PRE THE PHILIPPINE REVIEW OF ECONOMICS
VOL. XLV NO. 1 JUNE 2008 P. 1-14

Notes on Philippine economic growth and its sources*

Ma. Rowena M. Cham and Dante B. Canlas
Asian Development Bank and University of the Philippines School of Economics

The review uses insights from the Solow growth model and endogenous growth theory to interpret Philippine economic growth since the 1950s. For five decades after World War II, total factor productivity growth (TFP) was low, thereby accounting for the country's uneven growth performance. In the first decade of the 21st century, TFP growth gained strength, a finding that suggests the need to further investigate the factors behind the increase.

JEL classification: O47
Keywords: growth accounting, total factor productivity

1. Introduction

The Philippine economy in the past five and a half decades experienced episodes of strong growth in real gross domestic product (GDP) followed by sharp downturns that made it lag behind South Korea, Taiwan, and Hong Kong, and some of its ASEAN neighbors like Singapore and Malaysia. The deepest output decline occurred in the early 1980s, enabling Thailand to overtake the Philippines in terms of per capita GDP.

In this paper, we examine some events and stylized facts about economic growth in the Philippines, review some theories of growth that help interpret the observed growth figures, and quantify sources of real GDP growth in the Philippines using standard decomposition analysis popularized by Solow [1957],

* This paper formed the basis of Canlas's presentation in the plenary session on Philippine economic growth during the 45th Annual Meeting of the Philippine Economic Society held at Bangko Sentral ng Pilipinas on November 14, 2007. The paper also provided some inputs to the study entitled "Philippines: Critical Development Constraints", an ADB-funded technical assistance to the Philippine government.

Jorgenson and Griliches [1967], and Denison [1967]. The paper may be viewe as setting the stage for an in-depth study of fundamental factors that constrai growth in the Philippines.

Broadly put, the sources of output growth are increases in the factors o production—namely, labor and capital—and total factor productivity (TFP). Th exercise is done at the aggregate level. A growth decomposition analysis is useful first step in trying to understand the factors that have hindered growt in the Philippines, thereby missing becoming a newly industrializing econom in East and Southeast Asia, or what Lucas [1993] termed "missing a miracle' Our paper is similar to the growth decomposition analysis that Cororato [2002] had done earlier.

Table 1 gives a snapshot of the country's growth experience compared t some selected Asian economies. In the 1950s, Philippine real per capita GD growth was on a par with or ahead of other countries in the region. Real GD growth averaged 6.5 percent each year. In the 1960s, Philippine real GDP growtl slipped behind Malaysia, Singapore, and Thailand. The divergence became ver pronounced in the 1980s when Philippine real GDP contracted 0.5 percent eacl year while its ASEAN neighbors' growth rates ranged from 3.2 percent to 8.2 percent annually. The difference in the mean growth rate narrowed down in th 1990s and even in the first half of the 21st century, but Philippine economi development had by then lagged behind its Asian neighbors.

Table 1. Average annual growth rate of real GDP

	Indonesia	*Philippines*	*Thailand*	*Malaysia*	*Singapore*	*HK*	*South Korea*	*Taipei, China*
1951-1960	4.0	6.5	5.7	3.6	5.4	9.2	5.1	7.6
1961-1970	2.0	1.8	4.8	3.4	7.4	7.1	5.8	9.6
1971-1980	5.3	3.1	4.3	5.3	7.1	6.8	5.4	9.3
1981-1990	4.3	-0.5	6.3	3.2	5.0	5.4	7.7	8.2
1991-2000	11.6	4.4	15.4	11.9	19.5	19.3	18.9	5.5
2001-2006	3.3	2.7	4.0	2.7	3.2	4.0	4.2	3.4

Source: World Bank, *World economic outlook* and *World development indicators; Taiwan statistica data book.*

The rest of the paper is organized as follows: section 2 describes the long-term growth experience of the Philippines using time-series data on real GDP. To organize thinking about how to view the Philippine growth experience and as a guide to future growth studies, section 3 reviews in broad strokes the evolution of growth theory starting with early models that emphasize the role

of savings and capital accumulation to recent models of endogenous growth that view the sources of long-run economic growth, such as human capital investments and technological progress, as matters of choice. Section 4 reports the decomposition analysis for the Philippines, including an estimation of total factor productivity as a residual. Section 5 concludes the paper.

