



PACIFIC
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PACIFIC ECONOMIC OUTLOOK



Structure Task Force

Infrastructure Development in the Pacific Region

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PACIFIC
ECONOMIC
OUTLOOK



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Infrastructure Development in the Pacific Region

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PREFACE

This report on “*Infrastructure Development in the Pacific Region*” is the 9th report in a series of studies conducted by the Pacific Economic Outlook (PEO) Structure Task Force.¹ PEO/Structure is one of the task forces under the Pacific Economic Cooperation Council (PECC) and deals with longer-term structural issues of macroeconomics in the Pacific region.

The purpose of this report is to draw possible implications for potential prioritization for itemized infrastructures in a broader set of alternative providers of these infrastructures and alternative policy incentive measures to support appropriate provisions of these infrastructures.

So far, the infrastructure-growth nexus has been more or less accepted. For example, the downward trend in US productivity growth since the 1970s, i.e. the *productivity puzzle*, raised the question of the shortfall of infrastructure as its cause. The rapid industrial growth in East Asia since the 1980s, i.e. the East Asian Miracle, raised the worry about possible underprovision of infrastructure as the bottleneck of sustained economic growth in the 21st century.

Meanwhile, accelerated technological progress has changed the meaning of infrastructure and its implication for economic growth significantly. In the past experiences, we have witnessed that the composition of infrastructure tends to change with income levels. The shares of power, roads and telecommunications in the total infrastructure increase, while those of such basic ones as water and irrigation decrease. In addition to these physical infrastructures, non-physical ones such as human and knowledge-based capital have become more important as a driving force of new industrialization based on information and telecommunication technologies.

Furthermore, not only the components of infrastructure shift weights from physical to knowledge-based ones, but providers of infrastructure shift weights from public to private sectors. Indeed, past investment in infrastructure has often failed to generate the quantity or quality of necessary infrastructure services. Privatization of infrastructure sectors can be the key to improve the performance through commercial management, competition and participation as advocated in World Bank, 1994. Also, public-private partnership in infrastructure financing can bring potential benefits.

¹ The previous studies published were The Emerging Role of the Private Sector in the Asia Pacific Region (1991); Changing Patterns of Foreign Direct Investment in the Pacific Region (1992); Changing Patterns of Trade in Goods and Services in the Pacific Region (1994); Capital Flows in the Pacific Region: Past Trends and Future Prospects (1995); Exchange Rate Fluctuations and Macroeconomic Management (1997); Domestic Savings in the Pacific Region: Trends and Prospects (1998); Productivity Growth and Industrial Structure in the Pacific Region (2000) and Fiscal Policy Issues in the Pacific Region (2001).

What, then, will be the role of government in the provision of old and new infrastructure? What's going on in the Pacific region? Perceiving the enormous differences in developmental stages, we should like to sort out learnable historical lessons due to development stages and an unprecedented pace of changing agendas due to accelerated technological progresses among our experiences in the region.

In the end, we will come up with the following points at issue:

Except for the United States, infrastructure development has been historically driven by the public sector. Since as early as the late 1970s, however, both technological innovations and changing policy thinking enabled the private sector to play more important roles in infrastructure provisions. Consequently, there appears the declining trend of public investment as a ratio to GDP among advanced economies. Declining public investment shares do not necessarily imply declining infrastructure development, however. Although we cannot claim high estimated rates of return on public investment as definite, there seems no significant decline in the rates of return, except for Japan.

In 1996, the World Bank estimated infrastructure needs in East Asia over the next decade as large as 1.5 trillion U.S. dollars to sustain the current pace of economic growth. The report emphasized the important role of foreign private capital for the infrastructure needs and, in fact, private foreign investments flew in the infrastructure sectors. The Asian economic crisis, however, almost killed the early accomplishments. In Malaysia, they had appeared to be successful in privatizing infrastructure sectors without the formal creation of a comprehensive regulatory framework. Similar problems can be found in New Zealand. In contrast to those blanket privatization efforts, Singapore has been very gradual toward privatization. As these experiences suggest, privatization is not a purpose

itself, but a means to motivate entrepreneurship and innovation.

Emerging markets in East Asia kept devoting huge amounts of resources on infrastructure investment in the past decades. As a consequence, they were successful in narrowing gaps with advanced economies in terms of the levels of per capita infrastructure capital stock. A notable thing is, first, in all the emerging markets, the government or the public sector played a leading role in the process. Second, these emerging markets are deliberately changing their course toward more coordination with the private sector initiatives in infrastructure development and other fields. Third, not only the emerging markets, but also other developed and developing economies have become more and more aware of the increasing importance of invisible, non-physical, soft infrastructure, which has a public-good nature and would make a fundamental factor input complementary to physical capital.

This report is a summary² of studies conducted by the PEO/Structure Task Force under the coordination of Dr. Akira Kohsaka.³ The first part of the report provides an overview, prepared by Dr. Kohsaka, of the infrastructure issues in the Pacific region as a whole. The second part consists of executive summary reports of individual countries/regions submitted by specialists from each PECC member economy.

The PEO/Structure Task Force held two International Specialists Meetings in March 2002 and September 2002 in Osaka, Japan. These meetings were hosted by Japan Committee for Pacific Economic Outlook which has been housed in and staffed by the Kansai Institute for Social and Economic Research (KISER).⁴ The Committee has been sponsored by the Ministry of Foreign Affairs of Japan and also by the regional business communities, the relevant organizations of which are the Pacific Resource Exchange Center (PREX) and the

² The PEO/Structure Task Force will publish three volumes in 2003. The first volume is a summary (this report), the second volume consists of background papers which are full reports of individual countries/regions, and the third volume is the Japanese translation of the overview.

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Ambassador Yukio Sato, Chairman of the Japan National Committee for PECC (JANCPEC), serves as Chairman of the Japan Committee for Pacific Economic Outlook. Mr. Tomoyuki Suga, Deputy Executive Director and Ms. Machiko Fujita, Program Officer coordinated the management of the PEO/Structure Task Force. Dr. Janis Kea supported the PEO/Structure Task Force by editing and checking the papers.

The PEO/Structure Task Force presents its reports to the meetings of PECC and the Asia Pacific Economic Cooperation (APEC), forums of government officials and individuals in business, government and academic sectors who are interested in economic issues of the Asia-Pacific region.

For more information on the PEO/Structure Task Force, contact the secretariat at the Japan Committee for Pacific Economic Outlook.

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⁴ The Kansai Institute for Social and Economic Research (KISER) is a nonprofit organization in Kansai (the region centered in Osaka, Kobe and Kyoto) that has its objectives in contributing to the development of the national and regional economies through academic advances. KISER promotes research projects through the collaboration of academia and local business community under governmental cooperation. For more details, see the information provided in the bottom part of this volume.

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OVERVIEW

OVERVIEW: INFRASTRUCTURE DEVELOPMENT IN THE PACIFIC REGION

BY AKIRA KOHSAKA*

1. INTRODUCTION

While infrastructure development has been believed to be a foundation of long-term growth in both advanced and developing economies, solid evidence for this correlation has never been easy to prove mainly because of measurement problems and lack of available data. In reality, however, investments in infrastructure often times failed to generate the quantity or the quality of necessary services. These are the reasons why more private sector involvement, more competition and greater stakeholder participation in the provision of infrastructure have been advocated (World Bank 1994).

Meanwhile, infrastructure development in East Asia was vigorously led and pushed by government and government-affiliated institutions in past decades. The public sector managed almost all of the planning, operating and financing of infrastructure. Their achievements have been quite impressive in and of themselves as well as in terms of overall economic growth and social development. Even East Asia has been in transition toward private provision of infrastructure since the 1990s. Their privatization processes, however, have been so gradual with the governments retaining control that it is not certain whether they could have in fact improved on efficient and effective provision of services (Mody 1997).

Upon reviewing the experiences of infrastructure development in the region, we would like to draw possible implications for potential prioritization for

itemized infrastructure in a broader set of alternative providers of the infrastructure and alternative policy incentive measures to support appropriate provision of the infrastructure. Without doubt, we will face measurement problems and limitations of data availability. Yet we will try to provide a framework for assessment as well as databases necessary for this effort as best as we can.

Furthermore, we would like to discuss the possible roles of infrastructure development in a broader sense, i.e., not only the visible but also the invisible infrastructure. This broader assessment is because, at the outset of the New Economy, it will be worthwhile to reexamine the role of infrastructure in economic growth and its implication for policy management in this dynamic Pacific region.

More generally, accelerated technological progress is going to change the meaning of infrastructure and its implication for economic growth significantly. Components of infrastructure are shifting from physical to knowledge-based ones. Providers of infrastructure are also shifting from the public to the private sector. The Pacific region is well known to be leading this trend. Perceiving the enormous differences in developmental stages among the economies in the region, however, we should like to sort out learnable historical lessons due to development stages and the unprecedented pace of changing agendas due to accelerated technological progress from our experiences in the region.

* Coordinator, PEO/Structure Project

Because of the diverse stages of development of the economies in the region, the needs for infrastructure development will inevitably vary across the economies, from conventional hard physical infrastructure to more knowledge-based soft infrastructure. On the other hand, because of its dynamism, the region has tried to and has actually attracted a huge amount of foreign capital, which has not only accelerated infrastructure development, but also encouraged technology transfer. Partly due to technological progress, the scope of infrastructure is no longer limited to the public sector, and appropriate division of labor between the public and private sectors must be pursued.

As such, infrastructure needs depend not only on the stage of development, but on ongoing technological progress. Accordingly, prioritization of itemized infrastructure may not be as easy as simply following the past experiences of advanced economies. This is also the case for addressing the question of who should provide specific infrastructure—i.e., the private or the public sector—and to what extent. Alternatively, the public sector may better devise or improve incentive schemes for the private sector in order to provide adequate infrastructure.

2. WHY INFRASTRUCTURE NOW?

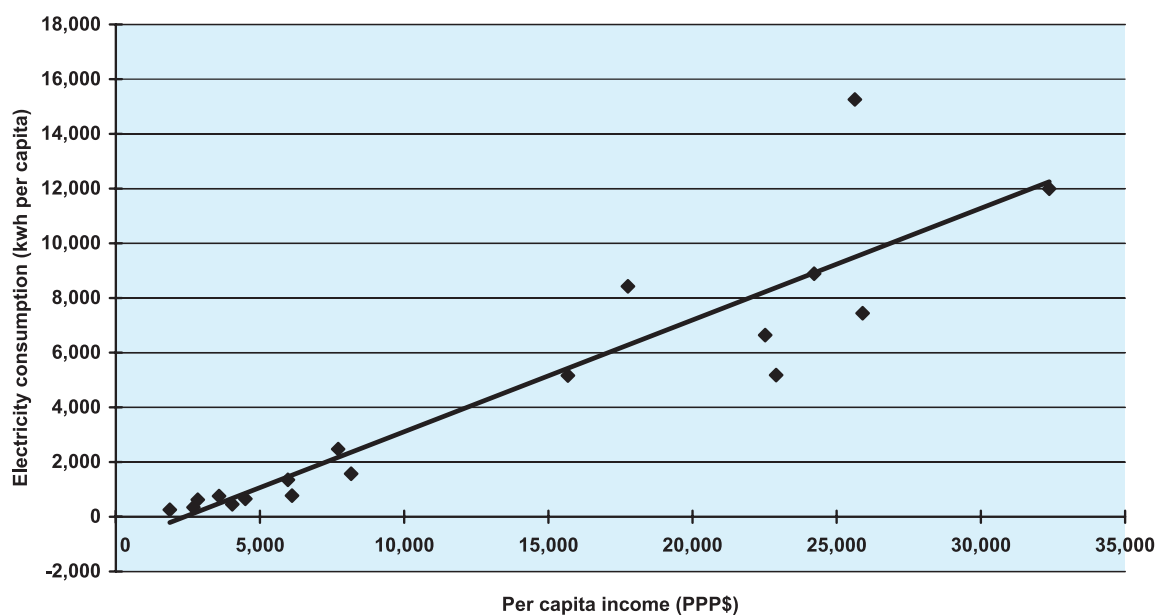
2.1 What is infrastructure?

Conventionally, infrastructure is an umbrella term for many activities referred to as “social overhead capital,” which encompass activities with such technical features as economies of scale and such economic features as spillovers from users to non-users. More concretely, public utilities (i.e., power, telecommunications, piped water supply, sanitation and sewerage, solid waste collection and disposal, and piped gas supply), public works (i.e., roads and major dam and canal works for irrigation and drainage), and other transport sectors (i.e., urban and interurban railways, urban transport, ports and waterways, and airports) are included as infrastructure (World Bank 1994: Box 1, p. 2).

2.2 Infrastructure and growth

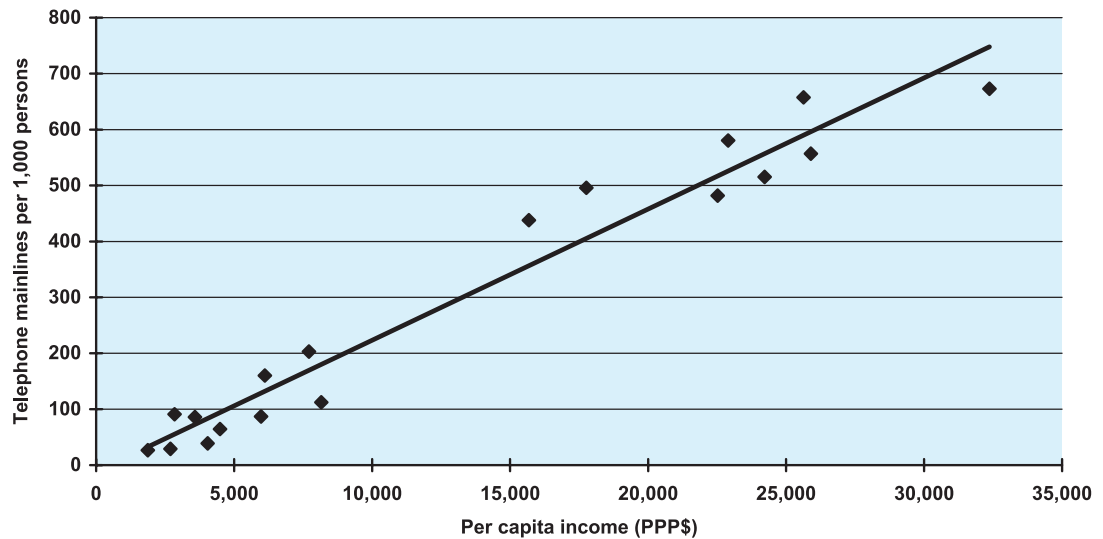
While the exact linkage between infrastructure and economic growth is not clear, infrastructure has been regarded as a fundamental for modern economic growth. As a matter of fact, we have witnessed a strong positive correlation between infrastructure and economic development. This holds true in the Pacific region in such conventional infrastructure such as electricity and telephone mainlines (Figures 1 and 2).

Figure 1. Electricity Consumption and Income Levels in the Pacific Region, 1999



Source: World Bank (2002).

Figure 2. Telephone Mainlines and Income Levels in the Pacific Region, 1999



Source: World Bank (2002).

2.3 Why infrastructure now?

So far, the infrastructure-growth nexus has been more or less accepted. For example, the downward trend in U.S. productivity growth since the 1970s, i.e., the productivity puzzle, raised the question of the shortfall of infrastructure as its cause (Aschauer 1989b; Holz-Eakin 1994). The rapid industrial growth in East Asia since the 1980s, i.e., the East Asian miracle, raised the concern about possible underprovision of infrastructure as a bottleneck for sustained economic growth in the 21st century (World Bank 1996). In the former case, literature on the growth effect of infrastructure development has grown not only in the United States, but in the OECD economies as well (Aschauer 1989b). In the latter case, a variety of private financing methods was pursued and implemented to fulfill resource gaps.

Meanwhile, accelerated technological progress has significantly changed the meaning of infrastructure and its implication for economic growth. In past experiences, we have witnessed that the composition of infrastructure tends to change with income levels. Power, roads and telecommunications as shares of total infrastructure have increased, while those of such basic infrastructure such as water and irrigation have declined (World Bank 1994: Figure

2, p. 4). In addition to physical infrastructure, non-physical infrastructure such as human- and knowledge-based capital have become more important as the driving force of new industrialization that is based on information and telecommunication technologies (UNIDO 2002).

Furthermore, not only do the components of infrastructure shift from physical to knowledge-based ones, but the providers of infrastructure have shifted from the public to the private sector. Indeed, past investment in infrastructure has often failed to generate the quantity or quality of necessary infrastructure services. Privatization of infrastructure sectors can be key to improving performance through commercial management, competition and participation as advocated in World Bank (1994). In addition, a public-private partnership in infrastructure financing can bring potential benefits.

What then will be the role of government in the provision of old and new infrastructure? What is going on in the Pacific region? Perceiving the enormous differences in the stages of development, we would like to sort out learnable historical lessons due to development stages and the unprecedented pace of changing agendas due to accelerated technological progresses among our experiences

in the region.

3. INSTITUTIONAL ASPECTS OF THE PROVISION OF INFRASTRUCTURE

3.1 Variety of characteristics and technologies

Some technological and economic characteristics distinguish infrastructure from other goods and services. One specific feature in infrastructure production has been regarded as the economy of scale and the network of delivery. Necessary large-scale investment in infrastructure constitutes huge sunk costs that prevent private firms from providing adequate levels of services. Such characteristics as a natural monopoly are not necessarily technologically inevitable, however, so that those sectors can be contestable with new entries and can be unbundled

across production stages as in the recent cases of power generation and telecommunications.

