

What can explain Taiwan's growth miracle over the period 1950-2000?

Export promotion, Capital accumulation, Policies and Institutions

Øystein Braaten

Advisor: Stig Tenold

Master thesis – Department of Economics

NORGES HANDELSHØYSKOLE

This thesis was written as a part of the Master of Science in Economics and Business Administration program - Major in Economics. Neither the institution, nor the advisor is responsible for the theories and methods used, or the results and conclusions drawn, through the approval of this thesis.

Abstract

This thesis surveys the literature on the sources and explanations of Taiwan's growth miracle in the period 1950-2000. The empirical literature on the decomposition of Taiwan's growth experience indicates that a large part of Taiwan's economic growth has been caused by accumulation of human and physical capital. The high growth in physical capital was enabled by high savings rates. The sources of these high savings rates will be discussed in this thesis. Human capital accumulation can be traced to beneficial demographic changes, increased female labour participation and investments in education.

Still, the productivity growth, measured by Total Factor Productivity (TFP), has also been impressive in the case of Taiwan. The explanations for this increased productivity are disputed. This thesis will present the debates over the export-led growth hypothesis and the merits of industrial policies in Taiwan. Lastly, I will look at the external factors and institutional framework that were conducive to economic growth in Taiwan.

Preface

This thesis is written as a part of my Master of Science in Economics and Business Administration at the Norwegian School of Economics and Business Administration (NHH). I have been fascinated by the mechanisms behind economic growth for a long time, and my interest in the topic has increased during the course of my studies at NHH. In the fall of 2009 I went on an exchange to National Chengchi University in Taipei, Taiwan. Since Taiwan is one of the four “East Asian tiger economies” and has had one of the highest growth rates in the world in the second half of the 20th century, I could not resist the temptation to look more deeply into the causes of this “growth miracle”.

The work with this thesis has been challenging, and at times it has been difficult to stay focused on one topic for such a long time. Still, it has been exciting and rewarding to learn more about Taiwan’s growth experience, and I think I have gained valuable insight into factors that can foster high economic growth. I would like to thank my thesis advisor Stig Tenold for his help and constructive guidance while writing the thesis.

Bergen 17.06.2010

Øystein Braaten

Table of Contents

	<i>Page</i>
Abstract.....	2
Preface.....	3
<i>Chapter: 1 Introduction</i>	7
1.1 Background.....	7
1.2 Limitations.....	8
1.3 Structure.....	8
Part: 1 Presentation of Taiwan’s growth miracle	10
<i>Chapter: 2 Description of Taiwan’s Growth Miracle</i>	10
2.1 Modern Political History of Taiwan.....	10
2.2 Taiwan’s Growth Miracle.....	11
<i>Chapter 3 Decomposition of Taiwan’s Growth Miracle</i>	17
3.1 The concept of TFP growth and its estimation.....	17
3.2 Empirical estimates of the TFP growth in Taiwan.....	20
3.3 Accumulationists vs. Assimilationists.....	22
3.4 Labour force Growth and “Demographic Bonus”.....	27
3.5 Methodological problems related to decomposing economic growth.....	28
3.6 Summary.....	30
Part 2 Explanations of Taiwan’s growth miracle	32
<i>Chapter 4 Policies</i>	32
4.1 Outward Orientation.....	33
4.2 Accumulation of Human Capital.....	40
4.3 Accumulation of Physical Capital.....	41
4.3.1 Macroeconomic Policies.....	42
4.3.2 Forces and Policies driving Taiwan’s savings rate.....	43
4.3.3 Investment rates.....	45
4.3.4 Coordination Failure.....	47
4.4 Industrial Policies and Allocation of Resources.....	49

4.4.1 Fundamentals.....	50
4.4.2 Selective Industrial Policies.....	51
4.4.4 Agricultural Policies.....	55
<i>Chapter 5 External Factors, Initial Conditions and Institutions.....</i>	<i>56</i>
5.1 External Factors.....	57
5.1.1 Geography and “Flying geese”.....	57
5.1.2 Ethnic Homogeneity.....	58
5.1.3 History.....	58
5.2 Initial Conditions.....	60
5.2.1 Equal distribution of income and wealth.....	60
5.2.2 Human capital.....	62
5.2.3 Efficient and insulated bureaucracy.....	62
5.3 Nationalism, Confucianism and Entrepreneurship.....	65
<i>Concluding Remarks.....</i>	<i>66</i>
<i>List of References.....</i>	<i>68</i>

List of figures and tables

	Page
<i>Figure: 1</i> Real GDP per capita over the period 1950-2000 for Taiwan, a sample of 16 Asian countries and the world economy.....	11
<i>Figure: 2</i> Economic growth rates per capita for Taiwan and the world economy over the period 1951-2000.....	12
<i>Figure: 3</i> Economic growth rates per capita, 5-year moving average, for Taiwan and the world economy over the period 1955-2001.....	13
<i>Figure: 4</i> Alternate Interpretations of growth.....	25
<i>Figure: 5</i> Real exchange rates and exports: Taiwan, 1960-81.....	35
<i>Figure: 6</i> Investment share of Taiwan, 1950-2007.....	38
<i>Figure: 7</i> Imports and Investment: Taiwan, 1952-90.....	39
<i>Figure: 8</i> Public Gross Fixed Capital Formation: Taiwan, 1950-2000.....	47
<i>Figure: 9</i> Worldwide Governance Indicators for Taiwan.....	64
<i>Table: 1</i> Empirical Estimates of TFP-growth in Taiwan.....	20
<i>Table: 2</i> Predicted and actual enrolment and literacy rates for Taiwan in 1960.....	62

Chapter: 1 Introduction

1.1 Background

Taiwan had an average economic growth of 8,10% over the period 1950-2000.¹ The average economic growth per capita was 5,95%.² That is simply startling. The ability to sustain such a high economic growth over half a century took Taiwan from having a poor, agrarian economy to becoming a developed economy. The consequences in terms of increased material well-being and human welfare are phenomenal.

Taiwan is one of the four “East Asian tigers”³. The success stories of these economies have naturally attracted an enormous amount of interest from researchers and scholars with interest in economic growth. Already in the 1970s Taiwan became a subject of study by development economists. In fact, several renowned scholars have functioned as consultants to the Taiwanese government, among them Simon Kuznets.

The interest in the growth experiences of the East Asian tigers was most rampant in the 1990s. A vast body of academic literature was written on the subject. Perhaps the most comprehensive study was conducted by a host of scholars in the much debated 1993 World Bank report, “The East Asian miracle”. This was also the first time the term “miracle” was used to describe the growth of these countries. The obvious reason for the enormous interest is that other developing countries are searching for replicable lessons in the experience of East Asia.

Although there are still many researchers that publish papers on the growth experiences of Taiwan and the other “tiger economies”, the interest is not as intense as during the 1990s. An important reason for this could be that the economic growth rates of the East Asian tigers have been outstripped by those of China since the late 1980s, and this stirring giant has thus stolen the limelight. This will be reflected in the sources of this thesis, as many of my most important sources are from the 1990s.

^{1,2} Source: Calculations based on Maddison (2001)

³ South Korea, Taiwan, Singapore and Hong Kong

1.1 Limitations

This is not an empirical study of Taiwan's growth miracle. My original ambitions of conducting a decomposition of Taiwan's economic growth were shattered at the realisation of the vast amount of empirical studies already conducted, and the inherent methodological problems that I will discuss in chapter 3. To cite Felipe (1999):

“And without any doubt, at this point, the Solowresidualization of the East Asian economies is an activity that one would like to discourage, since it is subject to significant decreasing returns.” (Felipe, 1999: 27)

Instead, this is a survey of the literature that tries to explain Taiwan's growth experience. It is by no means a complete survey, due to the imbalance between the enormity of the literature on the topic and the limited amount of time available. However, I think that I have surveyed a sufficient amount of the literature to make an interesting assessment of the sources of Taiwan's growth experience.

The thesis is admittedly also somewhat comprehensive in its focus, as I have not chosen to look at just specific factors in Taiwan's growth miracle. By that I do not claim to have treated all sources of economic growth in this thesis. Still, to provide a broad and comprehensive survey was always my intention, as I think it is the entire spectrum of explanations and the interlinkages between them that are most interesting.

Another aspect that has to be noted when studying Taiwan, is the particular challenge of finding data. Only a very limited number of countries recognise Taiwan as an independent nation, and many important international organisations do consequently not produce statistics for Taiwan. Still, Taiwan has a statistical agency that produces data on important macroeconomic variables, but many of the time series do not go back sufficiently long with regard to the purpose of this thesis.

1.2 Structure

The thesis is separated into two parts, each with two chapters. In part 1 I give a presentation of Taiwan's growth experience, as I think it is crucial to have a solid understanding of the nature of this growth miracle before I look into the explanations. Chapter 2 contains a brief presentation of Taiwan's modern political history and a more thorough presentation of

Taiwan's economic growth miracle. Chapter 3 is a survey of the vast body of literature on the decomposition of Taiwan's growth miracle, with specific focus on the debate over the role of Total Factor Productivity (TFP) relative to the role of accumulation of physical and human capital. Methodological challenges will be discussed.

Part 2 of the thesis looks at the underlying explanations behind the sources identified by the growth decomposition. It is separated into policies (Chapter 4) and external factors, initial conditions and institutions (Chapter 5). This separation is complicated by the fact that the line between policies and institutions is quite blurred. Finally, I will make some concluding remarks.

Part 1: Presentation of Taiwan's growth miracle

Chapter: 2 Description of Taiwan's growth miracle

2.1 Modern Political History of Taiwan

In 1894 war broke out between Japan and Imperial China over the Japanese invasion of Korea. The poorly equipped Chinese navy was no match for Japan's modern fleet, and China was forced to cede Taiwan to Japan as a part of the peace agreement. The Japanese rule on Taiwan, that extended to Japan's defeat in World War 2 in 1945, was harsh, with brutal crackdowns on political dissent. Still, the Japanese made significant investments in infrastructure to modernise the island.

The loss of Taiwan to Japan was just one in a string of defeats for the Qing dynasty on Mainland China. Opposition was mounting, and in 1911 China's Nationalist party, Kuomintang (KMT), took power. Imperial China became the Republic of China (ROC), founded by KMT's leader, the revolutionary doctor Sun Yat-sen. Almost immediately after the defeat of Japan, civil war broke out on the mainland between the KMT (led by Chiang Kai-shek) and Chairman Mao's communist forces. Defeated, Chiang Kai-shek fled to Taiwan in 1949.

The Kuomintang (KMT) immediately imposed martial law on Taiwan in 1949 and kept it in place until 1987. Chiang brought some 2 million of his defeated soldiers and camp followers to Taiwan, which then had a population of around 6 million. The KMT rule on Taiwan began with the killing of between 10 000 and 20 000 (and possibly up to 100 000) indigenous Taiwanese, including the cream of the island's intelligentsia (Field, 1995). Chiang Kai-shek remained in power in Taiwan until his death in 1975. As leader of the ROC, he persisted to claim sovereignty over all of China. He was succeeded by his son Chiang Chin-kuo. In 1987 he took the initial steps towards dismantling military rule by ending martial law, just before his death. Lee Teng-hui became the first Taiwanese-born ROC president the same year. In 2000, the Democratic Progressive Party (DPP) ended 54 years of KMT rule when their candidate Chen Shui-bian was elected president.

2.2 Taiwan's growth miracle

Before delving into the explanations of Taiwan's "growth miracle", it should be useful to get an overview of the history and development of the economic growth of Taiwan. Figure 1 shows the extraordinary growth of the Taiwanese economy over the period 1950-2000 compared to the world average and a sample of 16 Asian countries⁴. The miraculous growth of the Taiwanese economy is evident. Specifically, it is interesting to compare the island's growth to the performance of the sample of 16 Asian countries, as they have more or less the same starting point.

Although Taiwan did not experience any prolonged periods of low growth over this period, the broad picture does however cloud some quite significant variations. I will therefore in the following divide the development into sub-periods and give an account of significant patterns of development.

