5.406239	0.194852		20.93960	2.098150	
(4)	21.59050**	-13.25146 (PRIVY*BANK)**	-10.89214***	-2.727652	25.90956***	-0.542102***		28.50600	4.018227*	-0.082816
S.E.	3.589407	5.251533	2.639159	5.407186	8.916599	0.195736		41.63319	2.139684	0.092192

Table 5.3 Continued

The Philippines

	Mean Equations							**Variance Equations**		
	Constant	**Financial Variables**	**Dum1**	**Dum2**	**Dum3**	**AR(1)**	**AR(2)**	**Constant**	**(residual)^2**	**GARCH (-1)**
(1)	36.24657***	-39.67915(BANK)***	-1.199589	-0.017162	-2.580649	-0.206270		39.35894	0.275889	-0.447349
S.E.	12.67737	15.24392	2.546741	2.879610	2.770488	0.282287		37.27499	0.276873	0.821365
(2)	-0.559031***	13.35504(DEPTH*PRIVY)*	1.648103**	-3.076446	-4.590386***	-0.559031***	-0.304311	0.015876	2.730085**	
S.E.	0.174824	7.744079	0.796654	2.392845	1.075219	0.174824	0.195736	0.711575	1.203921	

Thailand

	Mean Equations								**Variance Equations**		
	Constant	**Financial Variables**	**Dum1**	**Dum2**	**Dum3**	**AR(1)**	**AR(2)**	**MA(1)**	**Constant**	**(residual)^2**	**GARCH (-1)**
(1)	-26.73389	69.31617DEPTH **	-14.28049 **	-42.62698***	-21.36981*	0.151261		-0.173419	24.89185**	-0.377492	1.249713 ***
S.E.	22.92906	33.7869	7.009918	15.27994	12.06998	0.964679		0.944966	11.11879	0.270297	0.189663
(2)	-10.71066	61.26567 (DEPTH*BANK) ***	-22.57369 ***	-51.67491***	-25.63707***	0.904587 ***	-0.611610 ***	-1.434134 ***	20.98369	0.816391	
S.E.	8.625146	16.62944	5.638100	10.38031	9.909605	0.137039	0.143127	0.323174	24.93085	0.884231	

Table 5.3 Continued

China

	Mean Equations								Variance Equations		
	Constant	Financial Variables	Dum1	Dum2	Dum3	AR(1)	AR(2)	MA(1)	Constant	$(residual)^2$	GARCH (-1)
(1)	-44.66645***	31.84072(BANK)**	-3.146564	-4.879338	13.63856*	-0.418635*	-0.507715*		9.777349	1.583666	0.049196
S.E.	13.34711	14.63682	6.306189	6.765873	7.918641	0.245050	0.282566		36.41070	1.409968	0.301642
(2)	48.37003***	-80.88556DEPTH***	13.13066	42.83333**	81.06938***	-0.148537		-0.899877***	6.214544	1.863191	-0.002202
S.E.	17.57466	25.75558	8.243215	17.70049	21.46937	0.266376		0.141934	28.50964	1.495457	0.469464
(3)		-5.657954 (BANK*DEPTH)*	0.556068	-3.711339	23.61705***	-0.551750	-0.318341		-0.009626	2.194773	0.088617
S.E.		2.991267	3.619981	5.132673	6.801319	0.361844	0.261115		17.20814	1.647522	0.638823
(4)		-5.031365 (BANK*PRIVY)***	1.328793	-3.931847	21.18035	-0.864313		0.809780	1.237567	2.101896	
S.E.		1.496281	2.626298	2.736268	286.700	0.660211		0.732270	12.62575	1.335164	

Note : For the panel data analysis, there is no financial variable that significantly determine the error series from the Thirwall and Hussain's model. Therefore, the study does not show the result table in this case.

Table 5.4 Estimation Results of the Augmented Solow Model's Error and the Financial Variables

Japan

	Mean Equations							Variance Equations		
	Constant	**Financial Variables**	**Dum1**	**Dum2**	**Dum3**	**AR(1)**	**AR(2)**	**Constant**	**(residual)^2**	**GARCH (-1)**
(1)	-25.11431**	25.58182(BANK)**	0.005612	1.033981	2.068222*	-0.395324		0.606843	-0.041487	0.456013
S.E.	11.54850	11.71477	0.724288	0.824764	1.058630	0.308797				
(2)	-4.969077***	2.873195(DEPTH)***	-0.642478	-1.523036***	-1.047541	-0.362204*	0.019253	-0.041354	-0.300775	1.486214**
S.E.	0.006976	0.165751	0.459754	0.52158	0.7194442	0.200986	0.262950	0.129752	0.480145	0.755786
(3)	0.729489***	-0.445353(PRIVY)*	0.076712	0.204376	-0.480329			-0.058579	-0.317477	1.394392*
S.E.	0.033535	0.246915	0.621592	0.861030	0.721464			0.440215	0.553974	0.736846
(4)	0.523878*	-0.302207 (BANK*PRIVY)***	0.060552	0.129126	-0.396316			-0.053516	-0.341370	1.410812*
S.E.	0.285321		0.478063	0.757816	0.692835			0.456159	0.569343	0.754812

Korea

	Mean Equations						Variance Equations		
	Constant	**Financial Variables**	**Dum1**	**Dum2**	**Dum3**	**AR(1)**	**Constant**	**(residual)^2**	**GARCH (-1)**
(1)	3.848033*	-11.00994(DEPTH)**	-0.849077	3.009778	3.852100		0.213892	-0.268634*	1.234829***
S.E.	2.117407	5.586748	1.771684	2.119854	1.951539		0.222962	0.155203	0.139472
(2)	6.557634***	-19.90170(BANK*DEPTH)***	-0.913250*	5.513711***	7.620572***	-0.365164*	0.762803	1.161482	-0.091882
S.E.	2.090007	6.777491	0.511282	0.956963	2.603173	0.196678	0.880875	0.811496	0.148734

Table 5.4 Continued

Singapore

		Mean Equations						Variance Equations	
	Constant	**Financial Variables**	**Dum1**	**Dum2**	**Dum3**	**AR(1)**	**MA(1)**	**Constant**	**(residual)^2**
(1)	-6.482441***	5.774239(PRIVY)*	1.653716	1.277659	1.730031	0.142846	-0.924370***	11.29076	-0.285615
S.E.	2.164229	3.257082	1.286946	1.618739	1.164651	0.241498	0.049796	7.374221	1.10311

Indonesia

		Mean Equations					Variance Equations		
	Constant	**Financial Variables**	**Dum1**	**Dum2**	**Dum3**	**AR(1)**	**Constant**	**(residual)^2**	**GARCH (-1)**
(1)	-23.35981***	26.26107(BANK)***	-2.530840	5.075862*	2.628093	-0.299372	0.597339	-0.194942**	1.159104
S.E.	9.004617	9.614514	2.673264	3.011882	2.233429	0.226881	0.449080	0.090584	0.109603

Malaysia

		Mean Equations							Variance Equations		
	Constant	**Financial Variables**	**Dum1**	**Dum2**	**Dum3**	**AR(1)**	**MA(1)**	**MA(2)**	**Constant**	**(residual)^2**	**GARCH (-1)**
(1)	-71.51570*	73.44849(BANK)*	-1.716334**	3.853834***	-0.455779	-0.245158	-0.999813***		1.325888	-0.147394	0.659729
S.E.	37.64763	38.64729	0.769606	1.063440	0.533037	0.309934	0.332612		4.040589	0.367778	1.395264
(2)	-2.091923***	2.504264 (BANK*DEPTH)***	-0.528307**	0.257269	-0.052739		-0.989458***	-0.371200	0.584786	0.854704	
S.E.	0.006543	0.135718	0.238514	0.545955	1.386364		0.104812	0.322832	0.639372	1.034777	

Table 5.4 Continued

The Philippines

		Mean Equations							Variance Equations		
	Constant	**Financial Variables**	**Dum1**	**Dum2**	**Dum3**	**AR(1)**	**AR(2)**	**MA(1)**	**Constant**	**(residual)^2**	**GARCH (-1)**
(1)	1.376063***	-5.549538 (DEPTH)***	0.882529**	1.782346 ***	1.604383 ***	0.389734**	-0.627086 ***	-0.951952***	0.141224	-0.260135*	1.246145 ***
S.E.	0.258121	0.050334	0.404242	0.360469	0.342033	0.184928	0.147285	0.028843	0.352657	0.155743	0.139321
(2)	-3.720295***	17.49177 (PRIVY)***	-0.190588	-4.282652 ***	-0.205415	-0.363227 ***		0.946062***	-0.000661	4.553094	
S.E.	0.341423	1.906688	0.660458	0.426523	0.529774	0.051265		0.002188	0.044891	1.808264	
(3)	-2.001540*	16.09941 (BANK*PRIVY) ***	-1.317597	-4.133311 **	-1.060305	-0.306012		0.936806***	0.857268	1.612715	-0.035527
S.E.	1.194805	4.329638	1.885719	1.658899	1.492571	0.174856		0.019139	1.319463	1.184579	0.156419
(4)	2.176781	-10.69028 (BANK*DEPTH)*	1.096565	3.228600	3.039300*	0.062405	-0.990495 ***		0.333379**	-0.257982*	1.177787 ***
S.E.	1.433400	6.154003	0.867618	2.065819	1.781730	0.196414	0.153935		0.135626	0.138298	0.171955

Thailand

		Mean Equations								Variance Equations	
	Constant	**Financial Variables**	**Dum1**	**Dum2**	**Dum3**	**AR(1)**	**AR(2)**	**MA(1)**	**MA(2)**	**Constant**	**(residual)^2**
(1)	-1.739170*	4.024133 (PRIVY)**	-3.089130***	- 4.267150***	-1.611267**	0.158372		-1.462193***		0.885327	0.404259
S.E.	0.910161	1.867128	1.186105	1.552333	0.794852	0.303619		0.329421		0.586007	0.499353

Table 5.4 Continued

Thailand

		Mean Equations								Variance Equations	
	Constant	Financial Variables	Dum1	Dum2	Dum3	AR(1)	AR(2)	MA(1)	MA(2)	Constant	$(residual)^2$
(2)	-1.357436**	3.699711 (BANK* PRIVY)**	-3.152001***	-3.649701***	-1.676028**	0.124152	-1.409210***			1.959816*	-0.290833
S.E.	0.672157	1.554669	1.176481	1.333355	0.698627	0.252909	0.340934			1.110801	0.390926
(3)	-0.501121	2.940578 (DEPTH* PRIVY)**	-2.727885***	-3.697624***	-2.208104***	-0.349610*	-0.695341***	-0.709420***	-0.210804	0.113550	1.987082
S.E.	0.413295	1.187194	0.646911	1.433083	0.656228	0.202214	0.132239	0.247989	0.233205	0.321016	1.488978

China

		Mean Equations							Variance Equations		
	Constant	Financial Variables	Dum1	Dum2	Dum3	AR(1)	AR(2)	MA(1)	Constant	$(residual)^2$	GARCH (-1)
(1)	-3.089295	8.346201 (PRIVY)***	-4.405385	-4.713437	-6.351386*	0.551790	-0.534128**	-0.970556 ***	0.085447	-0.257497	1.208748**
S.E.	4.083004	0.772848	3.844680	3.127218	3.359299	0.380163	0.218051	0.144273	0.687162	0.243856	0.508050

Table 5.4 Continued

Panel Data Analysis

		Results							
	Constant	**Financial Variables**	**Dum1**	**Dum2**	**Dum3**	**AR(1)**	**R-square**	**AIC**	**SIC**
(1)	0.095179*	-0.095238(BANK)**	-0.004426	0.004375	0.002201	0.513223***	0.365606	-4.627306	-4.41513
S.E.	0.044956	0.048170	0.007467	0.008258	0.008114	0.068032			
(2)	-0.037269	0.054866(DEPTH)**	-0.009484	-0.012332	-0.009925	0.618902***	0.407788	-4.498027	-4.298135
S.E.	0.020123	0.023977	0.008176	0.010908	0.011272	0.059452			
(3)	-0.015677	0.029777(PRIVY)*	-0.009920	-0.006966	0.000804	0.589173***	0.403128	-4.490189	-4.290297
S.E.	0.013481	0.016617	0.008061	0.009989	0.009410	0.061709			
(4)	-0.006817	0.016227(DEPTH*PRIVY)*	-0.009396	-0.007193	0.000515	0.585933***	0.404930	-4.49321	-4.293319
S.E.	0.009087	0.008246	0.007948	0.009879	0.009347	0.061096			

Their results indicated that financial development positively influenced both rates of investment and total factor productivity. The relative size of banking sector (BANK) robustly enters with its predicted sign in both physical and human capital. The private sector's share of credit relative to GDP (PRIVY) influences growth through enhanced total factor productivity. In this study we also found that BANK and PRIVY are the most important financial development factors that influence the growth in almost every country in the study except Singapore and Thailand.

5.3 Implications from the Results

From the results shown, we found that there are two cases of financial variables' coefficient signs and constant terms. Each case implies different correlations between financial variables and the error of predicted growth rates. We explain each case in Table 5.5.

5.3.1 Case I Constant Term Is negative and Financial Variable Coefficient Is Positive

The correlation between the error between the predicted growth rates and the actual growth rates and financial variable is positive. This implies that when financial development increases, the error or the gap increases. However, the constant term is negative, which means if the mean of financial variables is less than the x-intercept (when the error is zero) the increase in financial variables will lead to a smaller gap (less negative). We illustrate this scenario in Figure 5.1, which focuses on the relationship between Japan's gap and Thirlwall and Hussain's predicted growth rates and the actual growth and BANK (the size of service provided by deposit money banks).

Table 5.5 Summary of Financial Variables' Influences on the Errors of the Growth Models

	BANK	DEPTH	PRIVY	BANK xDEPTH	BANK xPRIVY	DEPTH xPRIVY
Japan	TW,ASL	TW,ASL	TW,ASL		TW,ASL	
Korea	TW	TW,ASL		ASL	TW	TW
Singapore			TW,ASL			TW
Indonesia	TW,ASL		TW	TW		TW
Malaysia	TW,ASL		TW	TW,ASL	TW	
The Philippines	TW	ASL	ASL	ASL	ASL	TW
Thailand		TW	ASL	TW	ASL	ASL
China	TW	TW	ASL	TW	TW	

Note: TW and ASL are shown for the case in which the financial variable can statistically explain the error of Thirlwall and Hussain's growth definition and the error of the augmented Solow model, respectively.

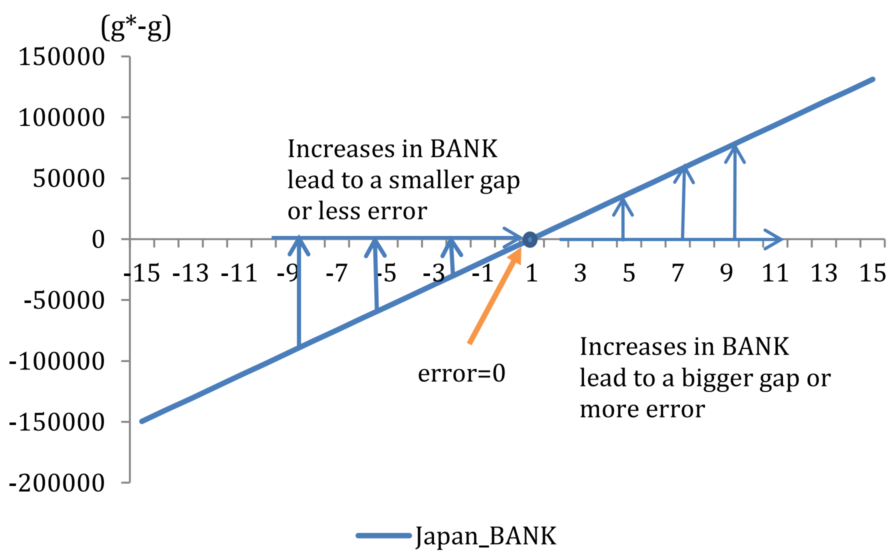


Figure 5.1 Relationship between Japan's error and BANK

Note: The graph is made by focusing only on the BANK and (g*-g) not including the effect from different periods by the dummy variables, autoregressive terms and moving average terms. This figure can be considered different in the intercept if we include the difference in structural break.