2. Economic growth in the Philippines: A background

The Philippines embarked on an industrialization drive after World War II, anchored on a strategy of import substitution. To save on foreign exchange, products that used to be imported were locally manufactured. Real GDP of the Philippines expanded 1.68 times over the period 1950-1960 for an annual growth rate in per capita GDP of about 3.3 percent. The Philippines had one of the highest real per capita GDP levels and growth rates among its neighboring countries in East and Southeast Asia in the 1950s. Import substitution, however, started to lose steam in the 1960s when the need to import capital goods and raw materials for the import-substituting industries led to serious balance-of-payments (BOP) difficulties. Real GDP growth began to slow down and by the 1960s, the Philippines had lagged behind its neighbor countries. Table 2 shows per capita GDP level of the Philippines in comparison with a sample of Asian countries. In 1960, the Philippines led Thailand. The latter overtook the Philippines in 1984.

Table 2. Per capita GDP in 2000 (US$)

Economy	*1960*	*1983*	*1984*	*2006*
Indonesia	196	444	467	983
Philippines	612	1,004	908	1,175
Thailand	329	897	933	2,549
Malaysia	784	2,059	2,161	4,623
Singapore	2,251	10,386	11,042	27,685
Hong Kong, China	1,960	13,028	14,163	31,779
Korea, Republic of	1,110	3,884	4,147	13,865
Taipei, China[a]	1,468	2,846	3,169	15,482

[a]Data for Taipei, China, for 1960 are in constant 1996 US dollars.

Sources: International Monetary Fund, *World economic outlook* (various years); and World Bank, *World development indicators* (various years).

The 1970s witnessed two oil price shocks, one in 1974 and another in 1979 causing a quadrupling of oil prices in world markets. The Philippine governmen pursued countercyclical fiscal and monetary policies in an attempt to ward of the expected contractionary impacts of the oil-price shocks. These resulted i large and persistent deficits in the national budget that were financed throug foreign borrowing. Consequently, the country's foreign debt ballooned.

Expansionary fiscal and monetary policies allowed real GDP to grow an reach a high of 8 percent in 1974 and 1977. The output growth, however, prove temporary. Following the worldwide recession in 1981-1982, the economy experienced a BOP crisis that led to the Philippine government declaring moratorium on foreign-debt servicing in 1983. Forced to adopt austerity measures called for by a standby credit arrangement with the Internationa Monetary Fund (IMF), the economy contracted, with real GDP declining by 7 percent in 1984. The downturn continued in 1985 with another 4 percen drop in real GDP.

Following the restoration of a democratic government in 1986, the economy recovered from the recession of 1984-1985. With newfound confidence an the introduction of a number of economic policy reforms beginning in 198 by the Aquino administration, the recovery was sustained. It gathered strength with real GDP growth reaching a peak of 6.2 percent in 1988. The recovery, however, was cut short in 1989 when military adventurism, supply bottlenecks, an electric-power crisis, and natural disasters hit the country, resulting in an economic flattening in the early 1990s.

The Ramos administration took over in 1992. The economy recovered in late 1994 with the resolution of the electric power crisis, but this would lose momentum with the outbreak of the 1997 Asian financial crisis. A financial contagion hit East and Southeast Asia following the collapse of the Thai baht, resulting in a sharp depreciation of several currencies in the region, including the Philippine peso. The uncertainty in foreign exchange and financial markets persisted, causing investment and real GDP to decline in 1998. The downturn, however, proved short-lived. Growth resumed the following year despite the sharp peso depreciation and the significant increase in interest rates.

A political crisis that hit the country in 2001 ushered in the Macapagal-Arroyo administration. In the aftermath of the global economic slowdown from the worldwide retrenchment in information technology and 9/11, real GDP growth slowed down. Growth picked up in 2002-2003. The economy performed better than expected as real GDP grew by about 6 percent. The growth, however, slowed down somewhat in 2005 as inflation accelerated and oil-price shocks arising from declining refining capacity worldwide and speculation about the

impact of the war on terror on the supply of Middle East oil caused a spike in the price of crude oil in the world market. The upward trend in growth since 2002 was, however, maintained even as the economy registered only moderate growth in 2006.