Figure: 1

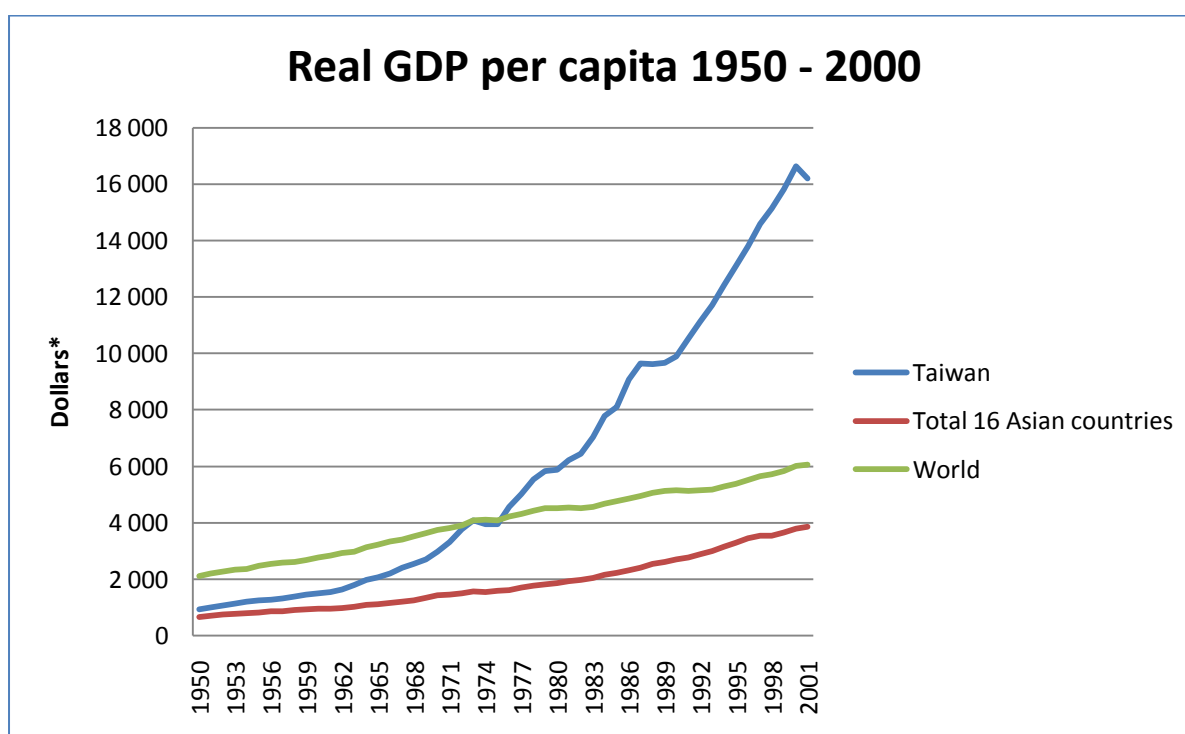


Figure: 1 Real GDP per capita over the period 1950-2000 for Taiwan, a sample of 16 Asian countries and the world economy. Source: Figures based on Maddison (2001)

* 1990 International Geary-Khamis dollars

⁴ China, India, Indonesia, Japan, the Philippines, South Korea, Thailand, Taiwan, Bangladesh, Burma, Hong Kong, Malaysia, Nepal, Pakistan, Singapore, Sri Lanka

Figure 2 illustrates the growth rates of Taiwan over the period 1951-2000, with the growth rates of the world economy as a reference. It is striking to see how the growth rates of Taiwan surpass those of the world economy in almost every single year over such a long period of time. However, the data also shows that the Taiwanese economy was hit hard in individual years, specifically due to the oil price shocks of 1973 and 1979. Still, the economy rebounded quite sharply in both cases. It is also clear that 1987 was a special year for Taiwan, not only politically. The year of 1987 is also often referred to as the end-point of Taiwan’s “era of high growth”.

Figure: 2

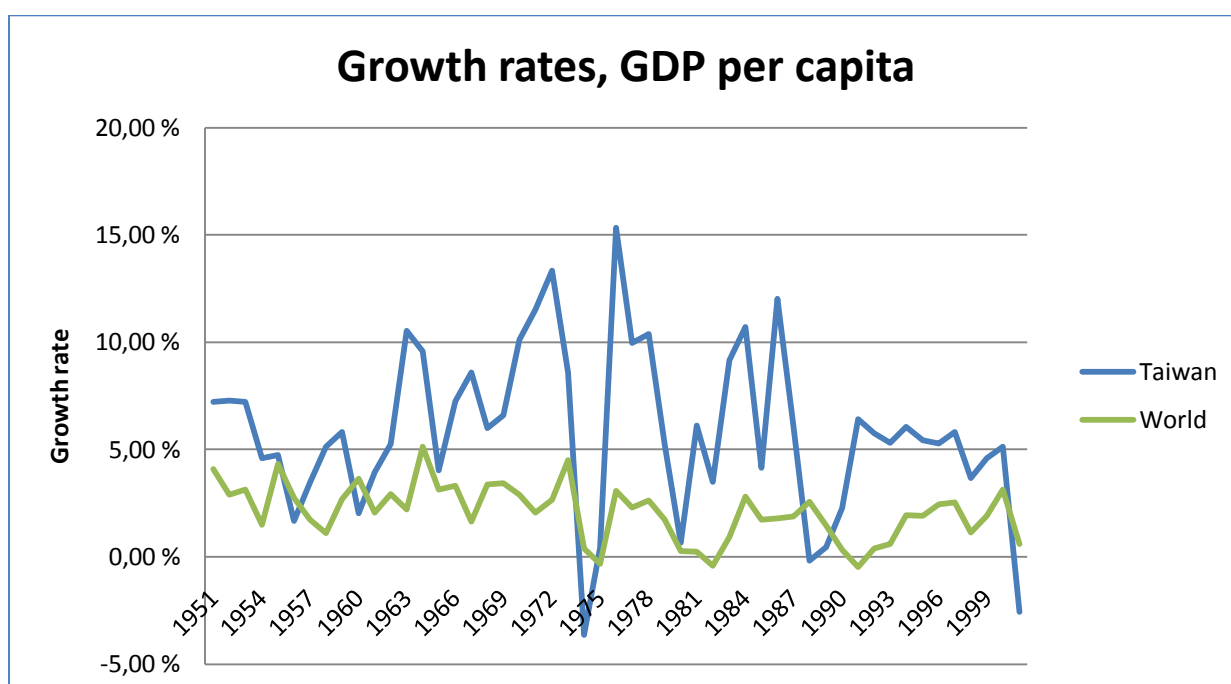


Figure: 2 Economic growth rates per capita for Taiwan and the world economy over the period 1951-2000. Source: Figures based on Maddison (2001)

To more easily define Taiwan’s “era of high-growth” I drew inspiration from Huang (2008). Following her example, I created a five-year moving average of Taiwan’s growth rates over the period 1950-2000 to smooth annual variations. The result, once again with the world economy as a reference, is shown in figure 3. Based on this figure I think Huang’s definition of Taiwan’s era of high-growth, which is consistent with the literature on the topic, as the period 1962-1987, is reasonable. It should, however, be noted that the growth before and after this period is also high and well above the world average. Consequently, I have not narrowed

the focus of this thesis to the period 1962 – 1987. It is nevertheless important to keep in mind that it is in this 25 year period that the economic growth was most spectacular.

With regard to further periodisation of Taiwan's growth experience in the second half of the 20th century I have drawn inspiration from the framework employed by Hwang (1991). I have, however, made certain adaptations, as her periodisation starts in 1945 and ends in 1990: (1) import substitution (1950-59); (2) export expansion (1960-69); (3) heavy and chemical industries (1970-79); (4) electronics and high-tech industry (1980 - 2000). This periodisation is not a division into different periods of high or low economic growth as such. I have actually not found many such attempts at periodisation, the reason quite probably being that the economic growth of Taiwan has been high throughout the entire second half of the 20th century and extremely high in the period of 1962-1987, with only the occasional year of low growth. Therefore I think this division that focuses more on what was produced at different stages rather than the level of production is useful to get an overview of the development. I am aware of the fact that it is not necessarily fruitful to divide the period into decades. Nevertheless, this division will in any case be quite approximate, and I therefore find no strong reason not to employ the periodisation sketched by Hwang.

Figure: 3

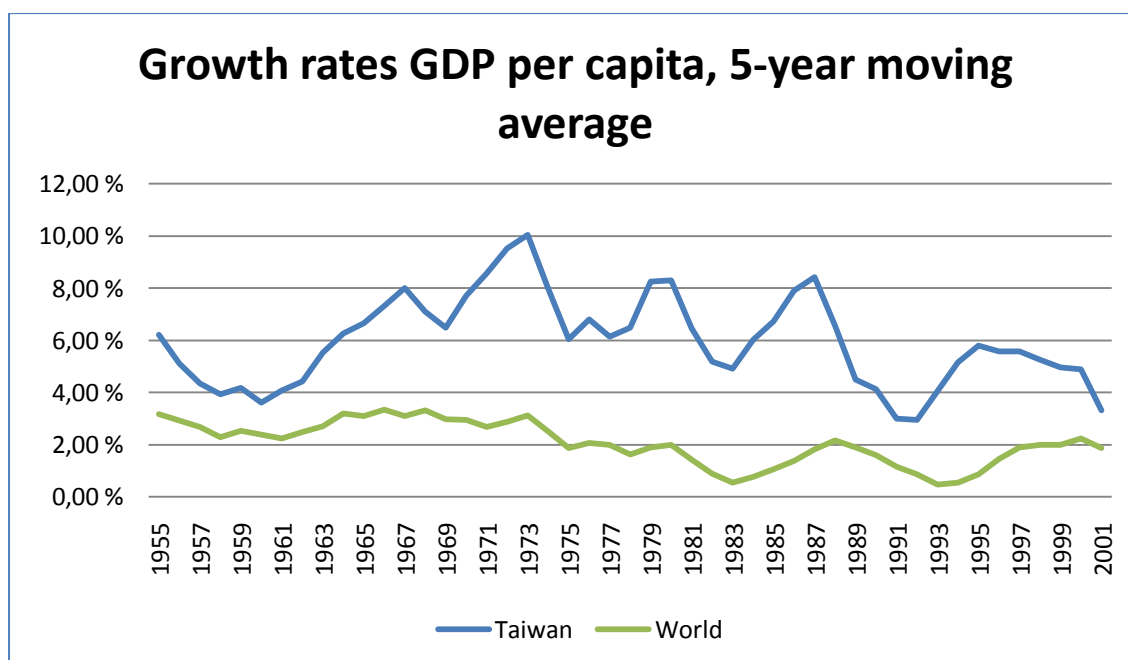


Figure: 3 Economic growth rates per capita, 5-year moving average, for Taiwan and the world economy over the period 1955-2001. Source: Figures based on Maddison (2001)

(1) Import substitution (1950-59)

The new Nationalist government had ambitious industrialisation plans for Taiwan. Their economic policies were inspired by the import substitution paradigm that dominated development economics at this time. Applications for import and export licenses, duties, quotas, and foreign exchanges were so complicated that the government had to establish special offices to handle applications, and businesses had to hire specialised personnel to take charge of them. (Hwang, 1991: 89)

Paradoxically, however, the ambitious industrial development efforts and the implementation of two consecutive four-year economic development plans led to a substantial growth of import demands for industrial equipment and materials. The result was a deep trade imbalance. This gap was by and large filled by US economic aid. From July 1950, immediately after the outbreak of the Korean War, and until 1965 the US funnelled on average \$ 1,5 bn a year into the Taiwanese economy.

Agriculture played a substantial role at this stage of Taiwan's development. In 1952 agriculture's share of GDP was 32,2 % and that of industry 16,7 %.⁵ It was not until 1962 that industry's share of GDP surpassed that of agriculture. Thus, in a way, Taiwan had an agricultural economy up to 1962.