Therefore, the implication from this case depends on where the mean of the financial variable locates. If the country's mean of BANK is less than the point that makes the error equal to zero, an increase in financial development makes Thirlwall and Hussain's predicted growth closer to the actual growth. On the other hand, if the mean of BANK is higher than the point where the error is zero, an increase in BANK makes a greater error in Thirlwall and Hussain's hypothesis.

5.3.2 Case II Constant Term Is Positive and Financial Variable Coefficient Is Negative

The correlation between the error between the predicted growth rates and the actual growth rates and financial variable is negative. This means when financial development increases, the error or the gap decreases. However, the constant term is positive, which means if the mean of financial variables is less than the x-intercept (when the error is zero) the increase in financial variables will lead to a smaller gap (less negative). We illustrate this scenario in Figure 5.2, which focuses on the relationship between Japan's gap between Thirlwall and Hussain's growth rates and the actual growth and DEPTH (Liquid liabilities to GDP).

The implication of this case is the same as for the first case. If the mean value of Japan's DEPTH falls on the left side of the graph, or less than the value that makes the error zero, an increase in DEPTH will decrease the error. However, if the mean value is higher than the x-intercept of the graph, higher DEPTH means a greater gap or errors of Thirlwall and Hussain's hypothesis.

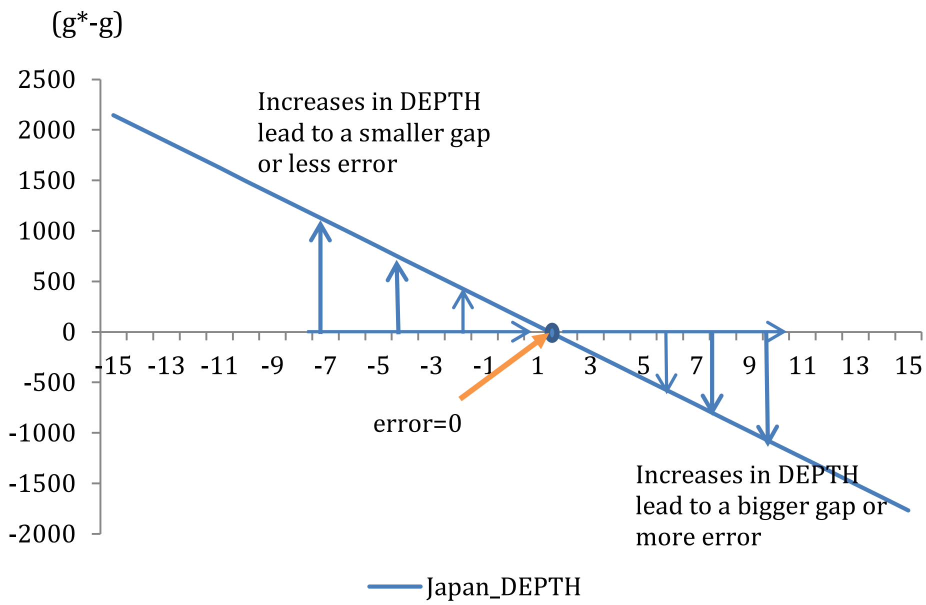


Figure 5.2 Relationship between Japan's error and DEPTH

Therefore, we have to consider the mean values of financial variables in each country and see if they are higher or less than the value that makes the error equal to zero (FIN*). The comparison of the mean value and FIN* is shown in Table 5.6. From Table 5.6, most of the mean values for financial variables are greater than FIN* in the case of the post- Keynesian model, which means in most cases financial development levels of the countries are in the range in which an increase in financial variables will increase the greater error of Thirlwall and Hussain's prediction.

For some cases of the post-Keyenesian models and the augmented Solow model, the mean values of financial variables are less than FIN*, which means that the financial structure and development level of the countries are in the range in which an increase in financial variables will decrease the gap or the error of the models.

Table 5.6 Comparison of the Mean Value and FIN*

	Financial Variables	Mean Values	FIN* Thirlwall's		FIN* ASL	
Japan	BANK	0.954956	0.984	Mean<FIN*	0.982	Mean<FIN*
	DEPTH	1.913204	1.451	Mean>FIN*	1.729	Mean>FIN*
	PRIVY	1.440526	1.326	Mean>FIN*	1.638	Mean<FIN*
Korea	BANK	0.966804	0.956	Mean>FIN*		
	DEPTH	0.469777	0.357	Mean>FIN*	0.350	Mean>FIN*
	PRIVY	0.624479	Not significant	-		
Singapore	BANK	0.975549	Not significant	-		
	DEPTH	0.911333	Not significant	-		
	PRIVY	0.883291	1.162	Mean<FIN*	1.123	Mean<FIN*
Indonesia	BANK	0.844297	0.956	Mean<FIN*	0.89	Mean<FIN*
	DEPTH	0.357935	Not significant	-		
	PRIVY	0.282947	0.257	Mean>FIN*		
Malaysia	BANK	0.975930	0.958	Mean>FIN*	0.974	Mean>FIN*
	DEPTH	1.084993	Not significant	-		
	PRIVY	0.973618	0.464	Mean>FIN*		
The Philippines	BANK	0.845729	0.913	Mean<FIN*		
	DEPTH	0.415871	Not significant	-	0.248	Mean>FIN*
	PRIVY	0.275405	Not significant	-	0.213	Mean>FIN*
Thailand	BANK	0.951803	Not significant	-		
	DEPTH	0.808576	0.386	Mean>FIN*		
	PRIVY	0.866919	Not significant	-	0.432	Mean>FIN*

Note: ASL is the augmented Solow model

Table 5.6 Continued

	Financial Variables	Mean Values	FIN* Thirlwall's		FIN* ASL	
China	BANK DEPTH PRIVY	0.968 1.111 0.935	1.403 0.598 Not significant	Mean<FIN* Mean>FIN*	0.370	Mean>FIN*

From the number of significant coefficients of financial variables, we found that they have more power to explain the error series of the post-Keynesian model than in the case of the neoclassical model.

CHAPTER 6

SUMMARY AND POLICY IMPLICATIONS

6.1 Summary

The comparison of two growth models using econometric techniques in this study shows that the growth rates estimated from the augmented Solow model (Mankiw et al., 1992) can better explain the performance of output in eight countries in East Asia during 1980-2010 than the growth rate calculated from the Thirlwall and Hussain growth model (Thirlwall & Hussain, 1982). The study uses R-squares, Adjusted R-squares, Akaike Information Criterion (AIC) and Schwart Information Criterion (SIC) of the regression of the fitted output growth from each model on the actual growth to be the comparison criterion. In addition, the study applied a discerning approach using Davidson and McKinnon's (1981) J-test to consider which model should be accepted to explain the growth in this region. For most of the individual countries, the J-test accepts the augmented Solow model and rejects the Balance-of-Payment constrained model (Thirlwall & Hussain's). Only in the case of Indonesia did the J-test reject both models to explain her growth.

The study further hypothesizes that the errors of both models are from omitted variables, especially from the financial structures. Therefore, a set of selected financial variables is used to explain the errors series and finds that the financial variables can explain more in the case of the error from the Thirlwall and Hussain model. Indeed, there are 26 out of 48 cases in which the financial variables can explain the error of this model whereas there are only 18 cases in which the financial variables can be the augmented Solow model errors. When the study considers the coefficient values, there are two possible cases that lead to different policy implications. The first case is when the constant term is negative and the financial variable coefficient is positive, which implies that when the financial development increases, the error or the gap increases. However, the constant term is negative, which means if the mean of financial variables is less than x-intercept (when the error is zero), the increase in financial variables will lead to a smaller gap (less negative). Therefore, it depends on the mean values and the value of financial variables, which make the error zero. If the mean values are greater than the value that makes the error zero, increasing the financial variable value will increase the gap between the actual and the predicted growth rate. However, if the mean values of financial variables are less than the value that makes the error zero, an increase in financial variable values will close the gap of predicted and actual growth. The policy implication from this case is that the country can promote the output growth using each growth model only when the mean values of financial variables are less than the value that makes the error zero.

The second possible outcome is when the constant term is positive and the coefficient of the financial variable is negative. This means when financial development increases, the error or the gap decreases. However, the constant term is positive, which means if the mean of financial variables is less than the x-intercept (when the error is zero) the increase in financial variables will lead to a smaller gap (less negative). The policy implication is the same as in the first case.

6.2 Policy Implications

1. Since the results of this study show that the supply-side growth theory can explain more in the growth performance in East Asian countries during 1980-2010 except in Indonesia, the supply variables should be considered important factors to promote the output growth in these countries. The determination of growth from the augmented Solow growth model consists of growth of factors of production (labor and capital); technological progress, which is partly brought by the foreign inflows; and also the accumulation and growth of human capital. In this study we found that the rate of tertiary level of education in the labor force is a significant factor for the output growth in the panel data case. It is also mostly significant to determine the GDP growth in all individual country cases. The results imply that if these countries experience a shortage of all supply variables, the output growth will be affected.

2. For the human capital policy, the country can use a variety of policies to improve overall human capital. Individuals can be healthier in a more efficient healthcare system. Quality of education, which can be reflected in the closer linkage between the academic and real sectors, is one important factor for improved human capital. A literate population contributes to political stability and consistency in the growth policy.

3. All countries' growth performances in this study cannot be explained by the Balance-of-Payment Constrained model by Thirlwall and Hussain (1982). This result shows that in these countries, the balance-of-payment or foreign exchanges shortages is not the limitation to growth. Countries in this region are able to run balance-of-payment deficit and still have positive output growth. The export growth and capital inflows are not important determinants of the output growth in terms of the source for foreign

exchange. One reason that growth in these countries is not demand-driven is that developing Asia still faces very elastic demand curves for their output in the world market. However, the capital inflow is important in terms of the source for technological transfer from foreign countries. Therefore, the countries should implement the policy for capital inflows attraction, which guarantees that there will be some technological transfer through the inflows. Foreign direct investment inflow is one category that will fulfill that policy.

4. Financial structure has a large role to explain the error from both growth models. The direction of promoting the efficiency in the financial structure depends on the position or the mean value of the financial variables of a particular country.

APPENDIX A

IMPORT AND EXPORT ELASTICITIES

The estimation details of the price and income elasticity of demand for import and export are the following:

<u>Import elasticity :</u> The study estimates the following specification by the two-stage least square technique: Import Growth = α_0+ α_1(Change in foreign price(%)+exchange rate change(%)-domestic inflation(%)) + α_2(output growth (%))

where the instrumental variables are change in foreign price(%), exchange rate change(%), domestic inflation(%) and constant term.

<u>Export elasticity</u> : The study estimates the following specification using the OLS technique.

Export growth(%) = β_0+β_1(Domestic inflation(%)-Exchange rate change(%)-Change in foreign price(%))+β_3(World income growth (%))

Table A.1 Data for Price and Income Elasticity of Import Estimations

Import growth (%)	Japan	Korea	Singapore	Indonesia	Malaysia	Philippines	Thailand	China
1980	-7.76103	-5.01778	21.30771	9.736934	20.50998	19.59951	-0.16162	-0.89858
1981	2.136229	6.285762	9.874222	33.79926	5.590864	-0.79119	0.56232	8.090472
1982	-0.6736	3.884086	6.128285	1.410291	13.75391	2.446969	-14.625	-18.8523
1983	-3.44347	10.18345	4.913235	-2.70486	9.00293	-3.05514	32.76397	10.00225
1984	10.53701	7.911211	8.085371	-7.51085	6.505901	-17.4773	7.632514	27.14019
1985	-2.69051	0.603787	-3.89773	5.277886	-9.83596	-14.2044	-12.6677	50.04352
1986	3.756128	18.43177	10.92957	4.170898	-6.46888	10.23601	-0.92851	-13.332
1987	9.017825	19.55883	13.28898	1.974242	8.473786	28.6268	33.55855	-6.85466
1988	18.6615	13.73254	26.60035	-18.6955	19.71473	19.61618	39.56445	19.80446
1989	17.99403	17.45609	9.585185	11.57036	25.70132	15.17868	21.5885	-0.43994
1990	8.105776	13.77777	14.4753	23.15991	26.28553	10.04048	23.68663	-20.3117
1991	-1.11248	18.64841	7.18258	15.72677	25.20915	-1.11797	12.93832	14.64766
1992	-1.08721	5.382155	7.60157	8.690528	6.373959	8.69245	8.968468	33.5502
1993	-1.28464	5.954457	18.5955	4.174528	15.03523	11.50297	13.22558	33.49692
1994	8.194499	21.3232	16.48485	20.29522	25.63566	14.50234	14.42514	10.03195
1995	14.20814	22.9504	22.92837	20.939	23.69806	16.0157	19.96789	13.00375
1996	13.37248	14.32203	10.28084	6.864764	4.885534	16.7382	-0.60528	14.38771
1997	0.5122	3.457183	11.51131	14.71597	5.824576	13.49037	-11.2979	11.12048
1998	-6.84055	-21.812	-8.659	-5.29013	-18.7538	-14.6981	-21.6471	9.578202
1999	3.605107	27.79679	8.963989	-40.6752	10.56333	1.698992	10.48925	16.138
2000	9.194441	20.05644	19.96915	25.93397	24.37454	11.79466	27.11849	24.83988
2001	0.625777	-4.86418	-5.86683	4.179861	-8.23504	1.210753	-5.49633	12.74196
2002	0.920183	14.42754	5.776698	-4.24945	6.185943	10.0609	13.70045	15.5764
2003	3.889139	11.07756	9.602454	1.563734	4.533771	2.631649	8.401537	31.21943
2004	8.119389	11.74487	22.89842	26.65329	19.63636	6.194057	13.38127	29.91376

Table A.1 Continued

Import growth (%)	Japan	Korea	Singapore	Indonesia	Malaysia	Philippines	Thailand	China
2005	5.813186	7.589764	11.32754	17.76895	8.910841	3.255969	9.003387	13.43134
2006	4.223583	11.28718	11.12107	8.582668	8.134281	3.474673	3.328373	16.04242
2007	1.635462	11.67877	7.778768	9.064258	5.938268	1.722399	4.440156	13.93197
2008	0.384544	4.415102	9.401622	10.00257	2.131026	1.60035	8.864411	3.786117
2009	-15.3282	-7.98209	-11.0381	-14.9775	-12.2188	-8.09603	-21.4912	4.146895
2010	9.787745	16.9131	16.55808	17.28272	15.07916	22.52106	21.51131	20.13036