Specific features of infrastructure consumption include those of public goods, i.e., nonrivalrous in consumption (that is, one user's consumption does not prevent others from consuming) and non-excludability (exclusion of nonpaying users is too costly). In fact, however, many infrastructure services are almost private goods that can be better produced by the private sector. More generally, infrastructure services are not only different from other goods and services but they are also different among themselves as shown in Table 1.

3.2 Institutional function/form

Table 1. Characteristics and Technologies Across Infrastructure Sectors

Rivalry	Excludability / externality			
	Low ←			→ High
High ↑	Telecommunications	Urban transport	Power generation	Urban roads
	Power distribution	Railways, Air/sea transport		
		Power transmission	Piped water	
			Urban sewerage	
		Rails/air/sea ports		
Low ↓	Highways			Rural roads

Source: World Bank (1994: Figure 1.3, p.25).

Table 2. Institutional Functions and Forms

Forms	Functions			
	Ownership	Management	Financing	Operation
Government department	public	public	public	public
Public enterprise				
traditional	public	public	public	public
corporatized	public	public	public/private	public
service contract	public	public	public/private	private
management contract	public	private	public/private	private
Contract-out				
leasing contract	public	private	private	private
concession contract	public	private	private	private
Private enterprise	private	private	private	private

Source: Adapted from World Bank, *World Development Report*, 1994, Table 6.1, p.110.

Table 2 shows four institutional forms of infrastructure provision over five functions. The institutional forms include government department, public enterprise, contracting-out and private enterprise, and the functions consist of ownership, management, financing, operation and revenue collection. Each form has its own advantages/disadvantages with regard to each function and this also depends on the context of each individual economy.

3.3 Feasibility of privatization

Feasibility for privatization of infrastructure provision can be assessed by such characteristics as potential for competition, characteristics of services, potential of cost recovery and equity concerns. Table 3 (adapted from World Bank 1994) suggests the following: some activities such as long-distance telecommunications, piped gas, urban bus services, or solid waste collection can be privatized without too much difficulty; power transmission and piped sewerage have characteristics of a regional monopoly, but can be commercially provided; in contrast, rural roads are public goods and can hardly be commercially provided.

Table 3. Feasibility of Privatization

Infrastructure sector	Competition	Characteristics of services	Cost recovery	Equity concerns
Telecommunications				
Local	Medium	Private	High	Medium
Long distance	High	Private	High	Few
Electricity				
Generation	High	Private	High	Few
Transmission	Low	Medium	High	Few
Distribution	Medium	Private	High	Many
Gas	High	Private	High	Few
Transport				
Railbeds	Low	Medium	High	Medium
Rail	High	Private	High	Medium
Urban bus	High	Private	High	Many
Urban rail	High	Private	Medium	Medium
Rural roads	Low	Low	Low	Many
Primary roads	Medium	Medium	Medium	Few
Urban roads	Low	Medium	Medium	Few
Water ports	Low	Private	High	Few
Airports	Low	Private	High	Few
Water	Medium	Private	High	Many
Sanitation	Low	Medium	Medium	Few
Waste	High	Private	Medium	Few
Irrigation	Low	Medium	Low	Medium

Source: World Bank (1994: Table 6.3, p.115).

3.4 Status in the Pacific Region

Now let us look at the current situation in the Pacific region with respect to forms of providers and operators in provision of infrastructure. Though preliminary, Table 4 shows the current situation of privatization in the provision of infrastructure across sectors, including telecommunications, electricity, railways, road, ports, piped water and sewerage in reporting economies in the region. For the industrial economies, all had completed

privatization in the telecommunication, electricity, and nationwide railways sectors by the mid-1990s. Emerging economies, however, except for Hong Kong, have generally relied on government enterprises in these sectors. Except for highways, roads are mostly operated by the public sector. Next, we will overview the background of the above current situation, i.e., the brief histories of infrastructure development in these reporting economies.

Table 4. Providers and Operators of Infrastructure in the Pacific Region: Corporatization and Privatization^a

Sector	Telecommunication	Power	Transport				Water	Sewerage
			Airline	Railway	Road	Port		
Australia	P	P	P	G/P	G	P	G	G
Canada	GC	GC	GC	P	GC	GC	G	G
Japan	P(84)	P	P	P	G	G	GC	G
New Zealand	P(90)	GC/P(90)	P(89)	P(93)	G	GC(88-90)	G	G
United States	P	P	P	P	G/P	G		
Hong Kong, China	P	P	P	GC	G	P	G	G
Korea	G>P	GC	P	G	G	G	G	G
Singapore	GC(94)	GC(95)	P	P	G	GC(97)/G	G	G
China	GC(99)	GC(96)	G/P?	G	G	G	G	G
Malaysia	GC(90)/P(93)	GC(90)	P	GC(92)	G/P	G/P	P	P
Philippines	P(93)	GC	P	GC	G	G	P(98)	

Note: G = Government agency (central/federal/local, statutory), GC = government corporation, P = private corporation.

Figures in parentheses refer to year of ownership change.

a. Preliminary

4. BRIEF HISTORY OF INFRASTRUCTURE DEVELOPMENT

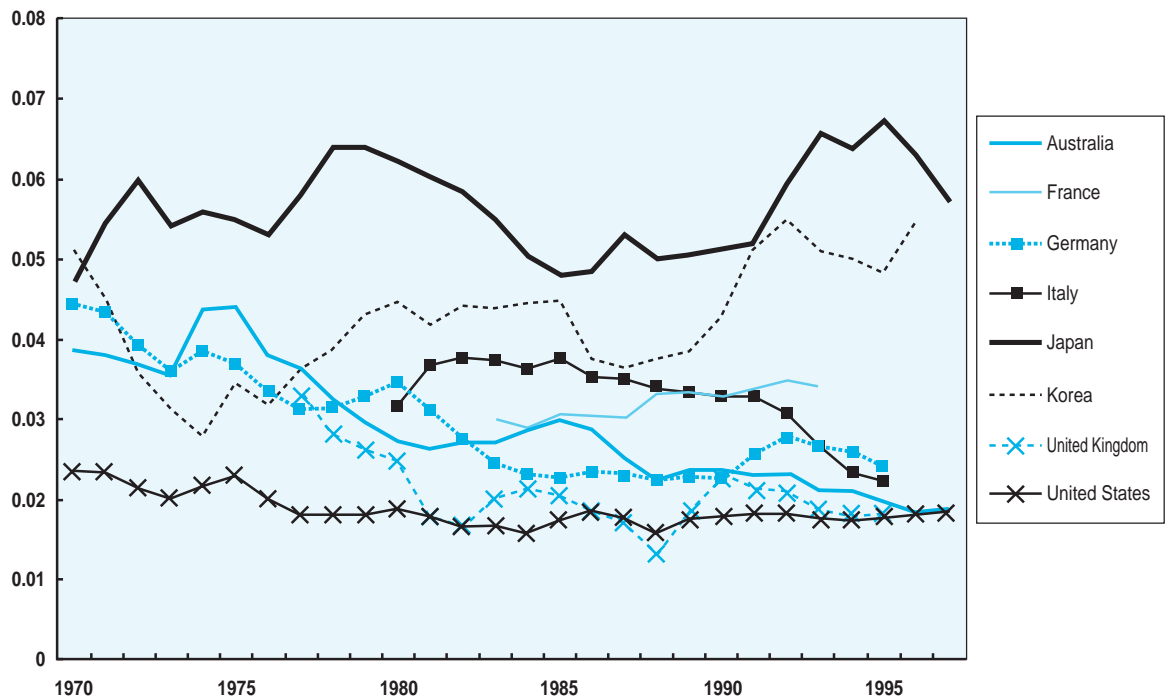
As part of the deregulation trend in the 1980s, Australia, Japan and New Zealand more or less privatized some infrastructure sectors that had been heavily regulated by the government. The deregulation was more rapid and comprehensive in Australia and New Zealand than in Japan. One reason for this is, at that time, Australia and New Zealand were faced with more serious fiscal imbalances and needed more radical retrenchment of public sector involvement than did Japan. Australia corporatized and privatized power plants, air/sea ports, freight railways, gas, etc., and significantly reduced public investment. In New Zealand, faced with increased public debt through heavy public involvement until the early 1980s, overall deregulation and privatization began in telecommunications, postal services, power, ports, railway and other transportation in 1984.

In the case of Japan, the national railway and telecommunication sectors were privatized in the mid-1980s, but deregulation has been very gradual

as it has in electricity generation and postal services (which were eventually corporatized in June 2003), and public investment was literally increased at least until the mid-1990s (Figure 3). While public investment was intended as an instrument for macroeconomic stimulation, it turned out to worsen microeconomic efficiencies as well as fiscal balances in the 1990s (Kohsaka 2001).

The United States is rather unique in infrastructure development in that the private sector has long played a far more important role than in other countries. Historically, during the 1930s and the Great Depression, almost all infrastructure sectors came under regulation. Under a social compact, the service providers were given exclusive rights to specific markets and the government, in turn, monitored and regulated their activities. The deregulation trend began in the late 1970s, and the share of fully regulated industries was reported as having declined from 17 percent of GNP in 1977 to 7 percent in 1988, with most of the transportation, telecommunications, energy and financial sectors

Figure 3. Ratio of Public Investment to GDP



Source: OECD National Accounts

freed of regulation (World Bank 1994: Box 3.2, p. 57).

While there is some evidence that points to substantial gains from deregulation, public infrastructure and/or public investment showed a secular declining trend since the 1960s in the United States (Figure 3). This trend has been identified as a cause for the observed slowdown in productivity growth, especially in the 1960s and 1970s. As opposed to other economies, in the U.S., public investment has not been used as a means of stabilization policy.

Emerging markets in East Asia, i.e., Hong Kong, Korea, Singapore and Chinese Taipei, have shown vigorous development in infrastructure in the past decades, where the government played a leading role. Even in Hong Kong, which has been regarded as a *laissez faire* regime, high-level infrastructure development in energy and transportation has been achieved through active public involvement. In these economies, we observe high levels of public involvement and public investment in infrastructure continues to be maintained.

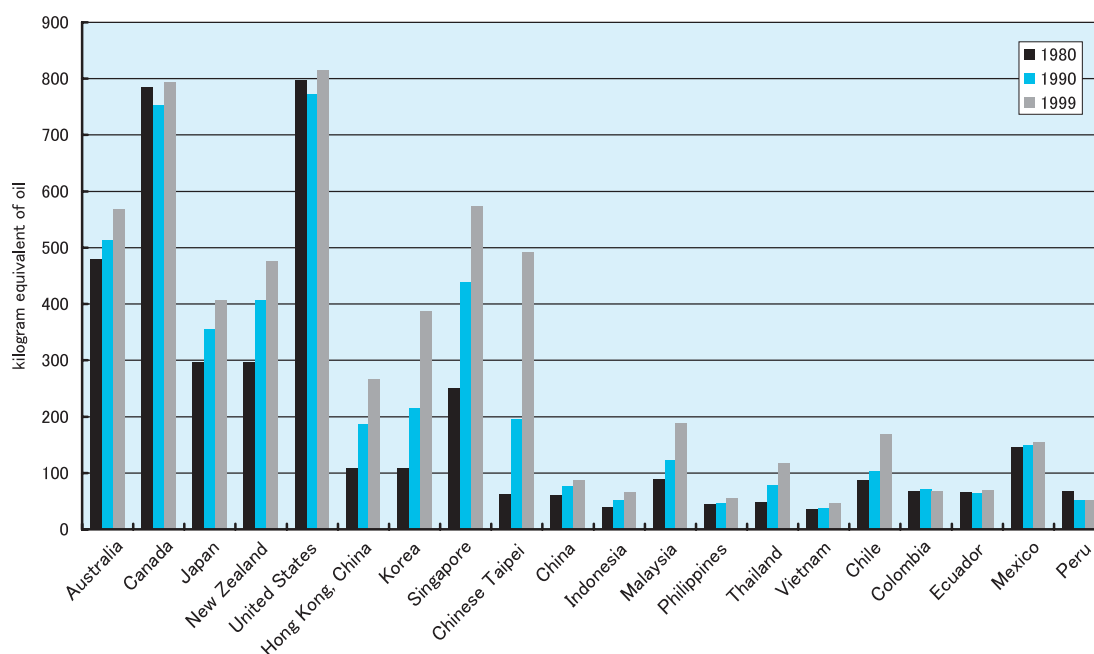
For instance, Figures 4 and 5 show two representa-

tive conventional infrastructure capital, i.e., energy and telephone mainlines. While the two types of infrastructure appear to have become almost saturated in the advanced economies, particularly the United States, they demonstrated vigorous growth in recent decades in the emerging markets of East Asia as compared to other developing economies.

In the last decade, however, partial and experimental deregulation can be found even in these emerging market economies. Hong Kong deregulated telecommunications, Korea has begun deregulation of the electricity industry, and Singapore has followed cautious privatization in telecommunications, electricity, railways and seaports in the mid-1990s.

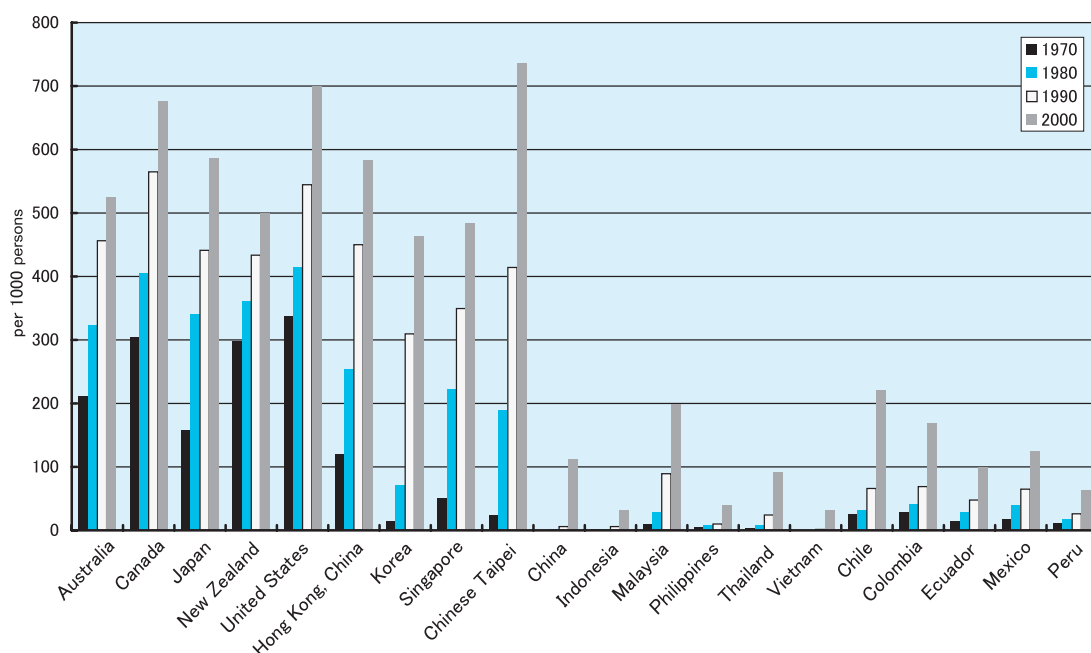
Malaysia took a deliberate initiative to switch its strategy from overall public involvement until the mid-1980s to overall privatization since 1983. The telecommunications, transportation, electricity, water and sewerage sectors were privatized, and private financing in other infrastructure activities was pursued. Figures 4 and 5 show that Malaysia has achieved remarkable infrastructure development, following the trend of the emerging markets

Figure 4. Commercial Energy Use per Capita in the Pacific Region



Source: World Bank (2002). For Chinese Taipei, various national sources.

Figure 5. Telephone Mainlines in the Pacific Region



Source: World Bank (2002). For Chinese Taipei, various national sources.

in the region.

Remarkable high economic growth in China since the 1980s has sometimes exposed its lagging infrastructure development, particularly in the energy and transportation sectors (Figure 4). China started serious efforts in infrastructure development in the 1990s including corporatization and deregulation. These efforts have been implemented both for long-term development and short-term stabilization purposes.

In contrast to China, underdevelopment in infrastructure in the Philippines can be seen as both the result of unfavorable short-run macroeconomic stabilization and the cause of stagnant long-run economic growth. Although deregulation in electricity and privatization in telecommunications were initiated in the 1990s, the after-shock of the Asian economic crisis appear to have backlashed these efforts. As a result, the Philippines' achievements in conventional infrastructure are less remarkable, particularly in comparison with East Asia (Figures 4 and 5).

4. PRODUCTIVITY EFFECTS OF INFRASTRUCTURE INVESTMENT 4.1 Incredibly high rates of return?

As noted in the Introduction, there is a strong positive correlation between output growth and infrastructure investment. More specifically, empirical studies on the return on infrastructure investment (usually proxied by public investment) are known to suggest incredibly high rates of return such as 60 percent as implied by Table 5. The usual suspects behind these incredibly high rates are (i) missing explanatory variables and (ii) simultaneity. We may have missed common factors that cause increases in both output and infrastructure, which lead to overestimation of the coefficients. In addition, output growth may cause infrastructure development, which leads to biased estimates of coefficients. In fact, infrastructure investments were not always the driving forces for growth, but simply responses to bottlenecks due to rapid growth.