(2) Export expansion (1960-69)

During Taiwan's transformation from an agriculture-based into an industrial economy it encountered a number of socioeconomic problems. The most important issue was the surplus labour created in agriculture. This was a major reason for the government's strategic decision to focus on labour-intensive industry through the establishment of export-processing and industrial zones to absorb the excess labour.

In 1958 the Taiwanese government shifted their focus from import restriction to export expansion. At the end of 1959 the famous nineteen point Programme of Economic and Financial Reform was promulgated. The program liberalized market controls, stimulated exports and designed a strategy to attract foreign companies and foreign capital. For example, Japanese companies moved in to take benefit of low salaries and a well-educated and capable

⁵ Source: Taiwan.com.au

workforce, as well as the support of the Taiwanese government. Nevertheless, the industrial structure was primarily national, and it was composed by a large number of small and medium sized enterprises, created within families with the family savings. The export performance was also helped by American demand induced by the Vietnam War.

When US economic aid was halted in 1965, Taiwan was able to generate 86 % of its investment needs partly due to the government's measures to stimulate savings (Hwang, 1991). Taiwan had successfully broken the vicious cycle that usually plagued the economy of poor countries: low per capita income generates low savings, which is responsible for low business investments, which leads back to low per capita income.

(3) Heavy and chemical industries (1970-79)

In the 1970s the government started to promote the development of heavy and chemical industries. However, the oil crisis of the 1970s forced the highly energy-dependent industries such as steel, copper, and aluminium to scale down their production. To counter the effects of the oil price shock in 1973 the government launched ten massive public construction projects. This effort produced the highest economic growth record in Taiwan's history between 1975 and 1977. The effects of the second oil price shock were, however, even more severe and had a more lasting effect on the competitiveness of Taiwanese industry.

Still, by the end of the 1970s, Taiwan had a foreign exchange problem quite different from the one it had experienced earlier. The foreign exchange shortage of the 1950s had been replaced by an excessive influx of foreign currencies. Therefore the slide in competitiveness in the late 1970s and early 1980s was to some extent welcomed as it dampened the inflationary threat of an oversupply of money generated by a too large trade surplus.

(4) Electronics and high-tech industry (1980 - 2000)

At the beginning of the 1980s, global economic trends, the most important being the increasing competition from Asian developing nations such as Indonesia, Malaysia, Thailand and Mainland China for Taiwan's market share of low-cost manufacturing products, pressured Taiwan's industry to change. Government officials reached a strategic consensus to develop those industries which produced high value-added goods. Labour-intensive industries were no longer to be the mainstay of the industrial sector and were slowly replaced by technology- and capital-intensive industries.

In fact the Taiwanese government pinpointed certain “strategic industries” that they felt had a good potential to produce high value-added goods for exports. Mostly the mechanical engineering and computer electronics industries were selected for development as strategic industries. To promote the development of these industries the government established funding for venture capital, financed high-level research and development projects, and offered elaborate management and marketing assistance. In 1981 the Hsinchu Science-based Industrial Park was established. This could be seen as the launch of the spectacular development of Taiwan’s high-tech industries. The establishment of this high-tech industrial park enticed many highly skilled overseas Chinese into returning to Taiwan. Their technological expertise was influential in developing the electronics and information technology (IT) industries of Taiwan.

In the beginning, most of the Taiwanese IT-companies were so-called OEMs (Original Equipment Manufacturer), meaning that they produced goods under contracts for multinational corporations, which marketed the resulting products under their own brand names. Increasingly, toward the end of the 1990s, Taiwanese IT companies started developing their own brand names. The success of Taiwan’s IT industry is perhaps most clearly represented by the Acer Group, the Taiwan-based computer manufacturer.

At this point Taiwan had become an economic power, with a mature and diversified economy, solid presence in international markets and huge foreign exchange reserves. The desire for democracy in a now developed country forced the KMT dictatorship to start the process of democratisation. In 1987 the martial law, epitomised by the Emergency Decree that Chiang Kai-shek had established in 1949, was lifted. The ensuing social and political instability had a detrimental effect on the investment environment. At the same time the New Taiwan Dollar (NTD) appreciated, which affected exports adversely. The resulting collapse in economic growth in the late 1980s is clear in figure 2 and figure 3. After 1987 the Taiwanese economy has also experienced significant financial liberalisation, combined with drastic changes in monetary and exchange rate policies. Nevertheless, the Taiwanese economy was surprisingly mildly hit by the Asian financial crisis in 1997.

The year of 1987 also marked the beginning of civilian contacts between Taiwan and the Chinese mainland. The economic integration between Taiwan and Mainland China has been increasing at a rapid pace since then. China is now Taiwan’s biggest trading partner whereas Taiwan is China’s sixth largest trading partner. It has to be said that a large share of Taiwan’s

trade with China goes through Hong Kong. Investments in the Chinese mainland by Taiwan's private sector have increased cross-strait trade. To illustrate the significance of these investments, China became the world's biggest IT hardware exporter to America in 2005. Yet more than 60% of these exports were made by Taiwanese companies with production on the mainland. (The Economist, 2005)

Chapter: 3 Decomposition of Taiwan's Growth miracle

“The exemplary performance of many East Asian economies has been the basis for a large and varied literature, much of which explores reasons for the persistently high growth and draws lessons for other countries that would like to follow suit. A surprising aspect of this literature is the lack of agreement on fundamental aspects of the performance record that analysts seek to explain.” (Collins and Bosworth, 1996: 135)

This quote from an influential paper written by Susan Collins and Barry Bosworth is a good introduction to this chapter of my thesis. In order to understand the reasons for Taiwan's extraordinary economic growth it is important to have an idea of where this economic growth stems from. During the 1990s there was a mushrooming of empirical literature that tried to decompose the growth of the East Asian tiger economies into factor accumulation growth and the residual growth in Total Factor Productivity (TFP). Before looking into the findings of this literature, I want to provide a theoretical framework for the concept of decomposition of economic growth. I specifically want to emphasise the concept of TFP, as this is the most controversial aspect of the literature on the decomposition of the East Asian growth miracle.

3.1 The Concept of Total Factor Productivity and its Estimation:

Total Factor Productivity is an attempt to measure the productivity of an economy taking into account all factors of production. Productivity refers to a ratio of output to input and when referring to a single input, the notion of productivity does not pose any problem. When more than one input is to be taken into account, the problem that arises is how to weight each factor in the quotient. Standard forms of the TFP ratio are:

$$A = \frac{Q}{\alpha L + \beta K} \quad A = \frac{Q}{L^\alpha + K^\beta} \quad (1)$$

Where the first is an arithmetic index and the second is a geometric. A denotes the productivity index; Q, L and K are output, labour and capital, respectively; α and β are the

weights. Neoclassical economics solves the weighing problem by relating the productivity ratio to an aggregate production function from which the weights can be taken and interpreted. In its simplest form, the aggregate production function can be written as

$$Q_t = F[K_t, L_t, t] \quad (2)$$

Equation (2) expresses output as a function of the stock of capital, employment and a shift factor (t), time, where the latter proxies the effects of productivity and technical progress. Assuming that the argument “t” is separable from K and L:

$$Q_t = A_t F[K_t, L_t] \quad (3)$$

and then

$$A_t = \frac{Q_t}{F[K_t, L_t]} \quad (4)$$

Expressed this way TFP (A_t) is exogenous, and is measured by how output changes as time elapses with the input bundle held constant. Consequently TFP can be interpreted as all the factors other than labour and capital not explicitly accounted for, but which contribute to the generation of output. According to Felipe (1999) examples of these factors are: Managerial capabilities and organizational competence, research and development, intersectoral transfer of resources, and diffusion of technology.

Estimation of TFP growth:

The two methodologies used in most papers on productivity growth have been growth accounting and econometric estimation of production functions.

(1) Growth Accounting:

For empirical purposes expression (4) poses a conceptual problem. The level of technology A_t is not clear in direct comparison among different economic units. The expression is therefore usually expressed in growth rates:

$$T[K_t, L_t, t] = \frac{dA_t}{dt} = \varphi_t = q_t - \frac{L_t}{Q_t} \frac{\partial Q_t}{\partial L_t} l_t - \frac{K_t}{Q_t} \frac{\partial Q_t}{\partial K_t} k_t \quad (5)$$

Where q_t , l_t and k_t denote the growth rates of output, labour and, capital, respectively, and φ_t is the rate of total factor productivity growth. The expressions in front of the growth rates of the factors are the respective elasticities. Empirically, neoclassical economics proceed by assuming perfect competition and profit maximisation. Under these conditions the price elasticity of demand is infinite, factor elasticities equal the factor shares in output, and thus (5) becomes

$$\varphi_t = q_t - a_t l_t - (1 - a_t) k_t \quad (6)$$

where a_t and $(1 - a_t)$ are the labour and capital shares, respectively. Expression (6) sums up the method of growth accounting, the purpose of which is to determine how much of the economic growth can be attributed to accumulation of inputs and how much can be attributed to technical progress. As national accounts and other statistics provide estimates of the right-hand side variables, one can obtain the rate of productivity growth as a residual category.

Empirically, researchers use the so-called Tornqvist index. In the discrete case it can be shown that:

$$\varphi_{t,t-1} = \ln \frac{Q_t}{Q_{t-1}} - \Theta_L \frac{L_t}{L_{t-1}} - \Theta_K \frac{K_t}{K_{t-1}} \quad (7)$$

where

$$\Theta_L = \frac{\theta_L + \theta_{L-1}}{2} \quad \Theta_K = \frac{\theta_K + \theta_{K-1}}{2}$$

Where θ_i denotes the share of each aggregate factor in total factor payments.

(2) Econometric estimation of Production Functions

The growth accounting approach depends on the existence of an aggregate production function for the total economy and the validity of the (aggregate) marginal productivity theory of factor pricing. Consequently, the direct estimation of the aggregate production function is an alternative to the growth accounting approach. In this case (3) takes a definite form with an assumption about A_t . Due to its simplicity, the most widely used form has been the Cobb-Douglas, and A_t has usually taken the form of an exponential time trend. This way, technical change is viewed as a shift of the production function over time at reasonably smooth rate.

The coefficient of the trend measures the average rate of TFP growth. Thus, the standard form used has been:

$$\ln Q_t = c + \alpha \ln L_t + \beta \ln K_t + \varphi t + u_t \quad (8)$$

where φ measures the average growth rate of output holding inputs constant, and u_t is the disturbance term. This equation has been directly estimated in most cases using ordinary least squares (OLS).

3.2 Empirical estimates of the rate of TFP growth in Taiwan:

The preceding section is a simplified presentation of the theory behind the various empirical studies that have tried to decompose “the East Asian miracle”. So what do these studies conclude with respect to Taiwan? Is the spectacular economic growth that happened on this island in the second half of the 20th century a result of accumulation of human and physical capital or a revolution in technology? Or, which seems most plausible, a combination?

The estimates of the size of the TFP growth in the East Asian tigers, including Taiwan, differ widely based on different assumptions. In the following I will present different results concerning the growth of TFP in Taiwan over different time periods in the second half of the 20th century. The results are presented in table 1 and I have commented on some important characteristics and methodology of the different studies below. This overview is based on Felipe (1999) and Yang (2006).