Today, the Philippines is considered a low middle-income country with a per capita GDP of about US$ 1,200. Its per capita GDP growth rate is about 3 percent each year. At this growth rate, it would take about 23 years for per capita GDP to double. What does it take to accelerate this growth rate? To answer this question, a good understanding of the factors that effectively hold back economic growth is useful. In this connection, a look at the economic performance of the various production sectors is insightful.

2.1. Economic performance of major production sectors

The growth trends in the principal sectors of the economy had followed the trend of total output over the past 40 years. The three major sectors grew steadily during the 1950s, 1960s, and 1970s. But the economic crisis experienced in the mid-1980s, early 1990s, and after the 1997 Asian financial crisis slowed down the growth of these major sectors, with adverse effects on total output. During the recession of the early 1980s, industry was the hardest hit; its growth rate for the period slipped to 0.64 percent from a high of 7.91 percent in the previous decade.

Agriculture, which was registering 4-5 percent growth for three decades, also dipped in the 1980s and 1990s. Services, meanwhile, posted a 2 percentage-point drop from the previous decade, which resulted in a moderate GDP growth rate in the 1980s. While growth again picked up in the 1990s and slightly improved from 2000 onward, the structural transformation from a predominantly agricultural economy to an industrializing one did not materialize. Table 3 shows these growth rates by sector. Compared to industry and services, agricultural productivity pales in comparison (see Table 4). Over time, people move out of low-productivity areas in search of employment in high-productivity areas.

Table 5 depicts the percentage share of the three major sectors on output. From the 1950s to the 1970s, the agriculture, fishery and forestry sector was a major contributor to growth and employment. Its share to the GDP ranged from 24 percent to 30 percent. However, it started to decline toward the end of the 1980s. By 2006, the share of agriculture stood at 19 percent of the GDP.

The industry sector's experience mirrors the boom-and-bust cycle of the Philippine economy since the 1950s. While a modern industrial sector emerged during the 1950s and throughout the 1960s and 1970s due to an enforced protectionist policy, the expected transition toward an export-oriented

industrialization never materialized. In the 1960s and 1970s, the share c industry to the GDP was the highest, peaking at 38 percent. However, with th decline in growth during mid-1980s, its share to total output also decline During the 2001-2006 period, its share to total output stood at 33 percent.

Table 3. Annual output growth by sector (in %)

Sector	*1950s*	*1960s*	*1970s*	*1981-1990*	*1991-2000*	*2001-2006*
Agriculture, fishery and forestry	4.99	4.29	4.06	1.18	1.87	3.77
Agriculture industry (crops, livestock and poultry and fisheries)	-	-	5.89	2.10	2.27	3.78
Forestry	-	0.43*	-2.15	-7.78	-13.38	8.07
Industry	7.47	5.70	7.91	0.64	3.12	3.29
Mining and quarrying	9.71	7.51	6.48	2.46	-0.06	11.20
Manufacturing	9.94	5.85	6.17	1.06	2.62	4.45
Construction	1.6	4.83	15.79	-0.78	5.04	-3.15
Electricity, gas and water	4.43	5.7	13.34	4.74	5.80	3.53
Services	6.97	4.77	5.31	3.42	3.66	5.96
Transport, communication,						
Storage	7.99	5.77	7.48	3.53	5.23	8.58
Trade	6.61	-3.51	5.86	3.17	3.61	5.82
Finance			9.19	3.11	4.66	7.26
Occupied dwellings & real estate	7.53	-1.54	0.53*	1.58	2.48	1.88
Private services			1.00*	5.19	5.31	3.70
Government services			7.83*	4.43	3.74	2.92
GDP	6.34	4.93	5.93	1.80	2.92	4.61

* Growth rate data started in 1967-1968.

Source: National Income Accounts of the Philippines, National Statistical Coordinatior Board.

