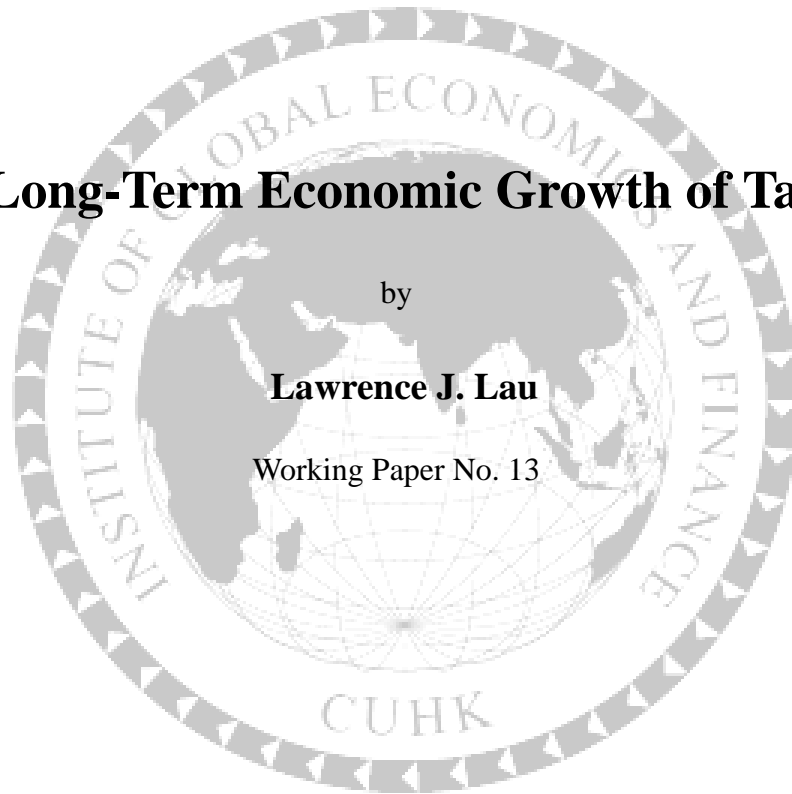


The Long-Term Economic Growth of Taiwan

by

Lawrence J. Lau

Working Paper No. 13



December 2012

Institute of Global Economics and Finance
The Chinese University of Hong Kong
13/F, Cheng Yu Tung Building, 12 Chak Cheung Street, Shatin, Hong Kong

Acknowledgements

The Institute of Global Economics and Finance is grateful to the following individuals and organizations for their generous sponsorship (in alphabetical order):

Individuals	Organizations
Johnson Cha	BCT Financial Limited
Vincent H.C. Cheng	Bei Shan Tang Foundation
C.K. Chow	China Development Bank
Fang Fang	Henderson Land Development Co. Ltd.
Victor K. Fung	King Link Holding Limited
Frederick Hu	Sun Hung Kai Properties Ltd.
Lawrence J. Lau	The Bank of East Asia, Limited
David K.P. Li	The Hongkong and Shanghai Banking Corporation Limited
K.L. Wong	



The Long-Term Economic Growth of Taiwan

Lawrence J. Lau*

December 2012

1. Introduction

In this paper, we shall provide a review of the historical experience of economic growth in Taiwan. While there has definitely been a slow down in the rate of growth of real GDP in Taiwan, it is not so clear whether there has been a real slow down in the rate of growth of aggregate social welfare. We shall also consider the question: What does the future hold for the Taiwan economy?

Taiwan has over the past sixty odd years grown into a developed economy. It is currently faced with many problems, but looking back over this long period of time, it has been a most successful experience. Between 1951 and 2011, the annual real GDP of Taiwan grew almost 73 times, from US\$6.4 billion to US\$466 billion (in 2011 prices), at an average annual compound rate of 7 percent. This is a most impressive achievement.

The industrialisation of Taiwan has followed those of Japan and Hong Kong, and has preceded South Korea and other Southeast Asian countries as well as Mainland China. In 1950, the Philippines had the highest GDP per capita of any economy in Asia. Today, the GDP per capita of the Philippines is among the lowest in Asia. The Philippines was, at the time, tipped to be the economy most likely to develop by development economists in the West. By comparison, during the same period, Mainland Chinese annual real GDP grew almost 106.2 times, from US\$70.6 billion in 1952 to more than US\$7.5 trillion (2011 prices), at an average annual

* The author is Ralph and Claire Landau Professor of Economics, The Chinese University of Hong Kong and Kwoh-Ting Li Professor in Economic Development, Emeritus, Stanford University. This is a slightly revised version of a lecture delivered at the Institute of Economics, Academia Sinica in Taipei, 4th October 2012. All opinions expressed herein are the author's own and do not necessarily reflect the views of any of the organisations with which the author is affiliated.

compound rate of 7.8 percent, to become the second largest economy in the World, after the United States.

We shall identify several areas of increases in aggregate social welfare in Taiwan that are not reflected in the conventional real GDP measurements. Looking ahead, we would also consider the question: From where will further economic growth come in the future?

The paper is organised as follows. In the next section, an overview of the economic growth of Taiwan is provided. Section 3 covers the economic growth with surplus labour in Taiwan, followed by a review of the tangible capital-driven growth in section 4. Section 5 explains the role of international trade in Taiwan. Section 6 and 7 discuss the intangible capital-driven growth in Taiwan and the value of leisure and public goods respectively. In section 8, comments on future opportunities and challenges for Taiwan are given. Section 9 concludes.

2. An Overview of the Economic Growth of Taiwan

In Chart 1, the real GDP of Taiwan and its annual rate of growth from 1952 to 2011 are presented. Despite some occasional setbacks, on the whole, the experience has been a most successful one.

Chart 1: Real GDP of Taiwan and Its Rate of Growth (2011US\$)

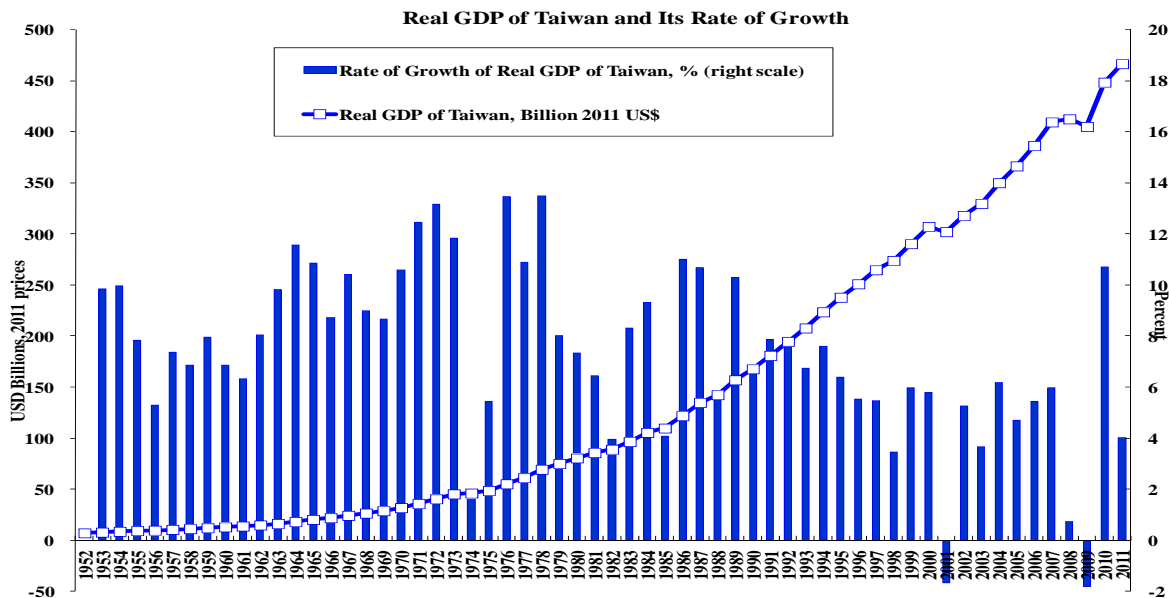
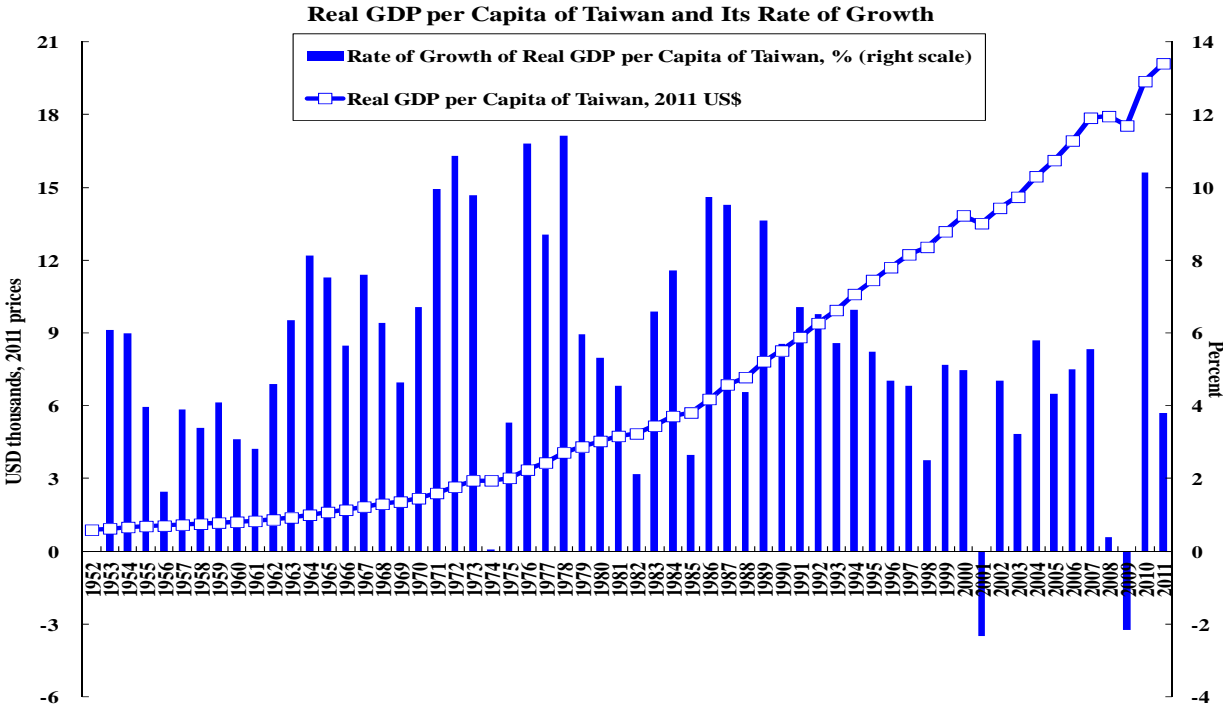