Table: 1 Empirical estimates of TFP growth in Taiwan

<i>Author</i>	<i>Period</i>	<i>TFP growth</i>	<i>% of Output Growth</i>
Young (1994)	1970-1985	1,5	
Kim & Lau (1994)	1966-1990	1,2	15,0
Fischer (1993)	1961-1988	1,7	
World Bank (1993)			
Figure 1.10	1960-1989	4,2	
Figure 1.11	1960-1989	3,9	
Table A1.2	1960-1990	1,3	
Table A1.3	1960-1989	0,8	

Marti (1996)	1970-1990	2,1	35,7
Collins & Bosworth (1996)	1960-1994	2,0	34,5
Drysdale & Huang (1997)	1950-1990	2,9	33,7
Singh & Trieu (1999)	1968-1990	2,6	30,6
Liang (2002)	1960-1993	2,5	28,4
Chow & Lin (2002)	1951-1999	≈ 3,0	≈ 40

The results cited in the table above indicate that there is a significant amount of disagreement concerning Taiwan's TFP growth. The lowest estimates of the TFP growth puts it in the region around 1,5 percent (Kim & Lau, 1994; Young, 1994; Fischer, 1993). The highest estimates put it above 2,5 percent and above 30 % of economic growth (Drysdale & Huang, 1997; Singh & Trieu, 1999; Chow & Lin, 2002). Of course, these results are not directly comparable as the time periods studied differ, but the differences are still noteworthy. I will return to the debate over the decomposition of Taiwan's economic growth and the policy implications after I have briefly presented the methodology of some of the studies.

Methodology:

Kim and Lau (1994) implemented a regression procedure called the meta-production function approach. I will not go into the technical details of this approach here, as the technique is quite complicated. However, it is worth to note some of their findings: (i) the null hypothesis that productivity growth in the four "East Asian tigers" was zero could not be rejected; (ii) the standard assumptions behind growth accounting, that is, constant returns to scale, neutral technical progress, and profit maximization, were rejected.

The World Bank report of 1993 gave several different estimates for the rate of TFP based on different methods and assumptions. According to Felipe "this leads the reader rather perplexed, since this is not a matter of choosing the most convenient figure. Only one can be true." (Felipe, 1999: 13) He also goes on to state that "I doubt it is possible to draw sensible conclusions out of all these numbers."

Fischer (1993) estimated three sets of TFP growth rates using growth accounting, each with a different weight for different factor inputs⁶. According to his findings Taiwan had the highest TFP growth rate in East Asia at 1,7. On the other hand Myanmar surprisingly appeared to have the highest TFP growth rate in South Asia at 1,5 percent, and Fischer thus concluded that the estimates raised questions about the underlying Summers and Heston data.

Marti (1996) took issue with Young's results. She fitted the same regression as Young (1994) using a more updated version of the Summers and Heston data base, including data for 1970-1990 (five more years than Young) and for 104 countries (Young used 118). Collins and Bosworth (1996) used growth accounting for a large set of countries. Their aggregate production function included capital and the product of labour and education, hypothesizing that the benefits of education are labour-augmenting. This is expressed by the interaction effect between human capital, H_t , and L_t in the production function below.

$$Q_t = A_t K_t^\alpha (H_t L_t)^{1-\alpha} \quad (9)$$

Collins and Bosworth used fixed weights both across time and across countries with $\alpha = 0,35$ and consequently $1 - \alpha = 0,65$. The authors defend the use of fixed weights saying that “existing studies provide surprisingly little evidence of major changes in factor shares over time. Instead most of the debate has been about the absolute level of the capital share.” (Collins & Bosworth, 1996: 154) Still, they acknowledge that as a region, East Asia exhibits the greatest sensitivity to the choice of the parameter values because it accumulates both physical capital and education faster than do other regions. An increase in the weight attached to physical capital accumulation increases capital's contribution and reduces the residual contribution of TFP by 0,6 percentage points per year over the period 1960-94. (Collins & Bosworth, 1996: 162)

3.3 Debate between accumulationists and assimilationists

The previous section makes it clear that the estimates of the importance of TFP growth in Taiwan's “growth miracle” differ widely among researchers. Still, two broad groups have emerged through the debate; the accumulationists and the assimilationists. Before proceeding to give a further presentation of these two views and the important debate between their

⁶ 1) The so-called Bhalla residuals, derived from a panel regression, with weights 0,398 for capital, 0,44 for labour and 0,012 for education. 2) The Solow residuals, with weights 0,4 for capital and 0,6 for labour. 3) the Mankiw-Romer-Weill residuals with equal weights of 0,333 for capital, labour and education. As the three data sets were highly correlated, Fischer decided to work with the Solow residuals.

protagonists, I will emphasise that in this debate all the four East Asian tigers are usually treated collectively. The researchers that have tried to decompose these growth experiences have generally not looked at just individual countries, but instead tried to reach conclusions based on the experience of the Asian tigers as a group. Although there are pronounced variations between the four countries, they are not large enough to inhibit the reaching of conclusions for the countries as a group. Consequently, the views that I am about to present do generally not apply to Taiwan alone, but instead to all the four East Asian tigers. Therefore I would like to make a comment about how Taiwan performs with respect to TFP growth relative to the other East Asian tigers.

Generally, and at this point there is of course a certain degree of variation between different studies, Hong Kong and Taiwan expose the highest rates of TFP growth. South Korea has a slightly weaker performance, while Singapore is the country with the weakest performance by far. Singapore has in fact zero or even negative TFP growth in some of the studies. The relatively strong performance of Taiwan in relation to the other East Asian tigers is of course important. It does however not mean that the debate between the accumulationists and the assimilationists does not apply to Taiwan.

The accumulationists (also known as the fundamentalists) claim that the phenomenal growth of the East Asian growth miracles was mainly input-driven (see for example Young, 1994; Kim and Lau, 1994; Krugman, 1994 and Collins and Bosworth, 1996). On the other side are the assimilationists, who argue that the acquisition and adoption of foreign technology and innovation was the essential component of the East Asian growth miracle.

This debate really got started as a result of the findings of Young (1994) and Kim and Lau (1994). According to their findings growth in the East Asian tigers was input-driven and productivity increases were negligible if not zero in some of the countries. Based on these findings Paul Krugman (1994) wrote one of the most cited papers in economics ever, where he in fact went as far as comparing the growth experience of these East Asian economies to that of the Soviet Union, with an extremely pessimistic outlook for the future as the growth in these countries will run into diminishing returns. His line of reasoning was inherently neoclassical in nature, because according to the standard neoclassical growth model, input-driven growth is not sustainable because incremental growth in inputs is subject to the law of diminishing returns. In this model, capital per worker rises over time, generating a decline in the marginal product of capital, up to the point where the economy reaches the steady state.

Countries' growth rates will level off at a growth rate equal to the sum of their labour and productivity growth rates, as capital per worker peaks at a level determined by saving behaviour and the pace of productivity growth. In the neoclassical growth model an economic growth that is based on the "the marshalling of inputs" will not be sustainable, and the process will stop as a result of diminishing returns to the factors.

As far as policy implications of the accumulationist view is concerned, Collins and Bosworth, conclude that "this outcome is not very encouraging either for the argument that the East Asian experience reflects the benefits of open, liberalized markets, or of the view that it illustrates the efficiency gains of an activist government policy." (Collins and Bosworth, 1996: 171) They come to this conclusion because "these policies are expected to operate by affecting the level and growth of TFP, but there is little about the behaviour of TFP in East Asia to be explained." The secret to the success of the East Asian economies, according to the accumulationists, is simply a willingness to make the sacrifices necessary to accumulate capital at very high rates. Or, as Howard Pack and Richard Nelson, which adhere to the assimilationist interpretation, remark rather sarcastically "the lessons for other developing countries would be simple, namely, increase levels of investment and there would be little need to pay attention to entrepreneurship, innovation, or learning." (Nelson and Pack, 1999: 434)

This provoking interpretation of the East Asian growth miracle generated a response. The assimilationists stress that what made the East Asian countries' performance special and different was how spectacularly well they mastered foreign technology. Nelson and Pack (1999) express the assimilationist interpretation by arguing that what explains the East Asian growth miracles was these countries ability to "learning about, risking operating, and coming to master, technologies and other practices that are new to the country, if not to the world." (Nelson and Pack, 1999: 434) However, to back up their interpretation of the East Asian growth miracle, Nelson and Pack do not provide a new estimate of the rate of TFP growth. They claim that the use of growth accounting and dynamic production function estimation "suppress the major structural change that was occurring, the progressive replacement of smaller by larger, more efficient firms that mastered entirely new (to the country) technologies." (Nelson and Pack, 1999: 424) Also "neither method can persuasively separate growth that would have occurred without technological advance from the contribution to growth made by advancing technology without some assumptions of uncertain validity." (Nelson and Pack, 1999: 425) Instead they present a model in which the effectiveness of

entrepreneurship is a constraint on the rate of assimilation of new technologies. In their model the strength of entrepreneurship in responding to profit opportunities determines the rate of assimilation.

Without going into the technicalities of their model a high degree of entrepreneurship causes a shift from a traditional labour-intensive sector to a modern capital-intensive sector, leading to an increase of K/L (capital per worker) and Q/L (production per worker). They point out that analysts studying this process might conclude that growth of Q/L was caused by the growth of physical and human capital per worker and infer that growth was due to “movements along the (economy-wide) production function.” However, in Pack and Nelson’s model the driving forces of the growth process are the profitability of employing modern technology and the strength of entrepreneurship. To illustrate this point the following two figures might be instructive. Both figures display a large increase in output per worker associated with a large increase in capital per worker. The dynamics driving this development does however differ.

Figure: 4

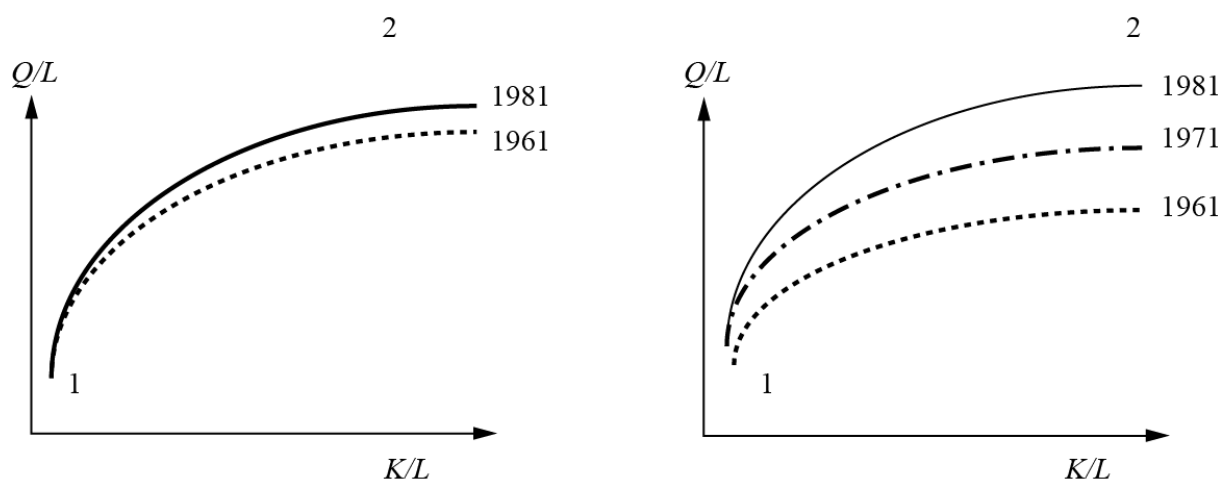


Figure: 4 Alternate Interpretations of growth. Source: Nelson and Pack (1999, Fig. 1)

In the figure to the left, the elasticity of substitution is assumed large, and much of the experienced growth would have occurred even had the economy stayed on its production function of period one (the dotted curve). The production function exhibits only relatively weak diminishing returns to increasing capital intensity. The economy in question is presumed to know, at time one, how to operate effectively at much higher capital intensities than were employed then, but chooses not to do so because prevailing factor prices made it more profitable to operate at low capital intensity.

In the explanation on the right hand side, however, the experienced productivity growth is almost completely the result of the establishment of a new production function. Here, at time one, the economy in question knew very little about how to operate effectively at significantly higher capital intensities. An increase of capital per worker without learning about and learning to use new techniques would quickly have led to very low marginal returns of capital. Consequently the economy had to go through a phase of innovation to reach point 2. According to Nelson and Pack standard regression techniques “do not permit confident acceptance of one explanation and rejection of the other.”(Nelson and Pack, 1999: 428) In Nelson and Pack’s model the growth of human capital is an important enabling element through its effect on entrepreneurship.