Table 4. Real value added per worker, 1970-2006 (in 1985 pesos)

Year	*Agriculture*	*Industry*	*Services*
1970	15,853	61,653	38,675
1975	14,430	79,000	36,940
1980	16,952	96,734	40,430
1985	14,493	71,446	31,649
1990	16,104	74,693	34,556
1995	15,507	68,585	33,252
2000	18,904	77,468	33,975
2006	20,328	83,558	38,164

Table 5. Growth rate and percentage distribution of output by sector

Year	*Agriculture*	*% Share in real GDP*	*Industry*	*% Share in real GDP*	*Services*	*% Share in real GDP*
1962-1970	4.05	0.30*	5.74	0.32*	4.74	0.38*
1971-1980	4.06	0.25	7.91	0.38	5.31	0.36
1981-1990	1.18	0.23	0.63	0.37	3.42	0.40
1991-2000	1.87	0.21	3.12	0.35	3.66	0.44
2001-2006	3.77	0.20	3.29	0.33	5.96	0.47

*Average of 1961-1970.

The rise of services as the main driver of growth became evident at the start of the 1980s. Among the three major sectors, it was the only one that registered positive growth rates in the past 46 years, except for the recession years 1984 and 1985.

In the 1960s, its share to total output was around 38 percent. During the 2001-2006 period, it stood at 47 percent. Over the past four decades, trade has consistently accounted to about one-third of the service-sector share to GDP.

Besides being an important contributor to growth, trade has become a major source of employment. In 1980, services accounted for 33 percent of total employment; it rose to around 40 percent in 1990. In 2006, half of the labor force is employed by the sector.

3. Growth theories

To organize our interpretation of Philippine growth experience, we brie review here some prominent strands of growth theory. Growth theory l been evolving and undergoing refinements through time. Early models growth, such as the model of Solow [1956], assume exogenous saving ra and technologies. They derive dynamic capital accumulation equations a define steady states, points where per capita capital and income are consta In these models, savings and population (or employment) growth matte great deal. From these models, a growth-accounting approach has emerg that decomposes real GDP growth into growth of labor and capital and grow of total factor productivity (TFP). Empirical applications of this approach data in a given country tend to show that a large chunk of real GDP grow is accounted for by TFP growth (see, e.g., Solow [1957], Denison [1967], a Jorgenson and Griliches [1967]).

3.1. Solow model

The Solow [1956] model is generally regarded as representative of neoclassi growth theory. The production function takes the form $Y = A\,F(K,N)$ where is capital, N is labor employed, and A is exogenous technological level. The tv factors of production, K and N, have positive marginal products but subject a diminishing rate. The function F exhibits constant returns to scale. Applyi the multiple $1/N$ to both inputs yields $y = A\,f(k)$ where $y = Y/N$ and $k = K/$ Assuming an exogenous saving rate, s, and denoting depreciation by d, the bas dynamic capital accumulation of the Solow model is expressed as

$$\Delta k = s\,f(k) - (n + d)\,k. \qquad (1$$

The above may be expressed as $\Delta k/k = sf(k)/k - (n + d)$, a differen equation defining the accumulation path of capital per worker; it can be solv for k. Once the time path of k is determined, the time path of y follows fro the production function.

The Solow model defines a steady state as one where Y, N, and K are growing at the same rate; hence, $\Delta k = 0$ in steady state and equation (1) reduc to

$$s\,f(k^*) = (n + d)k^* \qquad (2$$

Once a steady state per capita capital, k^*, and correspondingly output, y is reached, the economy tends to stay there until perturbed by a change in an of the model's parameters, mainly, the saving rate and the population growt

rate. The Solow model posits the effect of s on the steady state values of k and y to be positive, while that of n, negative.

The Solow model predicts that economies with diverse initial per capita income growth rates will tend to converge at the same level of income per capita. If two countries manage to have the same savings rate, the same rate of population growth, and have access to the same technology, then, both will reach the same level of income eventually. It is implied that developing countries with access to the production technology of the developed countries will realize high marginal productivity of capital that permits them to eventually reach the per capita income level of the developed countries.

In the 1970s, interest in growth waned as attention focused on business cycles. But in the 1980s, there was a resurgence of interest in accounting for patterns of growth in a large cross-section of countries. A question of convergence has surfaced: is there a tendency for developing countries to catch up in per capita income terms with the developed countries? Baumol [1986] concludes that there is convergence, but de Long [1987] thinks otherwise. The highly diverse pattern of growth has inspired serious efforts to extend the standard neoclassical growth model exemplified by that of Solow [1956] into a theory of development.