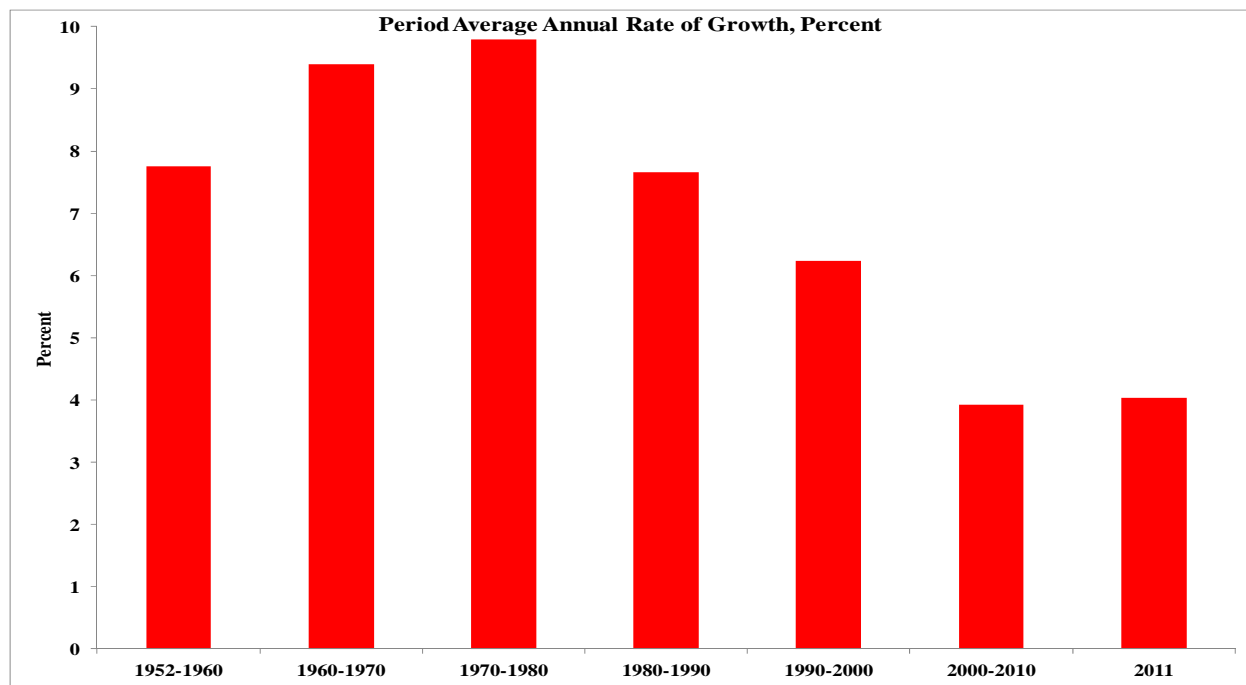
Chart 2 shows the real GDP per capita of Taiwan and its rate of growth over time. In terms of its real GDP per capita, US\$20,110 (in 2011 prices), Taiwan is considered a developed economy. Between 1952 and 2011, Taiwan real GDP per capita grew 22.6 times, from US\$890 to US\$20,110, at an average annual compound rate of 5.2%. By comparison, the Mainland GDP per capita in 2011, US\$5,555, was 45.2 times Mainland GDP per capita of US\$122.8 in 1952, with an average annual compound rate of growth of 6.4% (Note that the rate of growth of population has been lower on the Mainland than in Taiwan). In 2011, Taiwan real GDP per capita was almost four times the Mainland real GDP per capita.

Chart 2: Real GDP per Capita of Taiwan and Its Rate of Growth (2011US\$)



It is instructive to examine the average annual rate of growth of the Taiwan economy decade by decade. From Chart 3, it is quite clear that the rate of growth of measured real GDP has been declining over time. The highest rate of growth occurred between the 1960s and the 1980s and the first decade of the 21st Century had the lowest rate of growth.

Chart 3: Period Average of the Annual Rate of Growth of the Real GDP of Taiwan



There are many reasons for the slow down. It is due, in part, to the fact that the real GDP as measured is not able to include the non-pecuniary improvements in aggregate social welfare. We shall present the case that increases in aggregate social welfare have been significantly higher than increases in real GDP per se.

It is also instructive to compare the evolution of the real GDP and real GDP per capita of Taiwan with those of the Mainland, Hong Kong and Macau (see Charts 4 and 5). Taiwan's real GDP has remained higher than those of Hong Kong and Macau over the years. However, Taiwan's real GDP per capita has lagged behind those of Hong Kong and Macau but remained ahead that of the Mainland by a significant margin. It was almost four times the Mainland real GDP per capita in 2011.

Chart 4: The Real GDPs of Taiwan, Mainland, Hong Kong & Macau (2011US\$)

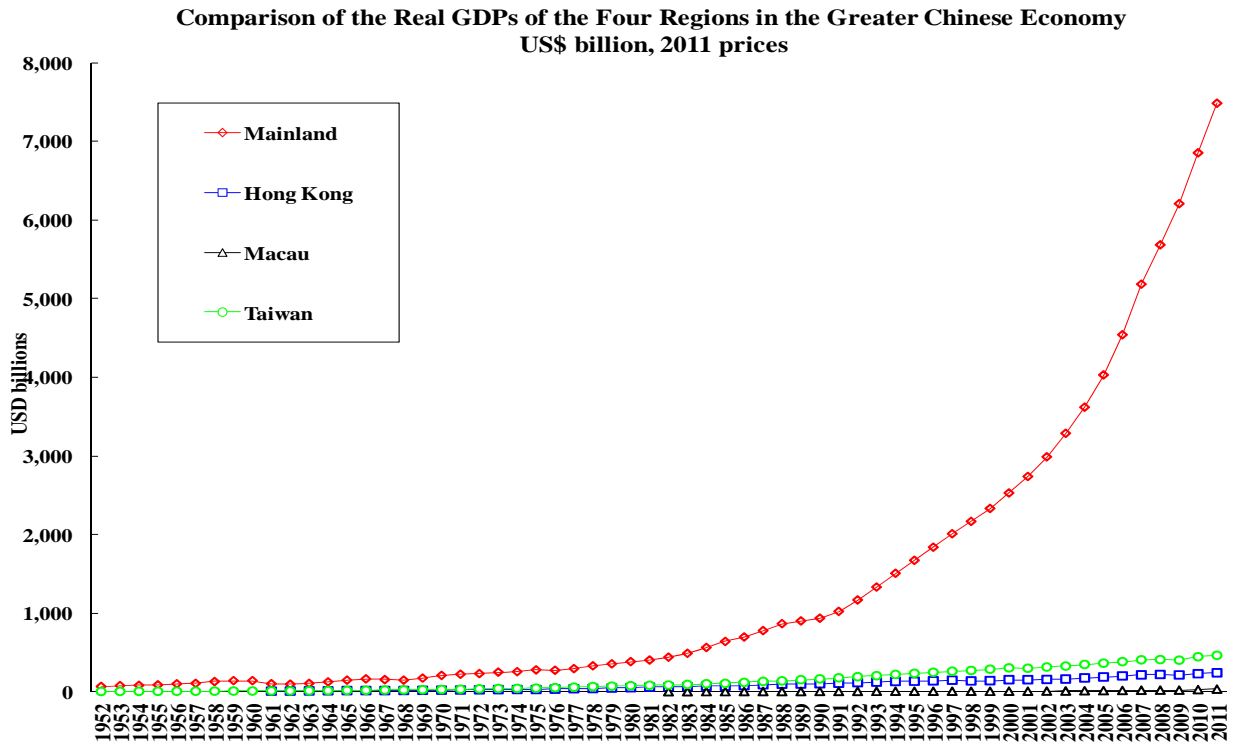
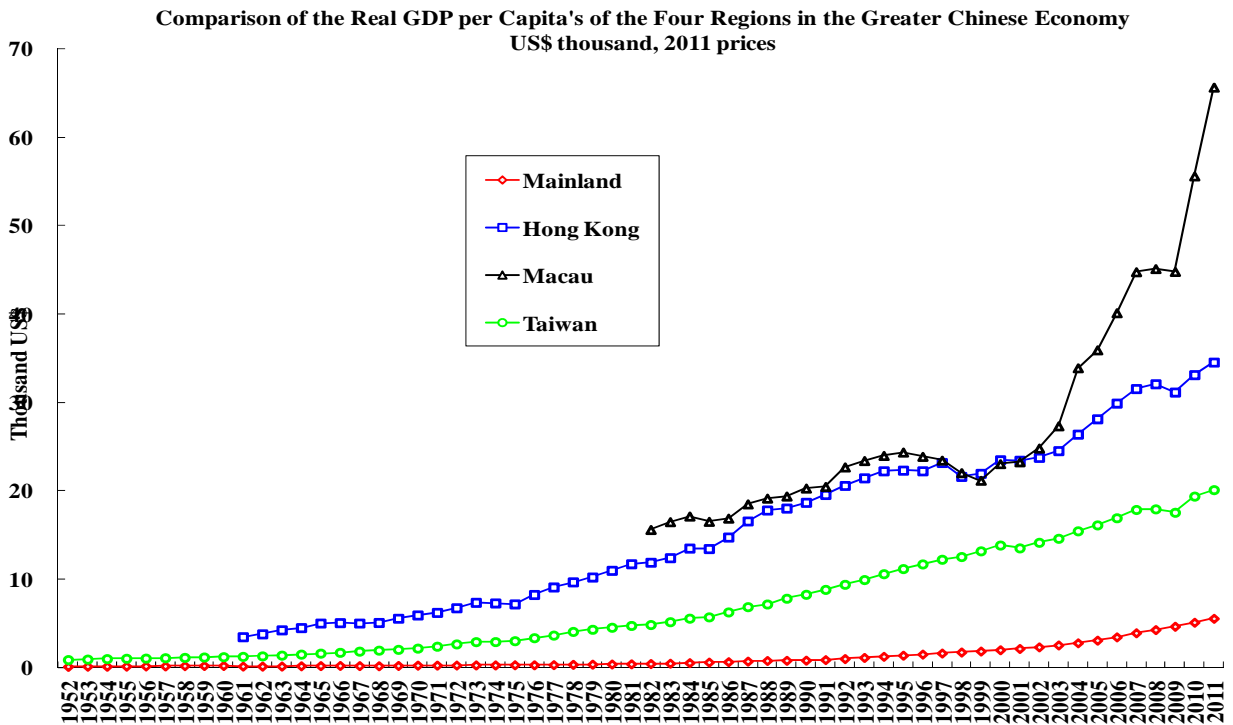


