A TEST OF ENDOGENOUS GROWTH THEORIES IN MALAYSIA

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Abstract

The aim of this paper is to investigate the determinants in per capita growth rate in Malaysia. The determinants draw on the recent endogenous growth theories and apply the Solow methodology to time series data from Malaysia, In our model, we develop a three different mode-IS, i.e. Solow model, Mankiw-Romer- Weil model and modifies Solow model. Our results indicate that, the growth rate of investment/GDP ratio, the growth rate of export trade over GDP ratio and the ratio of quasi-liabilities of the financial system to GDP lead to improved growth performance.

INTRODUCTION

Over the past few years economist studying growth have turned increasingly to endogenous growth models[1]. Advocates of endogenous growth models present them as alternatives to the Solow model and motivate them by alleged empirical failure of the Solow model to explain cross-country differences. The empirical evidence initiated by Mankiw, Romer and Weil (1992) try to prove that the confirmation of Solow growth model. By adding both the human and physical capital variables into the Solow model, they show that the cross-country differences in economics growth can be explained by the differences in both variables and population growth.[2]

To test the augmented Solow model, several authors have considered to include domestic and foreign capital (see, Balasubramanyam, Salisu and Sapsford (1996)); inflation rate (see, DeGregorio (1992), Fischer (1993)); financial development (see, Greenwood and Jovanovic (1990), and De Gregorio and Guidotti (1995)); and government expenditure (see, Barro (1991) and Fischer (1993)) as an additional explanatory variable or as a test of individual variable such as export (see, Balassa (1978), Feder (1982), Frankel and Romer (1999); population (see, Kapuria-Foreman (1995) and Darrat and Al-Yousif (1999)). The inclusion of these variables is to ascertain the differences in growth rates across countries.

The primary objective in this paper is to reexamine this evidence on convergence (in terms of levels of economic growth) to assess whether it contradict the Solow model. Also, our primary objective is to test

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[1] Renelt (1991) provides a recent of overview and empirical testing of endogenous growth models.
[2] Lucas (1998) also find that the differences in growth rates across countries is determined by each country's initial. capital level. Two types of capital rate that are crucial to stimulate growth are physical capital and human capital.

the modified Solow model derived from recent work in growth theory. In addition, this study brings new empirical evidence of the existing studies in Malaysia (see, Pang (undated) and Rahmah (1999)).

MODEL AND DATA

The model in this paper adopts a supply side description of changes in aggregate output. In so doing, it follows a practice widely used in empirical studies of sources of growth, (see, among others, Romer (1990), Grossman and Helpman (1991) and Aghion and Howitt (1992). In the usual notation the production function can be written as follows:

$$Y=g(K,L) \qquad (1)$$

where Y is gross domestic product in real term, K is capital stock and L is labor input.

From equation (1), Solow (1956) suggests a simple decomposition that provides a useful model for further analysis. Under the assumptions of constant returns to scale and competitive markets, Romer (1987) simplify the Solow model as shown in equation (2).

$$g_y = ag_n + (1-a)a_k + (1/a)q \qquad (2)$$

where g_y, g_n and g_k, are the growth rates of output, labor and capital, respectively, and a is the share of labor in output; q then measures that part of growth that cannot, under the maintained assumptions, be explained by either growth of labor or growth of capital. This term has been dubbed the Solow residual. Within this framework, we will investigate the residual by looking at the role of various economic policies that a number of the "new" growth theories have identified as potential determinants of the long-run rate of economic growth. We will provide a brief summary here.

Inflation.

Appropriate use of monetary policy is thought to promote a stable financial environment necessary for economic growth by maintaining a low inflation rate. We use, as suggested by DeGregorio (1992), Fischer (1993)), and Grier and Tullock (1989), the average rate of inflation (π) as our indicator of the effects of monetary policy and macroeconomic stability.

International trade.

The role of international trade in economic growth has been debated for over two centuries. The studies of Balassa (1978), and Frankel and Romer (1999) have included an indicator of export performance in explaining economic growth. They produce a proposition that more outward-oriented economies tend to grow faster. This proposition has been tested extensively and the majority of the evidence tends to support this proposition.[3] A measure frequently used is the share of trade (export plus import) in GDP. However, in this study, the measure we use is the growth rate of export trade over GDP ratio (g_x). We believe that this to be a preferable measure of openness; economies that adopt more outward-looking policies will experience faster growth in this ratio.[4]

Fiscal policy.

The role of fiscal policy indicators has received considerable attention in the literature. Most studies have focused on government consumption expenditure because of the most availability data (see, Grier and Tullock (1989), Romer (1989) and Barro (1991)). A few studies have looked at the impact of budget deficits on economic growth (see, Landau (1986) and Fisher

[3]For most recent overview and empirical testing of this proposition, see Frankel and Romer (2000).
[4] This finding is supported by Balasubramanyam, Salisu and Sapsford (1996)).

(1993)) or tax revenue (see, Landau (1986)). Most studies have used the average ratio of government consumption expenditure to GDP as the indicator of fiscal policy. In this study, we follow Grier and Tullock (1986) and use the growth rate of in the government consumption/GDP ratio (g_g) as our indicator of fiscal policy. Therefore, in this paper, we test the hypothesis that it is not the size of the government sector per se that is detrimental to economic growth but the growth in this sector.

