The Myth of Asia's Miracle

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A CAUTIONARY FABLE

PAPER TIGERS

AT FIRST, it is hard to see anything in common between the Asian success stories of recent years and the Soviet Union of three decades ago. Indeed, it is safe to say that the typical business traveler to, say, Singapore, ensconced in one of that city's gleaming hotels, never even thinks of any parallel to its roach-infested counterparts in Moscow. How can the slick exuberance of the Asian boom be compared with the Soviet Union's grim drive to industrialize?

And yet there are surprising similarities. The newly industrializing countries of Asia, like the Soviet Union of the 1950s, have achieved rapid growth in large part through an astonishing mobilization of resources. Once one accounts for the role of rapidly growing inputs in these countries' growth, one finds little left to explain, Asian growth, like that of the Soviet Union in its high-growth era, seems to be driven by extraordinary growth in inputs like labor and capital rather than by gains in efficiency.

Consider, in particular, the case of Singapore. Between 1966 and 1990, the Singaporean economy grew a remarkable 8.5 percent per annum, three times as fast as the United States; per capita income grew at a 6.6 percent rate, roughly doubling every decade. This achievement seems to be a kind of economic miracle. But the miracle turns out to have been based on perspiration rather than inspiration: Singapore grew through a mobilization of resources that would have done Stalin proud. The employed share of the population surged from 27 to 51 percent. The educational standards of that work force were dramatically upgraded: while in 1966 more than half the workers had no formal education at all, by 1990 two-thirds had completed secondary education. Above all, the country had made an awesome investment in physical capital: investment as a share of output rose from 11 to more than 40 percent.

Even without going through the formal exercise of growth accounting, these numbers should make it obvious that Singapore's growth has been based largely on one-time changes in behavior that cannot be repeated. Over the past generation the percentage of people employed has almost doubled; it cannot double again. A half-educated work force has been replaced by one in which the bulk of workers has high school diplomas; it is unlikely that a generation from now most Singaporeans will have Ph.D's. And an investment share of 40 percent is amazingly high by any standard; a share of 7O percent would be ridiculous. So one can immediately conclude that Singapore is unlikely to achieve future growth rates comparable to those of the past.

But it is only when one actually does the quantitative accounting that the astonishing result emerges: all of Singapore's growth can be explained by increases in measured inputs. There is no sign at all of increased efficiency. In this sense, the growth of Lee Kuan Yew's Singapore is an economic twin of the growth of Stalin's Soviet Union growth achieved purely through mobilization of resources. Of course, Singapore today is far more prosperous than the U.S.S.R. ever was--even at its peak in the Brezhnev years--because Singapore is closer to, though still below, the efficiency of Western economies. The point, however, is that Singapore's economy has always been relatively efficient; it just used to be starved of capital and educated workers.

Singapore's case is admittedly, the most extreme. Other rapidly growing East Asian economics have not increased their labor force participation as much, made such dramatic improvements in educational levels, or raised investment rates quite as far. Nonetheless, the basic conclusion is the same: there is startlingly little evidence of improvements in efficiency. Kim and Lau conclude of the four Asian "tigers" that "the hypothesis that there has been no technical progress during the postwar period cannot be rejected for the four East Asian newly industrialized countries." Young, more poetically, notes that once

one allows for their rapid growth of inputs, the productivity performance of the "Tigers" falls "from the heights of Olympus to the plains of Thessaly.

This conclusion runs so counter to conventional wisdom that it is extremely difficult for the economists who have reached it to get a hearing. As early as 1982 a Harvard graduate student, Yuan Tsao.) found little evidence of efficiency growth in her dissertation on Singapore, but her work was, as Young puts it, "ignored or dismissed as unbelievable." When Kim and Lau presented their work at a 1992 conference in Taipei, it received a more respectful hearing, but had little immediate impact But when Young tried to make the case for input-driven Asian growth at the 1993 meetings of the European Economic Association, he was met with a stone wall of disbelief.