Chart 5: The Real GDP per Capita's of Taiwan, Mainland, Hong Kong & Macau (2011US\$)



3. Economic Growth with Surplus Labour

In the 1950s, Taiwan had a supply of surplus labour, especially as a result of the increased agricultural productivity that occurred after the land reform. This fitted into the classic case of economic development with surplus labour as described and analyzed by the late Professor W. Arthur Lewis, Nobel Laureate in Economic Sciences in 1979.

It is important to remember that the principal source of economic growth during this phase is not the surplus labour itself, but the accumulation of tangible capital in the non-agricultural sector, which made it possible for the non-agricultural sector to employ the surplus labour productively and profitably at the constant institutional real wage. During this phase, tangible capital was accumulated in the non-agricultural sector and surplus labour moved from the agricultural sector to the non-agricultural sector as the complementary tangible capital became available. A relatively high domestic savings rate was critically needed in this phase, unless it was supplemented by foreign aid, foreign investment, or foreign loan. U.S. aid was an important factor during this period. The tangible capital-labour ratio in the non-agricultural sector remained more or less constant in real terms during this phase. However, this surplus labour began to be exhausted in the 1970s.

4. Tangible Capital-Driven Growth

This was followed by a phase in which the tangible capital-labour ratio in the non-agricultural sector began to rise. The growth in tangible capital was therefore also the principal source of growth of the real GDP during this phase. This phase continued until the 1980s when the importance of intangible capital was recognised. The Hsinchu Science Park was established during this period and attracted many high-technology firms to establish themselves there.

Taiwan has consistently had a high national savings rate of approximately 30% since 1970. This savings rate is more than adequate to finance all of its domestic investment needs, even as U.S. aid was phased out beginning in the mid-1960s. Taiwan has not had to depend on foreign direct investment, foreign portfolio investment, or foreign loans since then.

The actual national savings rate of Taiwan in recent years is probably higher than the measured national savings rate because of the expensing of educational and R&D expenditures which properly speaking should have been recognised as investment rather than consumption expenditures.

Chart 6: Savings Rates of Selected Asian Economies (1952-present)

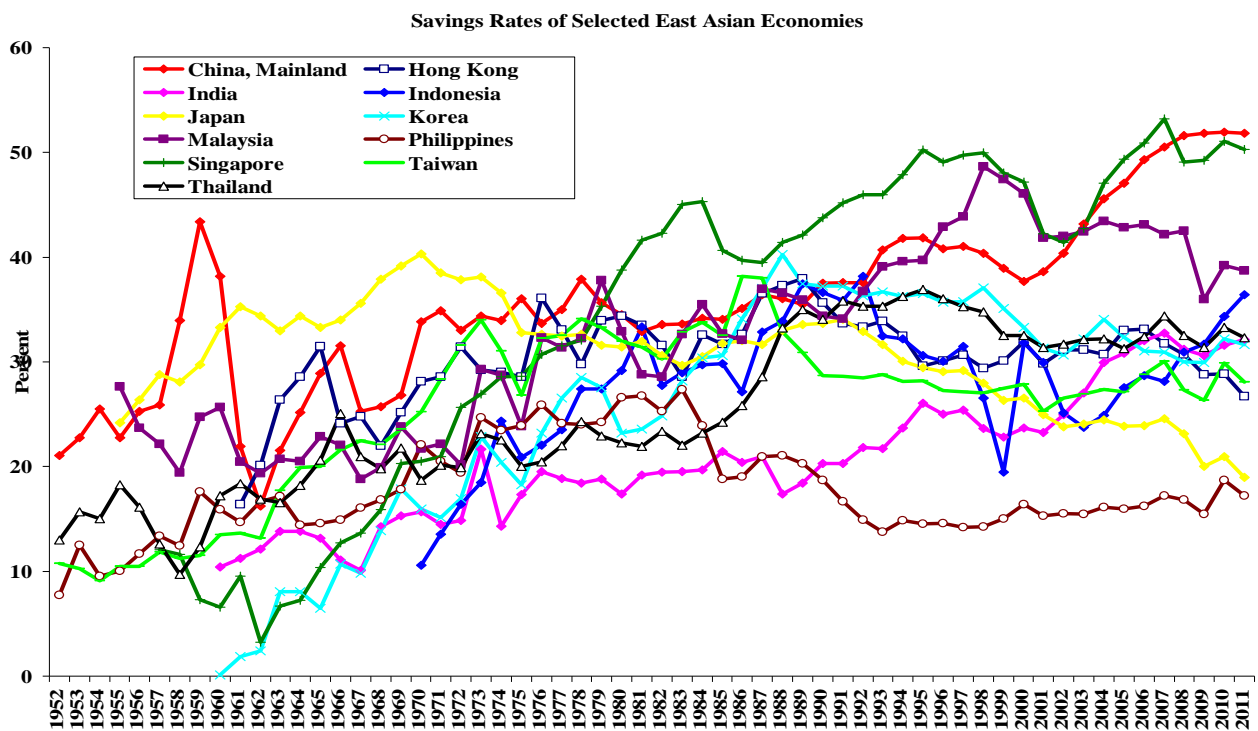
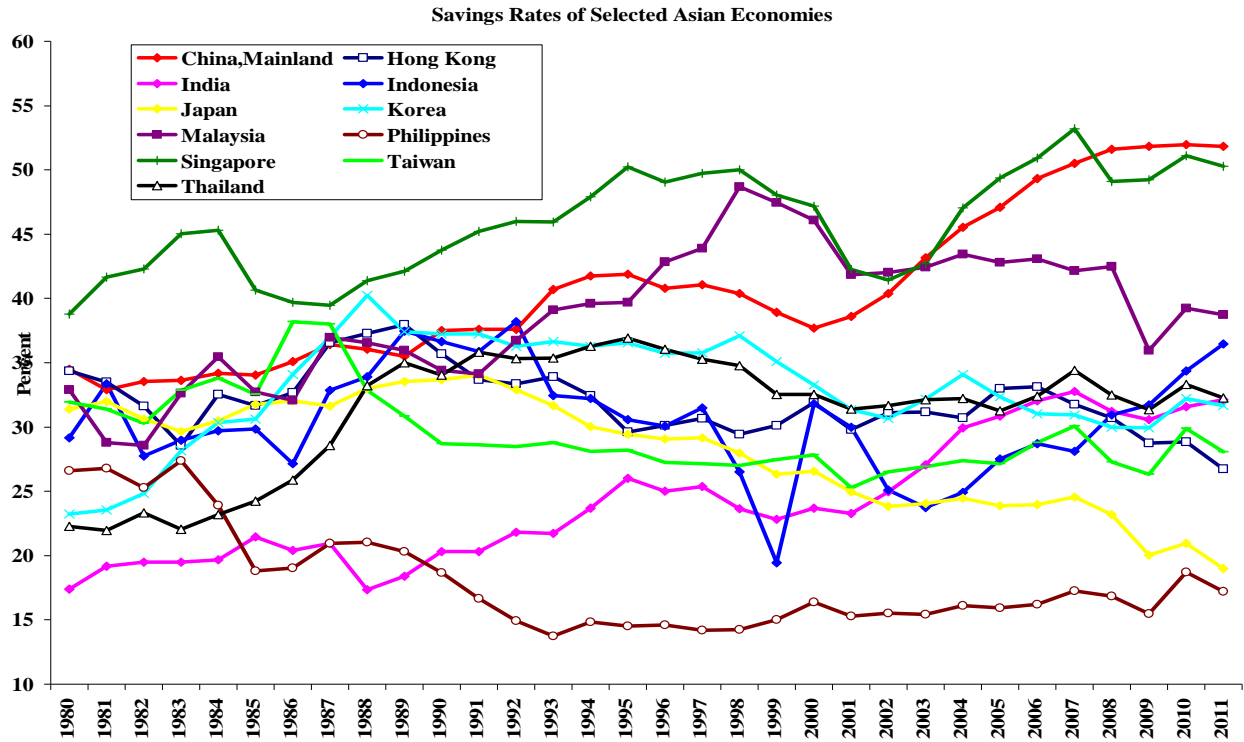