A strain of debate in economic growth theory that I think is very much related to these two differing interpretations of the East Asian growth miracle is the debate concerning the validity of the neoclassical growth model. The reason is that the accumulationist interpretation of the growth miracles to a large extent hinges on a neoclassical interpretation of economic growth.

One of the most famous papers ever published in economics (Mankiw et al, 1992) claims that the Augmented-Solow model based on a production function $Y = AK^\alpha H^\beta L^\gamma$ with returns to scale has been a good first approximation to the international growth experience. However, this result is quite controversial. For example, Islam (1995) re-examined these results using panel data methods and found that country-specific effects are substantial.

Moreover, the neoclassical assumption of a universal technology is probably not justified (Crafts, 1998). This assumption implies that if a technology is efficiently employed in advanced industrial nations, firms in poorer countries can adopt that technology at relatively low cost, and without significant uncertainties regarding the outcome of their efforts. Extensive case studies of firms suggest this is not the case. For example, in 1960 virtually no electronics goods were produced in Taiwan but by 1990 these accounted for roughly 21 % of manufacturing exports. (Nelson and Pack, 1999: 418) This industrial transformation was not a matter of routine, but involved risk taking entrepreneurship as well as good management.

This leads to the conclusion that countries will vary both in the extent to which they catch up and the speed with which they reduce productivity gaps. Abramovitz (1986) argued that these differences in the experience of catch-up growth will be determined by what he called “social capability”. The standard of education and the level of human capital, the role of institutions

and the incentive structures to which they give rise are important parts of this “social capability”. I will revisit these important aspects in Chapter 5.

3.4 Labour force growth and the demographic bonus:

So far I have focused on the debate concerning the importance of the growth of TFP in explaining Taiwan’s growth miracle. The reason is simply that this is truly the aspect that gets almost all the attention in the empirical literature. The part of the economic growth that is not attributed to the growth of TFP is by definition explained by the accumulation of inputs, namely capital and labour. The relative importance of these two factors, although not that controversial, is by no means an easy or obvious question. To give an idea of this relative importance in the case of Taiwan Chow and Lin (2002), that admittedly ascribe a relatively large share of the GDP growth to TFP, put the contribution of capital at about 40 percent and that of labour at about 20 percent for the entire period 1951 – 1999, leaving 40 percent to be explained by TFP. Collins and Bosworth put the contribution of capital at almost 50 percent, labour at around 28 percent and TFP at around 22 percent for the period 1960-94. In both cases the contribution of labour is about half that of capital. This is an indication of the tendency for much bigger variation in the estimates of the importance of accumulation (both capital and labour) relative to TFP, as compared to the relative importance of accumulation of labour and capital, respectively.

In any case there is no doubt that an increase in the labour force, both quantitatively and qualitatively, has played a significant part in both the general East Asian and the specific Taiwanese growth miracles. The reason for this is partly that these countries have experienced what is termed a “demographic bonus”. The essence of this “demographic bonus” is that as economies develop they typically undergo a demographic transition in which birth and death rates both fall to much lower levels but during which there is an acceleration of population growth because the falls in mortality tend to lead those in fertility. In East Asia the mortality rates started to decline after World War 2 leading to high population growth. The birth rates adjusted faster than was the case during the European demographic transition and started to fall quite rapidly. (Crafts, 1998)

Despite this more rapid adaption of birth rates to declining death rates than was the case in Europe, the East Asian countries experienced a “demographic bonus”. To give a sense of this in the case of Taiwan the growth of the age group 15-64 minus total population growth was 1

percentage point over the period 1965-90. This caused the share of the population in the age group 15-64 to increase from 52,5 in 1965 to 66,7 in 1990 (Crafts 1998: 20).

The demographic changes related to decreasing death and birth rates also made an important contribution to the increase of household savings. I will return to this effect in Chapter 4, under my discussion of factors and policies that contributed to increased savings rates and thereby increased investment rates.

The rapid shift from high birth rates to low birth rates also increased the potential resources available per child, consequently contributing to the increase in quality of the labour force. This increase in the quality of the labour force in Taiwan was a result of substantial investments in education, an issue I will also revisit under my discussion of policies contributing to Taiwan's high economic growth. To what extent the human capital accumulation resulting from a more educated and skilled population is captured by the labour force growth will naturally have significant implications for the residual TFP growth.

Another aspect of the labour force growth is the increased female participation in the salaried workforce. According to Ranis (1995: 524) female participation rates increased sharply after 1967.

3.5 Methodological problems related to decomposing economic growth

The main point of this chapter has been to present the differing estimates and the debate concerning the decomposition of the growth rates of the East Asian tigers, and Taiwan in particular. The obvious reason for this "war of numbers" is the methodological problems related to decomposing economic growth. Felipe (1999) claims that these problems are so substantial that he doubts whether the collective body of empirical research on this topic teaches us anything about growth in the East Asian region. I have already touched upon different challenges when decomposing economic growth. In the following I will give a more complete discussion of these issues.

Firstly, the measurement of TFP depends critically on assumptions about production functions, choice of output measure (value added vs. gross output), use of capital stock versus flows of capital services, quality of inputs, cyclical smoothing, time period studied, errors of measurement in the variables and so forth. Differences in assumptions related to measurement will give radically different results and create difficulties of comparison.

Secondly, the appropriateness of the growth accounting method hinges on how well the assumption of perfectly competitive markets approximates the real economy at the aggregate level. In the case that this approximation is not close, the weighing of growth rates of various contributing factors by their factor shares in national income and account for total growth becomes problematic. In the case of Taiwan, as well as the other East Asian tigers, this condition is likely to be breached as a result of government intervention that I will discuss in Chapter 4. This will lead to a divergence between the price per unit of each employed factor and its marginal value.

Thirdly, there is the important question of whether it is possible to distinguish between capital accumulation and TFP growth as technical advances might be embodied in new capital and increased TFP could lead to greater capital accumulation. Felipe uses this example to illustrate this point: “It is not clear that purchasing the machinery represents exclusively capital accumulation, that how well one uses it represents technical progress, and that both can be easily split.” (Felipe 1999: 20) This is no new thought. Solow (1960) and Arrow (1962) argued that most technical progress, except for very small improvements (for example better arrangement of the shop floor due to learning by experience), has to be embodied in capital goods. Actually, if in fact most technical progress is embodied in capital goods, then the finding of a zero residual may not be such a surprising finding and will not be a sign of absence of technological progress.

Fourthly, the so-called “attribution problem” should be mentioned. According to expression (6), a 1 percent increase in output could be achieved by either a 1 percent increase in productivity growth, or a $(1/a_t)$ increase in employment, or a $(1-(1/(1-a_t)))$ percent increase in the capital stock. However, if the factors are complements, overall growth from the growth of inputs is greater than the mere sum of the individual growth rates of each input. I wish to quote Nelson that gives an illustrative parallel:

“Consider the source of a well made cake. It is possible to list a number of inputs – flour, sugar, milk, etc. It is even possible to analyze the effects upon the cake of having a little more or less of one ingredient, holding the other ingredients constant. But it makes no sense to try to divide up the credit for a good cake to various inputs.” (Nelson, 1981: 1054, quoted in Felipe 1999)

Lastly I would like to point at the problem related to the assumption of Hicks-neutrality, which implies that the rate of technical substitution is independent of time. That also has the

implication that technological progress does not influence the proportions in which capital and labour are combined. In that sense inventions should, with given factor proportions, raise the marginal product of labour in the same proportion as the marginal product of capital. This is however, quite dubious.

2.7 Summary:

So where does all this leave us? Can we say anything meaningful about where Taiwan's economic growth stems from, or are the methodological challenges too great? Well, firstly I do not feel that I am in a position to pick one of the estimates of Taiwan's TFP growth rate and say that this is probably the correct number.

Luckily, the variation in the estimates of Taiwan's TFP growth (see Table 1), however significant, is not too big to make any conclusions. Although it seems that economic growth in Taiwan, as well as the other East Asian tigers, was primarily a result of accumulation of physical and human capital, productivity growth was also quite substantial in the case of Taiwan. For example the extremely influential 1993 World Bank report "the East Asian Miracle", that ascribes a high proportion of the "growth miracle" to accumulation, concludes that; "Between 1960 and 1989 Japan, the Republic of Korea, Hong Kong, Malaysia, and Taiwan, China – had among the highest rates of TFP growth in the world." (World Bank 1993: 259) Crafts (1998) also concludes that productivity performance has been much stronger than what the most strident critics of the East Asian growth miracle claim.

To the extent that Taiwan's growth miracle is explained by factor accumulation and most importantly investment, this kind of economic growth easily invites comparisons with the Soviet Union and other Soviet-type economies. This comparison, however, seems unjustified as it is not appropriate to compare economic systems where the level of accumulation and allocation of resources are determined by central planners, to systems where investment and savings decisions are generally made on the basis of profitability.

It is also possible that the potential to adopt foreign knowledge and technology depends on a country's stage of development. Perhaps growth in the early stages is primarily associated with physical and human capital accumulation, and the potential for technological catch-up emerges when a country has crossed some developmental threshold (see for example Collins and Bosworth 1996: 186). In support of this idea Crafts (1998) notes that TFP growth appears to have been much stronger in Taiwan towards the end of the 20th century.

Lastly, performing a growth accounting exercise with the aim of decomposing overall growth or fitting a production function is not the same as explaining the ultimate sources of growth. The real sources of economic growth are the mechanisms that drive the accumulation of capital and labour and the increased productivity of these factors of production. These ultimate sources of the Taiwanese growth miracle will be the focus of the rest this thesis. And no matter how this economic growth is decomposed, it does not change the fact that these growth rates are exceptionally high.

Part: 2 Explanations of Taiwan's growth miracle

In the second part of this thesis I will discuss the mechanisms that have driven the accumulation of capital and labour in Taiwan in the second half of the 20th century as well the increased productivity of these factors of production.

I have divided this discussion into two chapters. Chapter 4 deals with policies, whereas chapter 5 discusses external factors, initial conditions and institutions. However, the division between policies and institutions is blurred. Thus, I am fully aware of the fact that these two broad groups of explanations often glide into each other.

I have divided chapter 4 into four sections: Outward orientation; Accumulation of human capital; Accumulation of physical capital and Allocation of resources and Industrial policies. Especially the section that deals with accumulation of human capital is very much intertwined with institutions and external factors. Concerning Chapter 5 I have divided it into External Factors and Initial Conditions and Institutions, with a brief section on cultural factors related to nationalism and Confucianism. The term "initial conditions" is inspired by Rodrik (1995) and Booth (1999). I have identified three: 1) The distribution of income and wealth; (2) Human capital and (3) Efficient bureaucracy. However, I am not sure if "initial conditions" is a completely accurate term for these factors as they are constantly changing. They are also to a large extent affected by changes in policies that again are affected by the institutional framework.

Chapter: 4 Policies

There is definitely no consensus concerning what has caused the Taiwanese growth miracle. The island, together with the other East Asian growth miracles, has been used to support conflicting policy advice over the years. For example, many Western economists, who tend to stress the benefits of free markets, have often pointed to East Asia as evidence that these countries have prospered due to relatively open trading regimes and other market friendly policies. Asian economists, on the other hand, often describe the underlying policy strategy as sequential industrial targeting, based on the Japanese model after World War 2. This citation from Collins and Bosworth (1996) illustrates the importance and controversy of economic policies in explaining the East Asian growth miracles.

“The role of government has emerged as the most controversial aspect of the East Asian growth experience. The debate is not about whether policy mattered, but over which measures paid off and their relative importance.” (Collins & Bosworth 1996: 171)

Before reviewing some of the discussion of the merits of different policies in Taiwan, I would like to define two broad types of economic policies inspired by the World Bank (1993).

Fundamentals: policies that encourage macroeconomic stability, high investments in human capital, stable and secure financial markets, limited price distortions, and openness to foreign technology.

Selective policies (interventions): mild financial repression (keeping interest rates positive but low), directed credit, selective industrial promotion, and trade policies that push non-traditional exports.