Change of import price index (%)	Japan	Korea	Singapore	Indonesia	Malaysia	Philippines	Thailand	China
1980	N/A	17.221425	N/A	N/A	N/A	N/A	N/A	N/A
1981	N/A	-7.19452	14.8484	22.503231	7.1507426	2.2472656	8.0474604	N/A
1982	N/A	8.0037937	2.1587117	27.026823	7.5159523	-2.424113	-14.129211	10.399021
1983	N/A	16.947923	-0.0330171	-3.0072958	6.7956708	-3.5752149	20.340692	-12.400636
1984	N/A	1.6486566	1.8076632	-15.105186	5.945514	-19.357411	1.0721958	10.915219
1985	N/A	1.4420606	-8.3081882	-26.098545	-12.794471	-15.199831	-11.114007	28.143993
1986	N/A	29.871775	-2.9457642	4.4741203	-11.809449	-3.5583861	-0.6889194	54.148121
1987	N/A	26.30668	27.627798	15.413323	17.350706	36.627812	41.638902	1.5431222
1988	N/A	18.633109	34.720354	7.0978173	30.170809	21.479464	56.0388	0.7272049
1989	N/A	13.632148	13.205255	23.490338	36.18773	27.940856	27.040404	27.887819
1990	N/A	16.724271	22.389283	33.477995	30.149777	16.406914	28.229286	7.0058623
1991	N/A	0.3071454	8.7564481	18.464075	25.260614	-1.0935349	13.688826	-9.7987825
1992	N/A	2.4760533	9.1928146	5.4544049	8.7485163	20.490612	8.2975988	19.581966
1993	N/A	22.133506	18.099904	3.8416422	14.541321	20.594441	13.249029	26.326598

Table A.1 Continued

Change of import price index (%)	Japan	Korea	Singapore	Indonesia	Malaysia	Philippines	Thailand	China
1994	N/A	32.019189	20.456625	12.902429	30.558531	21.149483	18.193222	29.005398
1995	N/A	11.264145	21.269115	27.033111	30.353137	25.173911	29.98142	11.211151
1996	3.9507922	-3.8067301	5.4864385	5.660981	0.9365354	20.414954	2.1830465	14.276893
1997	-2.9780726	-35.496902	0.8367723	-2.9094551	0.7794109	13.174921	-13.103522	5.1968897
1998	-17.201273	28.376597	-20.929197	-34.412188	-26.265289	-18.450481	-31.634096	2.3362098
1999	10.973175	34.011123	6.0552526	-12.195925	12.213049	3.4026219	17.172712	-1.324997
2000	21.926544	-12.078065	21.146227	39.62838	25.34681	13.692275	22.986632	18.162574
2001	-8.0161049	7.8158443	-13.783493	-10.780192	-9.8786158	-5.6887756	0.0589438	35.729968
2002	-3.4074405	17.551898	0.3862069	-1.8247957	8.1268674	17.671545	4.3340935	8.2342328
2003	13.563705	25.519636	17.017177	10.170314	2.602884	3.6108784	17.292827	21.193334
2004	18.701068	16.383547	27.385813	32.333759	28.493679	8.2826453	24.511271	39.838059
2005	13.283701	18.429555	15.24692	37.489933	8.6535357	7.3430017	25.15438	35.969813
2006	12.555688	15.341179	19.326958	6.6481028	14.574775	9.2825162	8.9414174	17.63576
2007	6.9297449	21.978388	10.240459	15.425509	11.96323	6.7058547	9.7659315	19.931809
2008	23.0572	-25.830107	21.517737	36.899225	12.018369	4.8121828	26.459722	20.767444
2009	-27.811746	31.708601	-23.139346	-26.403016	-24.762478	-24.386002	-24.542758	18.34145
2010	25.775707	N/A	26.448319	40.827037	33.176765	27.31765	36.908779	-11.262615

Table A.1 Continued

Change of exchange rate (local currency/dollar) (%)	Japan	Korea	Singapore	Indonesia	Malaysia	Philippines	Thailand	China
1980	3.468483	25.50258	-1.53364	0.632127	-0.52815	1.81474	0.281195	-3.63987
1981	-2.7366	12.11589	-1.3318	0.759603	5.84513	5.168343	6.564109	13.7569
1982	12.94159	7.350037	1.293768	4.695492	1.356987	8.106055	5.406272	11.0299
1983	-4.64315	6.109306	-1.2605	37.47147	-0.60554	30.12549	0	4.392682
1984	0.004561	3.89656	0.948077	12.83234	0.964638	50.26666	2.779348	17.43033
1985	0.426626	7.946165	3.144118	8.249485	5.948008	11.42983	14.88837	26.57783
1986	-29.3524	1.314242	-1.03326	15.4856	3.962882	9.557204	-3.16657	17.57553
1987	-14.1718	-6.68063	-3.28065	28.16931	-2.39414	0.892743	-2.19054	7.799727
1988	-11.398	-11.075	-4.4425	2.54621	3.93489	2.562273	-1.66747	0
1989	7.657138	-8.20439	-3.08914	5.00414	3.438938	3.043462	1.613706	1.155486
1990	4.949163	5.407405	-7.06188	4.110268	-0.14643	11.84089	-0.4536	27.04039
1991	-6.96572	3.615493	-4.68865	5.833698	1.670749	13.03195	-0.26838	11.29333
1992	-5.97991	6.449483	-5.70654	4.081558	-7.37012	-7.15517	-0.45722	3.591695
1993	-12.2016	2.820723	-0.80885	2.817008	1.048592	6.300247	-0.31699	4.485675
1994	-8.08468	0.096553	-5.4677	3.528804	1.948711	-2.591	-0.67007	49.58009
1995	-7.97222	-4.00431	-7.2061	4.06591	-4.5671	-2.66001	-0.93351	-3.10168
1996	15.6491	4.301977	-0.51745	4.166503	0.460722	1.950783	1.71585	-0.44593
1997	11.22625	18.25287	5.302329	24.21059	11.81462	12.41435	23.76091	-0.29297
1998	8.194369	47.31973	12.71519	244.1841	39.49903	38.75852	31.86758	-0.13098
1999	-12.9853	-15.1716	1.275991	-21.5554	-3.16929	-4.41167	-8.57298	-0.00856
2000	-5.39152	-4.86695	1.711352	7.21342	0	13.05551	6.07756	0.00307
2001	12.77167	14.15058	3.93043	21.83714	0	15.38822	10.77014	-0.01734
2002	3.175434	-3.09112	-0.0633	-9.25516	0	1.198048	-3.31252	-0.00134
2003	-7.54024	-4.75379	-2.7033	-7.88361	0	5.037959	-3.43451	0.000956

Table A.1 Continued

Change of exchange rate (local currency/dollar) (%)	Japan	Korea	Singapore	Indonesia	Malaysia	Philippines	Thailand	China
2004	-6.67702	-3.88507	-2.98218	4.217221	0	3.388322	-3.04258	-0.00285
2005	1.872257	-10.5824	-1.52825	8.568123	-0.33969	-1.70312	-0.00568	-0.99657
2006	5.517328	-6.76936	-4.53402	-5.62019	-3.14	-6.84612	-5.81337	-2.69551
2007	1.250409	-2.67423	-5.1501	-0.19998	-6.28671	-10.0671	-8.87969	-4.58906
2008	-12.2239	18.59436	-6.12041	6.103955	-2.95953	-3.95486	-3.49057	-8.66086
2009	-9.47122	15.86896	2.80267	7.124216	5.655845	7.572545	2.919175	-1.68722
2010	-6.1881	-9.46559	-6.25682	-12.5073	-8.60876	-5.39019	-7.58352	-0.89509

Domestic inflation (%)	Japan	Korea	Singapore	Indonesia	Malaysia	Philippines	Thailand	China
1980	5.4379839	24.041396	11.088545	30.990439	6.8726791	14.249949	12.702481	3.793078
1981	4.4430528	18.239206	5.9557585	10.43919	1.0601633	11.703139	8.3724198	2.2925441
1982	2.1624666	6.6687006	4.3303435	6.0613048	2.5284435	8.7012244	5.0578546	-0.2498831
1983	2.3532637	6.2106512	3.1542902	14.251865	5.1897109	14.221881	3.6491565	1.0002184
1984	3.070554	6.0043033	0.5824747	8.0479288	5.5461673	53.335958	1.4478694	4.9362076
1985	2.2076367	4.7664187	-1.4309729	4.2854264	-1.5092803	17.63286	2.1772053	10.20397
1986	1.6505917	5.5092218	-0.8689388	-0.0968959	-8.6378262	2.9528781	1.6531545	4.7484211
1987	0.1942095	5.6509646	0.457543	15.437827	5.5307402	7.4981921	4.7232097	5.1580225
1988	0.691274	7.6065436	5.6965901	12.745347	3.6200271	9.6470229	5.9183978	12.082195
1989	2.3034957	5.7355812	4.2766317	9.9931654	4.4627724	9.0330636	6.1167439	8.5107477
1990	2.6251695	10.519284	4.3778468	7.7239105	3.8067488	12.971281	5.773184	5.838486

Table A.1 Continued

Domestic inflation (%)	Japan	Korea	Singapore	Indonesia	Malaysia	Philippines	Thailand	China
1991	2.6057347	10.664841	4.1401305	8.8277302	3.5839347	16.52688	5.7465228	6.8493801
1992	1.5881739	7.621974	1.4089895	5.3643162	2.4149967	7.9326583	4.4904536	8.237469
1993	0.4374039	6.3493175	3.452935	8.8801055	3.9863721	6.8321581	3.286939	15.121173
1994	0.1150405	7.835182	3.5331472	7.7763777	3.9374052	9.9913146	5.2078507	20.607395
1995	-0.4974979	7.387149	2.8298149	9.7032769	3.6334816	7.5508702	5.5897501	13.736252
1996	-0.6321296	5.119044	0.9450003	8.8535913	3.6807778	7.6610378	4.010292	6.4353708
1997	0.5334493	4.6168701	1.1995247	12.571309	3.4819436	6.224392	4.0635711	1.5129002
1998	-0.0344171	5.8217205	-1.4204847	75.271284	8.4987145	22.381723	9.2376193	-0.858533
1999	-1.3020457	-0.0993828	-4.7978187	14.161193	0.0454607	6.585053	-4.0382209	-1.2547845
2000	-1.7331978	5.0139856	3.6082504	20.447459	8.8552153	5.7097999	1.3461607	2.0622248
2001	-1.2298962	3.8599386	-2.1572487	14.295715	-1.5818739	5.5494778	2.0694716	2.0528824
2002	-1.5455748	3.2303257	-0.914441	5.8960517	3.1288832	4.1622298	0.8168577	0.5841973
2003	-1.5981901	3.5612932	-1.5251639	5.487427	3.2989329	3.201336	1.327977	2.6115462
2004	-1.0760424	3.0335752	4.3093468	8.5507327	6.0092826	5.516871	3.1258845	6.9128157
2005	-1.2268785	0.6545943	2.0613783	14.331786	4.630272	5.8280207	4.4870779	3.9297507
2006	-0.8989481	-0.1434439	1.7581849	14.087422	3.8768259	4.9490305	5.2428963	3.7855503
2007	-0.7379612	2.0803532	6.3968659	11.258579	4.9672736	3.0903238	3.4528107	7.6019714
2008	-1.0079229	2.9104352	-1.2077193	18.149752	10.336369	7.5490596	3.9313031	7.7978513
2009	-0.3655328	3.4286119	0.2898449	8.2848057	-6.8990572	2.7732467	1.9466452	-0.5933422
2010	-2.1638887	3.7270799	-0.5228458	8.0211933	5.091882	4.2223889	3.6631922	6.6015284

Table A.2 Data for Price and Income Elasticity of Export Estimations

Export Growth (%)	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
1980	25.5	10.8	36.1	N/A	18.8	27.4	26.6	N/A
1981	17.9	22.2	16.4	N/A	-7.17	3.84	7.24	N/A
1982	-7.57	2.54	3.08	-14.9	4.3	-9.16	0.449	N/A
1983	4.41	7.31	2.01	-5.02	14.7	-0.176	-4.66	-1.91
1984	14.4	14	1.73	10.9	17.9	3.23	14.1	15.2
1985	2.98	-6.42	-7.83	-9.16	-6.87	-2.4	-2.17	5.42
1986	16.5	30.4	-1.18	-21.3	-9.01	12.2	22	5.04
1987	10.8	38.2	26.7	19.9	28.9	4.71	32.1	32.4
1988	16.4	25.9	38.3	14.3	15.9	17.6	39.3	17.2
1989	5.06	2.84	14.7	19	18.4	16.4	23.8	4.16
1990	4	4.63	21.9	17.9	18.2	3.48	15.6	20
1991	9.06	10.1	11.4	10.8	16.6	9.31	21.5	14.9
1992	8.11	8.87	10.1	14.6	17.7	16.6	16.6	19.6
1993	6.36	9.61	16.5	9.09	17.5	10.2	14.7	10.2
1994	9.39	15.5	25.4	11	25.8	26.2	18.3	37.2
1995	11.3	32.1	31.8	17.6	25.9	32.3	25.2	23.5
1996	-5.26	3.45	6.59	7.3	10.5	25	1.6	16.6
1997	2.25	7.51	0.281	11.4	1.24	20.5	1.4	20.7
1998	-8.79	-3.12	-15.6	-13.3	-10.6	-8.4	-8.99	0.0893
1999	6.47	7.32	6.46	1.81	15.1	2	8.35	6.53
2000	13.8	21.9	18.4	26.5	17	7.99	14.5	26.5
2001	-15.3	-13.5	-9.01	-11	-8.84	-15.6	-6.92	7.1
2002	2.94	7.37	3.93	4.71	5.69	10	7.01	22
2003	14.2	20.5	16.2	5.43	9.53	2.37	15.3	32.7

Table A.2 Continued

Export Growth (%)	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
2004	20.9	29.8	24.2	19.3	21.4	10.6	21.4	35.2
2005	6.47	11.5	16.4	20.7	12.1	4.55	13.4	27.6
2006	8.16	15.8	18.2	15.1	13.1	18.3	18	26.9
2007	10.1	17.6	14	13.4	12.6	11.9	18.9	26.4
2008	10.9	13.6	14.1	18.7	11.8	-2.21	14.9	17.8
2009	-24.8	-17.8	-17.1	-14.2	-19	-16.1	-13.1	-15.7
2010	29.4	26.7	28	31.7	24.3	33.9	26	31.4

World Income Growth (%)	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
1980	1.6938094	1.8866596	1.8519034	1.8403429	1.853764	1.8523576	1.854896	1.803501
1981	1.6113389	1.9679053	1.9868312	1.9776676	1.9906834	1.9938729	1.9898301	1.964836
1982	-0.2096543	0.289862	0.3328967	0.3397463	0.3337128	0.3327609	0.3315247	0.2487921
1983	2.4456705	2.4769136	2.5342632	2.5223351	2.537131	2.5452528	2.5362743	2.4459879
1984	4.6165795	4.5616808	4.5855811	4.5825944	4.5868499	4.6282749	4.589515	4.4586385
1985	3.2088302	3.6783852	3.7133912	3.7071338	3.7147219	3.7357546	3.7040203	3.5702213
1986	3.4538527	3.2848106	3.3554339	3.3422053	3.355871	3.3520401	3.3469611	3.2692692
1987	3.3939488	3.4344023	3.4986605	3.502806	3.5067521	3.507905	3.4951047	3.3800829
1988	4.1617845	4.5854435	4.6387943	4.6425577	4.640557	4.6442884	4.6269703	4.5342274
1989	3.4378085	3.7273153	3.7496906	3.7394017	3.7517169	3.754968	3.7373255	3.7547371
1990	2.4177917	2.8815453	2.9402971	2.9277862	2.942432	2.9533602	2.9286374	2.9379165
1991	1.1976554	1.4716172	1.558279	1.5348116	1.5525027	1.5734533	1.5451218	1.4257122
1992	2.3803331	2.0536068	2.0934597	2.0789305	2.089467	2.1080742	2.0827554	1.860841
1993	2.1163925	1.716015	1.7549006	1.7482017	1.7578789	1.7752459	1.7520425	1.5009039