Chart 7: Savings Rates of Selected Asian Economies (1980-present)

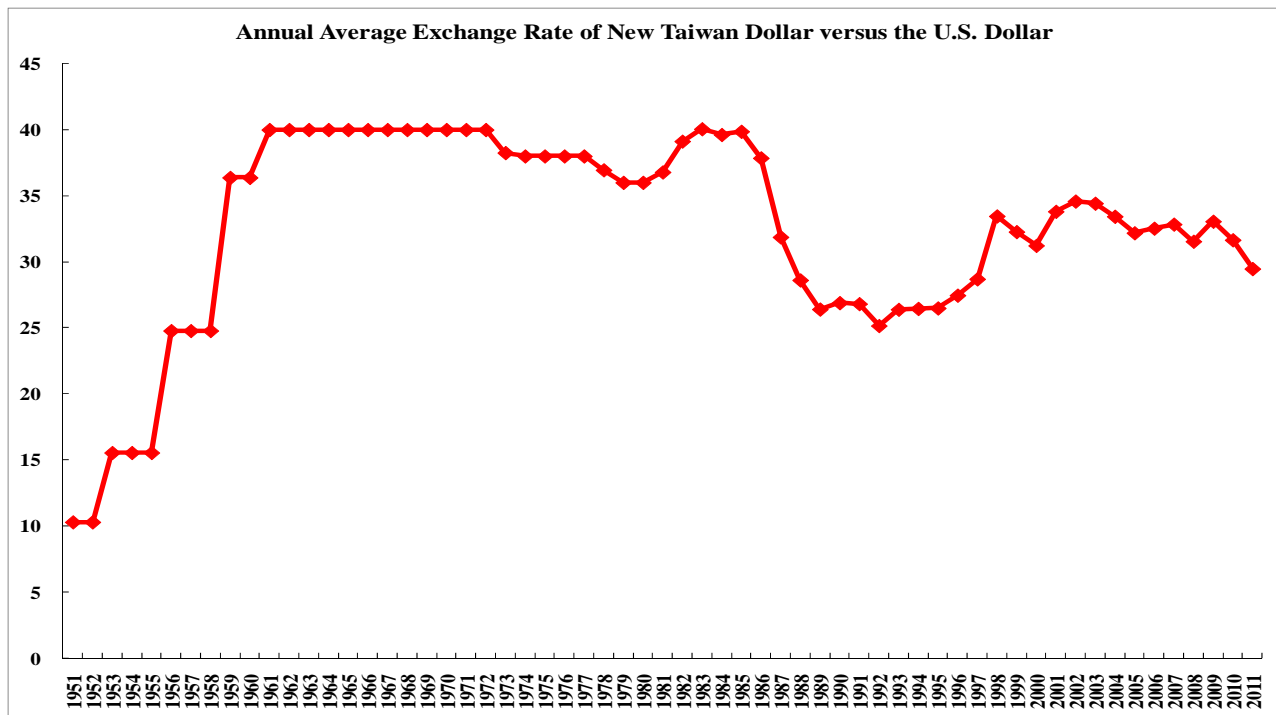


5. The Role of International Trade

The shift from an import substitution to an export promotion strategy, pioneered in Taiwan, played a critical role in its economic development. This shift occurred in the 1950s, when the New Taiwan Dollar was successively devalued from NT\$10 per US\$ in 1952, to NT\$24 in 1956, NT\$36 in 1960 and finally NT\$40 per US\$ in 1961 (see Chart 8).

However, the benefits of international trade go beyond the macroeconomic effects of export surpluses. Even if international trade is balanced or in deficit, it still brings significant benefits, some of which are not reflected in the conventional measurements of the real Gross Domestic Product (GDP).

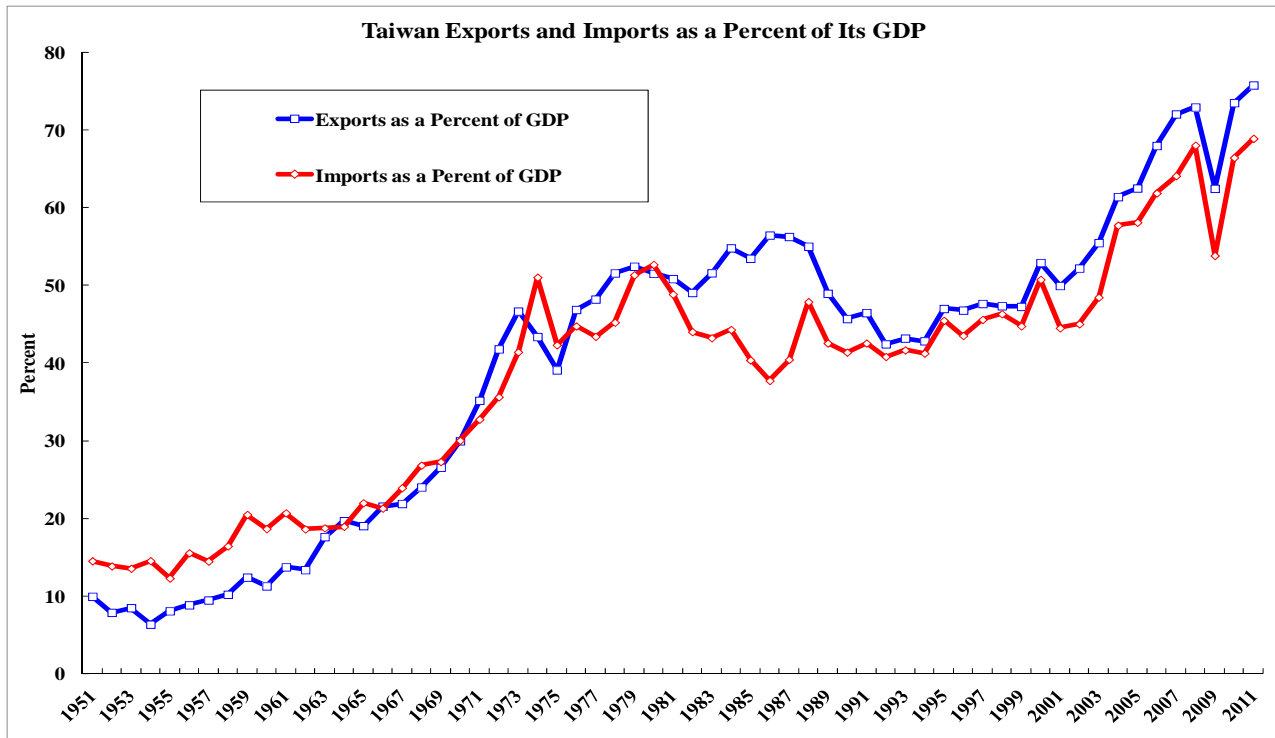
Chart 8: The New Taiwan Dollar/U.S. Dollar Exchange Rate, Annual Average, NT\$/US\$



The exchange rate adjustments triggered a significant increase in the share of exports to GDP, from less than 10 percent in 1951 to almost 50 percent in 1973, when the first oil shock occurred. Then beginning in 2001, the share of exports in GDP resumed its climb to more than 75 percent in 2011, helped by the entry of Mainland China and Taiwan into the World Trade Organisation (WTO). Similarly, the share of imports in GDP also increased from 15 percent in 1951 to almost 70 percent in 2011, consisting mostly of fuel, raw materials, components and parts, and semi-finished goods as well as capital goods.

The increases in both export and import shares in GDP indicate that the economy of Taiwan is increasingly specialised and benefits from such specialisation. They also reflect the rapid growth as well as globalisation of World trade, driven in part by the entry of new players such as Mainland China, Russia and India increasing fragmentation of production and finer division of labour.