4.1 Outward Orientation

The idea of export-led economic growth is very influential in the case of Taiwan and the other East Asian tigers. According to Rodrik (1995: 55) “the standard story to which most orthodox economists subscribe is one of export-led growth (see, for example Tsian 1984; Krueger, 1985; World Bank 1993; Little, 1994).” This is admittedly a general statement for all the East Asian economies. Hwang (1991: 94) claims that “the success of Taiwan’s economy has hinged on the performance of its manufacturing exports.” Krueger (1995) also supports the notion that outward orientation was important in explaining the growth experiences of the High Performing Asian Economies (HPAE⁷s), including Taiwan, although other factors also played a substantial role; “Having agreed that outward orientation was a necessary condition for rapid economic growth, analysts have then considered the extent to which it was sufficient. Clearly it was not. High rates of investment; provision of infrastructure, a well-functioning labour market, and the overall policy framework conducive to efficient production were clearly major contributing factors” (Krueger 1995: 24)

So what is the essence of this export-led growth theory? Rodrik points to a particularly clear statement given by Little (1994):

⁷ This group of countries usually includes the tiger economies Hong Kong, Singapore, South Korea and Taiwan, as well as Indonesia, Japan, Malaysia and Thailand. China could also be included, depending on the context.

“the outstanding success of Korea and Taiwan comes from the early 1960s to the mid 1970s was based on a phenomenal growth of labour-intensive manufactures. This branch of manufacturing took off because exports were highly profitable once the bias against manufacturing for export was removed. The high profitability also depended on a relatively well-educated hard working docile labour force which was, apart from the natural rate of increase, fed by a large movement out of agriculture... High profits and increased earnings for recruits to the industrial labour force led to a very rapid rise in savings. There was thus a virtuous circle.”

A natural question next could be to consider to what extent the Taiwanese government in fact promoted its exports and what consequences this promotion had. As mentioned in Chapter 2 the switch to policies of export promotion in Taiwan is marked by the program of Economic and Financial Reform in 1959. Still, according to Rodrik most of the export incentives were put in place already in the mid- to late 1950s. By 1954-55 the system of import duty and commodity tax rebates for exportable production had already been implemented. In 1957 a relatively generous export credit programme was commenced, and the multiple exchange rate system was unified during 1958-61. Taiwan's export businesses have always tended to be small or medium in size. In fact, this has often meant that they do not have a full-fledged international marketing and sales function. The Taiwanese government responded to this by establishing a government agency that promoted Taiwanese products overseas. As an illustrative remark on Taiwan's dedication to increase its exports Hwang (1991) points out that an ever present propaganda slogan on the island was “everything is for export”. “The slogan appeared on highway billboards, street signposts, government buildings, and the advertisement section of newspapers and magazines.” (Hwang 1991: 93)

What consequences did this export promotion have? Figure 7 that I've taken from Rodrik (1995: 65) shows Taiwan's export performance and the development of its real exchange rate:

Figure: 5

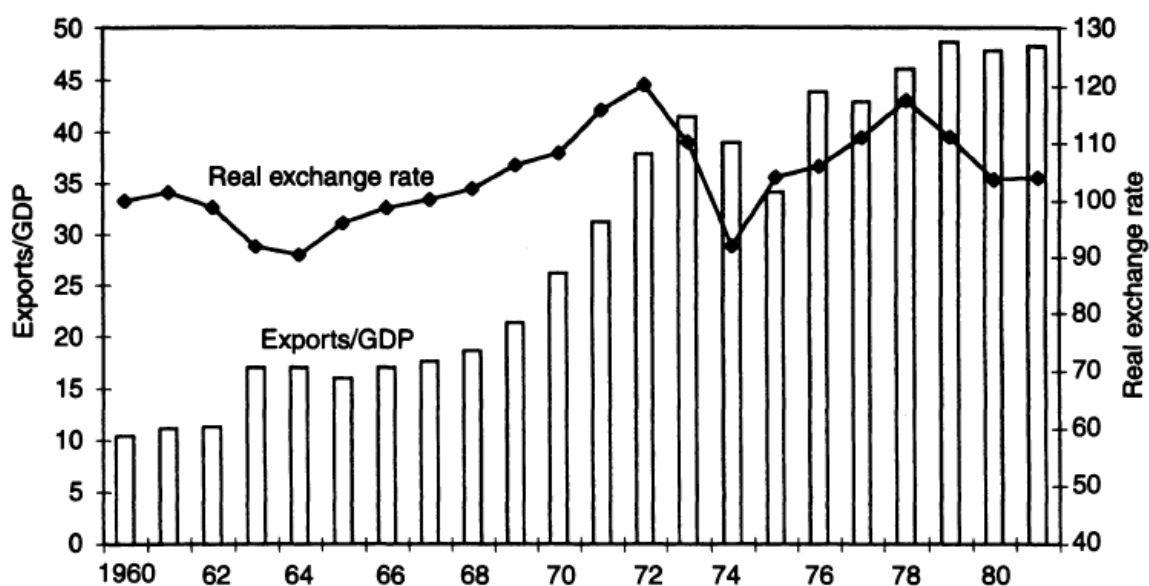


Figure: 5 Real exchange rates and exports: Taiwan, 1960 – 81 Sources: Kuo (1983, Table 14.4) and Council for Economic Planning and Development, Taiwan Statistical Data Book, 1982 and 1991, as presented in Rodrik (1995)

The figure shows that exports as a share of GDP takes off from the late 1960s. That is intuitively somewhat surprising as most of the policies to promote exports were established during the 1950s. Rodrik therefore claims that these policies were not sufficient to drive exports, and he claims that something else drove the growth of exports and production. I will return to this later.

Before that I want to make some comments concerning the composition of Taiwan's exports and products that have been important at different stages. During the course of the second half of the 20th century varying products have been the mainstay of the export sector, such as the processed agricultural products of the 1950s, the labour-intensive products of the 1960s and 1970s, the machine tools and electronic products of the 1980s as well as notebooks, integrated circuits (IC) and other high-tech products in the 1990s.

The labour-intensive products of the 1960s and 1970s resulted in a rapid generation of employment and an increasingly favourable income distribution. These labour-intensive products were generally destined for industrial countries like the Western European countries, Japan and most importantly the US. However, from the 1980's Taiwan began to lose its advantage in the production of labour-intensive products, due to higher wages in Taiwan and

heavy competition from countries such as Thailand, the Philippines, Malaysia, Indonesia and mainland China. Many Taiwanese manufacturers have in fact chosen to relocate plants to these countries.

From the early 1990s Taiwan's economy has become ever closer knit to the economy of the Chinese mainland. This shift has several causes. One reason is that Taiwan's persistent trade surplus with the US forced the US government to exert pressures on Taiwan to voluntarily curtail its export expansion to the US market and to limit the increase of the assigned import quotas to Taiwan (Hwang, 1991). The appreciation of the New Taiwan Dollar against the US dollar at the end of the 1980's also contributed to a shift of Taiwanese exports from the US to Mainland China. Nevertheless, the most important reason is the enormous growth of the Chinese economy after 1978 and the reduced political tensions between Taiwan and the mainland.

As already mentioned Rodrik's influential paper "Getting interventions right: how South Korea and Taiwan grew rich" (1995) tries to take the export-led growth explanation apart. His main problem with the export-led growth hypothesis with respect to Taiwan and South Korea is that in his opinion the switch in relative incentives toward exports in the late 1950s and the early 1960s was not significant enough to account for the subsequent export boom. According to him "what is striking about the experience of South Korea and Taiwan is how stable the relative price of their exportables, was around the time of export take-off." (Rodrik, 1995: 61) And this export boom picked up speed without a corresponding increase in the profitability of exports. Rodrik rejects the idea that the export boom from the mid-1960s could have been a delayed response to the shift in incentives toward exports during the late 1950s by pointing out that comparative evidence, from for example Turkey and Chile, indicates that exports tend to react quite quickly to changes in incentives.

Rodrik also points out that it is not clear that export growth was, or should have been, associated with cumulative productivity spillovers to the rest of the economy. That is however a quite common assumption and the World Bank's (1993) East Asian miracle report "gives it top billing in its exposition of the 'dynamic' benefits of outward orientation." (Rodrik 1995: 69) According to Rodrik the report does not provide any evidence that exports or outward orientation is associated with technological externalities. Still, he acknowledges that several studies on this topic point to correlations between export growth and TFP performance across firms or industries. These, however, say nothing about the direction of causality, if any.

Dessus (1999: 1) also concludes that “export promotion, per se, did not affect TFP growth significantly” in Taiwan. However, Dessus finds that imports of technology, in a context of decreasing returns to imitation, and the removal of domestic distortions, through its impact on the labour market’s allocative efficiency, have played an important role in Taiwan’s TFP growth. Exports have therefore had an indirect contribution through its financing of imports.

The benefits related to imports of technology estimated by Dessus are however not a result of Foreign Direct Investments (FDI). They are primarily a result of imports of intermediate inputs and capital goods. Concerning FDI Dessus concludes that “the share of FDI over total investment does not influence significantly the speed of convergence. It is most likely that it did not constitute a major source of technological transfer. Foreign investors generally leant toward highly labour-intensive industries, which uses less advanced technology and whose products were mainly intended for export.” ((Liang and Hou, 1984), quoted in Dessus, 1999: 11) In addition, Taiwan has always had a rather restrictive policy toward FDI. According to Yoshida et al. (1994, Table 4.4), the average ratio of FDI inflows to gross capital formation did not exceed 2 percent for any five-year period from 1970 to 1999. Still, Taiwan encouraged FDI in production for export and in those sectors where the potential for technology transfer was deemed to be high. (World Bank 1993: 304) This of course is at collision with the findings of Dessus. Anyway, the relatively small size of FDI inflows in Taiwan suggests that they did not play a significant part in productivity growth. Also, there is no consensus about the effect of FDI on productivity and economic growth.

The hypothesis that Rodrik proposes is that the export-boom of Taiwan was not a driver of economic growth, but just a natural consequences of what he thinks really drove this growth miracle: a boom in savings and investment. This view is of course not revolutionary and in accordance with the work of the accumulationists that I have discussed at great length in Chapter 2 of this thesis. The phenomenal growth of the investment rate of the Taiwanese economy is showed in figure 6, which I have created based on data from the Penn World Table. The development is indeed impressive and the take-off in the mid-1960s corresponds almost perfectly to the export boom showed in figure 5.