Table A.2 Continued

World Income Growth (%)	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
1994	3.802249	3.2209017	3.2788592	3.2734986	3.2819416	3.2936009	3.2737894	3.0483937
1995	3.0711544	2.7862962	2.8701163	2.8505709	2.8635904	2.8769475	2.8548863	2.6588623
1996	3.5255015	3.314767	3.3616414	3.3478634	3.3548799	3.3668037	3.3618053	3.1743404
1997	4.2685296	3.8128139	3.8135181	3.8211724	3.8163595	3.8230434	3.8500919	3.6515972
1998	3.2130167	2.5236263	2.3821656	2.4647751	2.3982255	2.3766299	2.4244348	2.1859502
1999	3.9522746	3.2150916	3.3011729	3.322385	3.3014948	3.3097602	3.3049043	3.156638
2000	4.6631308	4.2355601	4.2896279	4.2999972	4.2904213	4.3028795	4.3014515	4.1512243
2001	1.8892104	1.6253656	1.6726101	1.6540216	1.6675456	1.6611039	1.6622798	1.4080816
2002	2.2713584	1.8954795	1.9779277	1.9711702	1.9745356	1.9801235	1.9715632	1.6910539
2003	2.85319	2.6847463	2.6812327	2.6755934	2.6775999	2.6809274	2.6691875	2.3634343
2004	4.3745162	4.0809574	4.0752317	4.0853735	4.0822615	4.0836249	4.0812062	3.8049477
2005	3.9099819	3.5409729	3.5363154	3.5365494	3.5427958	3.5450773	3.5439496	3.157704
2006	4.4180185	4.0276386	4.0328223	4.0400966	4.0425326	4.0450205	4.0438416	3.5778025
2007	4.2516518	3.9577346	3.9618255	3.9650135	3.9704134	3.9712379	3.9739722	3.3737477
2008	1.8094247	1.4217928	1.4369274	1.4110605	1.4266217	1.430136	1.4333125	0.9043233
2009	-1.8369731	-2.3555906	-2.3108806	-2.3485822	-2.3084134	-2.3162106	-2.3059968	-3.1230613
2010	4.1875865	4.1773083	4.1795031	4.2050405	4.2076795	4.2076723	4.2022026	3.7232493

Note : World income growth is not the same for every country because it is calculated by the change of total world income subtracted by that country ’s income.

APPENDIX B

DATA FOR OUTPUT GROWTHS CALCULATION

Table B.1 Data for Calculating Thirlwall and Hussain's Predicted Output Growth

Exports of goods and services (BoP, current US$)	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
1978	1.0887E+11	16770000000	13250074212	N/A	8008059732	4438000000	4863858317	N/A
1979	1.1713E+11	19097000000	17843163561	N/A	11863692967	5677000000	6268870755	N/A
1980	1.4698E+11	21156400000	24285352905	N/A	14097677879	7235000000	7938706473	N/A
1981	1.7335E+11	25860000000	28273884430	23797000000	13086529598	7513000000	8513401713	N/A
1982	1.6022E+11	26517900000	29143584783	20251000000	13649102404	6825000000	8551652506	23637000000
1983	1.6728E+11	28455800000	29728591387	19235000000	15655358110	6813000000	8153350168	23186000000
1984	1.9141E+11	32440300000	30244012975	21324000000	18453332958	7033000000	9301929412	26716000000
1985	1.97109E+11	30356100000	27874463109	19371000000	17184971389	6864000000	9100301783	28163000000
1986	2.29666E+11	39590700000	27544567341	15240000000	15636611325	7702000000	11105350790	29583000000
1987	2.54455E+11	54720300000	34890636995	18271000000	20149320372	8065000000	14664744179	39171000000
1988	2.96252E+11	68907100000	48265997491	20878000000	23358938947	9487000000	20428614917	45912000000
1989	3.11254E+11	70862900000	55358255958	24849000000	27646134110	11046000000	25290984353	47823000000
1990	3.23692E+11	74141700000	67489351920	29295000000	32664725727	11430000000	29229483219	57374000000
1991	3.53005E+11	81659000000	75156145987	32457000000	38086349422	12494000000	35504312762	65898000000
1992	3.81625E+11	88901600000	82765352268	37187000000	44811865771	14566000000	41387414595	78817000000
1993	4.0588E+11	97443700000	96455182679	40566000000	52649571985	16048000000	47465138940	86852000000
1994	4.43996E+11	1.12566E+11	1.20963E+11	45020000000	66217227228	20251000000	56144195299	1.19181E+11
1995	4.93991E+11	1.48749E+11	1.59488E+11	52923000000	83368732084	26795000000	70291857803	1.4724E+11
1996	4.67999E+11	1.53884E+11	1.70004E+11	56787000000	92120547270	33490000000	71415808938	1.71678E+11
1997	4.78543E+11	1.65434E+11	1.70481E+11	63239000000	93265596905	40365000000	72419158862	2.07239E+11
1998	4.36456E+11	1.60266E+11	1.43826E+11	54849971800	83399522217	36973000000	65908516081	2.07424E+11
1999	4.64692E+11	1.72001E+11	1.53118E+11	55840471035	96016105263	37711000000	71410225659	2.20964E+11
2000	5.28751E+11	2.09589E+11	1.81346E+11	70621534780	1.1237E+11	40724000000	81761851506	2.79561E+11
2001	4.48108E+11	1.81373E+11	1.65014E+11	62865038247	1.02436E+11	34385000000	76106587483	2.99409E+11

Table B.1 Continued

Exports of goods and services (BoP, current US$)	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
2002	4.61292E+11	1.94747E+11	1.71505E+11	65828019017	1.08261E+11	37831000000	81442771880	3.65395E+11
2003	5.2674E+11	2.34666E+11	1.99351E+11	69402129559	1.18577E+11	38728000000	93881649848	4.85003E+11
2004	6.36611E+11	3.04683E+11	2.47539E+11	82812559662	1.43928E+11	42837000000	1.14019E+11	6.55827E+11
2005	6.77782E+11	3.39618E+11	2.88225E+11	99921822251	1.61384E+11	44788000000	1.2926E+11	8.36888E+11
2006	7.33111E+11	3.93337E+11	3.40825E+11	1.15048E+11	1.82597E+11	52970000000	1.52497E+11	1.06168E+12
2007	8.07207E+11	4.62563E+11	3.88563E+11	1.30501E+11	2.05682E+11	59278000000	1.81321E+11	1.34221E+12
2008	8.95228E+11	5.25286E+11	4.43366E+11	1.54853E+11	2.30054E+11	57970000000	2.0825E+11	1.58171E+12
2009	6.73615E+11	4.3177E+11	3.67742E+11	1.32801E+11	1.86424E+11	48624000000	1.8089E+11	1.33335E+12
2010	8.71533E+11	5.47006E+11	4.70793E+11	1.7484E+11	2.31714E+11	65106000000	2.27908E+11	1.75262E+12

Private capital flows, total (BoP, current US$)	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
1978	-5170000000	4.36E+10	59805851	N/A	5.79E+08	1E+08	1.25E+08	N/A
1979	-4250000000	1.03E+08	5.91E+08	N/A	7.68E+08	20000000	2.32E+08	N/A
1980	7250000000	24000000	1.15E+09	N/A	9.23E+08	-1E+08	2.83E+08	N/A
1981	-260000000	1.13E+08	1.63E+09	1.8E+08	2.4E+09	1.75E+08	3.32E+08	N/A
1982	-1980000000	78800000	1.27E+09	5.4E+08	2E+09	17000000	2.57E+08	4.07E+08
1983	-5070000000	-9.7E+07	1.04E+09	6.6E+08	1.93E+09	1.12E+08	4.56E+08	-7.8E+07
1984	-29570000000	4.84E+08	1.06E+09	2.12E+08	1.91E+09	6000000	5.56E+08	-5.1E+08
1985	-48544131493	8.94E+08	9.84E+08	2.75E+08	2.64E+09	17000000	1.06E+09	4.06E+09
1986	-1.18E+11	1.38E+09	9.8E+08	5.26E+08	5.19E+08	1.4E+08	2.32E+08	2.99E+09
1987	-1.26E+11	-1.1E+09	2.88E+09	2.97E+08	5.62E+08	3.26E+08	5.28E+08	2.72E+09
1988	-1.12E+11	-2E+08	3.24E+09	4.78E+08	2.72E+08	9.86E+08	1.61E+09	3.22E+09

Table B.1 Continued

Private capital flows, total (BoP, current US$)	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
1989	-64262054628	-7.1E+08	1.93E+09	5.09E+08	1.56E+09	8.43E+08	3.21E+09	2.43E+09
1990	-39832884675	-1.9E+08	2.5E+09	1E+09	2.08E+09	4.8E+08	2.27E+09	2.42E+09
1991	15377853891	-1E+08	3.45E+09	1.47E+09	4.17E+09	6.54E+08	1.77E+09	3.69E+09
1992	-39010366762	2.79E+09	3.38E+09	1.69E+09	4.06E+09	2.68E+08	2.89E+09	7.1E+09
1993	-83563367754	5.52E+09	-2.4E+09	3.45E+09	4.3E+09	8.12E+08	7.03E+09	2.62E+10
1994	-44626648703	9.35E+09	-3.8E+09	5.38E+09	2.69E+09	1.56E+09	3.53E+09	3.53E+10
1995	-48728742740	4.58E+09	-2.4E+09	7.84E+09	3.74E+09	2.27E+09	5.3E+09	3.46E+10
1996	-57059379816	9.94E+09	-1.1E+10	1.06E+10	4.81E+09	6.65E+09	5.1E+09	3.98E+10
1997	9270399445	1.28E+10	-1.2E+10	1.87E+09	4.89E+09	1.68E+09	7.81E+09	4.86E+10
1998	-60529498644	1.28E+10	-3.5E+09	-2.1E+09	2.45E+09	1.2E+09	7.54E+09	3.74E+10
1999	-37439712580	-4.2E+07	-1E+09	-3.7E+09	1.45E+09	4.43E+09	5.65E+09	2.57E+10
2000	-59282286129	1.47E+10	-4E+09	-6.5E+09	-7.7E+08	1.56E+09	2.68E+09	3.35E+10
2001	-78592211694	1.7E+10	-1.3E+10	-3.2E+09	-1.2E+08	1.36E+09	3.75E+09	1.8E+10
2002	-1.29E+11	8.04E+09	-9.2E+09	1.37E+09	-1E+08	2.22E+09	1.56E+09	3.64E+10
2003	-1.18E+11	-2.9E+08	2.51E+09	1.65E+09	2.08E+09	7.5E+08	4.52E+09	5.87E+10
2004	-202870384.6	1.67E+10	4.65E+09	2.9E+09	1.1E+10	-1.6E+09	8.87E+09	7.28E+10
2005	-55492936742	1.02E+10	5.07E+09	9.46E+09	-2.7E+09	5.14E+09	1.31E+10	1.01E+11
2006	70565667125	-3.6E+09	6.63E+09	6.47E+09	3.49E+09	5.86E+09	1.28E+10	3.54E+10
2007	21821280273	-3.1E+10	-1.1E+10	7.82E+09	2.64E+09	4E+09	1.58E+09	1.62E+11
2008	-3.99E+11	-4.4E+10	-9.1E+09	5.18E+09	-3.2E+10	-2.3E+09	2.28E+09	1.64E+11
2009	-2.79E+11	-1.9E+10	-1.9E+10	1.3E+10	-6.9E+09	9.79E+08	-4.9E+09	1.09E+11
2010	-2.10E+11	3.48E+10	-3E+09	2.43E+10	-4.3E+09	5.05E+09	1.33E+10	1.49E+11

Table B.1 Continued

Total Receipts (current US$)	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
1978	1.037E+11	1.69E+10	1.33E+10	N/A	8.59E+09	4.54E+09	4.99E+09	N/A
1979	1.129E+11	1.91E+10	1.84E+10	N/A	1.26E+10	5.7E+09	6.5E+09	N/A
1980	1.542E+11	2.13E+10	2.54E+10	N/A	1.5E+10	7.13E+09	8.22E+09	N/A
1981	1.731E+11	2.59E+10	2.99E+10	2.4E+10	1.55E+10	7.69E+09	8.85E+09	N/A
1982	1.582E+11	2.64E+10	3.04E+10	2.08E+10	1.56E+10	6.84E+09	8.81E+09	2.4E+10
1983	1.622E+11	2.89E+10	3.08E+10	1.99E+10	1.76E+10	6.93E+09	8.61E+09	2.31E+10
1984	1.618E+11	3.33E+10	3.13E+10	2.15E+10	2.04E+10	7.04E+09	9.86E+09	2.62E+10
1985	1.486E+11	3.17E+10	2.89E+10	1.96E+10	1.98E+10	6.88E+09	1.02E+10	3.22E+10
1986	1.113E+11	3.85E+10	2.85E+10	1.58E+10	1.62E+10	7.84E+09	1.13E+10	3.26E+10
1987	1.282E+11	5.45E+10	3.78E+10	1.86E+10	2.07E+10	8.39E+09	1.52E+10	4.19E+10
1988	1.84E+11	6.82E+10	5.15E+10	2.14E+10	2.36E+10	1.05E+10	2.2E+10	4.91E+10
1989	2.47E+11	7.07E+10	5.73E+10	2.54E+10	2.92E+10	1.19E+10	2.85E+10	5.03E+10
1990	2.839E+11	7.4E+10	7E+10	3.03E+10	3.47E+10	1.19E+10	3.15E+10	5.98E+10
1991	3.684E+11	8.45E+10	7.86E+10	3.39E+10	4.23E+10	1.31E+10	3.73E+10	6.96E+10
1992	3.426E+11	9.44E+10	8.61E+10	3.89E+10	4.89E+10	1.48E+10	4.43E+10	8.59E+10
1993	3.223E+11	1.07E+11	9.4E+10	4.4E+10	5.69E+10	1.69E+10	5.45E+10	1.13E+11
1994	3.994E+11	1.17E+11	1.17E+11	5.04E+10	6.89E+10	2.18E+10	5.97E+10	1.55E+11
1995	4.453E+11	1.59E+11	1.57E+11	6.08E+10	8.71E+10	2.91E+10	7.56E+10	1.82E+11
1996	4.109E+11	1.67E+11	1.59E+11	6.74E+10	9.69E+10	4.01E+10	7.65E+10	2.11E+11
1997	4.878E+11	1.78E+11	1.58E+11	6.51E+10	9.82E+10	4.2E+10	8.02E+10	2.56E+11
1998	3.759E+11	1.6E+11	1.4E+11	5.27E+10	8.58E+10	3.82E+10	7.34E+10	2.45E+11
1999	4.273E+11	1.87E+11	1.52E+11	5.22E+10	9.75E+10	4.21E+10	7.71E+10	2.47E+11
2000	4.695E+11	2.27E+11	1.77E+11	6.42E+10	1.12E+11	4.23E+10	8.44E+10	3.13E+11
2001	3.695E+11	1.89E+11	1.52E+11	5.96E+10	1.02E+11	3.57E+10	7.99E+10	3.17E+11
2002	3.324E+11	1.94E+11	1.62E+11	6.72E+10	1.08E+11	4.01E+10	8.3E+10	4.02E+11