So far, we may be able to summarize that, as far as empirical studies are concerned, there seems to be no consensus on the magnitude or on the exact nature of the impact of infrastructure on output growth. Conceptually, however, it is evident that the role of infrastructure in growth is substantial,

significant and frequently greater than that of investment in other forms of capital. Then why is it that the findings vary so much from study to study? We should be modest enough to say that the past results are neither specific nor solid

enough to serve as the basis for designing policies for infrastructure investment (World Bank 1994: 15, Box 1.1).

4.2 PEO Estimates

Table 5. Estimates of Output Elasticity of Infrastructure Investment

Sample description	Elasticities	Author(s)	Infrastructure measure	Method
United States, aggregate	0.3–0.4	Aschauer (1989), Munnell (1990)	Nonmilitary public capital	Cobb and -Douglas
states/regions	0.04–0.20	Garcia-Milla and McGuire (1992), Eisner (1991), Munnell (1999b) and Dufey-Deno and Eberts (1989)	Public capital	
	0.0–0.2	Nadiri and Mamuneas (1994)		cost function
Mexico	0.05	Shah (1992)	Power, communication, transportation	
Sweden	0.69	Berndt and Hansson (1992)	Public capital	
Canada	0.5	Wylie (1996)	Public capital	translog
Australia, aggregate	0.0–0.3	Paul, Sahin and Bagala (2001)	Public capital	cost function
by sector	0.0–2.65	——— (2001)		
aggregate	0.38–0.45	Otto and Voss (1994)	Public capital	
Korea	0.19	Uchimura and Gao (1993)	Transportation, water, communication	

Table 6 sums up the estimated results of our PEO Structure Group for selected members in the Pacific region. Compared to Table 5, we see little difference between the results of the two tables. Estimated elasticities appear large enough to produce

incredibly high rates of return on infrastructure investment.

One may note that the estimated elasticities of aggregate or private outputs with respect to infrastructure investment tend to increase with the level

Table 6. PEO Estimates of Output Elasticity of Infrastructure Investment

Sample description	Elasticities	Author(s)	Infrastructure measure	Method
Australia, aggregate	0.9	Makin and Paul (2002)	Public capital	Cost function
by sector	0.4–1.5			
Hong Kong, China	0.9	Tang KY (2002)	Public capital	Cobb and -Douglas
Japan	0.0–0.8	Yoshino and Nakahigashi (2002)	Public capital	Translog
United States, aggregate	1.3–2.8	Dekle and Nugent (2002)	Public capital	Translog
by sector	0.0–1.9			
(Reference estimations)				
United States, aggregate	0.3–0.4	Aschauer (1989), Munnell (1990)	Nonmilitary public capital	
states/regions	0.04–0.20	Garcia-Milla and McGuire (1992)	Public capital	

Table 7. Average Rates of Return on Projects, 1974–92 (percent)

Sector	1974–82	1983–92
Irrigation and drainage	17	13
Telecommunications	20	19
Transport	18	21
Power	12	11
Urban development	n.a.	23

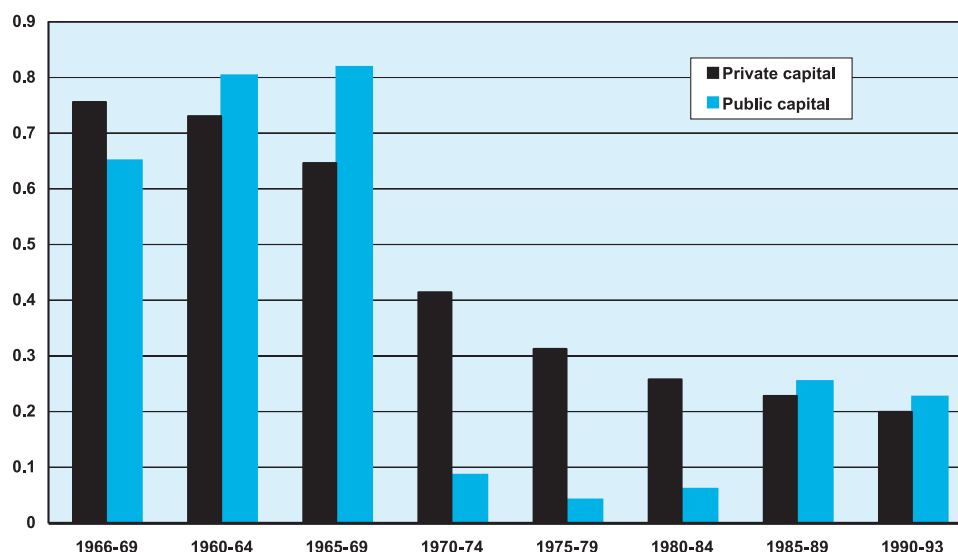
Source: Adapted from World Bank, *World Development Report*, 1994, Table 6.1, p.110.

of aggregation. For example, Table 7 shows average rates of return on specific projects conducted by the World Bank, which range between 6 to 29 percent across various infrastructure sectors. This may suggest the existence of strong spillover effects of infrastructure. In fact, in the case of Japan, Yoshino and Nakahigashi (2001) report nonnegligible indirect effects of infrastructure on output growth.

4.3 Case study of Japan

Even if the marginal effect of public investment was rather high in the past, we have no idea whether additional infrastructure investments would raise long-term output growth or not. In this respect, Japan seems to provide an interesting example (Figure 6). In this country, output elasticities of public investment fell sharply in the 1980s. Japan is the only country among the OECD economies that did not experience a declining trend in public investment during the period. The other OECD countries tried very hard to cut public expenditures

Figure 6. Output Elasticities of Private and Public Capital, Japan



Source: Yoshino and Nakahigashi (2001).

including investment to recover their fiscal balances, while Japan enjoyed autonomous fiscal consolidation due to economic bubbles (Kohsaka 2001). In the background, however, the productivity of infrastructure development deteriorated sharply as the figure implies. While it has been noted that the composition of infrastructure investment changes quickly as income rises, in contrast, in Japan, we see surprisingly little change in the composition of infrastructure investment over this time period.

5. POLICY ISSUES

5.1 Under- vs. oversupply of public capital

Except for the United States, infrastructure development has been historically driven by the public sector. Traditional infrastructure consists of large-scale, capital-intensive sectors such as transportation, power, telecommunications and social services. In these sectors, it has been thought that the private sector cannot provide an adequate level and quality of services that are socially needed. Even in the United States, these sectors were heavily regulated by the government until only recently.

Since as early as the late 1970s, however, both technological innovations and changing policy

thinking have enabled the private sector to play more important roles in the provision of infrastructure. Technological innovations enable unbundling of production stages, some of which can be more efficiently handled by the private sector than the public sector. Along with the general trend of market orientation, privatization and/or deregulation have become new norms of economic management since the 1970s.

Consequently, there appears to be a declining trend of public investment as a ratio to GDP among the advanced economies (Figure 3). Australia, New Zealand and the United States are among them; Japan appears to be the only exception. Declining public investment shares do not necessarily imply declining infrastructure development, however. In fact, the total share of value added created by conventional physical infrastructure sectors have either increased or remained almost constant in Australia, Japan, New Zealand and the United States. Note, however, that the capital stock of infrastructure sectors relative to GDP tended to decrease in Australia and New Zealand, and to increase in Japan. Although, as noted before, we cannot claim high estimated rates of return on public investment as a definite result, there seems to be no significant decline in the rates of return, again except for Japan. Regional oversupply or misallocation of public capital can be claimed for the present Japan, but we are not sure of undersupply of public capital for the United States.

5.2 Costs of privatization

Globalization has kept things changing in many sectors including the privatization trend in infrastructure. From the Asian economic crisis to the terrorist attack on September 11, these external shocks seriously affected the management of newly privatized infrastructure sectors in the Pacific region.

In 1996, the World Bank estimated infrastructure needs in East Asia over the next decade to be as large as US\$1.5 trillion in order to sustain the current pace of economic growth (World Bank 1996). The report emphasized the important role of foreign private capital for infrastructure needs. As a matter of fact, private foreign investment poured into the infrastructure sectors, particularly telecom-

munications and electricity. The Asian economic crisis, however, almost killed the early accomplishments (Baietti 2001).

Malaysia, for example, appeared to have been successful in its privatizing of infrastructure sectors without the formal creation of a comprehensive regulatory framework. The old government agencies were assumed to become regulators and their role was only to supervise tariffs and maintain quality of services. However, their independence from politicians remains questionable. Contingent liabilities of the government with many privatized projects turned out to be realized and the government had to come to the rescue; this made autonomy of these enterprises more vulnerable.

Similar problems can be found in New Zealand. Claiming strategic importance, some enterprises that had been previously privatized had to be bailed out by the government. An airline, a national railway and even a commercial bank in distress were rescued. In contrast to these blanket privatization efforts, Singapore has taken a very gradual approach toward privatization. One reason is that they did not face acute inefficiency problems in their infrastructure sectors. Even though these sectors were profitable, first, telecommunications, then electricity were privatized. According to the Singapore government, privatization was not a purpose in and of itself, but a means to motivate entrepreneurship and innovation.

5.3 Ever-increasing needs toward a knowledge-based economy

Emerging markets like Hong Kong, Korea, Singapore and Chinese Taipei have devoted huge amounts of resources to infrastructure investment in the past decades. As a consequence, they have been successful in narrowing the gaps with advanced economies, though they have not yet caught up in terms of the level of infrastructure stock per capita (Figures 1 and 2). It is notable that, in all of the emerging markets, the government or the public sector played a leading role in the process. This holds true even for Hong Kong. Moreover, the public sector increased its leading role since the 1980s. Why is this so?

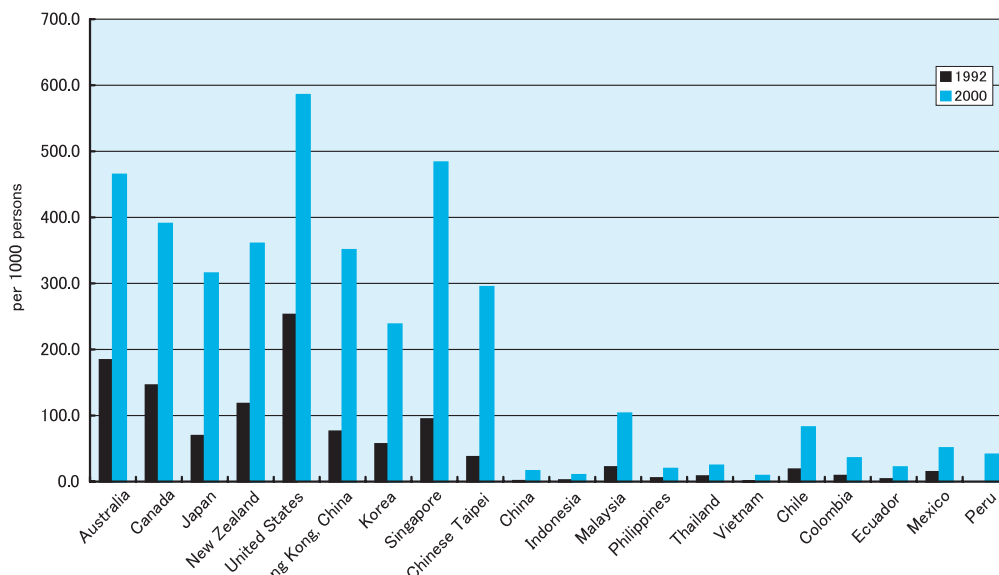
First, as opposed to advanced economies, these

economies have not reached the saturation levels for physical infrastructure investment as yet. They may have room for more infrastructure investment without losing efficiencies. Of course, one can ask whether the investment in infrastructure could have been even more efficient with private sector participation, but the question is academic. We can at least say, however, that government-led infrastructure development has helped achieve unprecedented

performance in these economies.

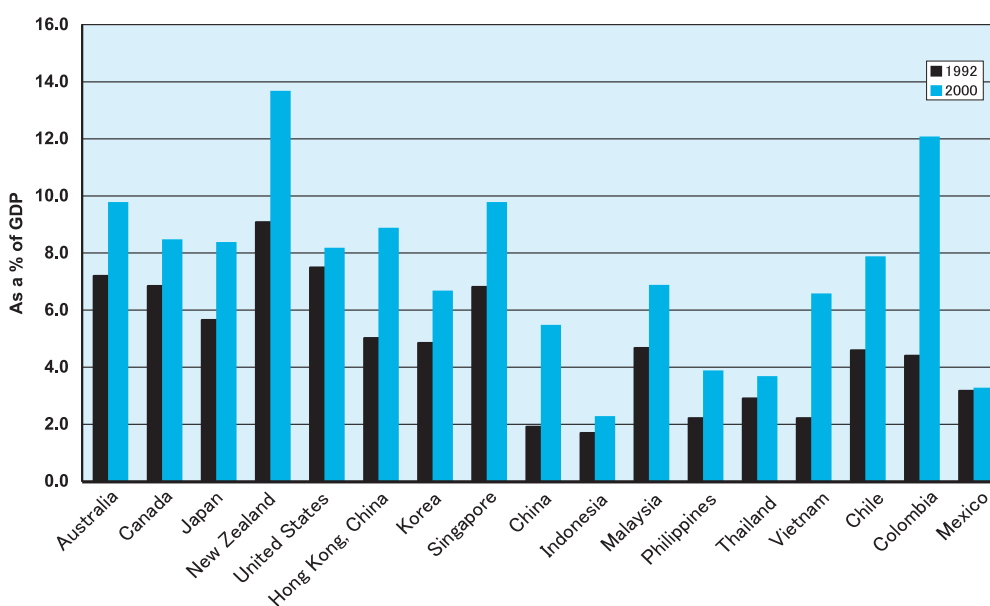
Second, these emerging markets are deliberately changing their course toward greater coordination with private sector initiatives in infrastructure development and other fields. Again, one can ask whether this strategy could have been applied to other developing economies, and this question is very practical.

Figure 7. Personal Computers



Source: World Bank (2002). For Chinese Taipei, various national sources.

Figure 8. Information and Communication Technology Expenditures




Source: World Bank (2002).

Third, in addition to the emerging markets, other developed and developing economies have become increasingly aware of the rising importance of invisible, nonphysical, soft infrastructure, i.e., human and/or knowledge capital, which has a public good nature and would make a fundamental factor input complementary to physical capital. These non-physical or soft infrastructure is going to be another area for increasing new investment.

Figures 7 and 8 provide information for output and input of new infrastructure, respectively, i.e., personal computers and ICT-related expenditures. The figures suggest that in this field of new infrastructure investment, there is little difference between the advanced and emerging market economies in the Pacific region, while there is a large gap between emerging markets and other developing economies in terms of output (personal computers).

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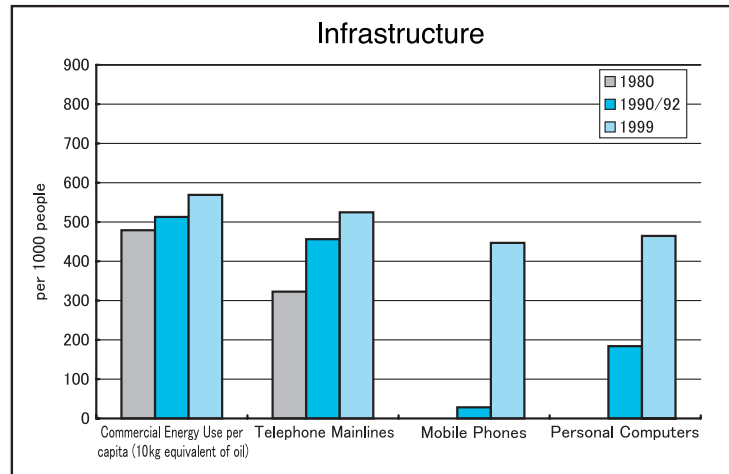
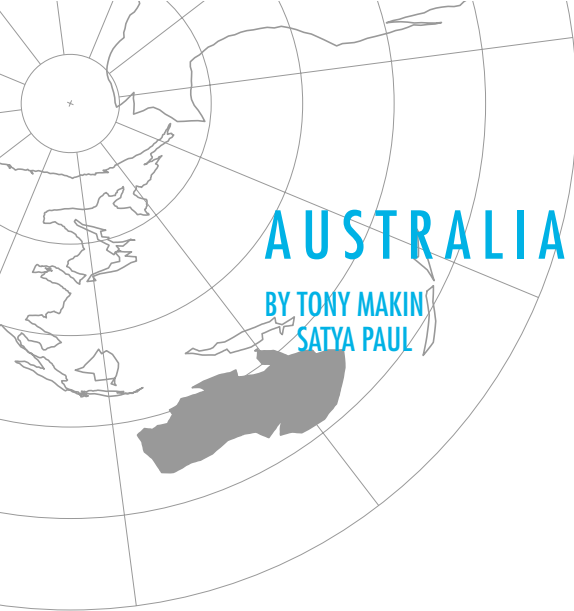
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The public sector has historically been the main provider of infrastructure in Australia because of the scale of many projects and the natural monopolies that arise from increasing economies of scale. Basic economic infrastructure is highly capital-intensive and long-lived and includes roads, railways, ports and airports, and services such as electric power, gas, telecommunications, sanitation and water.

Given the three-tiered structure of government and an array of ideological perspectives, it has proven difficult to reach a consensus on whether the public or private sector should primarily own the infrastructure. Traditional infrastructure like roads and rail remains important for many commodity-export industries. For instance, the agricultural and mining sectors produce significant exports of wool, wheat, beef, coal, bauxite/alumina, crude oil and iron ore, all of which are bulk commodities whose economic viability depends on transport costs.