In Young's most recent paper there is an evident tone of exasperation with this insistence on clinging to the conventional wisdom in the teeth of the evidence. He titles the paper "The Tyranny of Numbers"--by which he means that you may not want to believe this, buster, but there's just no way around the data. He begins with an ironic introduction, written in a deadpan, Sergeant Friday, "Just the facts, ma'am" style: "This is a fairly boring and tedious paper, and is intentionally so. This paper provides no new interpretations of the East Asian experience to interest the historian, derives no new theoretical implications of the forces behind the East Asian growth process to motivate the theorist, and draws no new policy implications from the subtleties of East Asian government intervention to excite the policy activist. Instead, this paper concentrates its energies on providing a careful analysis of the historical patterns of output growth, factor accumulation, and productivity growth in the newly industrializing countries of East Asia."

Of course, he is being disingenuous. His conclusion undermines most of the conventional wisdom about the future role of Asian nations in the world economy and, as a consequence, in international politics. But readers will have noticed that the statistical analysis that puts such a different interpretation on Asian growth focuses on the "tigers," the relatively small countries to whom the name "newly industrializing countries" was first applied. But what about the large countries? What about Japan and China?

Sound Finance and Sustainable Development in Asia

Keynote Address to the Asia Development Forum
by
Joseph Stiglitz
Senior Vice President and Chief Economist
The World Bank

Manila, the Philippines, March 12, 1998

The Allocation of Investment and Productivity Growth

Although in traditional neoclassical economic model, investment and saving are determined independently, most empirical research has found that
most of an increase to saving gets translated into higher investment. East Asia is no different, and its high saving rates have been essential to
maintaining its high rate of capital accumulation, contributing strongly to its growth.

Research by Alwyn Young, Jong Il Kim and Lawrence Lau, and popularized by Paul Krugman, has argued that rapid capital accumulation is
actually all there is to the East Asian miracle. According to their estimates, total factor productivity growth, the additional output that cannot be
explained by increases in capital or labor, ranged from unremarkable in Korea to virtually nil in Singapore. In interpreting their results, however, it
is important to note that even in the extreme, and in my view, unlikely event that East Asia had no total factor

productivity growth, the region still would have demonstrated a remarkable ability both to maintain high saving rates and to allocate that capital to productive uses.

This latter point is particularly underappreciated. An aggregate production function is second nature to many of us trained in economics. Greater capital, all else being equal, will shift an economy along its production function, increasing output, albeit with diminishing returns. In reality, however, all else is not equal. In a world of perfect information, additional financing will go to the projects with the highest rates of return. In a world of imperfect information, incomplete risk markets, and transaction costs, however, the translation of saving into the best investment prospect is not automatic. The process of investing a large fraction of GDP can result in large costs of adjustment and misallocated investment. Indeed, we have seen many examples of countries that have had high rates of investment and negative total factor productivity growth. The fact that, even according to the most critical view, East Asia has managed to move along an unchanged production function is an accomplishment.

I do not believe, however, that East Asia has grown through investment alone. Any visitor to the cities and factories in East Asia comes away impressed by the enormous technological progress in the last decades. The Young, Kim, Lau, et al. results are simply not very robust. When a country is accumulating capital rapidly, small changes in the estimate of the capital share can result in a large shift in estimates of the contribution of total factor productivity. Estimating these shares is very problematic, especially in East Asia where the assumption of perfect competition in labor and product markets is inappropriate, at least in some economies. There are also problems in the measurement of human and physical capital.

Moreover, we must remember that technology is both the cause and the consequence of investment. Without improving technology, diminishing returns would have set in, and it is hard to believe that investment could have been sustained. These considerations make me reasonably confident that East Asia has seen impressive productivity growth in recent decades.