Table B.1 Continued

Total Receipts (current US$)	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
2003	4.091E+11	2.51E+11	2.02E+11	7.11E+10	1.21E+11	3.95E+10	9.84E+10	5.44E+11
2004	6.364E+11	3.15E+11	2.52E+11	8.57E+10	1.55E+11	4.12E+10	1.23E+11	7.29E+11
2005	6.223E+11	3.36E+11	2.93E+11	1.09E+11	1.59E+11	4.99E+10	1.42E+11	9.38E+11
2006	8.037E+11	3.63E+11	3.47E+11	1.22E+11	1.86E+11	5.88E+10	1.65E+11	1.1E+12
2007	8.29E+11	4.19E+11	3.77E+11	1.38E+11	2.08E+11	6.33E+10	1.83E+11	1.5E+12
2008	4.964E+11	5.06E+11	4.34E+11	1.6E+11	1.98E+11	5.56E+10	2.11E+11	1.75E+12
2009	3.943E+11	4.67E+11	3.49E+11	1.46E+11	1.8E+11	4.96E+10	1.76E+11	1.44E+12
2010	6.62E+11	5.66E+11	4.68E+11	1.99E+11	2.27E+11	7.02E+10	2.41E+11	1.9E+12

Capital Inflows Growth (%)	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
1978		-99.7638	-101.111	N/A	-96.0439	-102.507	-98.1519	N/A
1979	-17.795	-76.699	888.0715	N/A	32.58424	-80	84.97395	N/A
1980	-270.588	372.5	94.73756	N/A	20.21827	-610	22.06383	N/A
1981	-103.586	-30.5115	41.37142	N/A	159.5902	-271.569	17.57492	N/A
1982	661.5385	-222.97	-21.9869	200	-16.6027	-90.2857	-22.6663	N/A
1983	156.0606	-599.69	-18.3746	22.22222	-3.48759	558.8235	77.44335	-119.165
1984	483.2347	84.6551	2.138094	-67.8788	-1.19883	-94.6429	21.84646	558.9744
1985	64.16683	54.33397	-7.04319	29.71698	38.37631	183.3333	90.18705	-889.3
1986	143.8256	-179.709	-0.35674	91.27273	-80.3245	723.5294	-78.0619	-26.2263
1987	6.669314	-82.2529	194.0904	-43.5361	8.420993	132.8571	127.5661	-9.12128
1988	-11.0544	263.3709	12.54512	60.94276	-51.7232	202.454	205.257	18.38235
1989	-42.7764	-73.1002	-40.5391	6.485356	474.8855	-14.503	99.34231	-24.441
1990	-38.0149	-46.9078	29.79494	96.46365	33.1183	-43.0605	-29.4746	-0.69873
1991	-138.606	-2858.93	37.97638	47	100.6337	36.25	-22.0482	52.64901

Table B.1 Continued

Capital Inflows Growth (%)	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
1992	-353.679	97.41305	-2.23158	14.89796	-2.5811	-59.0214	63.70931	92.48915
1993	114.2081	69.46876	-171.998	104.4405	5.811685	202.9851	143.0534	268.559
1994	-46.5954	-51.0144	54.35173	55.71966	-37.339	91.87192	-49.6906	35.03287
1995	9.192028	116.9294	-35.9451	45.862	38.99746	45.63543	50.03263	-1.95698
1996	17.09594	28.3953	346.6146	35.13961	28.52341	193.1688	-3.78216	14.92959
1997	-116.247	0.170101	14.94907	-82.3851	1.634624	-74.7895	53.04705	22.12258
1998	-752.933	-100.329	-71.3505	-213.487	-49.9565	-28.5033	-3.45473	-23.103
1999	-38.1463	-35166	-71.6624	72.64352	-40.7963	269.3912	-25.1245	-31.1382
2000	58.34065	15.28345	301.3688	76.63031	-153.198	-64.7324	-52.472	30.09854
2001	32.57284	-52.6563	218.5564	-50.1447	-83.8115	-12.8041	39.89855	-46.4
2002	64.01752	-103.552	-27.9941	-142.436	-19.6203	63.21586	-58.3583	103.0252
2003	-8.74055	-5941.54	-127.195	21.02746	-2176.38	-66.2618	189.2314	60.934
2004	-99.8275	-38.8737	85.51453	75.12671	426.0523	-313.867	96.2171	24.15033
2005	27253.89	-135.077	9.027999	226.5469	-124.714	-420.449	47.69014	38.65448
2006	-227.162	761.8306	30.68182	-31.6649	-228.907	14.02724	-2.64584	-64.9753
2007	-69.0766	42.75006	-269.326	20.94848	-24.221	-31.7011	-87.6405	357.3206
2008	-1927.89	-56.0246	-19.3335	-33.7165	-1302.3	-158.506	44.57511	1.612574
2009	-29.9783	-279.776	106.3147	150.1358	-78.2387	-141.802	-313.573	-33.668
2010	-24.9612	-44.8739	-84.1156	87.49939	-37.1772	415.526	-373.308	36.65878

Table B.2 Predicted Output Growth from Thirlwall and Hussain's Definition

Thirlwall and Hussain Predicted Growth (%)	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
1980	2.87208	19.31814	-9.517	-16.5175	13.23539	44.68127	19.88948	N/A
1981	2.435991	-0.70499	-1.81011	-45.7572	7.118288	5.630916	0.710643	N/A
1982	-6.11032	1.661921	-0.05123	-3.2601	-3.5987	-0.40417	4.291774	-3.05721
1983	1.399103	-5.97577	-2.55156	10.7631	0.766576	1.360588	-3.46199	1.790095
1984	-19.1386	1.131756	-5.2493	-10.3926	2.924895	25.40583	4.400975	-2.23382
1985	-1.55762	5.000315	-4.90573	-25.4929	6.906426	24.56552	7.174796	-15.2844
1986	-2.15302	32.50018	-21.6504	-10.2687	15.1617	50.35953	23.60549	-1.51392
1987	23.89615	13.30329	-2.60363	-63.259	9.135424	15.40496	3.126548	4.542765
1988	18.87217	13.59296	-15.9594	-55.3083	1.309395	27.64908	-1.53223	5.932707
1989	6.595843	5.321558	-7.68219	-40.6424	2.435391	-4.4126	-0.60006	-0.80124
1990	13.97873	14.0975	-13.6223	-8.92849	2.555827	16.46565	3.0477	1.151611
1991	4.306092	-21.5211	-5.16325	6.661956	19.4505	27.72307	-7.17842	5.919285
1992	20.06965	4.697013	-4.05256	1.93711	-12.5381	31.32248	-7.29905	6.465059
1993	-5.04891	2.03411	7.159286	-2.20673	17.02435	-1.19259	1.919979	10.92116
1994	10.14175	-0.19544	3.066642	2.365888	35.63911	34.20052	-11.2639	0.583216
1995	11.40102	1.873431	-1.05148	8.098524	16.10352	43.85645	-14.7495	9.171921
1996	-1.52604	-1.12193	15.07047	0.09998	-8.57338	15.1208	-2.37081	1.086681
1997	-3.21602	-4.52738	0.953817	1.843503	-7.24822	-5.43066	-27.2202	5.285791
1998	32.50382	-2.68095	-0.4297	-39.7592	-5.05026	-0.63682	43.6966	15.03595
1999	6.718144	-767.04	-0.39827	13.12939	8.927232	14.8976	-27.7356	-43.0358
2000	0.723325	2.907332	-1.09923	1.35775	3.389092	2.016444	-116.359	-30.3143
2001	-3.80858	-1.41337	-7.59806	10.35674	4.021088	-1.69394	-48.3104	41.4039
2002	-2.41932	4.397019	9.830456	7.089991	7.419427	1.013448	4.524423	11.93531
2003	15.6892	-91.1415	18.88343	7.344047	10.22126	19.19445	14.83803	33.10062

Table B.2 Continued

Thirlwall and Hussain Predicted Growth (%)	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
2004	11.10135	10.09702	18.10282	4.643322	40.62454	26.71082	11.54451	22.15364
2005	-652.497	9.856427	12.36004	8.575601	26.10092	-7.55739	4.181041	9.675476
2006	-1.41786	-8.8194	11.83197	17.68559	15.7957	15.15645	10.98574	20.40248
2007	9.020244	14.15106	38.12548	9.976419	40.52077	23.51685	17.81116	56.3004
2008	435.1841	2.765767	14.36615	4.715624	215.0227	24.90605	6.705683	29.22321
2009	0.011652	-8.00049	-5.26104	33.99576	-3.72004	-1.55464	3.902603	-31.1599
2010	11.29714	5.391622	9.300871	-13.5573	11.68566	20.78887	-4.67092	41.84042

Table B.3 Data for Estimating the Output Growth from the Augmented Solow Model

GDP/Worker	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
1980	34160.72	5397.847	13862.28	704.7807	3325.1	2052.363	1378.322	314.1814
1981	35293.72	5579.576	14496.71	740.4974	3452.252	2054.86	1410.456	321.6783
1982	36181.95	5835.576	14775.75	727.2944	3558.198	2061.18	1435.637	340.6361
1983	36951.7	6305.738	15760.84	766.2807	3680.899	2033.032	1464.521	366.781
1984	38240.02	6663.224	16744.79	798.0319	3858.361	1824.952	1496.616	411.2093
1985	40260.53	6969.276	16505.06	802.7391	3703.585	1639.391	1514.039	454.7533
1986	40960.06	7548.732	16599.64	827.2096	3628.591	1644.044	1544.893	482.3328
1987	42213.96	8206.741	17943.25	847.4438	3697.944	1663.858	1636.758	525.0088
1988	44805.2	8886.053	19263.88	877.3438	3928.627	1724.117	1797.183	570.8714
1989	46809.4	9292.993	20489.61	932.2033	4142.55	1778.066	1961.141	582.0343
1990	49092.39	9936.324	21644.76	990.4375	4371.726	1779.559	2129.947	593.0566
1991	50479.36	10690.25	22428.83	1052.409	4643.51	1719.11	2269.93	637.4055
1992	50746.24	11150.86	23393.24	1101.55	4908.143	1676.588	2418.236	718.4158

Table B.3 Continued

GDP/Worker	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
1993	50746.48	11675.98	25573.67	1154.041	5237.952	1664.66	2585.992	809.5166
1994	51093.79	12513.2	27558.63	1212.768	5551.715	1690.131	2783.782	905.0991
1995	52005.25	13424.42	28801.06	1285.04	5910.641	1721.336	2998.331	992.0788
1996	53380.25	14189.45	29841.33	1352.517	6294.473	1773.238	3123.775	1078.236
1997	54283.75	14678.62	31354.08	1385.123	6535.122	1815.92	3026.169	1163.908
1998	53281.46	13551.55	29659.1	1177.669	5858.462	1758.414	2658.32	1238.685
1999	53314.76	14716.24	31238	1162.678	6026.305	1766.119	2727.525	1315.275
2000	54685.03	15824.66	33456.76	1196.102	6372.51	1797.53	2811.289	1405.959
2001	55033.8	16334.93	32162.75	1216.77	6237.521	1803.671	2831.352	1499.972
2002	55353.77	17417.19	33167.62	1249.177	6414.39	1823.805	2943.707	1610.797
2003	56474.69	17829.97	35135.92	1286.911	6630.942	1868.575	3116.849	1743.827
2004	58123.06	18588.37	37768.5	1329.758	6924.37	1946.932	3277.483	1890.789
2005	59235.93	19272.55	39457.29	1383.331	7134.147	1993.113	3390.705	2074.792
2006	60631.54	20140.81	41397.16	1437.078	7387.488	2050.591	3524.739	2309.005
2007	62363.83	21021.6	43004.32	1505.523	7697.814	2138.318	3663.552	2607.838
2008	62183.45	21292.56	41263.36	1572.932	7897.728	2178.93	3716.727	2829.947
2009	59274.83	21204.56	39473.69	1622.45	7607.626	2156.415	3595.904	3062.413
2010	62499.89	22395.07	44354.83	1699.11	7989.52	2270.776	3843.287	3353.341

Table B.3 Continued

Gross Fixed Capital Formation/GDP (S_k)	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
1980	31.55263	32.2162	39.45318	21.56828	29.9447	27.22062	27.77238	29.09187
1981	30.56017	28.10878	42.10192	24.19409	34.65523	27.75146	27.98965	27.37959
1982	29.36377	28.60183	45.78472	25.25664	34.95748	27.53195	26.94111	28.23759
1983	27.74804	29.52084	46.13042	25.15099	34.67173	29.8496	28.46266	28.90134
1984	27.34848	29.1628	46.2423	22.0754	30.69891	23.071	28.60111	29.78594
1985	27.55158	28.77264	40.57397	22.72312	28.70861	16.46631	27.16507	29.6362
1986	27.50927	28.42841	34.83175	25.51698	25.34329	16.04731	25.78029	30.5561
1987	28.36772	29.3754	31.97548	25.17103	22.08053	16.50102	27.63793	31.502
1988	29.96617	29.85133	29.75464	25.62737	24.60323	17.79645	30.67911	31.25681
1989	31.12272	32.17646	31.24347	26.56505	29.07738	20.81866	34.61921	26.00825
1990	31.96078	37.08479	31.11353	28.33928	33.04305	23.11042	40.38222	25.86164
1991	31.58262	38.88782	32.54974	26.99859	36.3565	20.04365	41.63159	27.86906
1992	30.36949	36.88999	34.32057	25.7703	36.62747	20.92273	39.25527	31.62182
1993	29.19766	36.33705	33.90682	26.28065	38.87324	23.77438	39.58395	37.66694
1994	28.23172	36.41852	32.7528	27.57069	40.24557	23.63586	39.95819	35.92003
1995	27.75086	37.3133	32.56731	28.42981	43.58616	22.20398	41.06625	34.35389
1996	28.14233	37.48514	37.12234	29.60236	42.49546	23.42372	41.05196	33.78653
1997	27.56691	35.62382	37.45706	28.3077	43.11432	24.41853	33.7791	32.87833
1998	25.81451	30.34777	36.60929	25.42951	26.82573	23.42991	22.38104	33.84872
1999	25.48603	29.72758	33.17835	20.13876	21.89125	20.73167	20.8299	34.04139
2000	25.20602	29.96302	30.28217	19.85085	25.29202	22.10002	21.96789	34.11233
2001	24.29782	28.77867	30.12611	19.67266	25.12345	20.84491	23.01185	34.4302
2002	22.88134	28.59694	25.48683	19.42916	23.48433	20.56719	22.8081	36.25956

Table B.3 Continued

Gross Fixed Capital Formation/GDP (S_k)	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
2003	22.49629	29.34066	23.58561	19.50606	22.41427	20.69012	24.06803	39.38272
2004	22.19204	29.20269	23.10008	22.44862	20.95484	20.34218	25.91618	40.72953
2005	22.34039	28.85781	21.13203	23.64051	20.51604	19.90116	28.89967	40.13948
2006	22.67593	28.68256	21.69137	24.13099	20.75287	20.12282	28.09413	40.6603
2007	22.57053	28.52966	22.92677	24.94694	21.5549	19.89951	26.38826	39.10631
2008	22.43817	29.30426	26.46654	27.69859	19.58512	19.66308	27.44718	40.78531
2009	20.79865	29.08012	25.95263	31.1152	20.22299	19.01409	24.13105	45.96025
2010	20.08754	28.62837	24.18487	32.0866	20.31344	20.5226	24.73385	45.73085