The federal government is the major source of funding for state and local infrastructure investment through payment of general and specific purpose finance for roads and for social infrastructure, such as education and health care. The state governments also approve and manage infrastructure provision and are major owners of infrastructure assets. At the state level, roads are primarily government-planned and -funded. However, the private sector has become increasingly involved in electricity generation and distribution. The local

government sector has varying degrees of responsibility for infrastructure across states, playing a significant role in providing urban and rural infrastructure in the form of water supply, sanitation, land use planning and local road networks.

Although the public sector has historically been the main provider of infrastructure, there has been a marked decline in public sector capital spending. For example, public sector capital spending has fallen from around 8 percent of GDP in 1960 to close to 2 percent today, in line with trends in other advanced economies where public sector investment as a share of national expenditure has generally declined over recent decades. Partially offsetting this, there has been strong growth in communications infrastructure spending by the private sector that includes spending on information and communication technology (ICT).

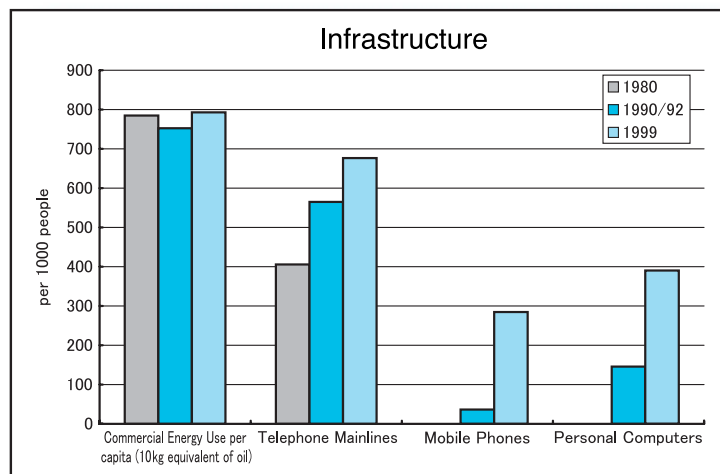
From the mid-1980s, there has been widespread microeconomic reform that has had a major impact on the provision of infrastructure services. During the 1980s, most public enterprises providing infrastructure services were “corporatized,” i.e., they were required to operate, where possible, along commercial lines. Through cost reductions, this initially improved efficiency, lowered the real prices of services to consumers and significantly raised the return on public capital. However, by the early 1990s the performance of public enterprises was showing little further improvement, suggesting the need for further reform.

Since the early 1990s, public infrastructure has passed to the private sector as a result of privatizations ranging from major capital city airports to power stations, ports, rail freight, and gas transmission and distribution. These privatizations have generally improved efficiency, innovation and financial outcomes, consistent with previous international experience.

The rationale for privatization is strongest for state-owned enterprises, though less so for public goods and natural monopolies where competition is weak. The electorate has at times, however, been reluctant to endorse widespread privatization of state enterprises and more extensive outsourcing of government services. From the investors' perspective, infrastructure investment entails additional risks, given the limited alternative uses for large-scale infrastructure assets and the regulatory risk (since regulations in place at the time of the initial investment may change).

Despite relative declines in the share of traditional infrastructure spending, multifactor productivity improved in the 1990s, due to economic reform and more intensive use of ICT. Previous research on public capital and private sector productivity suggests public infrastructure plays a role in the productivity of private sector industries. The rates of return to public infrastructure investment are significant: 26.5 percent per year when benefits are measured in terms of cost saving and 74 percent when benefits are measured in terms of output. These rates are based on the assumption that public infrastructure provides no benefits to consumers and other producers not included in the study.

Yet most components of public infrastructure such as highways, roads, sewerage, and water pipes are known to generate some benefits to consumers. To the extent that these additional benefits to society are not negligible, the economywide or social rates of return to public infrastructure could be larger.



In Canada, as in many other countries, public expenditures on infrastructure must serve a variety of masters. Infrastructure development facilitates private sector growth, but it can also be used to further other goals, including mitigation of regional inequalities, promotion of public policy goals (such as environmental remediation), and even “nation building.” It is also a convenient means for injecting fiscal stimulus into the economy and for consolidation of political power. Complicating the analysis in Canada’s case is the structure of government, which allocates some traditional infrastructure-related powers to the federal government and other powers to the provinces (which, in turn, allocate certain responsibilities to municipal or local governments). Federal responsibilities include inherently national areas such as citizenship, external relations and defense. In the context of physical infrastructure development and provision, the key federal powers are in the areas of air, rail and marine transportation, the national highway system, and communications. Provincial government responsibilities include health care, education and property rights. Municipal governments are typically responsible for water distribution, sewage collection and treatment, public transit, social housing and various other services including waste collection.

The bulk of electricity generation and transmission is accomplished by publicly owned and publicly funded near-monopoly providers. Municipal utilities (either publicly or privately owned) may stand

between the provincial utilities and local industrial or retail customers, but the role played by these companies is largely distributive.

The majority of exploration and development of oil and gas in Canada is undertaken by the private sector. Large pipeline projects are generally privately owned and developed today, but much early development was publicly owned or subsidized.

Ownership of the major railway lines is now essentially in the hands of the private sector, though municipal commuter systems are publicly owned in many areas.

The federal government has transferred ownership of numerous airports to local interests. However, it has retained ownership of the 26 busiest airports accounting for well over 90 percent of total air traffic.

In terms of sea transport, Canada has divested itself of most local and regional port facilities, but has retained ownership of ports that are designated as vital to trade.

For road transportation, the vast majority of Canada’s road network is publicly owned, financed and maintained. Toll roads are the exception rather than the rule.

Over the past 25 years, technological advances and sequential deregulation in telecommunications

have introduced greater dynamism and competition into what was traditionally a system of highly concentrated, locally monopolistic mature utilities.

As for provision of health services, those aspects of health care that are deemed necessary are publicly provided in Canada. Canadian hospitals are public, not-for-profit institutions, typically built by government or by designated government agencies.

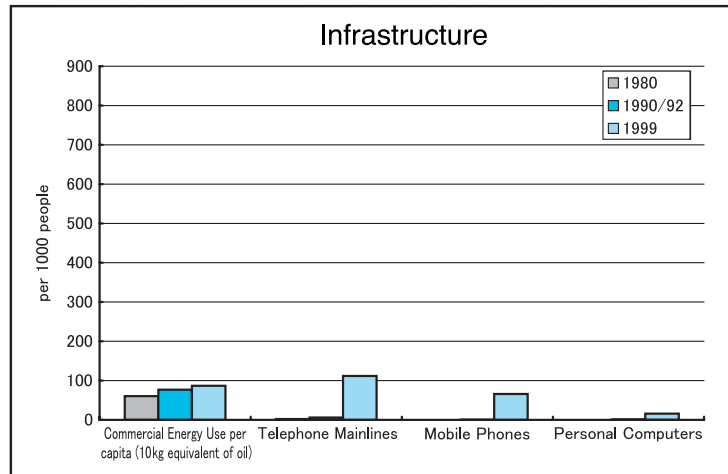
In education, the majority of educational facilities are built, owned and operated by provincial government bodies, with public funding coming from different levels of government. Unlike health care, however, alternatives to public sector provision are not only tolerated, but they may be partially funded via the public purse.

Water and sewage is essentially a municipal responsibility, publicly built and maintained. Construction of water and sewage facilities is often financed by multiple levels of government.

In assessing the economic impact of infrastructure, this study used established techniques. Among the findings, the output elasticity of public capital is estimated to be positive, though it appears to have trended down over the past 40 years, and is on average somewhat smaller than has been found in previous studies using different data sets. Output elasticities with respect to labor and private capital are consistently positive, and all elasticities are at least three times as large as their standard errors. The marginal product of public capital is estimated to be positive.

Infrastructure development is, and likely always will be, an important political issue as well as an important economic issue. Canada has the relative luxury of considering how best to renew and expand its infrastructure, given diverse considerations including environmental protection and/or remediation, regional and/or rural/urban disparities, the promotion of innovation, and so forth, in addition to the basic imperative of efficiently getting inputs where they are needed and outputs where they are wanted. In 2002, the federal government created a new department (Infrastructure Canada) within the Industry ministry designed to focus solely on infrastructure investment.

A crucial public policy issue relates to the appropriate roles of the state and the private sector in the provision of certain services, especially health care, but also electricity and water/sewerage. While this debate is not necessarily about infrastructure, it impinges on infrastructure decisions. A second more focused issue relates to the process by which publicly funded projects are selected and subsequently evaluated. Institutionally, governments continue to search for a governance model that will simultaneously permit sufficient public accountability and prevent actual or perceived political influence. Methodologically, concerns relate to the conceptual and quantitative underpinnings of the process by which projects are accepted and evaluated, and perhaps more importantly, to the transparency of the process. Careful assessment of project viability, including formal cost-benefit or present-value analysis, is not necessarily required of applicants, and may not always be readily available to those outside the process.



Since the implementation of the economic reforms and “open door” policy in 1978, the Chinese economy has developed rapidly. Along with China’s economic reform and development in the past 20 years or so, the Chinese government has adopted policies to promote infrastructure construction in the 1990s and as a result, China’s infrastructure has developed rapidly. The present overall level of China’s infrastructure has risen remarkably through large-scale construction of infrastructure compared with that of the 1980s. Generally speaking, the development of China’s infrastructure has experienced two periods over the past 22 years: lagged development in 1978–90 and accelerated development in 1991–2000.

At the beginning of the economic reforms, the Chinese government adopted the policy of accelerating light and manufacturing industries while relatively decelerating heavy industries and infrastructure. This policy led to a slowdown in terms of the development of infrastructure during the period 1978–85. The percentage of infrastructure investment accounting for total investment in capital construction decreased. As a result, China’s infrastructure developed slowly during the period of the sixth Five-year Plan (1981–85). The supply of energy and transportation could not meet the demands of economic development. During the period of the seventh Five-year Plan (1986–90), the government increased investment in infrastructure, particularly in energy. However, the proportions of investment in transportation and water

conservancy decreased compared with the sixth Five-year Plan. In 1990, China’s infrastructure, particularly, energy and transportation, became a “bottleneck” for economic development. Power supply only met 75 percent of demand, and railway freight planning could only meet 68 percent of actual demand.

Since the eighth Five-year Plan (1991–95), the government has adjusted its policies for industrial development, and has given priority to infrastructure by gradually increasing investment in infrastructure. The government developed financing policies for encouraging domestic and foreign capital to invest in infrastructure in order to raise funds for infrastructure construction. The result is a clear increase in the share of infrastructure investment to total investment in 1991–2000. Today, the condition of China’s infrastructure has improved by following the policies of developing infrastructure through multi-entities, raising funds through a multichanneled pattern and attracting foreign capital. The output of electricity is basically meeting present demands.

China’s infrastructure has improved significantly since the 1990s. However, the allocation of infrastructure facilities in areas remains unbalanced. The different growth rates of infrastructure facilities occurred in different areas over the last two decades. As a result, there remain disparities in infrastructure level between regions in China, and the gaps are very large for some sectors. The

infrastructure levels in the eastern region are relatively higher than in the middle and western regions. Although infrastructure in the western regions has developed more rapidly in recent years, the infrastructure situation in the west was significantly backward compared with that in the east.

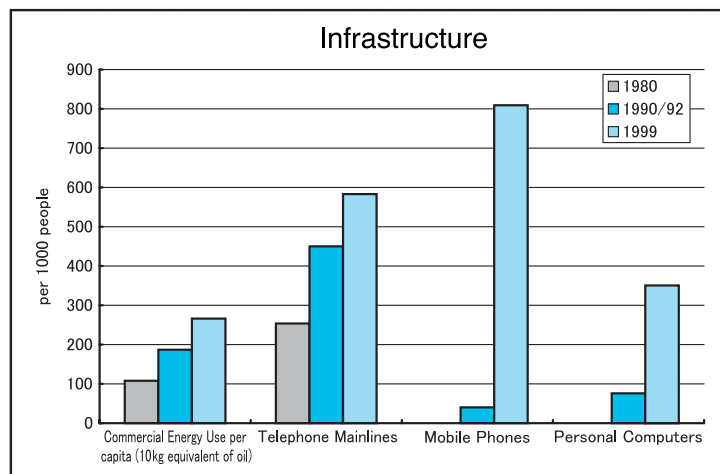
China's infrastructure sectors had been governed by the state before the 1980s. In the 1990s, the government tried to reform the infrastructure management system. The main efforts focused on separating administration and enterprise, and on corporatizing infrastructure services. The government reformed the investment system and the pricing system for the electric power sector and set up power construction funds for financing power production in 1987. In addition, the government carried out the corporatization of electric power enterprises, including running of operations along commercial lines and legal management for the power industry. The telecommunication sectors were restructured into corresponding corporations in 1999.

Through the development of infrastructure over the past 20 years or so, the overall level of China's infrastructure has been raised substantially. The infrastructure "bottleneck" that impeded economic growth for quite a long time has been relieved. At present, demand and supply in energy, transportation, and telecommunication sectors are roughly in balance. However, there are still some problems in China's infrastructure development. For example, the electric network construction is lagging in the construction of electric sources; the highway standard is low; infrastructure development across regions remains unbalanced, etc. It should also be noted that there is great disparity in infrastructure between current provision levels and the requirements for China's future economic growth. According to the tenth Five-year Plan outlined by the Chinese government, the annual average growth rate of GDP will be around 7 percent during 2001–05. In line with the objective of economic development, China's infrastructure must maintain certain growth so as to meet the demand arising from overall economic development.



HONG KONG, CHINA

BY KWONG YIU TANG



Over the past two decades, about one-tenth of the capital formation in Hong Kong has been devoted to infrastructure. This amount of investment has contributed profoundly to Hong Kong's economic advancement, not only for its overall growth over the years, but also with regard to its structural transformation to a predominantly service-oriented economy.

Comparing the 1990s with the 1980s, overall infrastructure investment soared by 67 percent in real terms, mainly attributable to implementation of a number of large-scale infrastructure projects in the public sector. The share of the public sector in overall infrastructure investment thus increased from 71 percent in the 1980s to 82 percent in the 1990s, while the corresponding share for the private sector fell from 29 percent to 18 percent. Yet in absolute terms, infrastructure investment by the public and private sectors both rose in real terms between the two decades.

Increased investment has brought about an enhancement in infrastructure capacity that matches closely with the surge in demand. Compared with two decades ago, there has been a great deal of scale expansion for supplying electricity, gas and water. Local transport has become much more efficient than before due to the continued development of highways and substantial expansion in the rail network. External transport has grown markedly in both passenger and cargo handling capacity, with the airport at Chek Lap Kok, the Container

Terminal Nos. 5–8 and the River Trade Terminal being brought into operation.

In the telecommunications sector, radical liberalization since the mid-1990s has motivated strong initiative in network enhancement by the operators, underpinning a phenomenal growth in the mobile phone and international call segments, as well as much wider use of information technology in the local community. In tourism, a new cluster of tourism infrastructure and facilities is in the pipeline, including, in particular, the Hong Kong Disneyland project.

The overall policy of the government on infrastructure is to ensure adequate provision of facilities and services to sustain a decent pace of economic growth and to meet the rising needs and expectations of the populace. This necessitates an efficient allocation of resources towards infrastructure provision, and a high degree of cost-effectiveness in running the respective facilities and delivery of the respective services.

In practical terms, the government performs an overall planning function that foreshadows the optimality of the infrastructure system. It must show foresight into the potential and emerging infrastructure needs in tandem with the broad economic and social development. In addition, it must plan well ahead of time on where, when and how the necessary infrastructure is to be brought into place.

Subsequently, in implementation of the investment project, the government may act as a direct investor or as an indirect investor via its stakeholding in statutory organizations that have a high degree of autonomy and is nevertheless required to operate in accordance with prudent commercial principles. In order to avoid causing undue burden on public finances, the use of public funds to provide infrastructure is warranted in principle only when it entails strong external benefits that cannot be adequately internalized by private operators.

When the market mechanism suffices in instilling business incentive, it is desirable for the government to enlist private sector participation and to promote competition as far as possible. Yet the government in many instances must be a regulator of the infrastructure involved, in order to guard against any abuse of market power by the infrastructure provider or service operator at the expense of consumers. This is particularly so when a franchise is granted to the operator in the interest of promoting capital investment and reaping economies of scale.

Driven by the desire to promote competition and aided by lower technological barriers to market entry and availability of more potential investors, the mainstream of regulatory practices by the government in the area of infrastructure has shifted in the 1990s towards liberalization and deregulation as well as adoption of more flexible and efficacious regulatory mechanisms. This has proven to be very conducive to the operational efficiency and cost economies of the infrastructure involved. Pertinent examples include local telephone services and local public bus services.

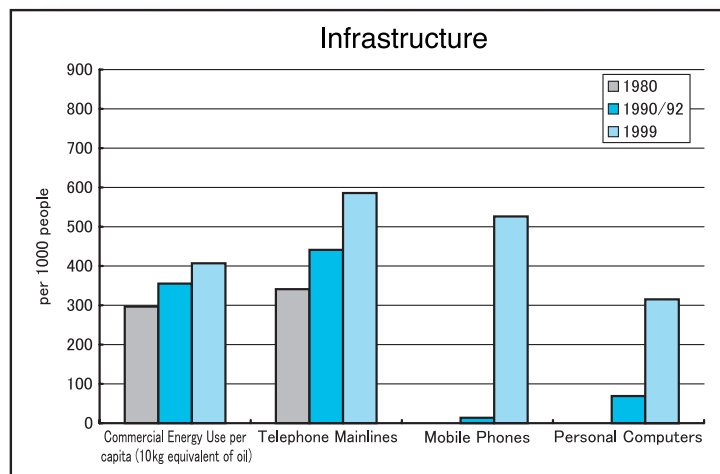
The growing stock of physical infrastructure for the economy must be complemented by an adequate supply of quality manpower. In this regard, the government has been devoting a sizable share of public expenditure to education, reaching 19 percent on average from 1996–97 to 2000–01. Increased education resources have contributed to an ascending educational attainment of the population over the years.