Chart 9: Exports and Imports as a Percent of Taiwan GDP

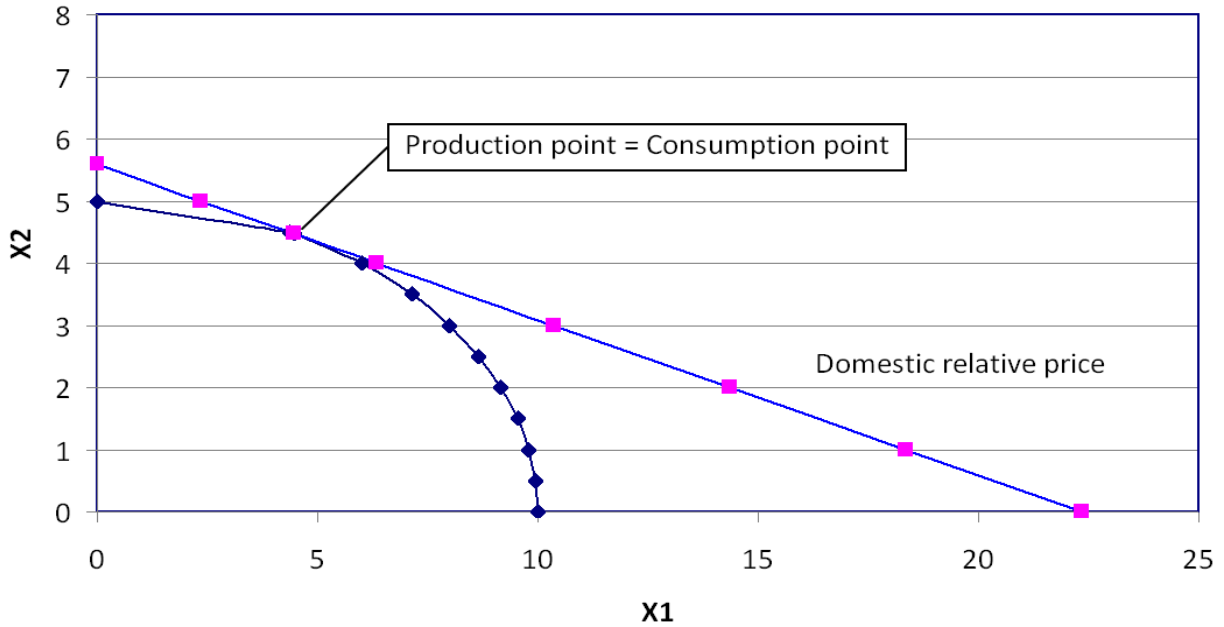


However, conventional measurements of real GDP understate the increases in aggregate social welfare due to international trade. This is because GDP merely measures the actual outbound movement of the frontier of the domestic production possibilities set but not the actual outbound movement of the frontier of the domestic consumption possibilities (including present and future consumption) set.

We shall consider a simple two-good example. In the absence of international trade, the production possibilities set of an economy is the same as its consumption possibilities set. A necessary condition for aggregate social welfare to be at a maximum is that the economy operates on the frontier of its production possibilities set. We should note that it is not necessary to assume the existence of a social utility or social welfare function for this statement to be valid. The point of tangency of the production possibilities set to the domestic relative price line marks the optimal combination of the two goods to be produced in the absence of international trade. It is also the consumption point of an economy without international trade.

Chart 10: The Domestic Production Possibilities Set
 (=Consumption Possibilities Set without Trade)

Production Possibility Frontier Chart 1

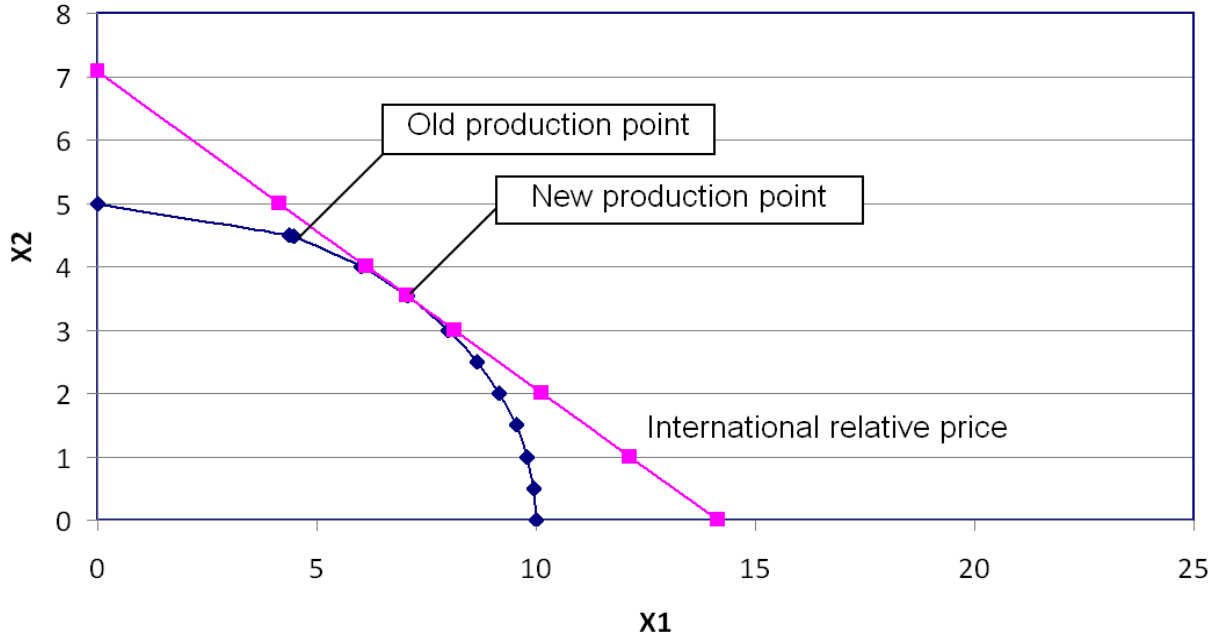


Now, we suppose there is the possibility of international trade. While the domestic production possibilities set remains unchanged, the domestic consumption possibilities set is expanded with international trade.

The consumption possibilities set in the presence of international trade is given by the entire area of the triangle bounded by the international relative price line through its tangency point with the production possibilities frontier and the two axes. Since the old consumption possibilities set is completely contained in the new consumption possibilities set, domestic aggregate social welfare must increase, even in the case that the international relative price is the same as the domestic relative price in the absence of international trade.

Chart 11: The Domestic Consumption Possibilities Set with International Trade

Production Possibility Frontier Chart 2

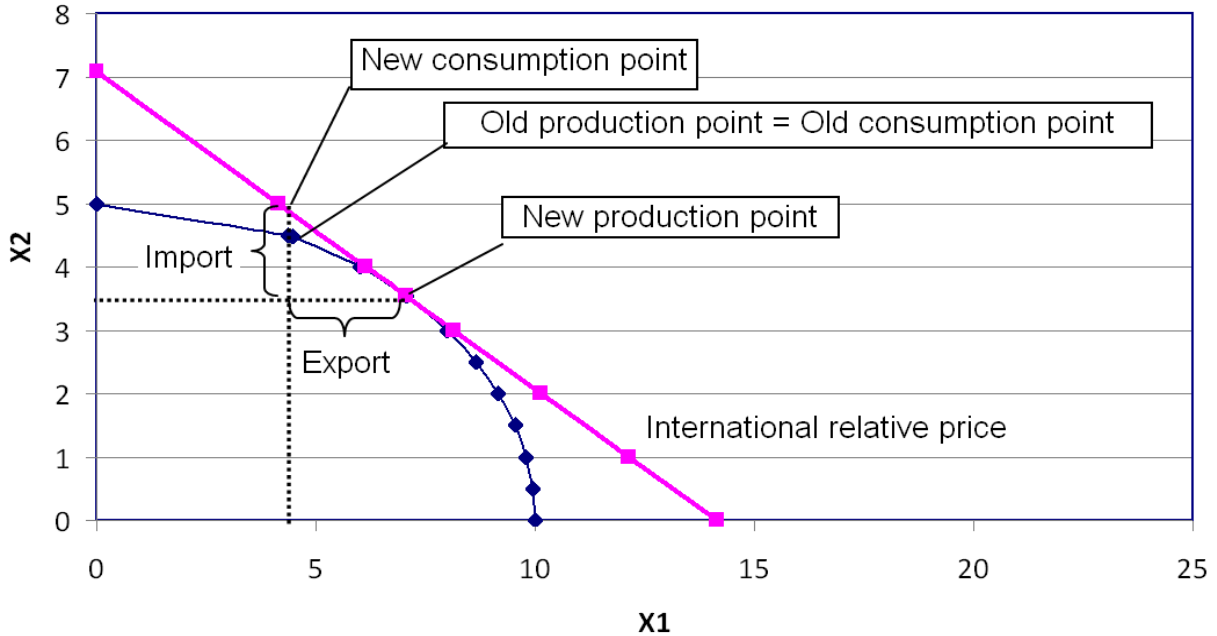


If the international relative price is the same as the domestic relative price in the absence of international trade, the optimal combination of the goods to be produced remains the same with or without international trade. However, with the possibility of international trade, the consumption point can be different from the production point, and the resulting aggregate social welfare may well be higher with international trade.

Chart 12 makes it clear. With trade, any point on the international relative price line is a possible consumption point. At the new consumption point selected in the chart, it is clear that aggregate social welfare must have increased as the same quantity of good 1 and a higher quantity of good 2 are now being consumed with international trade.