Financial development

Since the pioneering contributions of McKinnon (1973) and Shaw (1973)), the relationship between financial development and economic growth has remained an important issue of debate. In recent years, a number of authors (among others, Bencivenga and Smith (1991), Greenwood and Jovanovic (1990), and De Gregorio and Guidotti (1995) have dealt with different aspects of this relationship at the both the theoretical and empirical levels. The indicator that they chose when reporting results from crosscountry regressions was the ratio of quasi-liabilities of the financial system to GDP (q_m).

Thus, we will estimate the following three models:

$$g_k = \alpha_0 + \alpha_1 g_k + \alpha_2 g_n + u_1$$
Solow model (3)

$$g_k = \beta_0 + \beta_1 g_k + \beta_2 g_n + \beta_3 g_{ed} + u_2$$
Mankiw-Romer-Weil model (4)

$$g_k = \delta_0 + \delta_1 g_k + \delta_2 g_n + \delta_3 g_{ed} + \delta_4 \pi + \delta_5 g_x + \delta_6 g_x + \delta_7 g_g + u_3$$
Modified Solow Model (5)

where α_i (i=0, ..., 2), β_i (i=0, …,3) and δ_i (i=0, ..., 7) are parameters and a vector of parameters, respectively, to be estimated. The descriptions of each explanatory variable will be discussed in the following, section.

FINDING

The dependent variable in equations (3) - (5) is the annual growth rate of real per capitaGDP. As for the explanatory variable, a number of different equations were estimated, the results are shown in Table 1. Furthermore, we present an t-statistic for the significance of each estimated coefficient, the corrected coefficient of determination (adj. R^2) and the DW-statistics for the identification of autocorrelation. Overall, the adjusted R^2 are satisfactory and there is no autocorrelation problem.

The model estimated in column (1) tests the hypothesis using the Solow (1956) as elaborated and augmented by Mankiw, Romer and Weil (1992). The model includes the growth rate of investment/GDP ratio (g_k) as a measure of physical capital accumulation and the growth rate of population (g_n). The results are quite satisfactory. The coefficient of g_k is positive and highly significant, confirming the importance of physical capital accumulation for Malaysia. The estimated coefficient implies that 1 percentage point increase in the growth rate of investment/GDP ratio increase real per capital GDP growth by 0.30 percentage point. However, the growth rate of inflation does not produce a negative (and significant) to per capita economic growth as predicted by the Solow model.

The next model estimated is the Solow model augmented by Mankiw, Romer and Weil (1992) to consider human-capital accumulation. In empirical terms, it implies adding a variable measuring human-capital accumulation. Mankiw, Romer and Weil (1992) measure this as the percentage of the government expenditure on education to total government expenditure (g_{ed}). The estimation results are shown in column (3) of Table 1. The signs and significance of the estimated coefficients of g_k and g_n remain the same as reported in column (1). On the other hand, the coefficient of g_{ed} is

insignificant. Although our finding, contrary to the results reported in Rahmah (1999), it should not be interpreted as indicative of the unimportance of human-capital accumulation in Malaysia. The lack of significance may reflect measurement problems. The ratio of government expenditure to total Government expenditure does not measure accurately investment in human capital and does not identify for differences in quality of investment.

The empirical results, to identify the potential determinants of the rate of economic growth, are shown in column (4) of Table 1. The estimated coefficient of g_k remains highly significant, while that of g_n and g_{ed} are insignificant. The next result is the tests of modified Solow model. By incorporating other variables such as π, g_x, g_m and g_g, into the Solow model and the

results are reported in column (4), we find that the estimated coefficients of g_x and g_m, are positive and significant. A1 percentage point increase in the annual growth rate of export/GDP tends to increase the growth rate of real per capita GDP by 0.53 percentage point.

The estimated coefficient of g_m is significant. We find that per capita real GDP growth is positively related with g_m. This result implies that 1 percentage point increase in g_m increases growth by 0.38 percentage point. Thus, these findings support the hypothesis that the effects of financial intermediation on growth, as indicated by most of the literature, are primarily transmitted through an increase in the growth rate of quasiliquid liabilities of the financial system to GDP ratio.

Table 1.
Results of regression analyses of growth rate equation, Malaysia 1971-1999

Independent variable	Solow Model	Mankiw, Romer, Weil Model	Modified Solow Model
Constant	2.5051	1.2216	0.5640
	(0.3834)	(0.1889)	(0.0729)
g_k	0.2972	0.3001	0.2712
	(4.3091)*	(4.4491)*	(3.9296)*
g_n	1.9279	2.5560	-0.9140
	(0.7902)	(1.0523)	(-0.4218)
g_{ed}		-0.2179	0.0376
		(-1.4356)	(0.2809)
π			-0.0758
			(-0.2321)
g_x			0.5279
			(3.1627)*
g_m			0.3849
			(2.5824)*
g_g			13.3501
			(0.2827)
Adj. R^2	0.4362	0.5164	0.7004
DW	2.0187	1.9691	1.9613

Note: figures in brackets are t-values and the asterisk sign shows the estimated coefficients are significant at 1% level.

CONCLUSION

This paper investigates the determinants in per capita growth rates in Malaysia. The determinants draw on the recent endogenous growth theories and apply the Solow methodology to time series data from Malaysia. In conclusion, our results indicate that, the growth rate of investment/GDP ratio, the growth rate of export trade over GDP ratio and the ratio of quasi-liabilities of the financial system to GDP lead to improved growth performance. Thus, these findings suggest that: first, the importance of physical capital accumulation for Malaysia; second, a faster growing export sector is associated with faster economic growth; and third, the effects of financial intermediation on growth, as indicated by most of the literature, are primarily transmitted through an increase in the growth rate of quasiliquid liabilities of the financial system to GDP ratio.

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