East Asia's productivity growth is the result of many factors, including an emphasis on factor accumulation, both of physical and human capital. But other policies have mattered as well, such as the promotion of social inclusion and the transfer of technology. These have been extensively analyzed in the World Bank's East Asian Miracle study and in a huge literature in recent years. Today, I would like to concentrate on the contribution of the financial system to growth. In the next section I will discuss general theoretical and empirical evidence on the relationship between finance and growth, introducing some concepts that I will return to in later parts of the lecture.

GROWTH ACCOUNTING NOTES ON EMPIRICAL ESTIMATES

(I) OECD COUNTRIES : HOWITT / AGHION

1960-2000 TABLE 5.1 SHOWS:

COUNTRY	"GROWTH RATE" $\hat{y}$	"TFP GROWTH" $\hat{B}$	"CAPITAL DEEP" $\alpha \hat{k}$	"TFP SHARE" $\frac{\hat{B}}{\hat{y}}$	"CAPITAL" SHARE $\frac{\alpha \hat{k}}{\hat{y}}$
US	1.89	1.09	0.80	0.58	0.42

$$\Rightarrow \quad \hat{y} = \hat{B} + \alpha \hat{k} \quad \Rightarrow \quad \frac{\hat{y}}{\hat{y}} = \frac{\hat{B}}{\hat{y}} + \frac{\alpha \hat{k}}{\hat{y}}$$

$$1.89 \quad 1.09 \quad 0.80 \qquad 1 \quad 0.58 \quad 0.42$$

(II) YOUNG : E. ASIAN GROWTH

TABLE I FOR HONGKONG 1966-1991

	N	D	N-1
GDP PC	$\hat{Y}$	$\hat{POP}$	$\hat{Y} - \hat{POP} = (\hat{Y/POP})$
	7.3	1.6	5.7

TABLE VI FOR SINGAPORE

TIME PERIOD / ECONOMY	OUTPUT $\hat{Y}$	RAW K $\hat{K}$	WEIGH. K	RAW LABOR $\hat{L}$	WEIGH. L	TFP $\hat{B}$	LABOR SHARE $1-\alpha$
66-90	0.087	0.108	0.115	0.045	0.057	0.002	0.509

(SIMILAR FOR TABLES IV, VII, VIII)

III YOUNG : TALE OF 2 CITIES (1992)

TIME PERIOD	GROWTH OF OUTPUT $\hat{Y}$	LABOR $\hat{L}$	CAPITAL $\hat{K}$	AV. CAPITAL SHARE	% CONTRIBUTION OF LABOR $\frac{(1-\alpha)\hat{L}}{\hat{Y}}$	CAPITAL $\frac{\alpha\hat{K}}{\hat{Y}}$	TFP $\frac{\hat{B}}{\hat{Y}}$
HONG KONG 61-66	0.577	0.130	0.694	0.393	0.14	0.47	0.39

ADDS TO 1

$$\Rightarrow \hat{B} = \hat{Y} - \alpha\hat{K} - (1-\alpha)\hat{L}$$

$$= 0.577 - \underbrace{0.393 \times 0.694}_{0.27} - \underbrace{(1-0.393)\,0.130}_{0.0789}$$

$$= 0.228$$

$$\Rightarrow \frac{\hat{B}}{\hat{Y}} = \frac{0.228}{0.577} = 0.39$$

6-4-10

SOLOW MODEL WITH HUMAN CAPITAL

(1) $Y = K^{\alpha} (A\, h\, L)^{1-\alpha}$

h = SKILL LEVEL
DEPENDS ON EDUCATION, ETC. = CONSTANT

$\hat{A} = g$, $\hat{L} = n$, α $\alpha < 1$

(2) $\dot{K} = sY - \delta K \Rightarrow \hat{K} = s\frac{Y}{K} - \delta$ (3)

ANALIZE THIS MODEL

Ⓘ LOOK AT BGP
Ⓘ COMP. STATICS.