Chart 12: Consumption (and Aggregate Social Welfare) is Increased with Trade

Production Possibility Frontier Chart 3

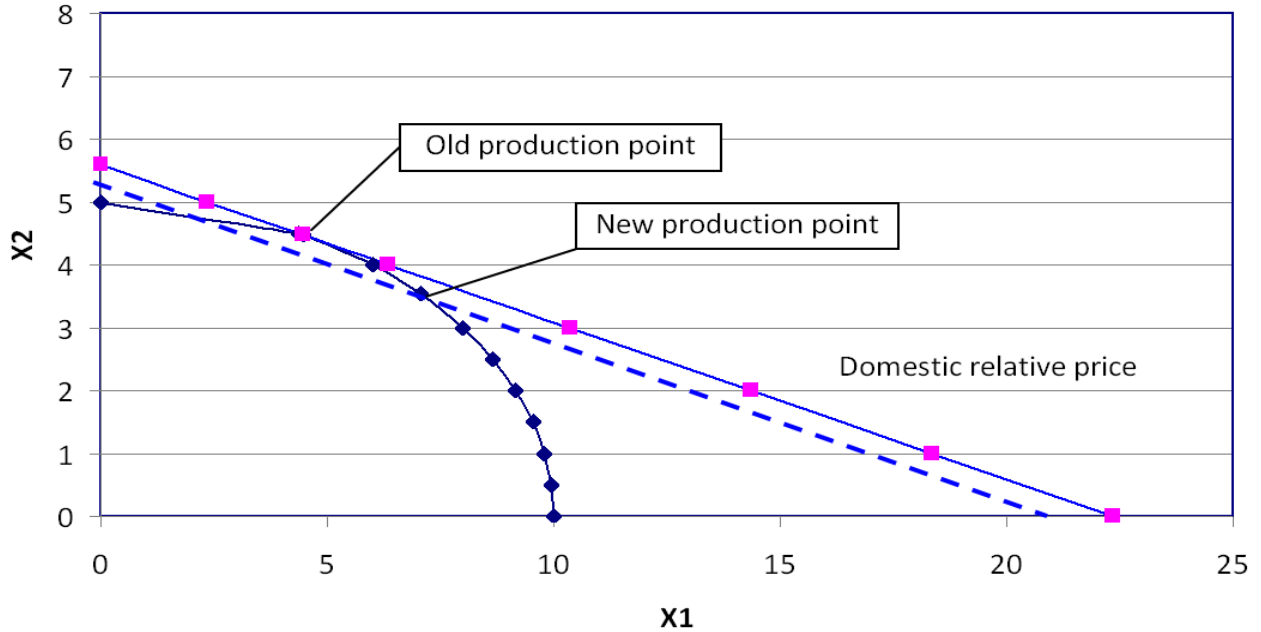


We can also see from the previous chart that the possibility of export and import implies that every point on the international relative price line is a possible combination of domestic consumption. Thus, with international trade, aggregate social welfare must be higher than without trade.

However, if the values of outputs in both periods are evaluated at the old relative price (the base period relative price), say, in units of good 1, then clearly output is higher in the base period than in the new period during which international trade is possible. Nevertheless, this measurement cannot be correct, as measured real GDP moves in the opposite direction as aggregate social welfare.

Chart 13: Valuation of the Old and New Production Points at the Old Relative Price

Production Possibility Frontier Chart 4

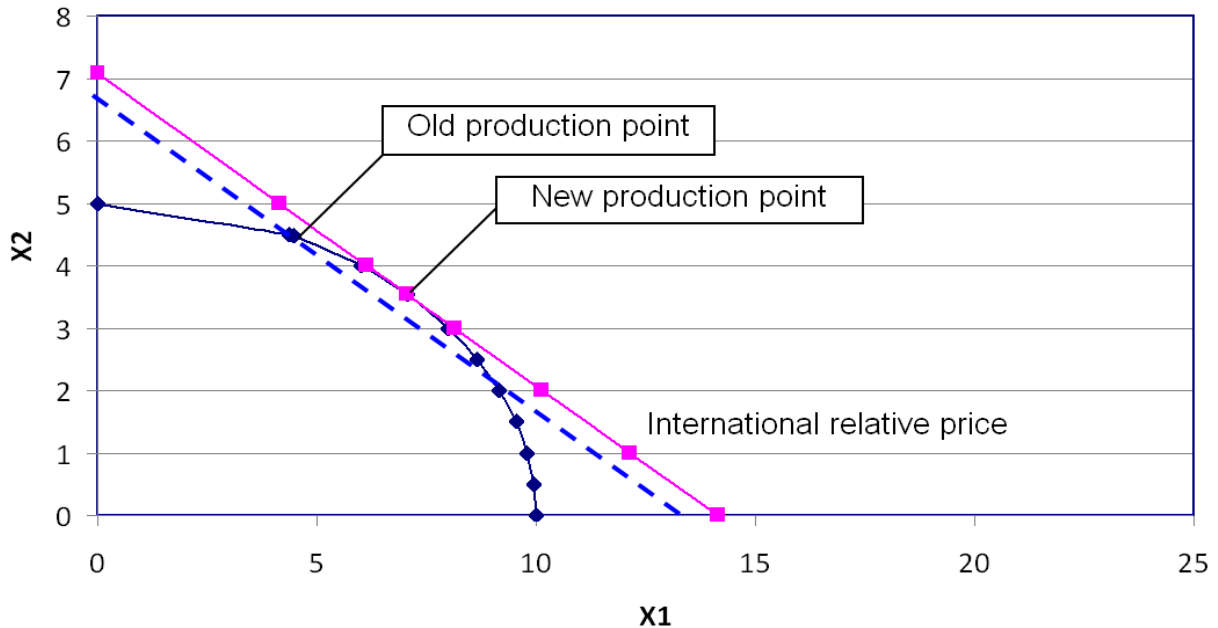


If instead of the base period relative price, we use the new period relative price to value the outputs of both periods, then the results will show that the value of output in the new period is higher than the value of output at the base period, again, in units of good 1. This makes more sense: measured real GDP moves in the same direction as aggregate social welfare.

We should note the importance of the “small open economy” assumption such that the participation of Taiwan in international trade does not change the international relative prices. Otherwise, the international relative price – the frontier of the new consumption possibilities set – will not be a straight line (or a hyperplane).

Chart 14: Valuation of the Old and New Production Points at the New Relative Price

Production Possibility Frontier Chart 5



However, this increase in aggregate social welfare is not reflected in the conventional measurement of real GDP. In fact, if the constant prices of the period before the introduction of international trade are used, the measured real GDP may actually show a decline, as we have demonstrated graphically above.

One partial remedy for this problem is to use the new relative price in the valuation of both the old and new combinations. This will lead to a new convention in the chained calculation of time-series real GDP. It remains to be seen how much difference such a modification will actually make.

We should note that the argument presented above on the benefits of international trade does not depend on the number of countries and the benefits for the domestic economy are larger the more countries participate in world trade. Moreover, we should note that aggregate social welfare can be increased even if the production possibilities set remains unchanged.

The growth and globalisation of world trade will further shift the international relative price. For example, it will lower the price of light manufactured consumer goods relative to the price of capital goods. This will create additional room for further specialisation and division of labour and bring further benefits to the economy. All of this can occur without any change in the domestic production possibilities set. But as the shares of exports and imports in GDP of Taiwan have continued to rise, the implication is that the new relative price is quite different from the old relative price, and that the new combinations of goods, both produced and consumed, are quite different from the old combinations of goods. Moreover, they are constantly evolving too.

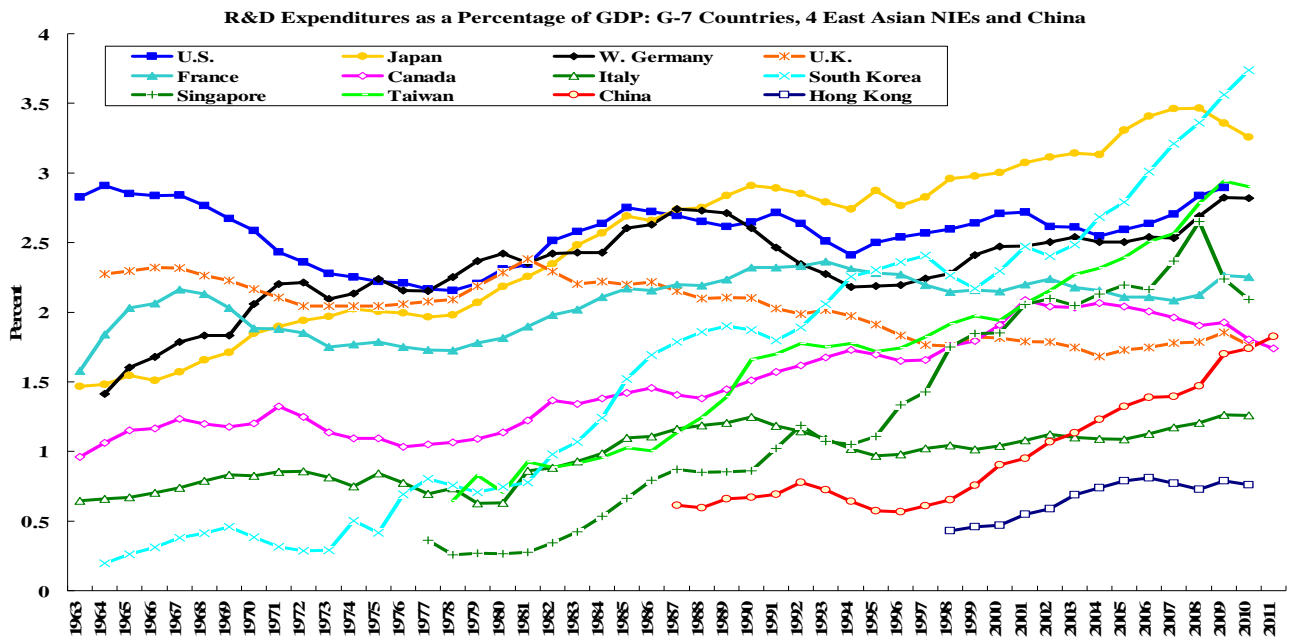
Furthermore, comparative advantage depends not only on natural endowments but can be created, through investment in intangible capital such as human capital, R&D capital and goodwill (reputational capital), as Taiwan has been doing.