In view of tighter fiscal constraints against an ongoing strong demand for infrastructure renewal and expansion, as well as a constant pursuit of bet-

ter efficiency in infrastructure provision and operation, the government is now faced with three major challenges ahead. The first challenge is to encourage more private sector participation and greater market competition in the various major aspects of new infrastructure provision. This calls for efforts to explore new and innovative means of financing and implementation with involvement by the private sector, to maintain a favorable investment environment for engendering private sector participation, to uphold a sound and equitable legal and regulatory framework conducive to infrastructure business, and to facilitate and expedite vetting and processing of proposals, plans and moves related to infrastructure development.

The second challenge is to expose the existing infrastructure facilities and services in the public sector to greater competitive forces and market discipline. This involves, where possible, more contracting out of infrastructure services hitherto provided by the public sector, corporatization of more government departments, and privatization of more infrastructure facilities.

The third challenge is to further develop soft infrastructure side by side with hard infrastructure, as synergies clearly exist between these two main planks of infrastructure investment for the future. This entails bringing up more high-quality manpower, further enhancement of the living and working environments, promotion of arts and culture, and general maintenance of Hong Kong as a vibrant and cosmopolitan city.



Infrastructure development in Japan has long been led by the public sector, i.e., the central government and its designated public corporations. After World War II, the government established public corporations in roads, airports, railways and telecommunications. In addition to those public corporations in infrastructure, nine regional private monopolies have provided electric power under a wide range of government regulations. The government devised diverse schemes for infrastructure financing and played a crucial role in providing infrastructure and sustaining Japan's rapid economic growth in the postwar decades.

Changes in the market environment for infrastructure — e.g., technological progresses in telecommunications and shifts in transportation modes — gradually eroded the rationale for the postwar regime of infrastructure provision, resulting in financial distress and organizational stalemate of public corporations toward the end of the 1970s. In the 1980s, with growing concerns over the financial viability and operational efficiency of the corporations, two of the largest public corporations—Nippon Telegraph and Telephone Public Corporation (NTT) and Japanese National Railways (JNR)—were privatized.

Currently, privatization of the Japan Highway Public Corporation (JH) is a central policy issue in Japan. While privatization and deregulation started in the 1980s, the government (or ministries) has been reluctant to lose control of public corpora-

tions (as seen in the case of the recent JH privatization fiasco), so that the degree and effectiveness of deregulation have been diverse and mixed across sectors.

Infrastructure has been financed directly and indirectly by the national and local governments in Japan. In order to alleviate the fiscal burden on general tax revenues, the government created several alternative conduits, including public corporations and special accounts of the national budget. In addition, the Fiscal Investment and Loan Program (FILP) has been a major conduit for the flow of financial resources to support infrastructure development in Japan. The program transfers funds via interest-bearing loans from postal savings and social security pensions directly to public corporations and indirectly to private sector investment via public financial institutions. FILP, however, has been criticized because it crowds out private financial intermediation with implicit subsidization by the government and the program was reformed recently to cope with this criticism.

Under the government-led infrastructure development, public investment has played a leading role in building up infrastructure capital in Japan. In fact, while other advanced economies reduced their public investment ratios to GDP sharply in the 1970s, Japan has kept its level as high as it was during the country's rapid growth period of the 1950s and 1960s. We examined the productivity effect of public investment at the aggregate level as

well as at the level of industries, sectors and regions. We found that: (i) the aggregate productivity effect began to decline significantly in the 1970s, when most advanced economies cut down on public investment; (ii) the productivity effect is higher in the secondary and tertiary sectors than in the primary sectors across regions; (iii) the productivity effect is higher in the telecommunications and environment industries than in rural development industries (e.g., roads and ports); and (iv) the productivity effect is higher in urban agglomerated regions centering on Tokyo, Osaka and Nagoya.

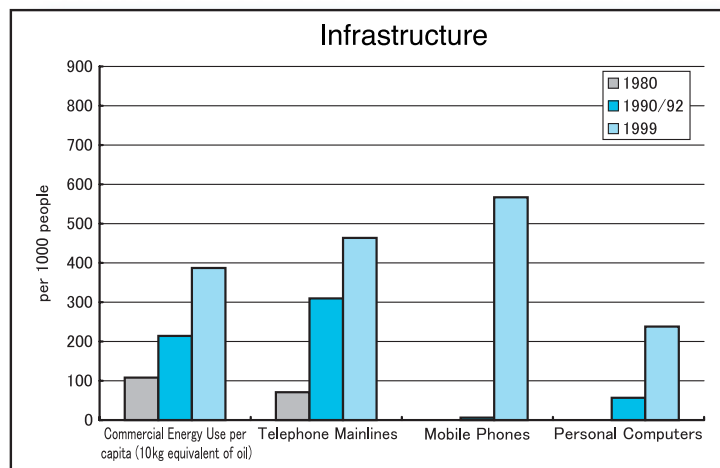
The above results imply that the general decline of the productivity effect of public investment in Japan may have come from the public misallocation of resources by sector, industry and region. Note that the 1970s was a period when improvement of regional inequality in income distribution was emphasized and this was reflected in the allocation of public investment.

Under the general trend of privatization of infrastructure development, public investment covers only part of infrastructure. However, when considering the expected external effects of infrastructure development either through public or private providers, we should remember that the correct motivation- and incentive-schemes in the provision of infrastructure are very important in order to avoid large-scale waste of resources which is the experience of Japan in recent decades.

Thus, policy issues on infrastructure development in Japan can be summarized as follows. First, although a significant part of Japanese infrastructure is now in the private sector, there is more room for reducing inefficiencies and waste through streamlining of public investment and deregulating private provision of infrastructure. Pricing policies in telecommunications and cross-subsidization in transportation are at issue. Technological advances and changing customer demands are affecting provision of power.

Second, along with the diminishing role of public initiatives in infrastructure development, the role of FILP and other public devices for financing infrastructure will likely decline. Realizing the medium-run slowdown of economic growth as well as the declining trend in the domestic saving rate, fun-

damental reforms in infrastructure financing including the budgetary process will be needed at this juncture of strategic changes in infrastructure development in Japan.



In Korea's rapid industrialization, the development of infrastructure played a critical role. Korea's infrastructure, which has clearly contributed to its economic development, is currently at an advanced level compared to other emerging industrial economies. However, when compared with advanced economies, Korea's infrastructure lags far behind in both quantitative and qualitative aspects. This is evident in the appearance of major infrastructure bottlenecks since the mid-1990s, with the continued expansion of the economy.

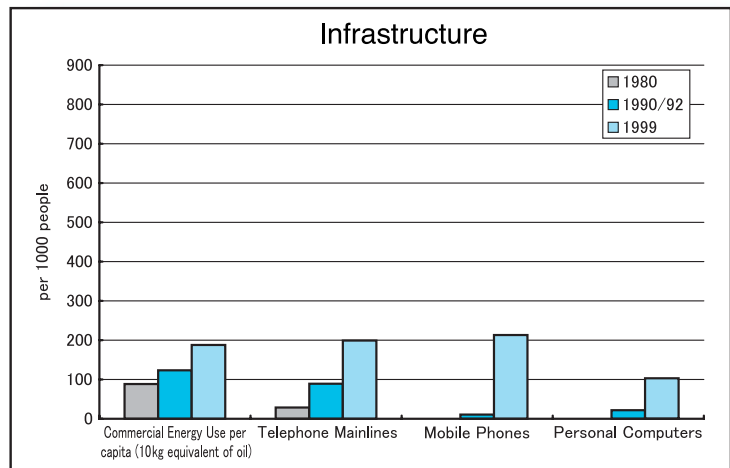
In addition, with the achievement of higher living standards and greater democracy, the required level of infrastructure has risen. Providing infrastructure for a better quality of life (for example, information infrastructure, urban public transportation, pollution control and high-speed rail, etc.) has also become an important policy objective for the government.

Yet many of the urgently needed infrastructure programs and projects (either for better quality of life or for economic purposes) have been delayed by various obstacles such as resistance from determined environmentalists and other interest groups, sharply divided political opinions, calls for radical policy changes, exposure of contract-related scandals and unprecedented budgetary requirements.

Considering these issues in the context of the new era of an information and knowledge-based economy, Korea needs new development goals that are

focused on restructuring, liberalization and private sector development. The private sector must play a major role in infrastructure development and operations in the future, and the only way to attract private sector investment is for the government to deregulate, guarantee a market economy, and globalize. If the government provides a better business environment than in other countries, private investments are sure to flow in.

The Korean government played a critical role and demonstrated authoritative leadership in developing "hard" infrastructure such as roads, transportation, etc. However, it now needs to focus on "soft" infrastructure, such as information networks, as knowledge distribution is emerging as a new source of productivity. The government's role in this context should be something like a "coach" to provide private businesses with the best environment to create and distribute knowledge.



Until the mid-1980s, the development of physical infrastructure was almost entirely the responsibility of the public sector. However, with the privatization policy enunciated in 1983, the private sector has assumed greater responsibility in the financing, construction and delivery of infrastructure of all types. This transition from public dominance to public-private partnership in the financing, production and delivery of infrastructure services is the most significant feature of infrastructure development in Malaysia in recent history.

The privatization of infrastructure development facilitated a more supply-driven approach, with active participation of both the public and private sectors. The focus was on increasing capacity, productivity and efficiency by introducing state-of-the-art technology in infrastructure development. Within a decade, Malaysia has been able to offer sophisticated infrastructure services that served as a principal source of attraction for foreign investors. Without private investment, it would not have been possible to meet the unprecedented increase in the demand for infrastructure services that followed the unabated high growth since the late 1980s. The sustained high growth also imposed higher demand on the capacity, distribution and efficiency in the provision of infrastructure.

Private sector entry into the infrastructure market has spawned several new approaches and institutions to mobilize funds for infrastructure development. The infrastructure projects developed by the private sector are either financed through debt, equity or the internal resources of the enterprises. Private firms also receive generous state subsidies.

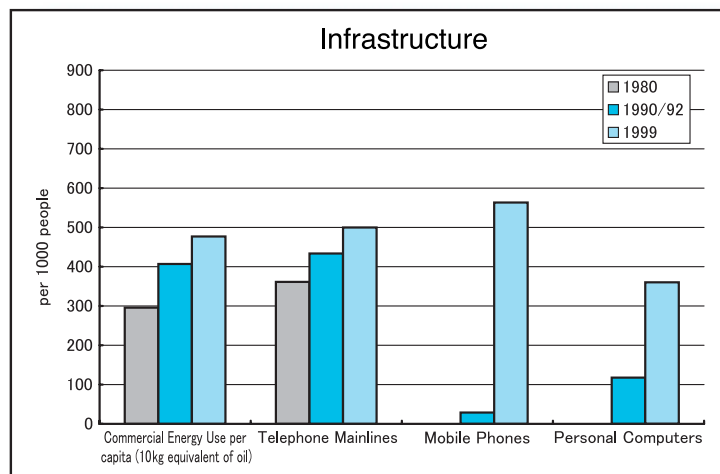
A review of private sector involvement in infrastructure development over the last 15 years, however, shows that private investment has only been successful in the more profitable segments of infrastructure

development. The less commercially viable components, such as rural roads and smaller port facilities, continue to be built, owned and operated by the government. There have also been instances where commercially viable projects that had been privatized incurred heavy losses and had to be bailed out by the government due to national interests.

The Malaysian experience shows that while the private sector can play a useful role in building and operating economic and social infrastructure, there are limits. These limits are imposed by strategic considerations, heavy initial capital outlay, or the need to create the foundations for new sources of growth. Thus, while private investment in infrastructure will continue to increase in the future, the state still has a considerable role to play in the development of infrastructure. The public sector will continue to invest in infrastructure as an enabling factor for growth and competitiveness.

The Malaysian experience also shows that investment in infrastructure has primarily been used to boost productivity and growth. Its use as a countercyclical policy tool has been limited in the past. However, following the 1997 financial crisis, public investment in infrastructure has been deployed to boost economic recovery, and continues to be deployed as part and parcel of the fiscal stimulus to sustain growth during economic slowdowns.

As investment in infrastructure steadily expanded, there was a parallel rise in the contribution of infrastructure to economic growth. Apart from contributing to growth through the flow of investment, the total stock of social capital also contributes to growth. An empirical analysis into the relationship between public infrastructure investment and private sector productivity carried out at the macro level shows that public capital does have a positive, but small, impact



on private productivity.

This paper discusses various infrastructure sectors in the New Zealand economy including some new areas such as internet connectedness and mobile communication. However, data limitations make the empirical work less than ideal and further work is required to obtain better data on infrastructure in order to look at the different impacts of public and private sector spending.

Infrastructure has played an important role in shaping New Zealand's economic development and growth. Infrastructure is vital to food production, both in the supply of power and water for production, and in the distribution of products to local markets and for export. A strength of New Zealand's current infrastructure is that most agricultural regions have access to local market and export facilities. A nationwide domestic food market exists despite the transport costs imposed by Cook Strait which separates the North and South islands. The infrastructure has facilitated regional specialization and adjustment to changed market conditions, exemplified by the recent expansion of dairying in the Southland region.

International supply chains link businesses and economies. Internally and internationally, efficient and flexible supply chains are critical to the timely delivery of supplies to enterprises and products to customers. A range of regulatory influences impact supply chain flows (transport regulations, customs, security, quarantine, safety, labor, immigration, competition, investment etc). Unfortu-

nately, the combined effect of these influences on the economy and trade has not been assessed in a coherent manner. Supply chains are the connectors of the networked economy and their efficiency and responsiveness (or otherwise) is critical to enterprise success, and therefore the entire economy.

Significant political regime shifts over the last 30 years have significantly influenced the expansion and provision of infrastructure services. The late 1970s and early 1980s were characterized by high levels of state intervention in the New Zealand economy. Infrastructure services such as railways, communications and air travel were largely provided by the state. Other state-owned institutions played a dominant role in many other sectors of the economy including the financial, health, and educational sectors.

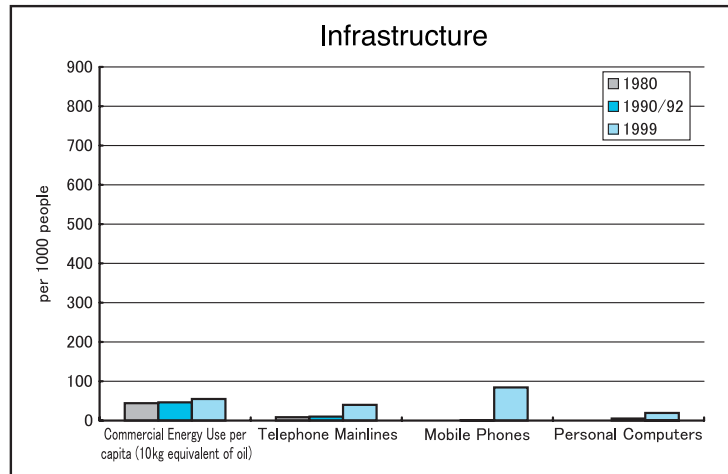
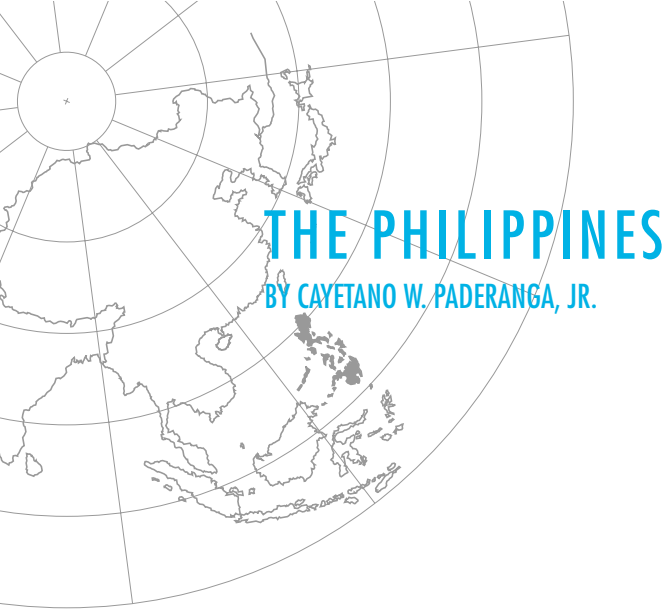
A major development in the expansion of infrastructure during this period occurred in the energy sector. Responding to a faltering economy and rising oil prices during the 1970s, the government embarked on many major energy projects. Collectively known as “Think Big,” these projects expanded New Zealand’s energy sector. Think Big aimed to invest public money into major energy projects that would provide alternatives to oil following the two oil price shocks of the 1970s. However, it is unclear whether there was a positive economic benefit to New Zealand from Think Big, as the expansion ultimately caused a large increase in public debt levels. The construction phase of the projects boosted economic activity, but as oil prices fell as the impact of the second oil shock abated, the basic premise for the projects evaporated; however, the servicing costs of the higher debt did not.