Ⓘ BGP $\Rightarrow \hat{Y}$, $\hat{K}$, & CONSTANT

TAKING GROWTH RATES OF (1)

$$\hat{Y} = \alpha\hat{K} + (1-\alpha)\underbrace{\hat{A}}_{g} + (1-\alpha)\underbrace{\hat{h}}_{0} + (1-\alpha)\underbrace{\hat{L}}_{n}$$

(4) $\hat{Y} = \alpha\hat{K} + (1-\alpha)(g+n)$

USING (3) : $\hat{Y} = \hat{K}$ (5)

$\Rightarrow$ (4) & (5) $\Rightarrow$ $\hat{Y} = \alpha\hat{Y} + (1-\alpha)(g+n)$

$\Rightarrow \hat{Y}(1-\alpha) = (1-\alpha)(g+n)$

$\boxed{\hat{Y} = g + n}$ ALONG BGP

$\Rightarrow \frac{Y}{A.L}$ CONSTANT AND ALSO

$\frac{Y}{A.h.L}$ CONSTANT

CLAIM: MODIFIED SYSTEM WILL BE IN VARIABLES:

$\frac{Y}{AhL}$ $\frac{K}{AhL}$, ... SO ON

MODIFIED SYSTEM

$$Y = K^{\alpha} (AhL)^{1-\alpha}$$

DIV. BOTH SIDES BY AhL

$$\frac{Y}{AhL} = \frac{K^{\alpha}}{(AhL)^{\alpha}} \frac{(AhL)^{1-\alpha}}{(AhL)^{1-\alpha}}$$

(10) $\boxed{\tilde{\tilde{y}} = \tilde{\tilde{k}}^{\alpha}}$

WHAT IS LAW OF MOTION OF $\tilde{\tilde{k}}$?

$$\hat{\tilde{\tilde{k}}} = \hat{K} - \hat{A} - \underbrace{\hat{h}}_{0} - \hat{L} = \hat{k} - g - n$$

USING (3)

$$\hat{\tilde{k}} = s\frac{Y}{K} - \delta - g - n =$$

$$= s\frac{Y/AhL}{K/AhL} - (\delta+g+n)$$

$$= s\frac{\tilde{y}}{\tilde{k}} - (\delta+g+n)$$

USING (10)

$$= s\frac{\tilde{k}^{\alpha}}{\tilde{k}} - (\delta+g+n)$$

(12) $$\hat{\tilde{k}} = s\,\tilde{k}^{\alpha-1} - (\delta+g+n)$$ HOLDS ALWAYS

(13) $$\dot{\tilde{k}} = \hat{\tilde{k}}\cdot\tilde{k} = s\tilde{k}^{\alpha} - (\delta+g+n)\tilde{k}$$

AT BGP : $\tilde{k}$ CONSTANT $\Rightarrow$

$$\hat{\tilde{y}} = \hat{\tilde{k}} \Rightarrow \hat{\tilde{k}} = \hat{\tilde{y}} = 0$$

$$\hat{\tilde{y}} = \alpha\,\hat{\tilde{k}}$$

THE MODIFIED SYSTEM HAS A S.S!

WE WILL COMPUTE $\tilde{\tilde{y}}^*$ (S.S. LEVEL)

i.e. $\frac{Y}{AhL}$ IS CONSTANT AT THE S.S.

AT S.S.