6. Intangible Capital-Driven Growth

Beginning in the late 1980s and early 1990s, the principal source of economic growth of Taiwan has begun to change from the growth of tangible capital to that of intangible capital. Intangible capital includes human capital, R&D capital and goodwill (reputational capital). Advertising and brand-building are examples of investment in reputational capital. This period also coincided with the gradual change from “original equipment manufacturing (OEM)” to “original development and manufacturing (ODM)” on the part of Taiwan firms.

Sustained investment in research and development (R&D) is essential for technical progress in an economy. Beginning in the late 1980s, Taiwan began to increase its investment in research and development (R&D). Expenditure on R&D has been rising rapidly, both in absolute value, and as a percentage of GDP. The Taiwan R&D Expenditure/GDP ratio has exceeded 2.5%, comparable to that of the U.S. and other developed economies but behind that of Japan and South Korea (see Chart 15). By comparison, the Mainland Chinese R&D Expenditure/GDP ratio is targeted to reach 2.2% only in 2015.

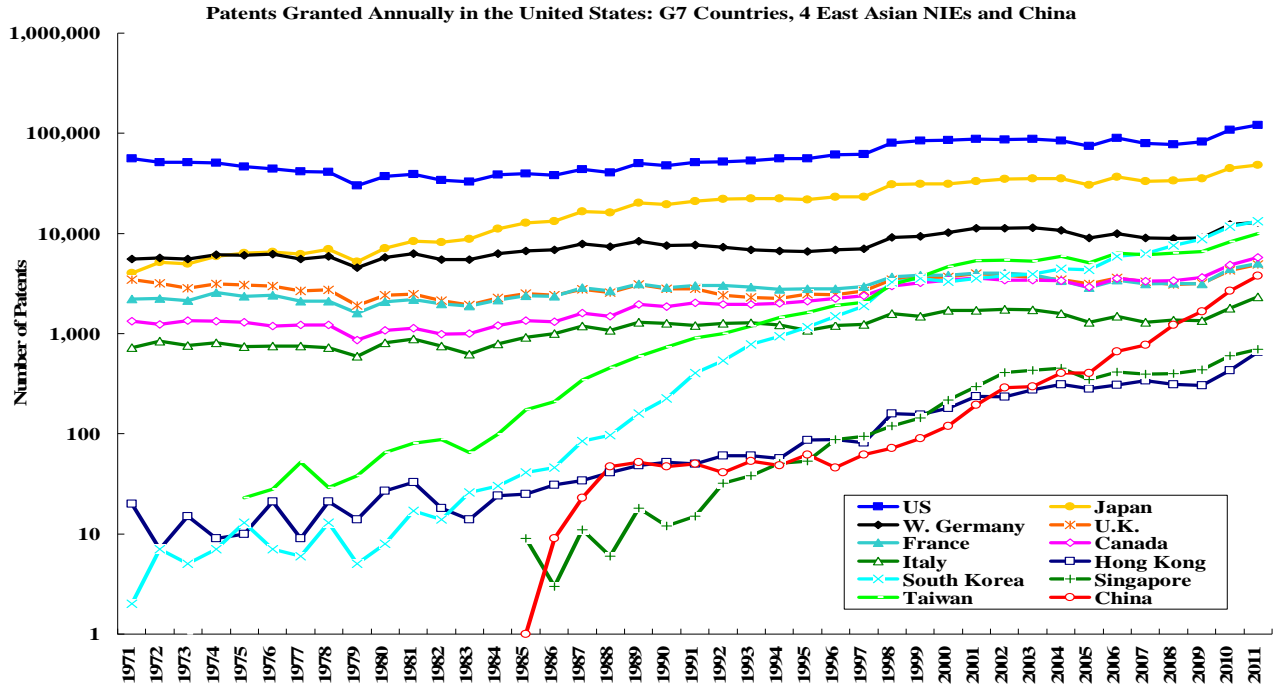
**Chart 15: R&D Expenditures as a Ratio of GDP:
G-7 Economies, 4 East Asian NIES & Mainland**



One indicator of the potential for technical progress (national innovative capacity) is the number of patents created each year. In Chart 16, the number of patents granted in the United States each year to the residents of the different economies, including the U.S. itself, over time is presented. The U.S. is the undisputed champion over the past forty years, with more than 120,000 patents granted in 2011, followed by Japan, with approximately 48,000. (Since these are patents granted in the U.S., the U.S. may have a home advantage; however, for all the other economies, the comparison across them should be fair.)

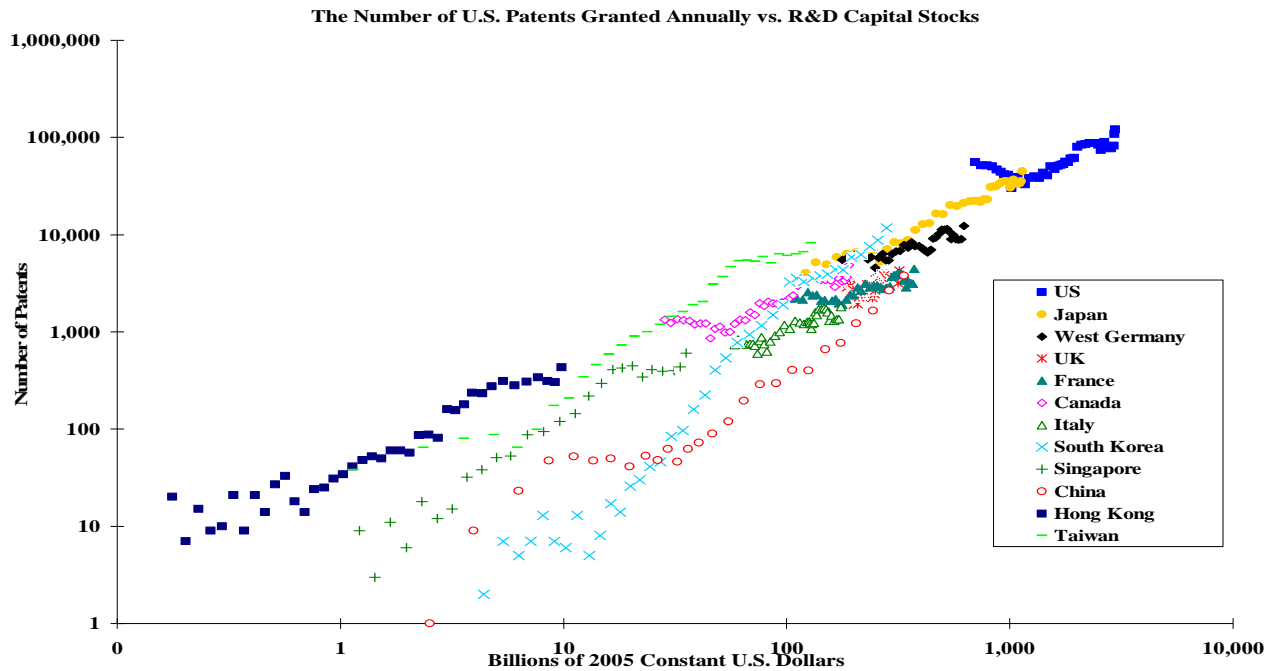
The number of U.S. patents granted to Taiwan applicants has been averaging close to 10,000 each year lately (9,907 in 2011). Taiwan is now behind only the U.S., Japan, Germany and South Korea in terms of U.S. patents granted each year and is ahead of Canada, France, Italy and the U.K. By comparison, Mainland China was granted 3,786 U.S. patents in 2011.

Chart 16: U.S. Patents Granted: G-7 Economies, 4 East Asian NIEs & Mainland China



The stock of R&D capital, defined as the cumulative past real investment in R&D less depreciation of 10% per year, can be shown to have a direct causal relationship to the number of patents granted. In chart 17, the number of patents granted is plotted against the R&D capital stock for each country and each year. Taiwan's R&D capital lags behind all other economies except Hong Kong and Singapore. However, Taiwan's efficiency in the generation of patents in the U.S. leads those of other economies in terms of the number of U.S. patents granted for given levels of the stock of R&D capital.