In 1984, the New Zealand economy entered a new era. A distinct shift away from state intervention towards free-market policies took place with the election of the 1984 Labour Government. Economic reform was comprehensive and included industry deregulation, the freeing up of international trade, monetary and government sector reforms, and finally, labor market deregulation.

As part of the new economic policy era, corporatization and/or privatization of the public sector occurred. Many areas of infrastructure provision

underwent change including postal services, railways, telecommunications, banking services, electricity, gas production, coal production, oil production, air transport and port services. As part of the structural reforms, the state’s involvement in the Think Big projects was ended.

More recently, since the Labour-led coalition government won the November 1999 general election, a more hands-on approach to economic management has been adopted. However, the direction that government is taking regarding infrastructure ownership in New Zealand is unclear, with several issues that remain outstanding.



Infrastructure is a very vital part of economic development. In the case of the Philippines, the accumulation of capital stock grew significantly (20 percent) from 1970 to 1982. Subsequently, the pace of capital stock accumulation slowed down slightly to 13.5 percent from 1986 to the present. However, despite the growth of capital stock in the country, this study finds that productivity has not increased significantly.

The power sector of the Philippines is composed of the National Power Corporation (Napocor) and Independent Power Producers (IPPs). Napocor is the largest entity in terms of power generation and holds a virtual monopoly in that activity. As of 2000, Napocor had 13,196 megawatts of capacity, with oil as the major source of electrical energy. With demand projected to grow by 12 percent annually over the next decade, Napocor plans to install an additional 12,828 megawatts to meet the needs of the people.

The Philippine power sector remains highly problematic. The geographical terrain of the country makes it difficult to attain economies of scale in the smaller islands. Furthermore, debt problems continue to hound Napocor and major power distributors, including Meralco, the main electricity provider in Manila.

The water sector is in a similar situation as the power sector. Provision of water in Manila is mainly tasked to the Manila Water and Sewerage

System (MWSS), a monopoly similar to Napocor. It has always been the case where demand for water is greater than supply. As of 1995, only 7.5 million of Manila's 10.6 million residents had access to water. This shortfall is even more pronounced in the provinces as piped water to houses is only available in major cities and towns.

The need to modernize the water system is eminent. Inefficiencies and loss of water through leaks and theft are prevalent. In 1998, the government privatized the operations of the MWSS and granted concessions to two groups, the Manila Water Corporation (MWCI) and Maynilad Water Services, Inc. (MWSI). Since then, provision of services has improved. Debt problems are currently affecting MWSI due to the large costs needed to modernize the piping system.

In terms of transportation infrastructure, as of 2000, the Philippine road network extended to 29,055.84 kilometers, 16 percent of which are national roads. Road carriers are the most popular form of transportation, and as of 2001, there were close to 3.7 million registered vehicles, mostly concentrated in Manila.

The rail system is not as rosy as the road network. Patronage to the major Manila-Albay artery (in Southern Luzon) is very low, largely because of inferior facilities and lack of maintenance. However, within Manila, the Light Rail Transit and Metro Rail Transit are becoming very popular as an alternative to using the congested roads. New commuter rail systems are currently planned to help ease the traffic problem in Manila.

Water transport is the cheapest mode of interisland transportation and is very popular for the lower end of the market. Air transport is now liberalized, but the flag carrier, Philippine Airlines (PAL), still dominates the market.

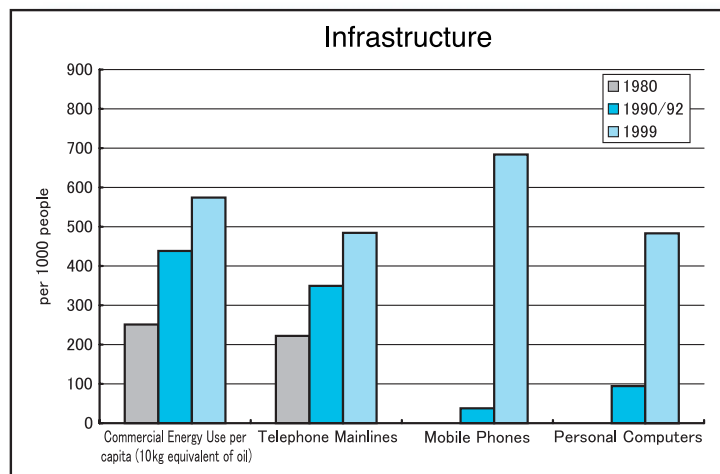
The major hindrances to development of the transport system are the poor transportation policy of government, large investment constraints and right-of-way acquisitions that make it difficult for new infrastructure to be constructed.

Prior to 1993, the Philippine Long Distance Telephone Company (PLDT) was a virtual monopoly.

With large players having gained entry, the telecommunications sector is now one of the most vibrant areas of the Philippine economy. As of 1998, there were an estimated 9.08 telephone lines per 100 people in the Philippines. In Manila, this figure is 14.8 telephone lines per 100 people. Beyond the fixed line business, the mobile phone industry is growing at a very rapid rate. It is estimated that the number of mobile phone subscribers will be about 20 million by the end of 2003.

As a form of investment in human capital, education is one of the most important aspects of Philippine development policy. Despite the recognition of its importance, the quality of instruction in the country remains poor, especially in less well-off regions. This is mostly due to lack of adequate facilities and new technology, low compensation for teachers and low participation rates of students because of poverty.

Among the alternatives to infrastructure development, the Build-Operate-Transfer (BOT) scheme of the Philippines is the first in Asia. Under this arrangement, the private sector is given incentives to participate in infrastructure building. This system also prevents the use of explicit government guarantees in order to avoid incentive mismatches when operating projects. As of March 2002, the BOT captured investments of US\$441.32 million in water infrastructure, US\$3.3 million in power, US\$3.3 billion in transportation and US\$207.7 million in communication.



Singapore's infrastructure development began in the 1960s with basic physical infrastructure such as road, utilities, sewage, telecommunication, financial services, sea and air ports in order to attract and support manufacturing activities from multinational corporations (MNCs) to provide employment, public housing, health care, education and reduce widespread poverty. Being a resource-poor, land-scarce new nation with a low-skilled labor force and small domestic market, complete control of the land by the state and the setting up of a key government agency known as the Economic Development Board (EDB) to take charge of the republic's industrialization strategy and sourcing for new sources of growth is paramount to Singapore's success story. The EDB, working in coordination with other government agencies such as the Jurong Town Council (JTC), the Telecommunication Authority of Singapore (TAS), the Civil Aviation Authority of Singapore (CAAS), the Port of Singapore Authority (PSA) and the Monetary Authority of Singapore (MAS), reflects the positive strong role of the government in directing and rationalized limited resources for essential basic infrastructure hardware and software development. This pioneering effort paid off when about three decades later, the port of Singapore and Changi Airport consistently became among the busiest and the best in the world. Following London, New York and Tokyo, the Shenton Way of Singapore soon became a major global financial hub.

Since the mid-1980s, recognizing the rapid growth

of high-tech industries and the emerging applications of advanced new information technology (IT), emphasis was placed on installation of a state-of-the-art digital telecommunication infrastructure. Anticipating a rise in demand for IT workers, there was also heavy human resource investment so as to ensure a steady supply of a high-quality work force in the new knowledge-based economy. Such a comprehensive multipronged strategy continuously enhanced the competitiveness of the economy, and is a critical component of the approximately four-decade-long course of development of the Singapore economy including its graduating from being an investment-driven economy to an innovation-driven economy. Since the early 1990s, efforts were made to improve productivity and quality of services especially in the public sector via the introduction of electronic-government. This signifies the government's relentless drive to exploit IT and its vision of Singapore as an intelligent island by the new millennium and the basis for further competitive enhancement and premier infocom hub.

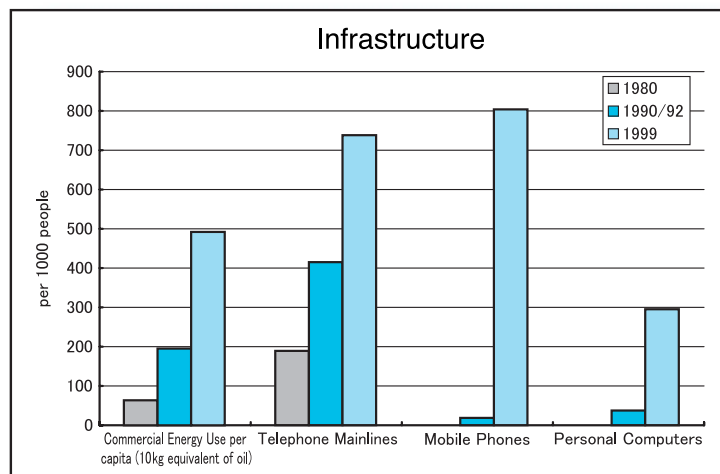
In 2000 and beyond, as the Singapore economy matures and as competition from the neighboring ASEAN economies and China intensifies, infrastructure development must be further initiated to support newly identified sources of growth such as chemical-pharmaceutical products and life sciences industries. Heavy investment was committed to develop a chemical island by reclaiming it from the shallow seabed to attract and host top MNCs to form a chemical hub, which would reinforce existing seaport and airport activities. Longer-term investments in laboratories, high-speed computers, and setting up of new research centers and attracting frontier research scientists to local universities are other infrastructure projects that have recently been put in place to host activities in life sciences. Such infrastructure development strategies serve to put Singapore a step ahead of her competitors and diversify its manufacturing activities to further improve resiliency of the economy.

Singapore, whose nationhood began in 1965 from an island of about 600 square kilometers in area, then carried a relatively small population of 1.6 million. After four decades of steady economic growth, the resident population in 2002 is about 4 million, of which approximately 800,000 are

skilled and unskilled foreign work force. Smooth, high-quality transportation flows within the crowded island are being undertaken by the Land Transport Authority (LTA) through innovative planning aided by new land transportation technology. The objective is to establish an efficient and affordable public transportation system. For private transportation ownership, the thrust of the strategy is to use price to control transport traffic (i.e., the Certificate of Entitlement or the COE bidding system for private vehicle ownerships) and charge according to transport usage while ensuring widespread ownership (i.e., electronic road pricing or the ERP system). This innovative system has been scored as being first in the world and is progressive in nature whereby revenue through fees collected will be used to further improve the public transport system.

The success story of Singapore's infrastructure development can be pinned down to its unique institutional setup with government agencies that are known locally as statutory boards (SBs), which are autonomous corporate bodies answerable to their own budgetary bottom lines and look after their own recruitment and rewarding of staff. SBs are established by individual acts of Parliament with clearly defined functions, scope and powers. SBs enjoy greater autonomy and flexibility in administrative and financial matters than the civil service, but they are accountable to the Parliament through their respective government ministries

Financing of infrastructure has been mostly through domestic sources such as the Central Provident Fund (CPF) established since 1955, which is a form of "forced savings" with contributions from both employees and employers, and is mainly used to fund infrastructure development. Successful economic management over the decades have allowed autonomous government agencies to accumulate sufficient government surpluses and such surplus funds are reinvested abroad by the Government of Singapore Investment Corporation (GSIC) which generally yield good returns. Hence infrastructure expenditures pooled from the relatively cheap CPF and government surpluses can, in turn, be channeled into public welfare projects undertaken by the Housing Development Board (HDB) and Public Utility Board (PUB) to provide affordable public housing and essential public utilities without



resorting to foreign borrowings or becoming a drain on public finances. As autonomous government agencies grew larger over the years, a public divestment Committee (PDC) was set up in 1986 to gradually privatize public sector investment so as not to crowd out or outcompete private sector activities and the divestment process will take place whenever market conditions allow.

Strategy for a sustainable infrastructure development involves long-term planning. The infrastructure services must be delivered in a timely fashion and must serve to enhance competitiveness of the economy. Given that infrastructure development tends to be initiated by the public sector, among the most difficult tasks is to ensure that infrastructure projects are provided with the highest quality, and are efficiently executed and coordinated by the various agencies concerned. In a knowledge-based economy, the role of the private sector will be paramount. Infrastructure projects encompass not just physical infrastructure building, but also entails investment in human capital, setting up of appropriate institutions and mechanisms, meeting financing requirements and keeping pace with rapid technological changes. Singapore's excellent infrastructure certainly plays a decisive role in attracting foreign direct investment, raising the quality of life and lifting per capita income almost 50 times in purchasing power parity terms within almost four decades from US\$570 in 1965 to US\$ 28,500 in 2002.

In this paper, we try to describe the picture of infrastructure development in Chinese Taipei. By introducing the background and path of infrastructure development and by examining the evidence from empirical study, we check for clues to the actual relationship between infrastructure and economic growth.

By looking back 100 years, we review the atmosphere for each regime's infrastructure development in this island. In the early years, the purpose of these infrastructure investments was to feed Japan the necessary agricultural and light industries products, accompanied with the Japanese imperialist needs in the first half of the 20th century. However, since the Japanese government returned sovereignty to China in 1945, the framework for physical infrastructure and basic social infrastructure has been almost completely reconstructed.

From the beginning, after the Kuomintang government took over authority, they hoped to recapture the ruling power for Mainland China, and Chinese Taipei was treated as a powerful base to support the unification war. But many years later, when it was realized that this was a far-off wish, the authorities began to promote economic growth for the sake of long-term development. Along this train of thought, infrastructure construction followed to support economic development. However, because most investments were related to economic development, items related to quality of life,

such as urban sewage systems, were neglected in this period.

Following the voice of democratization in Chinese Taipei, the government began to pay attention to social-based issues such as environmental protection, development of an urban metro system, etc., to reflect the will of the people in the 1970s. However, the attention to social welfare—related items not only reduced the emphasis of the budget on economic development investment but also lessened the direct effect of economic promotion of infrastructure.

Examination of trends in infrastructure development for the past 50 years, in particular, the physical items such as railroad and roads, show little increase in the total amount of these types of investment relative to economic growth. However, in reality, the quality of the infrastructure has greatly improved, especially in the last 30 years. Moreover, the increase in electricity and water supply corresponds with the trend in economic growth, and other public investment in social infrastructure items—such as legal reform, education, industrial parks, telecommunication, etc.—was also undertaken in line with the goal of promoting economic growth in various stages. Nevertheless, the different circumstances affected by the prevailing governor's interest restricted the contributions of these kinds of social infrastructure to push economic growth.

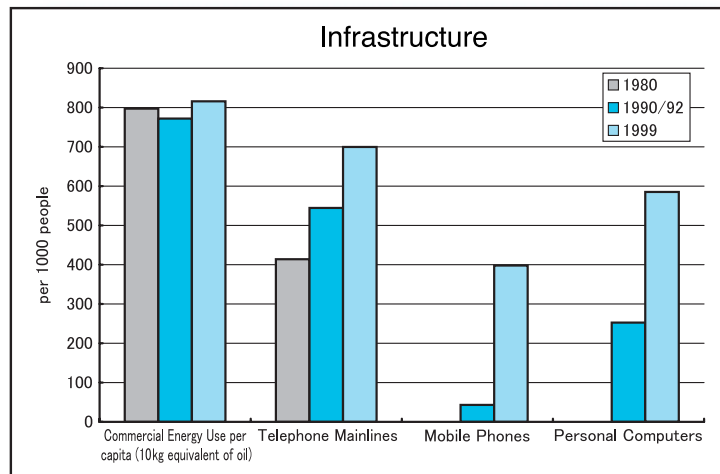
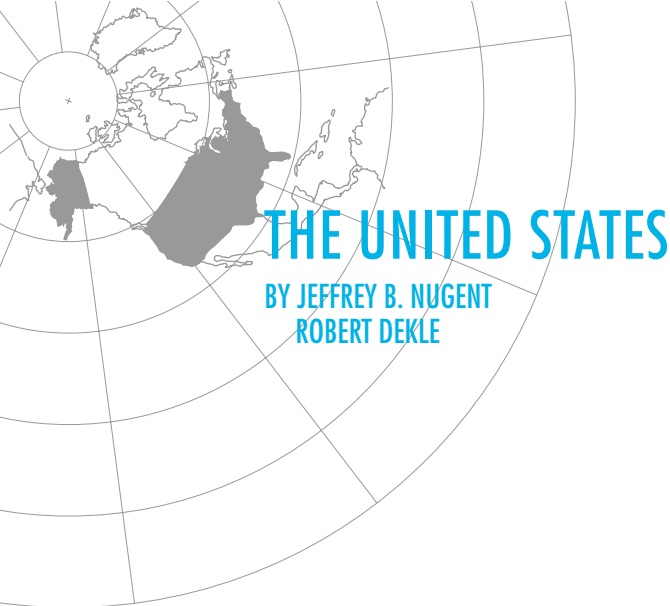
The second major finding comes from empirical studies. One approach is to look at expenditures for economic development in the general government budget, accompanied by political dummy variables to take into account political factors. Through stepwise regression, we find that the introduction of political factors can reduce the error sum of squares dramatically, suggesting that these political elements must be taken into account when analyzing the contribution of infrastructure.

Another approach is the Seemingly Unrelated Regression model, based on the production function and a wage share equation, to estimate the direct and indirect effects of infrastructure development. Results using this approach suggest that the highest direct effect occurred in the years of President Chang Ching-kuo (1976–87) and the

lowest direct effect occurred under President Lee Teng-hui (1988–2000). However, during President Lee's term, the indirect effects of labor and capital reach the highest levels compared to two other regimes. This result can be seen as a fruit of infrastructure investment in non-economic related items. Moreover, the rising trend of the indirect effect also suggests the growing importance of non-economic related infrastructure and requirements of investment for these items.