S_h	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
1980	5	4.8	1.6	0.2	1	8.2	2.8	0.5
1981	6.2	5.22	1.66	0.32	1.24	8.56	3.22	0.56
1982	7.4	5.64	1.72	0.44	1.48	8.92	3.64	0.62
1983	8.6	6.06	1.78	0.56	1.72	9.28	4.06	0.68
1984	9.8	6.48	1.84	0.68	1.96	9.64	4.48	0.74
1985	11	6.9	1.9	0.8	2.2	10	4.9	0.8
1986	11.32	7.36	1.88	0.82	2.22	10.56	4.68	0.84
1987	11.64	7.82	1.86	0.84	2.24	11.12	4.46	0.88
1988	11.96	8.28	1.84	0.86	2.26	11.68	4.24	0.92
1989	12.28	8.74	1.82	0.88	2.28	12.24	4.02	0.96
1990	12.6	9.2	1.8	0.9	2.3	12.8	3.8	1
1991	13.16	9.46	2.44	0.94	2.42	13.6	3.96	1.16

Table B.3 Continued

S_h	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
1992	13.72	9.72	3.08	0.98	2.54	14.4	4.12	1.32
1993	14.28	9.98	3.72	1.02	2.66	15.2	4.28	1.48
1994	14.84	10.24	4.36	1.06	2.78	16	4.44	1.64
1995	15.4	10.5	5	1.1	2.9	16.8	4.6	1.8
1996	15.94	11.14	5.6	1.1	2.96	17.54	4.66	1.96
1997	16.48	11.78	6.2	1.1	3.02	18.28	4.72	2.12
1998	17.02	12.42	6.8	1.1	3.08	19.02	4.78	2.28
1999	17.56	13.06	7.4	1.1	3.14	19.76	4.84	2.44
2000	18.1	13.7	8	1.1	3.2	20.5	4.9	2.6
2001	18.6	14	8.44	1.12	3.38	20.74	5.48	2.8
2002	19.1	14.3	8.88	1.14	3.56	20.98	6.06	3
2003	19.6	14.6	9.32	1.16	3.74	21.22	6.64	3.2
2004	20.1	14.9	9.76	1.18	3.92	21.46	7.22	3.4
2005	20.6	15.2	10.2	1.2	4.1	21.7	7.8	3.6
2006	21.08	15.4	10.3	1.24	4.22	21.94	8.46	3.92
2007	21.56	15.6	10.4	1.28	4.34	22.18	9.12	4.24
2008	22.04	15.8	10.5	1.32	4.46	22.42	9.78	4.56
2009	22.52	16	10.6	1.36	4.58	22.66	10.44	4.88
2010	23	16.2	10.7	1.4	4.7	22.9	11.1	5.2

Note: S_h is the completion rate of tertiary education or ratio of people completing a college degree to the total number in the labor force

Table B.3 Continued

Rate of depreciation (%)	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
1980	7.335131	0.186278	26.05334	40.90158	13.43799	8.417595	16.21757	21.89999
1981	14.70803	14.89066	19.18849	17.6733	2.050111	11.11013	9.778925	2.02656
1982	-5.65247	17.52766	18.37666	5.415405	7.87333	5.204155	9.741973	6.159159
1983	11.11911	13.62956	16.61607	-27.1635	13.98126	-1.7383	14.73234	11.0622
1984	6.203987	12.92228	13.30245	2.625569	14.19403	10.70188	10.86232	6.210506
1985	6.925743	5.773222	12.67959	-0.3033	0.902435	5.140585	-1.97645	12.24968
1986	50.58877	14.58202	4.15437	-8.33865	-13.0722	-3.3394	15.55482	3.725226
1987	23.91557	29.7232	10.14082	-5.15513	15.72773	5.636739	14.51727	-9.8292
1988	21.3753	37.05691	13.50543	11.01759	10.64037	2.373318	16.45951	3.655593
1989	3.413555	21.43084	15.0347	20.35279	11.26282	4.592015	15.8039	16.6209
1990	4.025747	16.65435	13.12195	12.78301	8.214792	1.854232	22.21039	7.982552
1991	18.53897	11.55211	18.0546	12.00851	12.98761	5.575403	23.36775	8.036341
1992	13.73549	7.118488	16.0482	8.54782	23.22166	19.40131	20.84871	4.641047
1993	18.09939	12.95875	18.73691	13.57828	14.68081	13.47126	19.18281	15.0641
1994	11.11565	14.32416	8.445995	11.95097	12.64243	18.23509	18.68833	-4.14117
1995	11.4142	37.49752	10.20282	14.26991	26.0308	16.59597	19.64642	55.34962
1996	-10.8788	12.81769	14.80615	12.48257	14.69905	8.608804	16.00954	19.84023
1997	-8.08372	-0.9185	9.983726	-5.10886	-0.99161	-2.76836	-7.96171	12.61075
1998	-5.94979	-22.8739	5.337465	-55.7608	-30.4947	-17.4447	-18.3562	7.773797
1999	13.39787	25.72515	-6.2738	46.68203	10.4385	11.51393	13.35705	6.931671
2000	8.080851	10.23517	1.860076	7.281259	18.10976	-4.15279	-2.45522	11.40481
2001	-10.1455	-7.10227	4.041839	-4.76804	-1.38652	-0.65265	-5.86215	11.65024
2002	-3.87273	8.884926	2.064546	164.874	9.305831	8.587172	7.711192	10.7502
2003	11.21193	12.50411	6.081898	22.19924	9.958151	5.376868	7.928601	14.24445

Table B.3 Continued

Rate of depreciation (%)	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
2004	10.14689	11.61892	9.896401	10.30196	14.28078	40.53057	-12.7977	19.64987
2005	-2.56192	18.99612	9.142343	1.725259	6.5694	15.22491	2.821035	8.870202
2006	-3.53479	13.43066	13.30152	31.98196	15.04095	18.17354	19.84772	23.28931
2007	-0.39239	10.01035	23.09645	21.30183	21.58465	22.0392	21.92747	33.26298
2008	15.01575	-11.1184	5.728689	20.66074	21.53771	14.27192	11.67941	33.84331
2009	-33.6169	-9.74585	6.309821	6.368036	-15.0223	-14.4949	-3.82767	11.73557
2010	9.343746	17.80821	11.6942	35.70598	26.12134	21.16069	23.74066	21.29804

Population growth (annual %)	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
1980	0.784008	1.559682	1.250537	2.291241	2.406865	2.802548	2.107793	1.254221
1981	0.738817	1.558973	4.811925	2.265214	2.471648	2.797477	2.038045	1.280952
1982	0.678537	1.545214	4.402255	2.23255	2.530815	2.787581	1.966149	1.472675
1983	0.681511	1.474104	1.276294	2.186419	2.602243	2.773675	1.918389	1.44495
1984	0.634413	1.235137	1.884408	2.123846	2.686386	2.755153	1.900095	1.312069
1985	0.611369	0.985084	0.146306	2.050566	2.771825	2.731665	1.895326	1.361699
1986	0.6093	0.92207	-0.10971	1.974869	2.859918	2.708919	1.913779	1.487399
1987	0.491825	0.944919	1.525084	1.903383	2.925774	2.681579	1.910441	1.603605
1988	0.426639	0.957518	2.526375	1.836592	2.940007	2.639075	1.826096	1.610071
1989	0.409395	0.960235	2.942916	1.776794	2.892471	2.578745	1.638016	1.53317
1990	0.341371	1.14724	3.881384	1.722441	2.805393	2.508172	1.388705	1.467303
1991	0.310356	0.926438	2.850357	1.670765	2.704724	2.433623	1.114214	1.364434
1992	0.248237	0.908773	3.003776	1.619575	2.618396	2.366741	0.887467	1.225536

Table B.3 Continued

Population growth (annual %)	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
1993	0.246819	0.896049	2.53062	1.569255	2.555962	2.315495	0.761713	1.149619
1994	0.340686	0.89709	3.134308	1.519358	2.526943	2.284554	0.773385	1.130261
1995	0.38179	1.429457	3.039047	1.471093	2.518634	2.266964	0.881435	1.086509
1996	0.25637	0.95346	4.06438	1.42248	2.5082	2.250176	1.014044	1.048142
1997	0.262059	0.937927	3.35655	1.378017	2.484043	2.227828	1.115002	1.02345
1998	0.252672	0.722025	3.397882	1.344559	2.453187	2.203585	1.185439	0.95955
1999	0.189678	0.710414	0.798898	1.324664	2.413254	2.175952	1.206208	0.865851
2000	0.173556	0.835252	1.732946	1.313507	2.364761	2.144654	1.188877	0.787957
2001	0.219669	0.739684	2.696743	1.307325	2.320566	2.117412	1.170934	0.726381
2002	0.232527	0.55802	0.914127	1.297202	2.271973	2.087897	1.157694	0.67
2003	0.213981	0.496435	-1.47636	1.276084	2.198194	2.042213	1.118892	0.622861
2004	0.033662	0.375399	1.253413	1.239717	2.093906	1.976484	1.050154	0.593933
2005	0.009392	0.20587	2.350538	1.193458	1.97252	1.899631	0.961299	0.588125
2006	-0.01331	0.484925	3.129294	1.14404	1.845101	1.818449	0.862704	0.558374
2007	0.011545	0.466124	4.165229	1.100058	1.733367	1.748199	0.770059	0.522272
2008	-0.05222	0.719656	5.321578	1.065196	1.65298	1.700588	0.693102	0.512387
2009	-0.11446	0.474876	3.016409	1.04299	1.613653	1.682449	0.639744	0.506395
2010	-0.08431	0.462513	1.770661	1.029348	1.60294	1.684377	0.603814	0.482916

Table B.3 Continued

Total Factor Productivity	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
1980	2.404958	0.229628	1.594881	-2.00271	-2.99009	0.348235	1.652691	2.016264
1981	2.662241	5.389994	1.773127	1.905647	-1.08744	-2.81913	1.408698	3.75764
1982	2.832804	1.874944	-3.07617	-2.89728	1.414548	-0.28451	3.176911	3.973031
1983	2.903573	3.281861	3.742081	5.20071	1.769246	-3.13057	-1.60538	4.438025
1984	2.395447	2.948124	3.993904	7.233233	4.905122	0.061673	1.471163	6.90141
1985	2.915412	3.636743	2.868438	-0.83513	0.030547	1.06813	3.601893	5.48173
1986	0.259346	5.358102	4.903178	1.010851	5.115602	1.010169	3.478625	4.298767
1987	0.780983	3.609931	9.247011	1.609756	4.590956	-0.0288	1.128933	5.103095
1988	2.075134	4.645179	7.300414	0.698719	-0.11954	-0.71472	3.855075	6.816225
1989	1.734897	0.034234	2.495425	2.3356	-2.56606	-2.98598	2.808602	7.308038
1990	2.511568	-0.71621	3.690675	1.913954	-2.21212	-3.92758	-0.2708	1.601431
1991	2.154966	3.462241	0.278173	2.95199	0.001183	2.205707	3.088923	3.337108
1992	1.369546	4.690816	1.449551	4.400476	3.21217	-3.71477	4.901265	5.266135
1993	0.953412	2.651106	6.665869	3.470465	1.978276	-2.68595	4.339955	3.278751
1994	1.24327	3.523228	5.59695	1.399786	1.812181	0.020722	4.369607	7.880387
1995	1.568101	3.629739	1.627367	2.198033	0.109297	1.260118	4.541916	6.763307
1996	1.107582	3.383966	-2.87633	1.289645	5.067273	0.009146	2.458497	5.828746
1997	1.704994	4.641233	2.871851	0.353744	2.021511	-0.4481	4.268959	5.772736
1998	0.400086	0.195476	-2.51279	-3.57505	4.735453	1.363896	3.01567	3.225204
1999	0.18923	6.15839	7.247768	5.462482	6.196864	3.293112	4.32498	4.465502
2000	2.2353	3.825734	4.172406	-1.98446	-1.91082	-1.13351	1.838035	4.116047
2001	1.243518	3.376933	-2.46412	0.224023	-0.59024	2.122282	0.827161	4.256661
2002	2.117104	4.466231	7.284614	1.74235	3.541781	0.99599	2.269899	3.639018
2003	1.848113	1.06273	7.078443	3.441551	3.28481	1.115537	2.328523	3.470136

Table B.3 Continued

Total Factor Productivity	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
2004	2.590542	3.683479	4.759378	-0.96133	4.093342	4.376731	1.202055	5.190812
2005	1.421183	3.145445	5.399895	0.997271	2.184043	2.424679	0.349151	6.48823
2006	1.621902	3.613075	1.777375	3.598538	1.856442	1.917245	3.074346	7.707404
2007	2.518412	3.233099	-0.14589	2.230224	1.898915	3.374923	3.828241	9.098075
2008	0.830421	2.282098	-6.63274	1.071363	2.992501	1.628251	1.414414	5.694941
2009	-1.40255	0.159215	-2.35153	2.573088	-1.19372	0.261526	0.115619	1.091078
2010	5.133516	3.547205	11.01707	2.426917	2.547683	-0.19566	4.113077	5.290251

Note: Total Factor Productivity in this table is calculated by the growth accounting approach

Capital Inflows (Stock in Million US$)	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
1980	3270	1138.633	5350.654	4559.45	5168.74	914.19	980.6302	1074
1981	3915	1273.789	7025.773	4692.45	5369.49	1157.19	1158.47	1339
1982	3998	1363.159	8310	4917.45	6066	1350.19	1346.791	1769
1983	4364	1452.81	9058	5209.45	6322.11	1597.19	1704.396	2685
1984	4458	1585.401	9938.184	5431.45	6510.1	1734.19	1799.068	4104
1985	4743	1803.286	10619.8	5739.45	7388.42	1839.19	1999.493	6060
1986	6514	2238.947	11357.66	5997.45	6111.41	1996.19	2303.659	8303.73
1987	9018	2840.804	14984.84	6382.45	6805.6	2411.19	2761.803	10617.26
1988	10416	3689.151	18394.41	6958.45	7054.1	3410.19	3851.117	13810.94
1989	9160	4426.412	21675.99	7640.45	8096.4	3978.19	5562.472	17203.51
1990	9850	5185.608	30468.04	8732.45	10318	4528.19	8242.25	20690.62
1991	12297	6318.117	35590.09	10214.45	12440.2	5084.19	10294.58	25056.96
1992	15511	6885.361	36206.94	12013.45	16859.9	5860.19	12301.65	36064.47
1993	16884	7431.627	41643.2	14016.45	20590.8	7098.19	14081.01	63579.42