One of the insights that has emerged from these new growth models is that countries at different stages of development do not face the same technology, that technology is endogenous, i.e., the product of a conscious choice process. Technology, moreover, involves spillover effects and increasing returns (see, e.g., Romer [1986]).

Meanwhile, it has been shown in other endogenous growth models that once human capital is explicitly recognized as an input to the production function, diminishing marginal productivity may be overcome (see, e.g., Lucas [1988]). As a result, convergence may not materialize for countries that do not invest in human capital.

3.2. Endogenous growth

One major motivation for the new theories of growth, often referred to as endogenous growth, is this convergence issue. Models that assume exogenous saving rate and technology have been deemed inadequate in accounting for the observed patterns of growth in a large cross-section of countries. Efforts to relax these restrictive assumptions have emerged as a result. The importance of investing in human capital and the potential gains from technological progress and other positive externalities that come from creating knowledge are emphasized in endogenous growth models.

One key assumption of the endogenous growth theory is increas returns to scale from the factors of production. An important implicat is that economies with increasing returns to scale do not necessarily reac steady-state level of income with zero per capita income growth. It also d not conclude that poor countries grow faster than rich countries, and hen no expectation of convergence. In developing countries, the potentially h rates of returns on investment are often greatly eroded by lower levels complementary investments in human capital, infrastructure, or research a development (R&D).

Romer [1986] has focused on uncovering the private- and public-sect choices that cause the growth rate of the TFP to vary across countries. particular, the model shows how savings are transformed into technologi advancement and used as a means to institute change and achieve growth.

Romer's model describes how capital stock and labor are combined usi the stock of knowledge, *A*. The growth in *A* is endogenously determined a is a function of time; it changes as a function of the number of innovators a that labor can be used for innovation or production. The rate of innovatic may be constant or may be a positive function of the past stock of knowledg or, if there are diminishing returns to the application of science, it may be decreasing function of the stock, *A*.

Romer's original model says that long-run growth depends on the growt rate of innovators or researchers and the innovation production functio But a higher population growth rate correspondingly reduces the level of p capita income under the neoclassical growth model, and this means that mo capital is needed to keep the capital-labor ratio constant, with capital runnin into diminishing returns.

Romer points out that the productivity of R&D is proportional to th existing stock of ideas and that productivity of R&D grows over time even i the number of scientists or researchers remains constant. This model has no been proven in the case of advanced economies like the Unites States sinc their growth rates have not risen as rapidly as expected with the enormou investment in R&D.

The importance of human capital as a source of long-run growth i stressed in the Lucas [1988] model. Human capital is an explicit input in th production function, making it a variable of choice. The basic intuition is tha no convergence materializes unless the lagging economies adopt the prope human capital investments.

4. Growth decomposition analysis

The standard growth decomposition framework breaks down GDP growth into the weighted sum of the growth of the factors of production, e.g., labor and capital. (The weights are the shares of capital and labor to total output.) Rounding up the growth of output is technological progress, or what is often referred to as total factor productivity growth.

4.1. Data

The output of an economy is measured by the real GDP. The GDP figures are taken from the National Income Accounts of the Philippines released by the National Statistical Coordination Board (NSCB). For the labor input, we use the number of employed people. We use the average of the four-quarter labor-force surveys undertaken by the National Statistics Office.

There is no official capital stock series and so we construct this from the investment data. Investment is measured by gross domestic capital formation from the National Income Accounts. To use the perpetual inventory method, an initial capital stock is assumed. The procedure for estimating the initial capital stock is as follows:

We assume a depreciation rate of 5 percent each year. The life span of the investment, in this case, gross fixed capital formation, is 20 years. This means that the amount invested in year 1 will be zero in value by year 20. The investment in year 2 is the remaining value of a certain amount in year 20, while investment in year 3 will also have a remaining value in year 20. If this process is continued until year 20, then one can arrive at the initial value of the capital stock in year 20 by summing up the remaining values. After constructing the initial capital stock, the standard formula is applied to generate the capital stock series, namely, $Kt = K\,t\text{-}1(1\text{-}d) + It$, where K is capital stock, I is investment, d is depreciation, and t is time period.