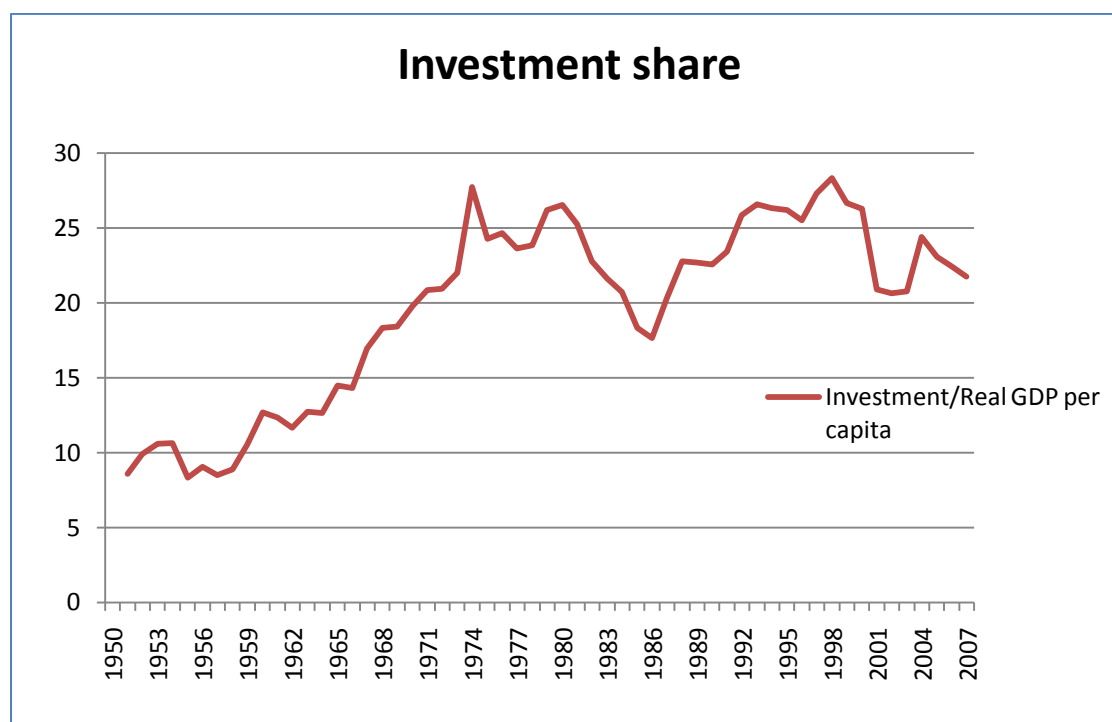
Figure: 6

Figure: 6 Investment share of Taiwan 1950 – 2007. Source: Penn World Table

Rodrik's line of reasoning to arrive at his explanation of Taiwan's export boom is the following; an exogenous shift in the profitability of investment causes an increase in the share of investment in GDP. If the country in question has a comparative disadvantage in the production of capital goods, this will require an increase in imports. Given that international borrowing is not unlimited, exports must rise to pay for the imports. This explanation reverses the causality between growth and exports. The export orientation enables growth, but it is not its underlying cause. To support this interpretation Rodrik produces a graph that shows how Taiwan's investment boom corresponds to the development of its imports (see Figure 7). He also points to the fact that imports of machinery and transport equipment accounted for a large share of this increase. The reasons for Taiwan's growth miracle must in his opinion "be traced back to reasons why it became profitable to invest." (Rodrik, 1995: 73) I will return to these reasons later in the thesis. This view that Taiwan's export boom was a result of rather than a cause of Taiwan's growth performance is supported by the findings of Liang and Lee (1975). They note that the positive contribution of exports and the negative one of imports showed parallel movements over a period of many years. They conclude that this may reflect the fact that increased exports made possible increased imports of capital goods and raw materials.

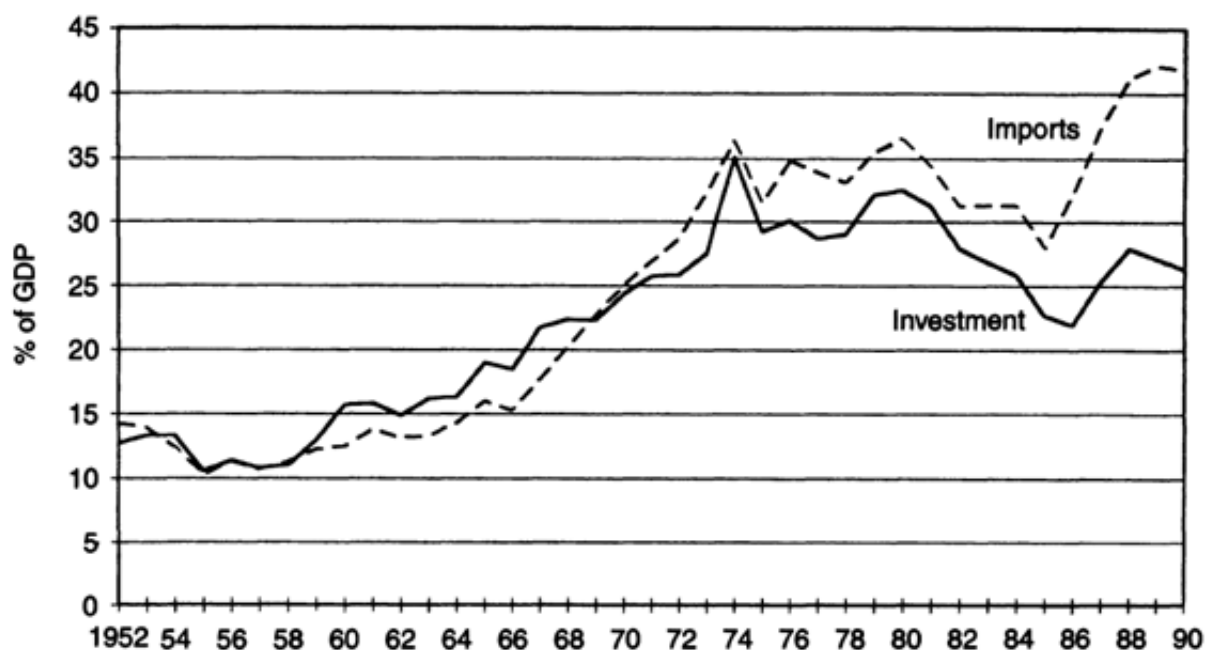
Figure: 7

Figure: 7 Imports and Investment: Taiwan, 1952-90. Source Penn World Table 5.5 and National Income in Taiwan Area of the Republic of China (1993) as presented in Rodrik (1995: Figure 10).

Victor Norman, in a comment to “Getting Interventions Right”, takes issue with some of Rodrik’s conclusions. He agrees that there is no obvious link between exports and growth, and expresses his puzzlement with regard to the pervasiveness of the notion that exports drove growth in Taiwan and South Korea. Still, he points out that there is a strong correlation between export orientation and growth in many countries. According to Norman this correlation could simply be due to Adam Smith’s assertion that the division of labour is limited by the extent of the market. Openness to trade has given Taiwan an access to the world markets and opened up for comparative advantages and industrial possibilities that would not have been there without this access. In the words of Norman “internal conditions are not sufficient, unless the market is large enough.” (Norman, 1995: 101) This can explain the observation that exports and growth are strongly correlated for small countries, while countries like Germany and the US could combine industrialisation with protectionism.

Norman dismisses Rodrik’s hypothesis that investment generated imports, which in turn generated exports. Taiwan’s export boom preceded the import boom and in Norman’s opinion “it takes exceptional belief in the foresight of policy-makers” (Norman 1995: 102) to think that they applied macroeconomic and exchange rate policies to stimulate a hike in exports in

order to meet the subsequent increase in import demand. Additionally, Sundrum (1990: 229) has shown a quite high correlation between export growth in Taiwan and growth of investments two years later. That also hints to causation from exports to investments and not the other way around.

I have already mentioned that “the East Asian miracle” World Bank report of 1993 gives firm support to the export-led growth hypothesis. However, the claimed positive effect on TFP from manufactured exports has, according to the report, happened through an interaction with rapid human capital accumulation. This is a particularly clear statement of this view from the report; “We believe that rapid growth of exports, a result of the export-push policies of the HPAEs, combined with the superior performance of these economies in creating and allocating human capital, provided the means by which they attained high rates of productivity-based catching up and TFP growth.” (World Bank, 1993: 316) High levels of labour force cognitive skills permitted better adoption and mastery of foreign technology. The report mentions a virtuous cycle between export orientation and human capital formation; exports raised the returns from education, and education raised the returns from exporting. That interpretation might serve as a good link to the next section of this thesis that will explore the factors and policies that generated Taiwan’s rapid accumulation of human capital.

4.2 Accumulation of human capital

Although very important, I will not delve too much into the causes behind Taiwan’s accumulation of human capital. Still, the importance of Taiwan’s high level of education will be revisited in Chapter 5 about the institutional framework. Also, the factors that contributed to Taiwan’s increase in the quantity of human capital related to demographic bonus and increased female participation in the salaried workforce have already been touched upon in Chapter 3.

A substantial body of empirical studies suggests that investments in education contribute significantly to economic growth. If the private returns are as high as social returns on these investments, individuals and households could be expected to make adequate (from an economy-wide point of view) investments in human capital on their own. However, two kinds of problems create a gap between private and social returns, which will cause private investments to fall short of optimal investments if they are not countered by government action. Firstly, there may be failures in the capital market and asymmetrical information that

reduce parents' ability or incentive to invest. Secondly, educational investments have positive externalities, which imply that families that invest in education are not the sole beneficiaries. These factors create an important role for the government with respect to investing in education.

During the course of Taiwan's economic development the government has invested heavily in education to increase the quality of its workforce. This has played a vital part in Taiwan's growth experience, and according to the World Bank (1993), as I mentioned in the previous section, these investments interacted with export industries to increase the growth of TFP. Several empirical studies have been conducted on the effect of education on economic growth in Taiwan. Lin (2004) finds that higher education provides a positive and significant effect on economic growth in Taiwan from 1965 to 2000. According to his estimates one additional percent of higher education stock increases real output by 0,19 %. Lee, Liu and Wang (1994) also found that Taiwan's economic growth relied heavily on human capital enhancement.

In Taiwan there has been a shift in higher education toward engineering and the natural sciences. Between the mid-1960's and late 1980's enrolments in graduate engineering and material science programmes virtually doubled to 40 percent of total graduate enrolments. (Ranis, 1995: 528)

4.3 Accumulation of physical capital

A large share of Taiwan's economic growth in the second half of the 20th century (as much as half according to some estimates, see Chapter 3) can be attributed to the accumulation of physical capital through high investment rates (see Figure 6). These high investment rates were enabled by the island's high savings rates. In fact, it has been argued that the measures to stimulate savings and investment by themselves were sufficient to "initiate a self-reinforcing process of industrialisation". (Norman, 1995: 102) According to this view, additional explanations like the export-led growth hypothesis or industrial policies are redundant

In this section I will examine the forces and policies that contributed to these high rates of savings and investment. Firstly, I will present the fundamental macroeconomic policies that provided a general macroeconomic environment conducive to savings and investment. It should be noted that these macroeconomic policies have not only affected economic growth through its impact on savings and investment. Subsequently, I will separate the discussion of

forces and policies that promoted savings and investment. With respect to savings the focus will be on interventionist policies to stimulate savings, whereas the emphasis of the discussion of investments will be on the so-called coordination failures that the Taiwanese government facilitated.

4.3.1 Macroeconomic Policies

Several analysts, and most significantly the World Bank (1993), put great emphasis on fundamental macroeconomic policies in explaining the high savings and investment rates of the East Asian tigers. What is meant by these policies? Policies intended to create a stable macroeconomic environment as defined by the World Bank (1993) could be a useful definition; “We define macroeconomic stability to mean that inflation was kept under control, internal and external debt manageable, and macroeconomic crises that emerged were resolved quickly, usually within a year or two”. (World Bank 1993: 105) In the following I will briefly comment on the different aspects of these macroeconomic policies.

Inflation and monetary policy:

By keeping down inflation Taiwan avoided volatility of real interest rates on deposits and ensured that real interest rates were largely positive. The resulting expectation of a stable price level has probably made an important contribution to the high savings rates. The average inflation for the period 1961-91 was 6,2 percent (World Bank 1993, Table 3.2: 110), which is low compared to other developing economies over the same period. This number would have been lower still if it had not been for the two energy crises of 1973 and 1979. The low inflation rate has been vital as Taiwan’s important export sector is extremely vulnerable to the inflationary impact of price fluctuations on the international market.

However, the low inflation rates are not only results of successful macroeconomic policies. According to Hwang (1991: 278) the high marginal propensities to import and save have also been important. This has meant that high income growth has not caused a correspondingly high growth in domestic consumption that could have stoked inflation. The low inflation rates have also been achieved in combination with a spectacularly low unemployment rate. Taiwan’s unemployment rate has been around 2-3 percent throughout most of the second half of the 20th century.