Table B.3 Continued

Capital Inflows (Stock in Million US$)	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
1994	19211	8226.964	54880.43	16207.45	22915.6	8689.19	15701.28	74151
1995	33531	9497.42	65644.24	20626.45	28730.6	10148.19	17684.44	101098
1996	29939.66	11509.56	89494	26871.45	36027.6	11668.19	19705.62	128069
1997	27079.65	14151	74768.31	31600.45	42350.6	12917.19	13332.81	153995
1998	26064.01	22195	86839.63	31393.45	45064.6	14669.19	25481.3	175156
1999	46115.46	41852.4	102533.5	29555.45	48959.86	15916.19	31113.96	186189
2000	50322.02	43738	110570.3	25060.45	52747.49	18156.19	29915	193348
2001	50318.66	53207.5	128245.3	15203.28	33971.84	10385	33267.92	203142
2002	78140.12	62658.3	141114.9	7117.041	37542.37	11565	38449	216503
2003	89729.23	66069.7	157889.1	10328.2	41187.89	11411	48944	228371
2004	96984.25	87766.4	185384.4	15857.86	43046.84	12737	53184	245467
2005	100898.5	104879.1	200414.4	41187	44459.52	14978	60408.23	272094
2006	107633.5	115773.5	250160.1	54534	53709.76	16914	76949.67	292559
2007	132850.9	121956.5	338749.6	79927	75762.65	20463	94112.24	327087
2008	203371.9	94679	353006.9	72227	73601.33	21746	93499.9	378083
2009	200143.6	117732.1	393876.1	108795	78994.54	22931	106154.1	473083
2010	214879.7	127046.6	461416.8	154158	101510.2	26319	137191.2	587817

Table B.3 Continued

Foreign Equities (US$)	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
1980	6.55E+09	0	1.46E+08	N/A	0	0	50509571	N/A
1981	5.92E+09	0	1.57E+08	0	0	0	11227651	N/A
1982	2.55E+09	0	97662411	0	0	0	26521605	0
1983	6.13E+09	0	2.01E+08	0	0	0	14782534	0
1984	-3.6E+09	0	18283393	0	0	0	34324952	0
1985	-6.7E+08	0	5.31E+08	0	0	0	40890333	0
1986	-1.6E+10	0	-1.9E+08	0	0	0	96134792	0
1987	-4.4E+10	0	3.21E+08	0	0	0	4.99E+08	0
1988	6.82E+09	0	35777731	0	0	0	4.44E+08	0
1989	6.95E+09	0	4E+08	0	0	0	1.42E+09	0
1990	-1.3E+10	3.81E+08	5.73E+08	0	0	0	4.4E+08	0
1991	4.66E+10	2E+08	-2.4E+08	0	0	0	37388496	0
1992	8.88E+09	2.48E+09	1.4E+09	0	0	0	4.55E+08	0
1993	1.99E+10	6.62E+09	2.76E+09	1.81E+09	0	0	2.68E+09	0
1994	4.89E+10	3.61E+09	1.69E+08	1.9E+09	0	0	-3.9E+08	0
1995	5.06E+10	4.22E+09	-1.6E+08	1.49E+09	0	0	2.25E+09	0
1996	4.95E+10	5.95E+09	6.77E+08	1.82E+09	0	2.1E+09	1.12E+09	0
1997	2.7E+10	2.53E+09	-4.4E+08	-5E+09	0	-4.1E+08	3.87E+09	5.66E+09
1998	1.61E+10	3.86E+09	1E+09	-4.4E+09	0	2.64E+08	2.89E+08	7.65E+08
1999	1.04E+11	1.21E+10	3.12E+09	-7.8E+08	N/A	4.89E+08	9.45E+08	6.12E+08
2000	-1.3E+09	1.31E+10	-1.2E+09	-1E+09	N/A	-2E+08	9E+08	6.91E+09
2001	3.91E+10	1.03E+10	-9E+07	4.42E+08	N/A	1.25E+08	3.52E+08	8.49E+08
2002	-1.7E+10	3.95E+08	-4.4E+08	8.77E+08	-5.5E+07	2.27E+08	5.39E+08	2.25E+09
2003	8.78E+10	1.44E+10	2.79E+09	1.13E+09	1.34E+09	5E+08	1.79E+09	7.73E+09

Table B.3 Continued

Foreign Equities (US$)	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
2004	9.83E+10	9.47E+09	2.38E+09	2.04E+09	4.51E+09	5.18E+08	1.32E+09	1.09E+10
2005	1.31E+11	3.28E+09	4.9E+09	-1.7E+08	-1.2E+09	1.47E+09	5.12E+09	2.03E+10
2006	7.14E+10	-8.4E+09	1.01E+10	1.9E+09	2.36E+09	2.53E+09	5.24E+09	4.29E+10
2007	4.55E+10	-2.9E+10	1.83E+10	3.56E+09	-6.7E+08	3.18E+09	4.27E+09	1.85E+10
2008	-7E+10	-3.4E+10	-1.2E+10	3.22E+08	-1.1E+10	-1.3E+09	-3.8E+09	8.72E+09
2009	1.24E+10	2.49E+10	-3.2E+08	7.87E+08	-4.5E+08	-1.1E+09	1.69E+09	2.82E+10
2010	4.03E+10	2.3E+10	3.56E+09	2.13E+09		5.03E+08	2.61E+09	3.14E+10

Foreign Loans (US$)	Indonesia	Malaysia	The Philippines	Thailand	China
1980	1.86E+10	6.61E+09	1.74E+10	8.3E+09	
1981	2.09E+10	9.18E+09	2.08E+10	1.09E+10	5.8E+09
1982	2.28E+10	1.34E+10	2.44E+10	1.22E+10	8.36E+09
1983	2.51E+10	1.76E+10	2.42E+10	1.39E+10	9.61E+09
1984	3.02E+10	1.87E+10	2.44E+10	1.5E+10	1.21E+10
1985	3.2E+10	2.03E+10	2.66E+10	1.75E+10	1.67E+10
1986	3.67E+10	2.19E+10	2.82E+10	1.85E+10	2.37E+10
1987	4.29E+10	2.28E+10	2.98E+10	2.03E+10	3.53E+10
1988	5.25E+10	1.86E+10	2.89E+10	2.17E+10	4.24E+10
1989	5.41E+10	1.63E+10	2.87E+10	2.35E+10	4.49E+10
1990	5.94E+10	1.53E+10	3.06E+10	2.81E+10	5.53E+10
1991	6.98E+10	1.71E+10	3.25E+10	3.77E+10	6.03E+10
1992	7.95E+10	2E+10	3.32E+10	4.18E+10	7.24E+10
1993	8.8E+10	2.61E+10	3.61E+10	5.26E+10	8.59E+10

Table B.3 Continued

Foreign Loans (US$)	Indonesia	Malaysia	The Philippines	Thailand	China
1994	8.91E+10	3.03E+10	4.03E+10	6.55E+10	1E+11
1995	1.08E+11	3.43E+10	3.94E+10	1E+11	1.18E+11
1996	1.24E+11	3.97E+10	4.4E+10	1.13E+11	1.29E+11
1997	1.29E+11	4.72E+10	5.07E+10	1.1E+11	1.47E+11
1998	1.36E+11	4.24E+10	5.36E+10	1.05E+11	1.44E+11
1999	1.51E+11	4.18E+10	5.83E+10	9.68E+10	1.48E+11
2000	1.51E+11	4.18E+10	5.83E+10	7.97E+10	1.45E+11
2001	1.43E+11	4.5E+10	5.83E+10	6.72E+10	1.84E+11
2002	1.32E+11	4.82E+10	5.99E+10	5.94E+10	1.85E+11
2003	1.28E+11	4.84E+10	6.26E+10	5.1E+10	2.06E+11
2004	1.33E+11	5.2E+10	6.1E+10	4.94E+10	2.46E+11
2005	1.37E+11	5.19E+10	6.17E+10	4.64E+10	2.83E+11
2006	1.34E+11	5.49E+10	6.04E+10	4.59E+10	3.23E+11
2007	1.25E+11	6.14E+10	6.6E+10	4.53E+10	3.73E+11
2008	1.34E+11	6.61E+10	6.5E+10	4.98E+10	3.8E+11
2009	1.48E+11	6.63E+10	6.31E+10	5.79E+10	4.32E+11
2010	1.63E+11	8.15E+10	7.23E+10	7.13E+10	5.49E+11

Note: Data for foreign loans in Japan, Korea and Singapore are not available.

Table B.3 Continued

Retained Profits (US$)	Indonesia	Malaysia	The Philippines	Thailand	China
1980	0	1.19E+09	1.98E+08	38003265	0
1981	4.03E+09	1.02E+09	1.9E+08	41137018	0
1982	3.91E+09	1.01E+09	2.02E+08	25478132	1000000
1983	3.62E+09	1.26E+09	1.62E+08	30608541	0
1984	2.76E+09	1.33E+09	1.02E+08	36077897	0
1985	2.15E+09	1.2E+09	1.44E+08	32003736	14000000
1986	1.45E+09	8.3E+08	1.38E+08	24524661	15000000
1987	1.39E+09	1.11E+09	1.89E+08	31436428	2000000
1988	1.32E+09	1.33E+09	1.95E+08	2.15E+08	8000000
1989	1.79E+09	1.63E+09	2.95E+08	3.29E+08	7000000
1990	2.19E+09	1.93E+09	3.11E+08	3.12E+08	46000000
1991	2.32E+09	2.28E+09	3.03E+08	55616852	10000000
1992	2.62E+09	2.94E+09	4.05E+08	0	22000000
1993	1.58E+09	3.22E+09	3.69E+08	0	2.31E+08
1994	5.97E+08	3.94E+09	3.4E+08	0	4E+08
1995	7.18E+08	4.14E+09	5.15E+08	0	9.95E+09
1996	9.64E+08	4.46E+09	5.14E+08	0	1.17E+10
1997	1.34E+09	5.07E+09	4.5E+08	0	1.33E+10
1998	3.54E+09	2.8E+09	4.14E+08	0	1.6E+10
1999	3.7E+09	5.4E+09	8.36E+08	0	1.6E+10
2000	3.57E+09	7.17E+09	2.3E+08	0	2.02E+10
2001	3.16E+09	5.93E+09	6.83E+08	1.17E+09	2.15E+10
2002	3.22E+09	6.12E+09	1.21E+09	2.39E+09	1.78E+10
2003	2.75E+09	6.74E+09	1.07E+09	3.32E+09	1.74E+10
2004	8.32E+09	7.76E+09	1.37E+09	4.22E+09	1.74E+10

Table B.3 Continued

Retained Profits (US$)	Indonesia	Malaysia	The Philippines	Thailand	China
2005	9.52E+09	8.33E+09	1.39E+09	4.5E+09	4.78E+10
2006	9.64E+09	8.86E+09	2.02E+09	4.03E+09	4.98E+10
2007	1.08E+10	9.93E+09	2.13E+09	5.8E+09	6.15E+10
2008	1.07E+10	1.38E+10	1.68E+09	4.14E+09	7.26E+10
2009	8.85E+09	1.11E+10	2.15E+09	3.4E+09	9.08E+10
2010	1.24E+10	0	2.23E+09	3.4E+09	1.03E+11

Note: Data for retained profits in Japan, Korea and Singapore are not available

Table B.4 Predicted Output Growth from the Augmented Solow Model

(with the additional assumption of technology)

Predicted Growth from Augmented Solow model (%)	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
1980	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1981	4.810678	4.517257	9.741945	N/A	7.603747	4.126115	5.722446	N/A
1982	4.611968	10.44618	8.789403	7.124409	7.479541	4.075566	4.145904	N/A
1983	1.716997	10.74893	4.483151	5.205233	6.931056	6.082743	7.71716	11.78287
1984	4.588135	8.539684	5.738929	1.158099	2.017865	-7.24344	6.008881	11.13203
1985	5.557935	8.365997	3.651111	7.54074	1.851259	-7.03251	4.442285	10.51397
1986	2.711902	7.807161	0.960425	12.68982	3.39072	2.219607	6.43502	9.497041
1987	5.234192	9.390727	8.209488	6.001886	5.613364	1.97517	10.90564	9.398607
1988	7.166673	8.794266	7.206369	6.730236	7.311418	4.295584	12.44558	8.925302

Table B.4 Continued

Predicted Growth from Augmented Solow model (%)	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
1989	6.023212	11.06619	7.055838	6.272894	10.44857	7.60702	12.46753	6.53719
1990	4.328108	13.33743	7.245731	8.3452	9.291302	6.72868	13.8158	8.05349
1991	2.739278	8.144559	10.28829	4.014999	10.00014	-3.90231	7.485437	13.0803
1992	0.471164	4.181773	9.065291	3.708077	8.275027	2.407822	3.211812	12.60232
1993	0.602539	4.759701	8.104033	10.01253	9.524657	6.711483	6.710808	12.80328
1994	1.321527	5.868554	6.072556	8.725597	8.635746	2.177488	7.900838	8.848094
1995	1.763138	6.505519	7.97586	8.184294	11.24864	-0.01304	13.00979	11.46824
1996	3.416078	8.000584	9.997259	8.973637	7.158878	6.061256	8.139763	9.128816
1997	1.164823	7.004804	6.823938	-2.20575	7.612633	7.007675	-2.14067	8.640214
1998	-1.43666	-0.93445	7.289163	-2.37633	-6.03754	0.118263	-8.39187	9.763143
1999	2.057304	5.429971	2.780747	-0.8104	13.43619	1.719873	1.083011	8.740354
2000	0.566655	7.117353	5.615978	4.201308	4.990044	3.568494	3.241422	8.981995
2001	0.465046	3.969313	8.47963	5.286633	6.585937	3.379803	5.198767	10.04719
2002	-1.31273	4.669559	2.382126	1.51093	2.370726	6.363118	4.36597	8.914455
2003	1.455429	4.485177	2.454364	5.105558	9.012433	4.851572	5.577227	9.635955
2004	1.155198	4.567826	8.766919	4.313409	9.281101	3.261216	8.027622	9.179198
2005	3.173594	3.965853	7.240717	3.527768	3.084626	4.535193	6.833052	12.77679
2006	1.769866	4.916745	8.923977	5.841045	6.104842	7.577482	1.239799	8.943363
2007	1.325427	5.470365	11.01256	4.145836	N/A	6.333441	5.83611	12.15426
2008	-0.78008	5.925713	2.589016	7.226814	N/A	0.552615	2.668611	11.42709
2009	-2.35848	1.062388	8.097901	14.71062	N/A	5.438496	-1.46452	11.69757
2010	-0.02598	3.508811	6.521799	3.116123	N/A	10.06013	7.249444	10.7566

Table B.5 Error Series from Thirlwall and Hussain's Model

(The gap between actual and predicted growth)

Thirlwall and Hussain's model Errors	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
1980	-0.04096	20.26669	10.03305		7.57427	6.341313	30.81605	
1981	-2.48513	-2.63109	-5.32033	-1.20772	26.53576	-5.26442	2.278834	
1982	-10.0301	-8.00837	-9.45945	4.181233	-9.93491	-4.23475	-9.26617	-12.1572
1983	-5.02729	-16.5239	-6.98056	-8.7342	-5.57561	3.563911	5.831035	-9.10991
1984	-54.6018	-0.69771	-3.04945	-6.77079	-3.86136	9.666733	8.19838	-17.4338
1985	-15.5178	0.318886	5.969607	-0.79882	12.09899	9.814832	21.60694	-28.7844
1986	-60.5765	19.70804	23.0371	-1.38154	17.25021	13.0433	44.75947	-10.3139
1987	14.78916	7.792539	21.08414	4.236237	10.38725	5.275001	35.86807	-7.05724
1988	12.18992	3.773862	4.555174	1.925517	3.272447	8.382602	43.34895	-5.36729
1989	5.940895	-0.03938	-5.46134	-2.55916	27.8441	-4.63326	17.72237	-4.90124
1990	8.528261	6.963388	6.129841	-4.1915	6.244816	1.931902	16.29522	-2.64839
1991	-3.29788	-77.6276	1.504783	-1.38842	7.80507	3.67369	3.13014	-3.28071
1992	30.48741	7.198127	1.874431	-4.23038	-1.86603	2.758815	17.28609	-7.73494
1993	-16.9689	-0.35285	-5.26155	2.008286	-8.41041	3.323634	24.87942	-3.07884
1994	9.38512	-0.37756	-1.55672	-3.07154	-2.56635	2.437073	6.455191	-12.5168
1995	7.22971	10.08057	8.204118	-1.14451	4.327948	2.251535	25.26902	-1.72808
1996	-2.62077	-3.14627	-28.2357	0.595288	-6.20837	10.72163	-1.32549	-8.91332
1997	-3.38095	-5.41659	-10.1461	-5.68142	-7.83228	-7.00996	8.481927	-4.01421
1998	76.30309	6.569412	3.424219	21.70686	4.913411	-0.41093	7.579587	7.23595
1999	5.41706	-2188.9	-0.80019	-4.04916	-2.6483	12.76066	2.818872	-50.6358
2000	-4.93313	-3.94776	-11.4382	-6.94668	-3.6573	-4.06472	1.407474	-38.7143
2001	-4.92392	-6.36122	-17.8834	0.876625	-0.7626	-3.41634	-0.08442	33.1039

Table B.5 Continued

Thirlwall and Hussain's model Errors	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
2002	-11.6301	-2.00835	2.653218	-6.96612	-0.94457	-0.06222	3.47716	2.83531
2003	12.87359	-297.141	10.72847	-2.46659	-38.2641	1.075833	42.35954	23.10062
2004	7.051884	11.00611	8.936422	3.511579	44.25547	6.697644	38.78502	12.05364
2005	-1484.01	8.690409	3.775717	14.6335	7.420955	-23.093	23.98676	-1.62452
2006	-8.40806	-43.8239	2.892184	-2.94682	-1.66335	-0.71957	16.24952	7.702479
2007	6.023317	10.85261	17.22139	-1.53575	7.935718	-1.26815	30.43592	42.1004
2008	963.6822	13.55919	12.54489	-0.38366	272.7464	4.983399	26.68919	19.62321
2009	13.00868	-23.6103	-12.3893	10.01146	-1.26104	-5.38258	1.270604	-40.3599

Note : The error series are generated by predicted growth subtract by the actual growth.