4.2. Empirical results

Table 6 shows a decomposition of real GDP growth into growth of labor and capital, each weighted by the factor share to total output. We assume a share of 0.35 for labor and 0.75 for capital. Total factor productivity is obtained as a residual. We see that in three decades spanning the '60s to the '80s, growth of capital accounted greatly for real GDP growth. TFP growth during those decades was low, and in the 1970s and 1980s was even negative. In the 1990s, growth of TFP emerged positive at 0.25 percent and gained strength in the first half of the 21st century, posting 2.41 percent.

Since TFP is widely regarded as the source of long-run growth, we are l to thinking that the inability of the Philippine economy to sustain its econom growth over a long period of time is on account of the weak growth of TF This further suggests the importance of paying attention to the determinan of TFP. Endogenous growth theory offers useful guides in this regard.

Table 6. Contributions of factors of production to GDP growth (%)

Period	*Growth rate of output (Δ Y/Y)*	*Contribution of capital stock growth [α(ΔK/K)]*	*Contribution of labor growth [(1-α)(ΔL/L)]*	*Contribution of TFP growth (ΔA/A)*
1961-1970	5.40	3.98	1.18	0.06
1971-1980	5.52	4.57	1.38	-0.64
1981-1990	1.81	2.05	1.37	-1.62
1991-2000	2.93	1.77	0.87	0.25
2001-2006	4.71	1.12	1.24	2.41

GDP = gross domestic product. TFP = total factor productivity

Note: In the column heads, Y=GDP, K=capital stock, ΔK=change in capital stock, L=labo force, ΔL=change in labor force, A=total factor productivity, ΔA is change in tot factor productivity, α=share of capital incomes, and $1-\alpha$=share of labor income Capital stock is derived by applying the perpetual inventory method to arrived at th initial capital stock and then applying the formula $Kt = K\,t\text{-}1(1-\delta) + It$ where Kt is th capital stock, $K\,t\text{-}1$ is capital stock in the previous year, δ is the assumed depreciatio rate, and It is the gross domestic capital formation.

Source: Estimations based on NSCB (various years).

5. Concluding remarks

Viewed from the lens of growth accounting, the positive growth rates tha were posted in the first three decades of post-World War II era can be attributec to the expansion of capital per worker. As more Filipinos got equipped with physical capital, GDP growth increased. This growth strategy, however, does not yield sustained growth rates given that both labor and capital are subjec to diminishing marginal productivity. It is important for growth of TFP tc improve.

In terms of TFP growth, the first half of the 21st century is promising It is useful to investigate the factors that contribute to the emergence of this relatively high TFP growth. We can think of many candidate-factors, including investments in human capital, R&D, and realization of scale economies. The remaining task is to quantify their contributions to real GDP growth.

References

Baumol, W. [1986] "Productivity growth, convergence, and welfare", *American Economic Review* **76**: 1072-1085.

Cororaton, C. [2002] "Total factor productivity in the Philippines", Discussion Paper No. 2002-01, Philippine Institute for Development Studies, Manila.

De Long, B. [1987] "Have productivity levels converged?: Productivity growth, convergence, and welfare in the very long run", Working Paper No. 2419, National Bureau of Economic Research, New York.

Denison, E. [1967] "The sources of economic growth and the alternatives before us", Committee of Economic Development, New York.

Jorgenson, D. and Z. Griliches [1967] "The explanation of productivity change", *Review of Economics Studies* **34**: 249-283.

Lucas, R. Jr. [1988] "On the mechanics of economic development", *Journal of Monetary Economics* **22**: 3-42.

Lucas, R. Jr. [1993] "Making a miracle", *Econometrica* **61**: 251-272.

Romer, P. [1986] "Increasing returns and long-run growth", *Journal of Political Economy* **94**: 1002-1037.

Solow, R. [1956] "A contribution to the theory of economic growth", *Quarterly Journal of Economics* **70**: 65-94.

Solow, R. [1957] "Technical change and the aggregate production function", *Review of Economics and Statistics* **39**: 312-320.