$$\dot{\tilde{\tilde{k}}} = 0$$

USING (12):

$$\dot{\tilde{\tilde{k}}} = 0 = s\tilde{\tilde{k}}^{\alpha-1} - (\delta+g+n)$$

$$\Rightarrow s\tilde{\tilde{k}}^{\alpha-1} = \delta+g+n$$

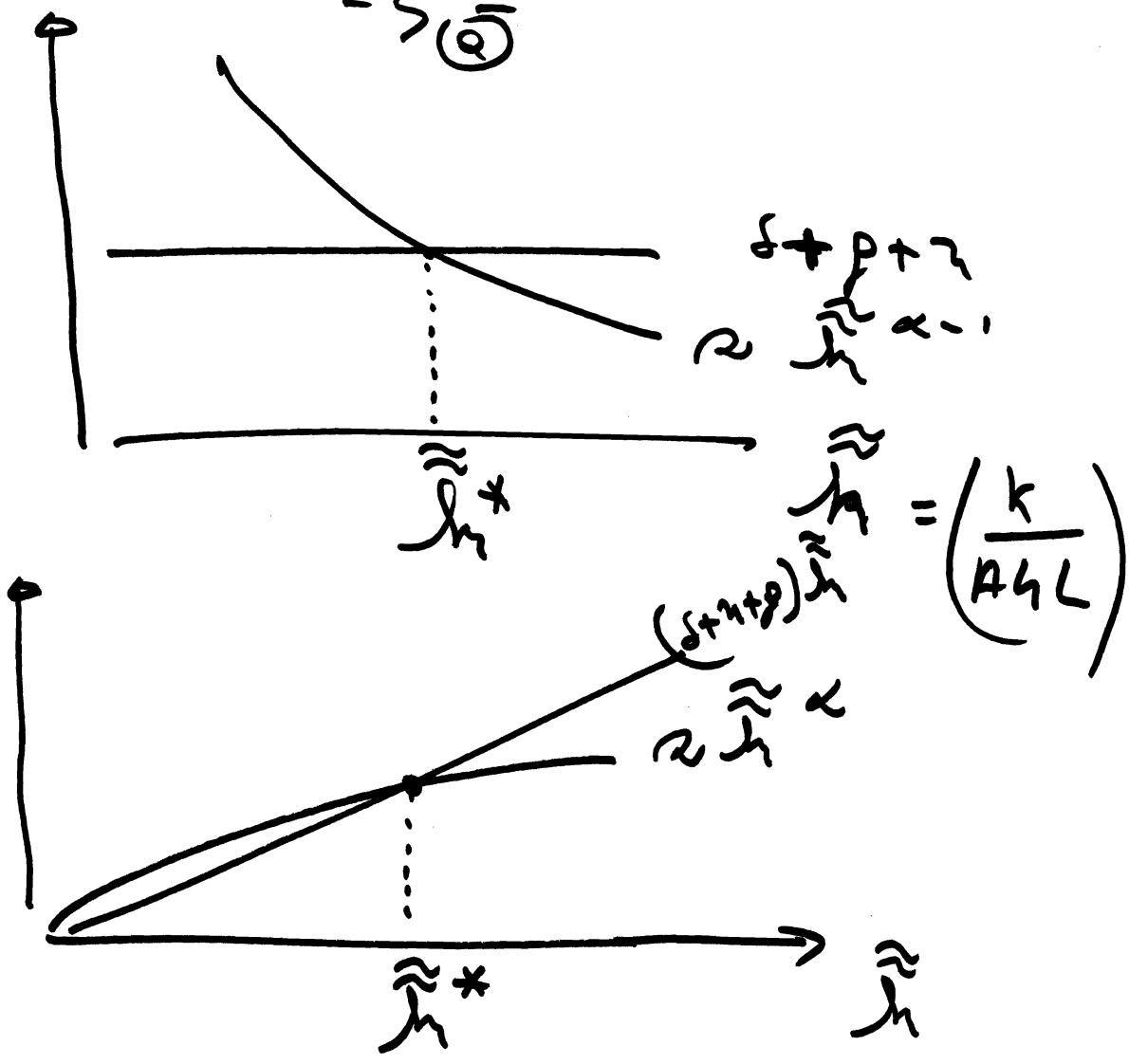
$$\frac{s}{\delta+g+n} = \tilde{\tilde{k}}^{1-\alpha}$$

$$(14) \quad \boxed{\tilde{\tilde{k}}^* = \left(\frac{s}{\delta+g+n}\right)^{\frac{1}{1-\alpha}}}$$

$$(15) \quad \boxed{\tilde{\tilde{y}}^* = \tilde{\tilde{k}}^{*\alpha} = \left[\frac{s}{\delta+g+n}\right]^{\frac{\alpha}{1-\alpha}}}$$

SINCE $\tilde{\tilde{y}} = \frac{Y}{AhL} = \frac{y}{Ah} \Rightarrow y = \tilde{\tilde{y}} \cdot A \cdot h$.