Based on the empirical exercises, the following conclusions can be made from this study:

- From an historical aspect, the interests of different governors played a significant role in shaping the construction of infrastructure in Chinese Taipei.
- Other political factors, such as democratization, revised the direction of infrastructure expansion. Certain items related to daily life began to be established after the demands of the Chinese Taipei people were adopted into the infrastructure policy formation process. The experience of Chinese Taipei demonstrates the transition of infrastructure investment as the social structure moved from authoritarianism to democracy.
- The quantitative index of infrastructure only reflects partial reality and, if the quality of the infrastructure is neglected in the analysis, the result leads to a misunderstanding on the contribution of infrastructure. Based on the experience of Chinese Taipei, although there appears to be unbalanced growth in certain infrastructure, when improvement in the quality of the infrastructure is taken into account, the results show that there is no way to achieve economic development if there is insufficient investment in infrastructure.
- In looking at the rising importance of infrastructure's indirect effect, it is clear that investment in social infrastructure benefited economic development. As Chinese Taipei moves toward a knowledge-based society, the importance of social infrastructure becomes more important than ever. The absence of a well-functioning commercial legal enforcement system and corporate governance will restrain further economic development of Chinese Taipei.



The infrastructure sector in the United States has several distinct features. First, the private sector has long played a somewhat more important role in the supply of infrastructure in the U.S. than in other countries. Second, the relative importance of the private sector varies considerably from one subsector to another. Third, there have been important changes over time in the relative importance of the private and public sectors in infrastructure supply. Fourth, as a large country, more of the country's public infrastructure is supplied at the state and local government levels than in most other countries. Fifth, the share of public infrastructure in GDP has varied considerably over time both secularly and cyclically. Especially notable of these changes has been the secular decline in the share of public investment in GDP from 1960 to 2000. That decline has been blamed by many for the observed slowdown in productivity growth in the U.S. economy, especially between 1960 and 1980. This study provides a brief overview of each of these distinctive features and investigates the effect of infrastructure spending and economic growth.

In recent years there has been little evidence of the use of aggregate infrastructural investment as a means of stabilization policy. There seems to be no hard evidence that there is a general dearth or undersupply of public capital, though there may be a tendency to undersupply replacement capital. Estimation problems are so severe in virtually all studies using aggregate data as to make even the

best of existing estimates of the marginal productivity of public capital unreliable. The few reliable findings of a general sort are that marginal productivity of public physical capital is subject to sharply diminishing returns and varies considerably from sector to sector and from one type of capital to another. Whereas in many cases infrastructure can be supplied privately with greater efficiency than the public sector, when it is privately supplied and there are economies of scale and scope, a satisfactory system of regulation is required. An important justification for public supply can be the existence of externalities. The most important examples of externalities arising in public capital would seem to be in education, health and other social types of government capital.

Many problems lie at the heart of the estimation difficulties. One of the difficulties for the United States is the lack of time-series data for different types of capital at the sectoral level. Even at the state level, aggregate time-series data are available for only a relatively short period and are not easily accessible.

There is substantial evidence of allocative inefficiencies in the use of public capital in the United States. This suggests the possible benefits of continuing privatization and greater reliance on user fees for financing such investments.



APPENDIX TABLES

Appendix Table 1. Infrastructure Services

Commercial energy use (kg of oil equivalent per capita)												
Country / Region Name	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Australia	4104.34	4392.14	4789.82	4743.42	4872.38	4614.87	4703.62	4690.44	4681.87	4827.44	4832.39	5070.59
Canada	6540.19	7212.63	7847.76	7555.38	7192.72	7065.17	7359.70	7453.70	7507.52	7658.68	7880.01	7963.69
Chile		749.73	866.78	869.67	784.59	796.08	824.65	809.25	835.25	847.06	935.06	1006.76
China		525.23	603.84	592.19	601.42	616.00	644.37	670.53	691.46	715.49	739.36	753.01
Colombia		630.51	680.14	678.21	679.32	682.23	683.39	681.39	694.67	700.63	702.45	695.16
Ecuador		482.26	650.67	659.39	689.04	623.38	653.54	646.33	627.73	623.79	643.10	599.86
Hong Kong, China		973.39	1079.38	1185.16	1276.62	1342.67	1383.99	1396.44	1523.71	1626.38	1854.94	1947.52
Indonesia		331.18	404.13	416.01	416.66	416.45	427.91	433.54	464.02	457.86	473.50	494.45
Japan	2465.00	2753.62	2967.30	2869.83	2860.55	2845.39	3041.84	3029.71	3048.39	3072.45	3274.86	3387.37
Korea		675.69	1081.68	1052.58	1098.71	1169.18	1253.16	1307.38	1487.16	1601.06	1784.56	1875.34
Malaysia		604.67	883.67	926.47	916.44	1036.24	1040.84	1014.42	1100.04	1085.15	1104.97	1153.45
Mexico		1048.68	1463.64	1527.29	1549.87	1419.09	1450.82	1476.37	1411.79	1451.78	1440.13	1478.58
New Zealand	2562.77	2886.62	2958.56	2899.21	3055.21	3117.61	3301.77	3502.37	3526.70	3539.40	3657.70	3904.36
Peru		709.78	675.36	663.23	658.48	591.02	598.68	565.98	580.73	594.54	579.99	536.78
Philippines		410.24	441.59	386.23	451.03	463.97	427.61	421.95	411.73	434.79	448.42	456.75
Singapore		1838.27	2511.18	2478.48	2357.39	2594.93	2844.44	2856.73	3049.76	3202.16	3442.38	3358.24
Chinese Taipei		298.80	636.10	649.30	679.40	736.80	823.20	877.50	961.90	1150.40	1362.40	1642.10
Thailand		437.05	488.21	482.75	481.56	436.32	474.11	504.89	522.98	569.80	617.89	695.82
United States	7594.93	7688.67	7972.93	7677.16	7286.95	7229.64	7475.26	7488.56	7424.66	7673.50	7902.73	7948.00
Vietnam		404.41	364.49	362.81	367.64	371.60	369.90	368.04	374.56	383.56	379.57	366.91

Telephone mainlines (per 1,000 persons)												
Country / Region Name	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Australia	211.00	254.70	322.70	339.60	352.70	363.20	375.50	391.80	405.80	419.10	429.30	441.50
Canada	305.00	356.60	405.70	413.40	410.10	411.20	460.10	481.10	494.10	508.80	524.70	545.40
Chile	24.90	28.70	32.50	34.10	35.10	37.30	40.40	44.40	45.40	46.40	49.00	49.80
China		1.80	2.10	2.20	2.30	2.40	2.60	2.90	3.20	3.50	4.20	4.90
Colombia	27.90	35.20	40.50	41.80	46.50	45.70	51.80	57.20	59.10	62.50	65.70	65.70
Ecuador	15.00	23.80	28.50	29.50	30.90	30.70	29.80	29.50	30.70	34.90	39.20	45.20
Hong Kong, China	120.00	190.40	253.70	270.20	283.90	297.70	309.90	323.30	341.00	372.60	402.10	428.50
Indonesia	1.10	1.50	2.40	2.70	3.00	3.10	3.30	3.60	4.00	4.40	4.80	4.90
Japan	158.00	289.20	341.10	341.70	349.80	359.00	365.50	374.20	384.70	396.60	410.60	426.10
Korea	15.00	29.90	70.90	84.40	104.10	121.10	138.90	159.70	182.40	207.20	245.10	277.70
Malaysia	9.50	13.70	28.70	34.60	40.40	47.10	55.80	61.40	65.20	68.40	73.60	80.00
Mexico	17.00	27.90	40.20	42.80	44.30	46.10	47.70	49.50	51.10	51.40	52.90	57.50
New Zealand	298.00	319.70	361.40	371.60	376.20	379.90	386.60	395.70	405.10	421.50	426.60	432.10
Peru	10.60	15.70	17.40	18.10	18.20	19.40	20.10	21.10	22.30	22.30	23.60	25.00
Philippines	4.70	6.60	8.60	8.90	9.40	9.40	9.40	9.30	9.50	9.50	9.70	9.90
Singapore	51.30	92.90	222.20	232.70	242.90	258.60	278.00	294.20	307.80	319.30	329.80	340.50
Thailand	2.60	5.50	8.10	8.30	9.30	9.70	10.70	12.60	15.80	17.50	19.10	21.60
Chinese Taipei	23.80	64.70	188.7	224.5	249.6	268.4	289.1	305.0	318.9	319.9	342.8	363.3
United States	337.00	372.80	414.00	459.00	463.00	472.00	476.20	486.30	491.50	505.70	518.60	531.60
Vietnam					1.10	1.10	1.10	1.20	1.20	1.20	1.20	1.20

Personal computers (per 1,000 persons)												
Country / Region Name	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Australia											102.92	130.93
Canada								34.69	45.79	60.56	71.33	85.65
Chile											4.71	6.56
China											0.27	0.35
Colombia												
Ecuador												
Hong Kong, China											25.69	32.89
Indonesia											0.58	0.86
Japan								17.35	23.03	31.13	41.60	52.80
Korea											11.18	21.44
Malaysia											4.13	5.76
Mexico											4.47	5.81
New Zealand												
Peru												
Philippines											2.06	2.69
Singapore											42.16	54.59
Chinese Taipei												17.50
Thailand											1.91	2.80
United States								105.97	129.44	155.85	183.98	199.72
Vietnam												

Mobile phones (per 1,000 persons)												
Country / Region Name	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Australia								0.00	0.00	0.27	1.91	5.63
Canada								0.46	2.29	3.72	7.61	12.85
Chile								0.00	0.00	0.00	0.00	0.38
China								0.00	0.00	0.00	0.00	0.01
Colombia								0.00	0.00	0.00	0.00	0.00
Ecuador								0.00	0.00	0.00	0.00	0.00
Hong Kong, China								0.81	1.82	5.17	9.41	16.30
Indonesia								0.01	0.03	0.04	0.05	0.07
Japan								0.51	0.78	1.24	1.98	3.98
Korea									0.17	0.25	0.48	0.94
Malaysia									0.68	1.05	1.61	2.27
Mexico								0.00	0.00	0.00	0.02	0.10
New Zealand								0.00	0.00	0.74	3.03	8.65
Peru								0.00	0.00	0.00	0.00	0.00
Philippines								0.00	0.00	0.00	0.00	0.00
Singapore											3.80	8.97
Chinese Taipei												
Thailand								0.00	0.02	0.11	0.33	0.75
United States								1.43	2.83	5.07	8.45	14.19
Vietnam								0.00	0.00	0.00	0.00	0.00

Source: World Bank (2002). For Chinese Taipei, various national sources.

1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Country / Region Name
5129.53	5017.18	5040.65	5259.26	5216.51	5233.85	5520.64	5640.51	5566.48	5690.41		Australia
7523.66	7412.83	7500.21	7658.89	7852.73	7894.94	7993.99	7992.34	7846.92	7928.93		Canada
1040.54	1059.11	1144.93	1157.92	1229.21	1297.57	1396.58	1510.83	1531.40	1687.86		Chile
768.68	760.88	778.64	812.57	840.32	887.99	918.60	903.30	879.90	868.18		China
715.30	708.14	722.13	743.03	754.12	773.56	774.52	759.18	759.21	676.02		Colombia
636.69	635.73	649.46	617.72	652.20	666.23	674.13	667.84	734.21	704.96		Ecuador
1869.05	1934.56	2189.78	2382.65	2234.91	2239.12	2172.24	2162.72	2496.39	2661.33		Hong Kong, China
520.76	558.53	562.06	592.18	583.80	612.40	634.48	659.51	646.19	657.52		Indonesia
3552.18	3620.70	3678.41	3702.42	3869.57	3967.98	4063.58	4106.42	4042.50	4069.85		Japan
2141.87	2308.47	2593.07	2874.48	3050.05	3315.50	3610.34	3877.87	3550.18	3870.52		Korea
1233.66	1405.48	1556.80	1663.77	1647.94	1856.15	1873.33	2117.97	1965.19	1878.03		Malaysia
1492.17	1525.30	1530.12	1505.67	1528.03	1456.08	1478.02	1507.31	1553.72	1542.96		Mexico
4068.74	4074.83	4239.57	4178.48	4326.37	4372.86	4559.38	4685.60	4574.39	4769.73		New Zealand
516.30	510.99	486.30	515.77	531.97	569.61	566.67	606.42	577.96	519.26		Peru
463.52	452.79	468.87	479.26	504.67	518.24	515.11	563.30	535.99	548.93		Philippines
4383.66	4612.25	5056.00	6093.21	7238.53	6058.14	6010.35	6613.60	5596.23	5742.16		Singapore
1950.70	2271.40	2572.30	2888.10	3183.50	3437.00	3603.50	3907.50	4585.90	4913.60	5299.8	Chinese Taipei
777.44	822.86	869.14	906.31	964.52	1078.28	1168.23	1199.70	1111.76	1168.80		Thailand
7719.62	7686.00	7747.12	7829.49	7861.12	7878.29	7966.03	8015.42	8023.63	8158.65		United States
372.96	367.19	374.26	383.21	390.87	409.77	431.92	446.34	447.73	454.22		Vietnam

1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Country / Region Name
456.30	465.50	472.00	483.50	495.60	492.40	500.70	512.70	509.30	515.30	524.60	Australia
564.90	579.30	577.70	577.50	594.10	598.40	605.70	622.20	637.80	657.50	676.50	Canada
65.90	79.20	94.70	110.40	113.40	127.30	149.10	184.10	204.20	205.80	221.30	Chile
5.90	7.20	9.60	14.40	22.50	33.00	44.00	56.20	69.60	85.80	111.80	China
69.00	73.70	77.50	84.50	92.80	100.40	118.20	134.60	155.90	160.20	169.10	Colombia
47.70	46.80	49.40	54.40	58.60	60.90	64.10	68.50	81.30	91.00	100.00	Ecuador
450.10	478.50	486.10	507.00	521.80	532.40	546.80	555.50	564.40	580.40	583.10	Hong Kong, China
5.90	7.10	8.90	9.90	12.90	16.80	21.10	24.70	27.00	29.00	31.40	Indonesia
441.10	453.70	463.40	471.40	484.80	496.00	508.80	521.20	534.00	556.80	585.70	Japan
309.60	335.40	354.20	374.00	393.40	412.40	430.30	444.00	432.60	437.80	463.60	Korea
89.20	99.10	111.40	125.40	145.60	165.70	178.10	194.80	201.50	202.90	199.10	Malaysia
64.80	68.50	75.40	83.50	91.80	93.80	92.80	96.90	103.50	112.20	124.70	Mexico
433.60	434.60	440.40	451.00	463.00	473.40	484.00	485.60	492.50	495.70	499.80	New Zealand
26.10	24.50	27.30	29.70	33.10	47.10	59.90	67.50	62.70	64.50	63.70	Peru
10.00	10.40	10.30	13.10	16.50	20.50	25.50	28.60	34.10	38.80	40.00	Philippines
349.40	356.30	367.80	382.10	395.90	411.90	432.60	450.90	459.90	481.90	484.40	Singapore
24.20	28.10	32.10	39.30	48.30	60.50	71.50	82.10	84.80	86.90	92.20	Thailand
414.2	484.8	513.6	536.2	544.5	562.9	602.5	617.1	647.6	723.4	736.8	Chinese Taipei
544.50	551.80	561.20	573.80	588.80	607.20	621.70	643.70	665.30	672.90	699.70	United States
1.40	2.00	2.20	3.60	6.00	10.50	15.70	17.40	22.40	26.70	31.80	Vietnam

1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Country / Region Name
149.78	160.39	183.99	207.52	240.11	275.50	289.44	329.30	368.39	417.17	464.58	Australia
107.11	128.22	145.79	169.28	196.31	218.03	246.02	273.45	330.61	360.73	390.24	Canada
11.45	15.02	18.46	23.24	28.59	33.20	38.77	44.65	61.26	71.65	82.32	Chile
0.43	0.68	0.93	1.17	1.65	2.27	3.61	6.00	8.92	12.24	15.90	China
	1.91	3.72	6.37	9.80	13.09	14.96	16.75	18.48	20.14	21.75	Ecuador
47.29	59.76	75.86	99.98	124.27	154.32	190.14	228.51	257.32	300.08	350.56	Hong Kong, China
1.11	1.44	2.01	2.78	3.74	5.03	6.55	7.94	8.24	9.08	9.90	Indonesia
59.87	65.32	69.14	77.73	91.87	120.25	162.11	202.21	237.38	286.62	315.16	Japan
37.21	45.28	56.79	68.37	86.39	107.69	131.67	150.70	168.83	181.80	237.95	Korea
8.45	12.55	21.86	26.03	32.55	37.29	41.57	46.15	59.77	68.71	103.14	Malaysia
8.23	10.25	14.52	17.54	22.71	25.59	30.50	33.52	36.52	44.16	50.57	Mexico
	96.94	117.72	144.41	181.52	220.34	244.47	263.94	290.05	328.02	360.24	New Zealand
	3.46	4.18	5.22	6.28	7.92	9.62	11.56	13.39	15.08	16.92	Peru
66.30	74.44	94.40	107.38	148.65	201.87	263.01	331.84	375.10	436.61	483.11	Singapore
21.42	30.06	37.21	43.31	54.18	63.92	76.52	96.03	109.30	228.70	294.60	Chinese Taipei
4.22	5.44	8.08	10.12	11.95	14.09	17.21	20.44	21.91	23.04	24.27	Thailand
216.84	233.54	252.56	272.00	297.39	328.09	363.91	406.87	458.84	517.07	585.18	United States
		0.14	0.28	0.69	1.36	3.33	4.57	6.45	7.62	8.77	Vietnam