**Chart 17: Patents Granted in the United States and R&D Capital Stocks,
Selected Economies**



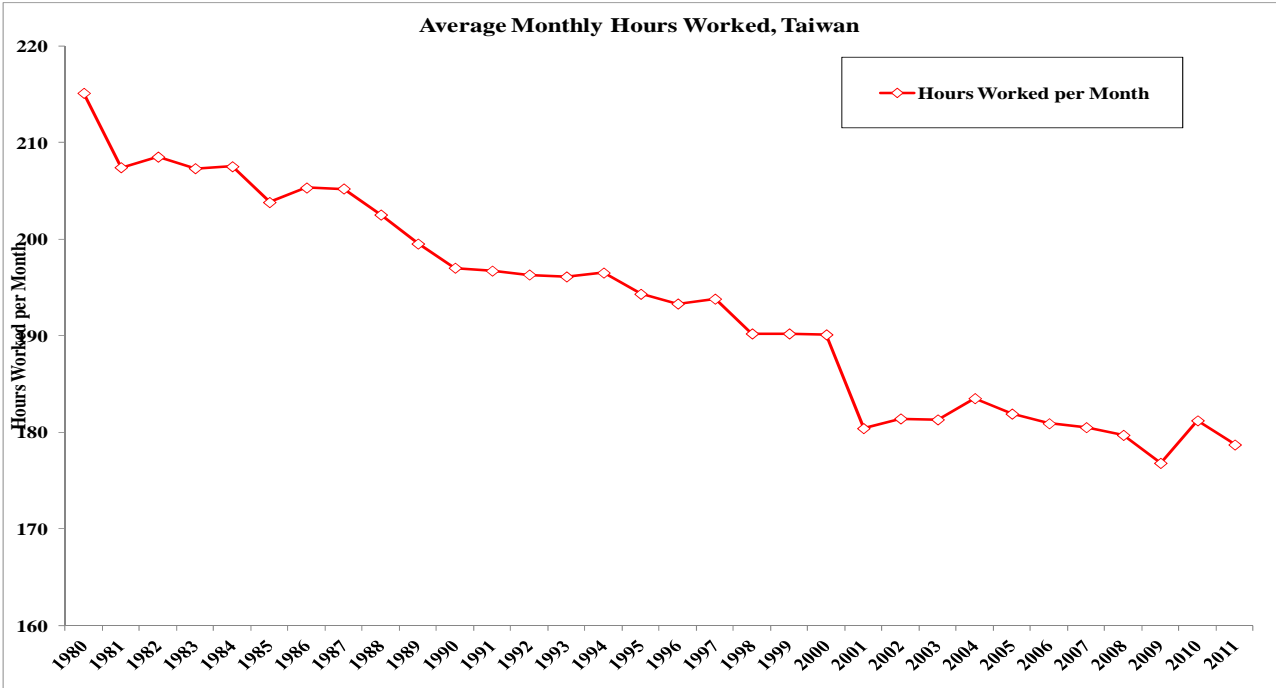
Taiwan's success in shifting from tangible-capital driven economic growth to intangible-capital driven economic growth is due to the abundance of human capital (from the immigration in 1949 and the almost 100% college enrolment rate), the investment in R&D capital, the strict protection of intellectual property rights, and the close relationship with the high-technology industry in the U.S. and in the Silicon Valley in particular.

7. The Value of Leisure and Public Goods

The value of voluntary leisure is not recognised in national income accounts. Similarly, the value of public goods is normally not recognised or not fully recognised in national income accounts. The measurement of real GDP should be modified by pricing the increase in individual voluntary leisure and in the improvement in the quality of life (green GDP) appropriately. With such modifications, the value of measured real GDP of Taiwan should be higher than otherwise.

In Taiwan, the average monthly number of hours worked has been declining continuously (see Chart 18). Since 1980, the number of hours worked has declined by almost 40 hours a month to just below 180, or more than 20 percent. If these increased hours of leisure are valued at the standard hourly earnings, it should boost real GDP thus measured by 20 percent times the labour share of GDP, which is approximately two-thirds, or a total of approximately 14 percent between 1980 and 2011. This amounts to an increase of almost half a percentage point per annum in the measured rate of growth of real GDP.

Chart 18: Average Monthly Hours Worked, Taiwan



Moreover, the value of such voluntary leisure should be included in its entirety in the measure of real consumption as well. Real consumption and real consumption per capita are therefore likely to have experienced much higher rates of growth if the imputed value of voluntary leisure is also included. The expectation is that the quantity of voluntary leisure (or voluntary unemployment) is likely to increase in the future. Any measures of real GDP and real consumption that fail to take the value of voluntary leisure into account underestimate the improvement in aggregate social welfare.

Public goods pose another problem of measurement. Public goods have two important characteristics—first, the provision of public goods is subject to significant economies of scale: once provided, the marginal cost of an additional individual enjoying the public good is low or zero; second, public goods are often provided free (marginal cost is zero) or not fully priced to reflect the external benefits. Thus, traditional measurements of real GDP may not recognise the full social value-added of the provision of public goods. For example, a mass-transit system may contribute to aggregate social welfare positively by reducing pollution and congestion and saving time for all its users but may be making a net loss in monetary terms.

As the real GDP of an economy grows, the consumption demand of the households will begin to shift from traditional basic needs of “Clothing, Food, Lodging and Mobility (衣, 食, 住, 行)”, which are mostly individual, to new basic needs of “Education, Health, Recreation (leisure time activities) and Elderly Care (學習, 健康, 消遣, 奉養)”, which are mostly provided socially as public goods. Public goods also include public infrastructure, clean air, clean water, clean environment, safety of food, beverages and drugs, etc., the valuation of which is fraught with difficulties. The convention that the value of benefits is equal to the cost of provision may not be correct or accurate. Thus, a slowdown in the rate of growth of real GDP as traditionally measured does not necessarily imply that aggregate welfare is no longer increasing or increasing as fast.

Taiwan has also already taken a major step in developing a set of “Green National Income Accounts”. However, these accounts have not yet been integrated with the real GDP accounts to produce a measure of real aggregate social welfare. In the measurement of real GDP, it is also necessary to take into account the depletion of natural resources. At the same time, it should also be recognised that pure appreciation of assets such as real estate (unimproved land and existing property) as distinct from new development and construction, is not value-added and hence should not be included in real GDP.

8. The Opportunities and Challenges for Taiwan

At this time, Taiwan has the advantage of its stock of intangible capital. We have already discussed the importance of R&D capital. However, Taiwan also has a significant lead in reputational capital (also known as goodwill). It should capitalise on it to build a lead especially in retail services on the Mainland (and elsewhere), taking advantage of the Economic Cooperation Framework Agreement (ECFA). Taiwan firms such as Kang Shifu, Wang Wang, Tianfu and Giant have been extraordinarily successful in building their brands in Mainland China, capturing large market shares. Other Taiwan firms, especially those with their own technologies, should be able to do the same.

However, brand-building is a pre-requisite for Taiwan firms to take advantage of the huge Mainland market. It is true that brand-building requires resources, but it also enables the owners of brand names to have greater market shares, much more pricing power and higher profit margins than enterprises that do only OEM (original equipment manufacturing) business. The huge potential Mainland market of 1.34 billion consumers not only enables the realisation of economies of scale in production and distribution but also greatly enhances the productivity of intangible capital (e.g., R&D capital, goodwill). The fixed research and development costs of a new product or process can be easily amortised over a large market. The benefits of investment in goodwill, e.g., brand-building, are also much greater in a large market. In addition, active participation in the huge potential Mainland market by Taiwan firms also enables them to take part in the setting of product and technology standards, for example, fourth-generation (4-G) standards for telecommunication, and share the economic benefits of such standard-setting.

Apart from it, there are opportunities for further job creation in Taiwan. Tourism generates job opportunities for the unskilled and low-skilled. Tourists generate demands for hotels, restaurants, retail, and transportation and through these demands create many job opportunities that cannot be moved away. Hong Kong has been a major beneficiary of the “Individual Visit Scheme” for tourists from the Mainland. The economy of Taiwan can benefit in the same way. Besides, non-local students (from the Mainland, Hong Kong, and Southeast Asia) at the tertiary level can also be a major source of revenue and jobs (as, for example, in

Massachusetts) that cannot be moved away. Moreover, Taiwan has significant over-capacity in the tertiary education sector.

Nevertheless, the advances in information and communication technology and globalisation have also meant that all jobs that can be moved away to a lower-cost location will be moved away. This has happened to the U.S., Japan, Hong Kong and even the Mainland. Taiwan is no exception.

There is, understandably, some concern about the possible over-dependence of the Taiwan economy on the Mainland. Of course, diversification is one possible response, but it is easier said than done, especially given the current state of the World economy. However, it is important to realise that the key for avoiding over-dependence is to make the relationship inter-dependent. As long as there is continuing innovation in the Taiwan firms, for example, through continued investment in R&D, the dependence is mutual--while the market is on the Mainland, the technology is from Taiwan. It is only when innovation stops in Taiwan that the dependence turns into one-way.

9. Concluding Remarks

This is the time for the Taiwan Government to launch some major public infrastructure projects, financing them through the sale of shares in companies like TSMC that are held by the Government. Examples of such projects can include a high-speed rail link between Kaohsiung and Pingtung, or between Taipei and Hualien, or a bridge or tunnel connecting Taiwan and Penghu Islands, which will help to more fully integrate the economy of Taiwan. By using the Government-held shares to finance these projects, the Government can avoid enlarging the deficit of the recurrent budget or increasing the public debt. Major public infrastructural projects are the most effective way to turn around public expectations about the future of the economy and hence encourage both investment and consumption.

Taiwan's direct investment on the Mainland in the 1990s was critical to the initial success of the Mainland's economic reform and opening to the World. However, Taiwan firms must now reorient towards the needs in the Mainland domestic market. The European and U.S. economies will be recovering very slowly so that Taiwan will need to look to the Mainland for sources of export demand. The domestic market on the Mainland can provide some help through increased imports from Taiwan and increased tourists to Taiwan. Both state-owned and non-state-owned enterprises from the Mainland can also be a source of increased investment in Taiwan in non-national-security-sensitive sectors, thus helping to increase real GDP and employment. What would benefit Taiwan the most would be "green field" investments as opposed to the purchase of existing assets by Mainland or other entities. This is because the former creates new aggregate demand and would increase employment whereas the latter only benefits the owners of the existing assets. This can justify a policy of encouraging greenfield investments from the Mainland to Taiwan.