(16) ALONG BGP: $\boxed{y_t^* = \left[\frac{s}{\delta+g+n}\right]^{\frac{\alpha}{1-\alpha}} \cdot h \cdot A_t}$


δ+ρ+η
$\tilde{k}^{\alpha-1}$
$\tilde{k}^*$
$\tilde{k} = \left(\frac{k}{AqL}\right)$
$(\delta+\eta+\rho)\tilde{k}$
$\tilde{k}^{\alpha}$
$\tilde{k}^*$
$\tilde{k}$

CONCLUSIONS

BASED ON THE FOLLOWING:

(1) → ALONG BGP

$$\hat{Y} = \hat{K} = g + n \quad \text{OR}$$

$$\hat{y} = \left(\frac{\hat{Y}}{L}\right) = g$$

OUTPUT PER WORKER GROWS AT RATE OF TECH. CHANGE

(2) ALONG BGP

$$(16) \quad y^*_t = \left(\frac{s}{\delta + g + n}\right)^{\frac{\alpha}{1-\alpha}} \cdot h \cdot A_t$$

LEVEL OF OUTPUT PER WORKER PATH DEPENDS ON SKILL LEVEL OF THE LABOR FORCE / LEVEL OF HUMAN CAPITAL.

IMPLICATIONS FOR INCOME P.C. DIFFERENCES ACROSS COUNTRIES.

ALONG BGP. WE COMPARE 2 COUNTRIES : 1, 2.

$$\frac{y^*_{1t}}{y^*_{2t}} = \frac{\left(\frac{s_1}{\delta + g_1 + n_1}\right)^{\frac{\alpha_1}{1-\alpha_1}} h_1}{\left(\frac{s_2}{\delta + g_2 + n_2}\right)^{\frac{\alpha_2}{1-\alpha_2}} h_2} \cdot \frac{A_{1t}}{A_{2t}}$$

$$\frac{y^*_{1t}}{y^*_{2t}} = \frac{\alpha_1^{\frac{\alpha_1}{1-\alpha_1}}}{\alpha_2^{\alpha_2/1-\alpha_2}} \left(\right) \frac{h_1}{h_2} \cdot \frac{A_{1t}}{A_{2t}}$$

QUESTION: WHAT WILL HAPPEN IF $g_1 > g_2$?

THEN $\frac{y^*_{1t}}{y^*_{2t}} \longrightarrow \infty$

IN GENERAL WE ASSUME THAT g IS THE SAME ACROSS COUNTRIES.

EVEN IF g IS THE SAME FOR ALL COUNTRIES, THE LEVEL OF THE PATH AT BGP WILL BE $\neq$ IF THE α'S ARE $\neq$ AND THE h'S ARE DIFFERENT REGARDING GROWTH RATES THE MODEL IMPLIES THAT COUNTRIES WILL EXPERIENCE HIGHER GDP pc GROWTH, THE FURTHER BELOW THEY ARE FROM THEIR BGP. IF WE OBSERVE THIS IN THE DATA WE SAY THAT

"CONDITIONAL CONVERGENCY" HOLDS.

Book : h = FUNCTION OF AMOUNT OF TIME SPENT & ACCUMULATING SKILLS

(h = LEVEL OR SKILL)

= FUNCTION OF HOW MUCH TIME PEOPLE HAVE SPENT AT SCHOOL

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