Table B.6 Error Series from the Augmented Solow Growth Model

(The gap between actual and predicted growth)

The augmented Solow model's errors	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
1980	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1981	0.633834	-1.64619	-0.9836		0.661795	0.702846	-0.18443	N/A
1982	1.235359	3.121287	1.603708	6.020335	1.538614	0.456238	-1.20644	N/A
1983	-1.34374	-0.02597	-4.08475	-3.24468	0.680805	4.208127	2.132958	0.882867
1984	0.124236	0.437279	-3.08601	-6.01405	-5.74406	0.08024	0.256454	-4.06797
1985	-0.77542	1.563545	4.301211	4.063201	2.973509	0.274097	-0.20495	-2.98603
1986	-0.11917	-2.81137	-0.32687	6.725299	2.238211	-1.19718	0.901191	0.697041

Table B.6 Continued

The augmented Solow model's errors	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
1987	1.126765	-1.71349	-2.56263	0.701883	0.224719	-2.33646	1.386687	-2.20139
1988	0.01998	-1.8469	-3.86712	0.374557	-2.62631	-2.45696	-0.84253	-2.3747
1989	0.65306	4.321556	-3.17254	-2.81213	1.390085	1.401709	0.277021	2.43719
1990	-1.24429	4.18227	-2.86114	-0.65647	0.281653	3.691714	2.648639	4.25349
1991	-0.58506	-1.24848	3.80286	-4.91208	0.45468	-3.32398	-1.07282	3.8803
1992	-0.34787	-1.69389	2.03404	-3.51258	-0.61009	2.070219	-4.87158	-1.59768
1993	0.431476	-1.37405	-3.37536	2.758062	-0.37029	4.595176	-1.5406	-1.19672
1994	0.457949	-2.66797	-4.50232	1.18581	-0.5763	-2.21014	-1.08635	-4.25191
1995	-0.17921	-2.66365	0.69752	-0.21223	1.419561	-4.69173	3.772407	0.568244
1996	0.806023	1.002077	2.257043	1.33104	-2.84382	0.215383	2.238391	-0.87118
1997	-0.43081	2.353863	-1.73022	-6.90545	0.28989	1.822313	-0.76918	-0.65979
1998	0.566488	5.920043	9.396683	10.75027	1.321881	0.694983	2.118332	1.963143
1999	2.256642	-4.05649	-3.43256	-1.60182	7.298581	-1.36205	-3.36466	1.140354
2000	-1.69084	-1.36878	-3.45767	-0.71849	-3.86882	-0.84272	-1.50849	0.581995
2001	0.109584	-0.00419	9.69958	1.642854	6.068262	0.485811	3.031319	1.747188
2002	-1.60228	-2.48038	-1.85702	-2.98817	-3.02026	2.71722	-0.95125	-0.18554
2003	-0.22968	1.68239	-2.14448	0.325136	3.223882	-0.11879	-1.56314	-0.36404
2004	-1.20553	-0.05121	-0.4688	-0.71775	2.497667	-3.43642	1.683307	-0.9208
2005	1.870865	0.008738	-0.14252	-2.1648	-2.24775	-0.24272	2.228414	1.476786
2006	0.076961	-0.26197	0.22037	0.340112	0.256622	2.335137	-3.85281	-3.75664
2007	-0.86676	0.364462	2.238354	-2.199	N/A	-0.28381	0.791975	-2.04574
2008	0.261558	3.627349	1.101935	1.21294	N/A	-3.60003	0.183907	1.827091
2009	3.168497	0.742967	8.867961	10.13507	N/A	4.29005	0.865593	2.497566

Table B.7 Financial Variables for Explaining the Error Series

BANK	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
1980	0.976064	0.92082	N/A	0.644328	0.960118	0.915357	0.853992	N/A
1981	0.971881	0.91108	N/A	0.694807	0.986136	0.891224	0.852194	N/A
1982	0.971903	0.919377	N/A	0.732569	0.967329	0.86517	0.849152	N/A
1983	0.974515	0.919467	N/A	0.808496	0.953747	0.848387	0.859007	N/A
1984	0.976566	0.930124	N/A	0.906338	0.947372	0.828116	0.883831	N/A
1985	0.980924	0.939666	N/A	0.922025	0.975518	0.803746	0.882198	0.955737
1986	0.984613	0.947217	N/A	0.874804	0.980971	0.674834	0.898861	0.954478
1987	0.98483	0.951733	N/A	0.871657	0.983093	0.74553	0.919154	0.947368
1988	0.986406	0.949508	N/A	0.885738	0.983139	0.797337	0.967021	0.949767
1989	0.986401	0.959959	N/A	0.911814	0.989944	0.830778	0.981116	0.949605
1990	0.979679	0.972552	N/A	0.933096	0.972413	0.858521	0.976195	0.952033
1991	0.986123	0.974937	N/A	0.951844	0.985826	0.885654	0.981546	0.946687
1992	0.983491	0.978666	N/A	0.945317	0.994597	0.822634	0.983262	0.948845
1993	0.982086	0.978891	N/A	0.948805	0.991166	0.633085	0.989526	0.955561
1994	0.982175	0.982453	N/A	0.964262	0.993082	0.735986	0.995934	0.960851
1995	0.980317	0.987918	N/A	0.981237	0.990683	0.798753	0.996114	0.970544
1996	0.976313	0.989515	N/A	0.985819	0.959788	0.845482	0.995041	0.976418
1997	0.971349	0.974253	N/A	0.986067	0.96418	0.881588	0.989456	0.98025
1998	0.944513	0.957903	N/A	0.936926	0.958652	0.891496	0.971165	0.983554
1999	0.949012	0.97886	N/A	0.672449	0.948005	0.865263	0.973598	0.985311
2000	0.957021	0.984992	0.973492	0.750011	0.939059	0.899343	0.978146	0.98683
2001	0.90805	0.985607	0.973034	0.706146	0.94349	0.922003	0.973716	0.979237
2002	0.898041	0.988697	0.973294	0.690166	0.983041	0.906158	0.980426	0.982065

Table B.7 Continued

BANK	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
2003	0.890535	0.989628	0.972222	0.72851	0.985488	0.91128	0.980079	0.984745
2004	0.887679	0.993859	0.970454	0.744012	0.986468	0.939198	0.983547	0.986087
2005	0.887447	0.990982	0.970861	0.764876	0.989135	0.951817	0.985225	0.987526
2006	0.907213	0.989119	0.974227	0.783657	0.991317	0.90191	0.982095	0.98919
2007	0.916416	0.987365	0.978269	0.822638	0.991351	0.872297	0.973385	0.9508
2008	0.927293	0.985457	0.982571	0.865604	0.991387	0.83936	0.96458	0.956498
2009	0.93984	0.983514	0.987065	0.914882	0.991423	0.809568	0.954545	0.967815

DEPTH	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
1980	1.395013	0.30253	0.581258	0.142516	0.721058	0.221197	0.393881	N/A
1981	1.428987	0.301088	0.613054	0.152438	0.83063	0.227619	0.402208	N/A
1982	1.498534	0.328145	0.647055	0.171057	0.893108	0.239874	0.427568	N/A
1983	1.565875	0.337522	0.654781	0.17071	0.919036	0.262138	0.484907	N/A
1984	1.587362	0.328731	0.663177	0.18737	0.961394	0.270874	0.545753	N/A
1985	1.60941	0.328683	0.714017	0.212088	1.102834	0.277035	0.593069	N/A
1986	1.677191	0.331724	0.749331	0.231062	1.323384	0.273039	0.618712	N/A
1987	1.753517	0.333764	0.791137	0.241188	1.246222	0.260284	0.627958	0.601424
1988	1.78282	0.33978	0.780408	0.258482	1.15977	0.262624	0.623319	0.595169
1989	1.836557	0.364115	0.803107	0.284854	1.175161	0.285026	0.644174	0.639658
1990	1.857083	0.361561	0.845837	0.342468	0.895344	0.304696	0.686228	0.707142
1991	1.854713	0.357201	0.879993	0.371503	0.615699	0.328671	0.73157	0.76699
1992	1.884304	0.370719	0.893392	0.390721	0.806971	0.344625	0.762087	0.795328
1993	1.944959	0.361433	0.83707	0.408282	1.008974	0.379174	0.796759	0.8474
1994	2.015778	0.365398	0.81902	0.417898	1.053434	0.426597	0.799489	0.873417

Table B.7 Continued

DEPTH	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
1995	2.064766	0.362491	0.825683	0.436478	1.066692	0.467001	0.789279	0.900631
1996	2.101157	0.373197	0.821124	0.476772	1.11044	0.502137	0.815022	0.977816
1997	2.166412	0.386897	0.828264	0.500243	1.166778	0.546223	0.909271	1.076797
1998	2.296625	0.484891	1.028441	0.530219	1.2644	0.576227	1.087223	1.181068
1999	2.397339	0.554565	1.198339	0.557792	1.249355	0.575047	1.134731	1.269749
2000	2.422045	0.640312	1.081303	0.495839	1.167232	0.576933	1.121255	1.306025
2001	2.235421	0.714675	1.150521	0.480285	1.295238	0.582468	1.137341	1.351943
2002	2.039895	0.724386	1.142987	0.472537	1.272754	0.568222	1.114372	1.399129
2003	2.059784	0.743512	1.154873	0.450544	1.235006	0.559203	1.101566	1.439053
2004	2.038226	0.714302	1.095036	0.43038	1.198026	0.527671	1.089867	1.443149
2005	2.031621	0.694518	1.067433	0.396675	1.182989	0.510683	1.056249	1.4436
2006	2.009065	0.68752	1.107675	0.386184	1.179213	0.524668	1.020771	1.467029
2007	1.977492	0.661088	1.144228	0.383291	1.164338	0.528295	0.969474	1.42233
2008	1.947658	0.634146	1.185763	0.380419	1.150238	0.532129	0.914908	1.442651
2009	1.916511	0.604426	1.235693	0.377769	1.13408	0.535759	0.858264	1.606306

PRIVY	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
1980	1.171857	0.363097	0.63122	N/A	0.427166	0.289	0.399425	N/A
1981	1.188028	0.381104	0.697249	0.090428	0.525852	0.302173	0.393945	N/A
1982	1.234037	0.414875	0.763003	0.118228	0.581171	0.317142	0.412649	N/A
1983	1.28761	0.429156	0.809988	0.128131	0.626518	0.311124	0.470794	N/A
1984	1.305072	0.435065	0.858818	0.146774	0.692497	0.269905	0.529669	N/A
1985	1.328349	0.454262	0.922378	0.168951	0.827478	0.216537	0.560578	N/A
1986	1.388299	0.457262	0.890537	0.1856	0.982108	0.168212	0.5562	N/A

Table B.7 Continued

PRIVY	Japan	Korea	Singapore	Indonesia	Malaysia	The Philippines	Thailand	China
1987	1.489296	0.443596	0.827907	0.203657	0.888477	0.145732	0.543795	0.716472
1988	1.572537	0.424978	0.76375	0.235708	0.82314	0.149207	0.568823	0.684696
1989	1.64487	0.451246	0.768193	0.284078	0.854928	0.15469	0.632592	0.724985
1990	1.68605	0.478176	0.78026	0.37961	0.768554	0.166262	0.72374	0.780661
1991	1.704617	0.488072	0.793835	0.433819	0.674978	0.175727	0.812518	0.804344
1992	1.743186	0.498855	0.809148	0.436159	0.870919	0.185093	0.893642	0.779885
1993	1.783545	0.473606	0.785198	0.447597	0.999808	0.224675	1.00063	0.803508
1994	1.803307	0.474516	0.79362	0.473446	1.010086	0.263295	1.132415	0.795708
1995	1.804768	0.473024	0.847879	0.489383	1.099226	0.31447	1.257104	0.770785
1996	1.798209	0.49592	0.910083	0.512098	1.238712	0.402812	1.374398	0.819208
1997	1.854946	0.541258	0.952318	0.535281	1.394884	0.486952	1.54081	0.900534
1998	1.972698	0.643713	1.078434	0.525855	1.552534	0.488058	1.659618	0.993098
1999	2.006109	0.662889	1.090557	0.338511	1.428558	0.411045	1.433915	1.05937
2000	1.952892	0.7258	0.967919	0.176534	1.227608	0.37248	1.166268	1.071766
2001	1.543397	0.793659	1.125573	0.172366	1.275615	0.361791	1.011958	1.078742
2002	1.103965	0.843055	1.120552	0.178908	1.195327	0.32802	0.971286	1.113457
2003	1.039561	0.909693	1.069233	0.192072	1.151111	0.304894	0.940021	1.168221
2004	0.989426	0.891336	0.993095	0.215617	1.083221	0.28332	0.902331	1.159802
2005	0.984142	0.893503	0.940373	0.226201	1.059466	0.262303	0.905479	1.102948
2006	0.986238	0.946794	0.893521	0.225401	1.046852	0.244085	0.871143	1.045358
2007	0.967621	1.008882	0.882142	0.226743	1.006895	0.23282	0.827088	0.996538
2008	0.949355	1.077026	0.871132	0.228322	0.965773	0.221109	0.781497	1.005667
2009	0.931793	1.159957	0.860803	0.229977	0.929091	0.209207	0.733249	1.124967

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