1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Country / Region Name
10.84	16.86	28.41	39.07	68.33	124.06	217.90	247.14	262.57	333.47	446.94	Australia
21.56	28.42	36.51	46.05	64.26	88.23	117.88	142.25	177.39	226.64	284.60	Canada
1.06	2.71	4.76	6.19	8.27	13.82	22.16	28.02	64.63	149.57	222.23	Chile
0.02	0.04	0.15	0.53	1.30	2.95	5.50	10.58	19.00	34.18	65.82	China
0.00	0.00	0.00	0.00	2.29	7.12	13.31	31.57	44.09	47.29	53.33	Colombia
0.00	0.00	0.00		1.69	4.75	5.11	10.60	19.94	30.87	38.13	Ecuador
24.36	34.35	40.22	49.29	80.33	129.69	215.79	339.70	480.49	641.42	809.16	Hong Kong, China
0.10	0.14	0.19	0.29	0.41	1.08	2.84	4.55	5.17	10.61	17.30	Indonesia
7.02	11.11	13.77	17.08	34.60	93.27	213.82	303.34	374.33	448.84	526.20	Japan
1.87	3.82	6.18	10.58	21.41	36.39	69.84	149.57	301.93	500.29	566.94	Korea
4.88	7.09	10.69	17.70	29.08	49.98	71.81	92.29	101.15	136.97	213.18	Malaysia
0.77	1.83	3.49	4.23	6.16	7.34	10.75	18.24	34.95	79.41	142.37	Mexico
15.97	21.05	28.77	40.72	66.80	100.53	133.86	149.44	208.31	366.07	563.33	New Zealand
0.08	0.26	0.96	1.60	2.24	3.13	8.39	17.31	29.67	32.53	47.64	Peru
0.00	0.56	0.88	1.57	2.57	7.20	13.69	18.55	23.77	38.28	84.37	Philippines
17.15	26.51	37.76	54.92	70.06	88.25	119.33	227.10	283.19	418.84	683.82	Singapore
	9.60	18.50	25.70	27.60	36.10	45.10	68.60	215.60	522.40	802.40	Chinese Taipei
1.16	2.24	4.50	7.35	12.96	22.57	31.75	37.53	33.31	39.01	50.42	Thailand
21.14	29.91	43.20	62.03	92.61	128.44	165.92	206.47	256.10	315.55	397.91	United States
0.00	0.00	0.01	0.06	0.17	0.32	0.92	2.10	2.87	4.18	9.88	Vietnam

Appendix Table 2. Expenditures on Infrastructure

Public spending on education, total (% of GDP)											
Country / Region Name	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988
Australia	3.82	5.70	5.24	5.17	5.49	5.38	5.32	5.22	5.07	4.75	4.58
Canada	8.49	7.46	6.70	6.77	7.14	6.91	6.53	6.33	6.61	6.47	6.36
Chile	4.80	3.95	4.46	5.19	5.27	4.53	4.34	3.83	3.56	3.04	3.07
China	1.25	1.73	2.51	2.51	2.59	2.61	2.51	2.51	2.57	2.27	2.17
Colombia	1.88	2.16	1.85	2.61		2.83	3.04	2.75	2.64	2.49	
Ecuador	4.13	3.14	5.31	5.00	4.57	3.47	3.71	3.42	3.27	3.23	2.79
Hong Kong, China	2.43	2.53	2.43	1.81	2.76	2.77	2.73	2.77	2.80	2.50	2.58
Indonesia	2.62	2.68	1.65	1.97							0.83
Japan	3.89	5.43	5.72	5.71	5.49	5.48	5.14	4.95	4.82	4.76	4.58
Korea	3.51	2.15	3.64	3.09	3.79	4.61	4.32	4.34	3.97	3.72	3.06
Malaysia	3.98	5.74	5.72	6.59	6.92		5.57	6.03	7.14	6.35	5.63
Mexico	2.43	3.71	4.57	5.02	4.99	3.60	3.85	3.73	3.57	3.29	3.02
New Zealand	4.67	5.69	5.66	5.39	5.22	4.85	4.44	4.48	4.78	5.16	5.47
Peru	3.22	3.27	2.95	3.09	2.80	2.85	2.79	2.68	3.02	3.47	3.54
Philippines	2.74	1.99	1.72	2.09	2.07	1.84	1.32	1.32	1.73	2.04	2.75
Singapore	3.18	2.91	2.74	3.45	4.16		4.42	4.56	4.22	3.87	3.39
Chinese Taipei				3.69	4.23	4.62	3.97	4.10	4.21	3.80	3.95
Thailand	3.21	3.50	3.39	3.67	3.85	3.83		3.73	3.64	3.36	3.03
United States	7.39	7.34	6.60	6.37	6.57	6.53	6.36	4.78	6.56	4.85	4.98
Vietnam											

Health expenditure, public (% of GDP)											
Country / Region Name	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988
Australia											
Canada											
Chile											
China											
Colombia											
Ecuador											
Hong Kong, China											
Indonesia											
Japan											
Korea											
Malaysia											
Mexico											
New Zealand											
Peru											
Philippines											
Singapore											
Chinese Taipei											
Thailand											
United States											
Vietnam											

Information and communication technology expenditure (% of GDP)											
Country / Region Name	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988
Australia											
Canada											
Chile											
China											
Colombia											
Hong Kong, China											
Indonesia											
Japan											
Korea											
Malaysia											
Mexico											
New Zealand											
Philippines											
Singapore											
Thailand											
United States											
Vietnam											

Source: World Bank (2002). For Chinese Taipei, various national sources: "Statistical Abstract of Transportation and Communications, 2001, Republic of China", Ministry of Transportation and Communication. "Taiwan Energy Statistics (2002)", Ministry of Economic Affairs. Recalculated from "Computer Application Status Report (in Chinese)" and "National Computer Resource Survey (in Chinese)", Directorate-General of Budget, Accounting and Statistics, Executive Yuan. "Statistics of the Republic of China (2002)", Ministry of Education. "National Medical & Healthcare Expenditure (2000)", Department of Health, Executive Yuan.

1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Country / Region Name
4.68	4.88	5.03	5.46	5.18	5.05	5.11			4.77			Australia
6.23	6.51	7.10	7.27	6.97	6.61				5.61			Canada
	2.51	2.54	2.68	2.66	2.90	2.97	3.28	3.51	3.74			Chile
2.21	2.34	2.23	2.02	1.86	2.39	2.24	2.29					China
2.71	2.39	2.40	3.38	2.82	2.85	3.09	3.51					Colombia
2.60	2.84	2.42	2.54	2.60	3.15	3.20	3.22					Ecuador
2.54	2.84	2.92	2.85	2.79		2.92						Hong Kong, China
0.82	0.99	1.04	1.25	1.71	1.37	1.33	1.34		1.43			Indonesia
			3.53	3.70	3.53				3.48			Japan
3.47	3.44	3.95	4.08	4.24	3.48	3.40			4.07			Korea
5.21	5.07	5.12	5.11	4.69	4.79	4.38	4.91	4.62				Malaysia
3.21	3.61	3.83	4.28	4.97								Mexico
7.33	6.16	6.94	7.12	6.64	6.38	7.06	6.80		7.17			New Zealand
3.14	2.77	2.76	2.73	3.00	4.16		3.12		3.20			Peru
2.86	2.88	2.97	2.34	2.46		3.04	3.36	3.56	3.20			Philippines
3.03	3.09	3.81	3.25	3.12	3.11	3.07						Singapore
4.29	4.79	5.34	5.58	5.79	5.56	5.36	5.47	5.21	4.92	4.92	4.10	Chinese Taipei
3.23	3.55	3.51	3.88	4.06	3.73	4.05	4.66		4.70			Thailand
5.01	5.09		5.24	5.09	5.16				5.01			United States
	2.03	1.80	2.00	2.65	2.58	2.93	2.87	2.78				Vietnam

1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Country / Region Name
	5.31	5.47	5.48	5.44	5.48	5.55	5.57	5.71	6.01			Australia
	6.75	7.28	7.46	7.24	6.93	6.6	6.39	6.29	6.54	6.57		Canada
	2.17	2.27	2.4	2.49	2.55	2.45	2.98	3	2.73			Chile
	2.15	2.08	1.98	2.05	2.06	1.92	1.92	1.97	2.03	2.08		China
	1.18	1.13	1.12	3.55	3.25	3.52	4.21	5.05	5.17			Colombia
	1.53	1.43	1.74	1.62	2.55	2.56	2.2	1.89	1.67			Ecuador
	1.6	1.62	1.74	2.06	1.9	2.25	2.1					Hong Kong, China
	0.57	0.63	0.73	0.68	0.66	0.63	0.66	0.63	0.75	0.75		Indonesia
	4.59	4.65	4.84	5.1	5.28	5.47	5.58	5.74	5.65			Japan
	1.75	1.49	1.59	1.58	1.56	1.7	1.92	2.06	2.38	2.38		Korea
	1.49	1.5	1.58	1.39	1.28	1.23	1.36	1.32	1.43			Malaysia
	1.79	2.21	2.59	2.53	2.63	2.34	2.24	2.31	2.56			Mexico
	5.79	6.14	6	5.55	5.63	5.64	5.63	5.87	6.25	6.27		New Zealand
	1.28	2.68	2.89	2.58	2.49	2.52	2.42	2.45	2.4			Peru
	1.49	1.26	1.21	1.38	1.39	1.36	1.45	1.56	1.52	1.56		Philippines
	0.98	1.34	1.21	1.05	1.03	1.24	1.18	1.14	1.15			Singapore
			4.77	4.88	4.93	5.27	5.29	5.27	5.33	5.46	5.44	Chinese Taipei
	0.95	1.07	1.22	1.11	1.26	1.26	1.77	1.77	1.87			Thailand
	4.71	5.19	5.5	5.71	5.9	6.03	6.04	5.92	5.78	5.72		United States
	0.88	0.83	0.96	1.18	1.1	1.07	1.07	0.97	0.79			Vietnam

1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Country / Region Name
			7.2	7.6	7.7	7.6	7.6	8.2	9.3	9.3	9.3	9.7 Australia
			6.8	6.7	7.0	7.0	7.2	7.5	8.4	8.6	8.4	8.4 Canada
			4.6	5.2	4.8	4.2	4.6	4.9	5.6	7.1	7.8	7.8 Chile
			1.9	1.6	2.2	2.9	3.1	3.1	4.2	4.8	5.4	5.4 China
			4.4	4.2	3.1	3.2	4.3	5.8	7.4	10.1	12.0	12.0 Colombia
			5.0	5.9	5.9	6.1	6.7	7.0	7.5	8.0	8.8	8.8 Hong Kong, China
			1.7	1.8	2.1	2.1	2.0	2.2	1.9	2.0	2.2	2.2 Indonesia
			5.7	5.2	5.1	5.3	6.4	7.3	8.0	8.0	8.3	8.3 Japan
			4.8	4.7	4.6	4.7	5.9	5.7	6.3	6.0	6.6	6.6 Korea
			4.7	4.6	4.8	5.0	5.4	5.4	6.6	6.7	6.8	6.8 Malaysia
			3.2	3.4	3.6	3.7	3.9	3.6	3.5	3.4	3.2	3.2 Mexico
			9.1	8.6	8.6	8.4	7.9	8.5	10.7	11.9	13.6	13.6 New Zealand
			2.2	2.4	2.4	2.6	2.8	3.0	3.0	3.2	3.8	3.8 Philippines
			6.8	6.8	6.7	6.9	7.3	7.8	9.0	9.6	9.7	9.7 Singapore
			2.9	2.8	2.7	2.7	2.9	2.9	2.8	3.2	3.6	3.6 Thailand
			7.5	7.3	7.4	7.5	7.7	7.7	8.2	8.2	8.1	8.1 United States
			2.2	2.4	2.8	3.6	4.1	5.0	4.8	6.1	6.5	6.5 Vietnam

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PACIFIC ECONOMIC COOPERATION COUNCIL

The Pacific Economic Cooperation Council (PECC) was founded in 1980 at the initiative of the Prime Ministers of Japan and Australia, with the aims of serving as a regional forum for cooperation and policy coordination to promote economic development in the Asia-Pacific Region.

PECC is a unique tripartite partnership of senior individuals from business and industry, government, academic and other intellectual circles in 25 Asia-Pacific Economies¹. All participate in their private capacity and discuss freely on current, practical policy issues in search of broad-based answers to regional economic problems.

PECC advocated the need for a formal, intergovernmental organization in the Pacific from the time of its creation. The regional ministerial process of the Asia Pacific Economic Cooperation (APEC) has realized that goal and now provides PECC with a formal channel by which its practical recommendations can be implemented. PECC is the only non-governmental official observer of APEC since the formation of APEC. PECC has provided information and analytical support to APEC ministerial meetings and working groups.

PECC's substantive work is carried out through a range of forums, task forces and project groups. These cover trade and investment policy, financial and capital markets, community building activities for sustainable cities, human resource development, and digital divide resolution, as well as outlooks for the Pacific economy and food system.

Pacific Economic Outlook (PEO) is among these PECC activities and has twin task forces of PEO/Forecast and PEO/Structure, respectively dealing with short-term and longer-term macro-economic issues in the Pacific region.

The groups of PECC activities meet periodically to organize seminars or workshops, conduct studies and publish their research outcomes and recommendations for the benefit of the Pacific community.

PECC member committees and PECC work groups send tripartite delegations to the PECC General Meetings held every two years. In the interim, policy matters are handled by a Standing Committee², and day-to-day administrative and coordinating functions are carried out by the International Secretariat based in Singapore.

¹ The PECC Economies include Australia, Brunei Darussalam, Canada, Chile, China, Colombia, Ecuador, Hong Kong China, Indonesia, Japan, Korea, Malaysia, Mexico, New Zealand, Peru, The Philippines, Russia, Singapore, Pacific islands Forum, Chinese Taipei, Thailand, The United States and Viet Nam. France (Pacific Territories) and Mongolia are Associate Members. The Pacific Basin Economic Council (PBEC) is the regional business organization, and the Pacific Trade and Development Conference (PAFTAD) is the region-wide organization of academic economists, both of which are Institutional Members.

² The Standing Committee is PECC's governing body, which meets twice a year. It includes the Chairs of PECC Committees in each of the 23 full member economies. PBEC and PAFTAD also have seats on Standing Committee.

For more information on PECC, please contact the
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KANSAI INSTITUTE FOR SOCIAL AND ECONOMIC RESEARCH (KISER)

BACKGROUND

The Kansai Institute for Social and Economic Research (KISER) is a nonprofit organization in Kansai (the region centered in Osaka, Kobe and Kyoto) that has its objectives in contributing to the development of the national and regional economies through academic advances.

KISER was established April 2002 as a result of the consolidation of the three research institutions in the region: the Kansai Economic Research Center (KERC), the Center for Industrial Renovation of Kansai (CIRK) and the Socio-Economic Research Institute in Kansai.

KISER promotes research projects through the collaboration of academia and local business community under governmental cooperation. The necessary funds for KISER are raised through membership fees from approximately 200 leading firms in various industries from all over Japan.

PURPOSE AND ACTIVITIES

KISER is currently engaged in the following projects:

- Conducting theoretical and empirical research on social and economic issues in Japan and overseas, including economic policies and regional development.
- Making proposals on both national and regional policies formulated through its flexible research capabilities that take advantage of its academic, industrial and governmental networks.
- Supporting and fostering researchers at universities, research institutions and private companies by inviting their participation in KISER research programs.
- Providing administrative and financial support

for academic research.

- Encouraging research exchange among Japanese and overseas economists, as well as among foreign residents in Kansai.
- Carrying out research commissioned by government agencies, regional public institutions, and private enterprises.
- Hosting seminars and symposiums by inviting specialists from all over the world.

KISER HIGHLIGHTS

<RESEARCH FOR POLICY PROPOSAL>

* **Policy agenda for the national and local governments**
(Discussion on policy agendas addressing the most pressing and challenging contemporary themes. Topics include structural reform and macro-economic policy, international trade, national security, among others. Some of the findings of these discussions are also published in the opinion paper “Nouvelle Epoque”).

* **Issues for public administrative and fiscal reforms and for local government’s initiatives.**

* **Proposals for revitalization of industrial competitiveness and for regional development strategies.**

* **Research and investigation on other social and economic issues** (social security, university reform problems).

<ECONOMIC ANALYSIS>

* **Macroeconomic analysis of the Japanese economy.**

* **Quantitative analysis of the regional economy.**

* **Compilation and publishing of a variety of data on regional economy** (“White Paper on Industrial Revitalization of Kansai”).

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Co-Chairperson, Kansai Association of Corporate Executive

<MEMBER SERVICE AND PUBLIC INTEREST >

OKUI, Isao
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RESEARCH DIRECTOR

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* **Sponsoring professional conferences and academic meetings** (Modern Economic Policy Conference).

* **Promoting International Academic Exchange** (PECC-PEO (Pacific Economic Cooperation Council — Pacific Economic Outlook)).

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* **Encouraging interactions among academia, business communities, and governmental bodies.**

* **Public affairs** (publishing the newsletter “KISER”, maintaining our website).

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