Fiscal Policy and responses to external shocks:

From 1950 to 1962, the Taiwanese government ran budget deficits that were caused primarily by high defence spending, costly refugee resettlement programs, post-war reconstruction projects, and low revenues. The deficits were mainly financed by American aid. From 1964 to 1986, with the exception of 1982, the Taiwanese government experienced huge budgetary savings that were built on the enormously increased government revenues contributed by the fast growing economy. (Hwang 1991) Generally, the High Performing Asian Economies (HPAEs) have responded well to external macroeconomic shocks. For example the World Bank (1993) notes that “The HPAEs responded to external shocks more quickly and effectively than other developing economies. East Asian policymakers have been more adept at managing fiscal contractions.” (World Bank, 1993: 348)

Exchange rate policy:

The Taiwanese government employed some kind of foreign exchange control up until the late 1980s. For example the eligibility to obtain foreign exchange from the market was reserved for those who could provide proof that foreign currencies were needed for international business transactions. It was only in 1987 that the Central Bank withdrew most of its influence on the exchange market. The government’s regulations of the foreign exchange market contributed to the massive build-up of foreign exchange reserves. (Hwang 1991)

4.3.2 Forces and Policies driving Taiwan’s savings rates

Before looking at the specific interventionist policies employed by the Taiwanese government to promote savings, I think it is important to acknowledge some very important forces driving the savings rates of Taiwan that were not directly related to the government’s policies.

The causal direction between savings and economic growth is not evident. In fact, savings could be just as much a result as a cause of economic growth. Econometric studies indicate that rapid economic growth boosts savings rates as households acquire resources faster than they increase consumption (World Bank 1993: 204). According to this view, Taiwan’s high savings rates are partially an outcome of high growth rates rather than a cause.

Another factor that has probably been important in explaining Taiwan’s high savings rates, which is not directly related to policies, is the change that occurred in the size and age composition of households related to the demographic transition already discussed. As birth

rates fell, the dependency ratio – that is, the ratio of non-working-age people to working-age people – decreased. Theories of savings based on the life cycle of increasing then decreasing income relative to consumption predict that societies with a high proportion of prime-age workers will save more than those with higher proportions of young or old people.

(Modigliani, 1970) This benefit of falling birth rates will eventually be reversed as the population ages and the old age dependency ratio rises. A study referred to by the 1993 World Bank report (Deaton and Paxton, 1992) shows that in Taiwan households headed by prime-age workers tend to save more.

Still, savings in older households are also remarkably high and stable in Taiwan, contradicting the life cycle savings hypothesis. According to Mason and Kinugasa (2008) this phenomenon appears to have occurred in East Asia because public support systems for the elderly are relatively undeveloped and because family support systems are in decline.

These two factors were probably very important in explaining Taiwan's savings boom. In fact Rodrik (1995: 74) states that: "Most accounts view the increase in savings in Korea and Taiwan as having been the result of economic growth itself and of a comparatively early demographic transition." He does however add that government policy was helpful as well.

Interventionist policies to promote savings

The most evident and direct way the government can push up savings rates is through public savings. The inherent danger of this approach is that public savings will crowd out private savings. However, empirical evidence shows that government savings does not fully crowd out private savings. (World Bank, 1993: 207) The public savings rates of Taiwan have been quite high, and the increase in the savings rate in the early 1960s coincided with a sharp increase in government savings after 1961.

Besides the public savings the Taiwanese government has employed some quite interventionist policies in order to stimulate savings. For example they have at times imposed stringent controls and high interest rates on loans for housing and consumer durables, and levied high taxes on so-called luxury consumption. (World Bank 1993: 16) This will cause some consumers to save when they would have spent or borrowed in the absence of government intervention. Such government interventions will lead to some loss of welfare, although there could also be outweighing benefits related to increased savings. As household incomes rose the demand for consumer durables, such as cars and refrigerators, increased.

Since consumers had difficulties obtaining loans for purchases of these items, savings as a proportion of income rose correspondingly.

In the initial phase of its rapid economic growth Taiwan compensated for the lack of deposit insurance markets by protecting banks from competition to increase the financial strength of banking institutions. The Taiwanese government also implicitly insured deposits by stepping in whenever necessary to prevent bank failures. In the early 1980s deposit insurance was explicitly established. These measures increased the public confidence in banks and other financial institutions, which was a prerequisite for high savings rates.

Another feature of government policies that was important to stimulate savings in Taiwan and several of the other East Asian tigers was the establishment of government-run postal savings systems to attract small savings. Piggy-backing on the mail-delivery infrastructure the postal savings system could offer small savers greater security and lower transaction costs and were thus effective in attracting the savings of low-income and rural households.

The Taiwanese government obviously also utilised the tax system to promote savings. For example, income from dividends and interest were tax-exempt until 1981, and capital gains were tax exempt until 1989 (World Bank, 1993: 229).

Throughout Taiwan's period of rapid economic growth savings were generally channelled through the banking system. Taiwan's stock market was established in 1962 and the money market was founded in 1974. However, the small- and medium-sized businesses and industries were not accustomed to using the money market as a source of business capital. (Hwang 1991: 106)

4.3.3 Investment Rates

High savings rates do not automatically translate into high domestic investment rates. A simple macroeconomic relationship states that;

$$S = I + (EX - IM) \quad (10)$$

In short savings (S), public and private, equals domestic investment (I) plus the current account balance (EX – IM), which could be viewed as investment abroad in the case of a current account surplus. Since 1965 Taiwan has generally had surpluses in its current account

balance with a few exceptions. Nevertheless, the high savings rates have led to high domestic investment rates.

The Statute for Encouragement of Investment, which was enacted in 1960 in conjunction with the nineteen-point programme that heralded Taiwan's export push, substantially extended the prevailing tax credit system for investment. Lin (1973) notes that “[with] the announcement of the nineteen-point reform programme of 1960, the improvement of investment climate became a catchword.”

A controversial practice that the Taiwanese government utilised to stimulate investment was to hold deposit and lending rates below market clearing levels (so called “financial repression”). Since savings are not very responsive to marginal changes in positive real interest rates, the government could mildly repress interest rates on deposits with a limited impact on savings and pass the lower rates to final borrowers. As the savers were mostly households and the borrowers generally companies, this practice caused a transfer of income from households to companies.

Holding down interest rates on loans generates an excess demand for credit. The government or private sector banks working with government guidance will consequently have to ration credit. A high risk of misallocation of capital ensues. Therefore we can see that there is a trade-off between the possible increase in investment and the risk that the increased capital will be badly invested. In Taiwan this allocation of credit was mostly done by public commercial banks. I will return to this in section 4.4 under my discussion of the role of financial allocation in industrial policies.

Another controversial policy to spur domestic investment was the restriction of capital outflows. The logic is simple: if people are restricted from sending capital abroad, they will save and invest more at home. Capital controls also facilitated the repression of interest rates, since savers were denied higher-yielding assets abroad. Taiwan liberalised its capital accounts very gradually throughout the 1970s and 1980s. (World Bank 1993: 235)

The Taiwanese government also made substantial public investments in infrastructure — telephone, mail service, port capacity, electricity and power, railroads and roads — that were complementary to private investments. In Taiwan it was common for the state to establish new upstream industries and either hand the factories over to selected private entrepreneurs (as happened in the case of glass, plastics, steel and cement) or run them as public enterprises.

Public enterprises actually accounted for a larger share of GDP in Taiwan than in such “socialist” developing countries as India and Tanzania (Rodrik 1995: 90). However, the share of public enterprises in gross fixed capital formation has declined in recent years, as figure 8 shows. Also, formal mechanisms for business-government interface are almost entirely lacking in Taiwan. Consequently, this coordination has been handed though the large public enterprises.

Figure: 8

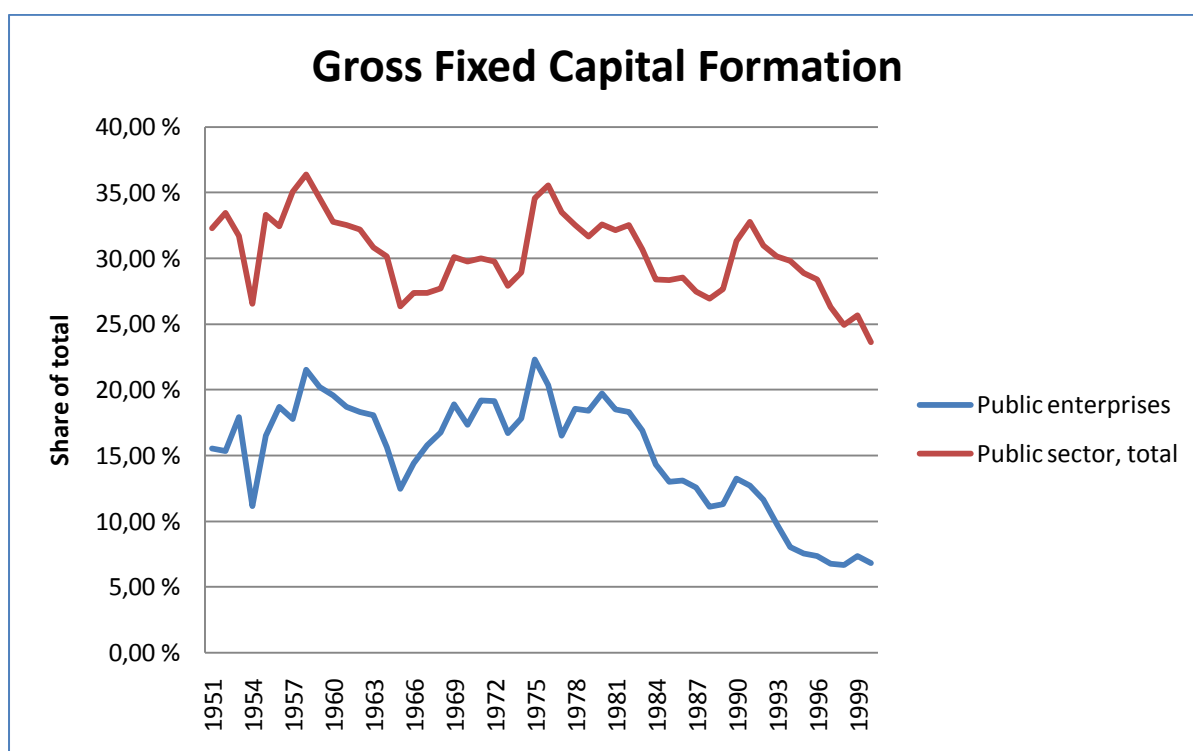


Figure: 8 Public Gross Fixed Capital Formation Taiwan 1950-2000. Source: Calculations based on National Statistics, R.O.C (Taiwan), National Accounts 1950- 2000, Capital Formation

3.3.4 Coordination Failure

An important aspect of the discussion on Taiwan’s high rates of savings and investments is the issue of coordination failure. A coordination failure is present when the return to coordinated investments is high while the rate of return to individual investments remains low. Coordinated investments could be investments that are so substantial, and perhaps dependent on investments in related industries, that they cannot be carried out by the private sector alone. According to Rodrik “it is in the intermediate economies most reminiscent of

Korea and Taiwan in the early 1960s – well endowed with skilled labor but poor in physical capital – that the coordination problem is most severe.” (Rodrik 1995: 80) In his opinion the alleviation of this coordination failure was the most important reason why the Taiwanese government managed to engineer a significant increase in the private return to capital that led to Taiwan’s savings and investment boom.

Rodrik defines three prerequisites for the presence of a coordination failure. (Rodrik 1995: 79 - 80)

- 1) Some degree of non-tradability in the technologies and/or goods associated with the modern sector
- 2) Economies of scale
- 3) A reasonably skilled labour force (but a low endowment of physical capital)

Rodrik explains the coordination failure elegantly: “Markets are known to handle resource allocation poorly in the presence of scale economies and non-tradability: market prices reflect the profitability of different activities only as they are currently undertaken; they do not provide any signals about the profitability of activities that would require a large-scale reallocation of resources within the economy.” (Rodrik, 1995: 80) The presence of economies of scale could be due to the presence of interdependent projects for which optimum scale depends on simultaneous investment in upstream and downstream industries. The imbalance between a well-educated labour force and a low endowment of physical capital meant that the return to coordinated investments — and consequently government policy aimed at generating these investments — was quite high. Taiwan addressed the coordination failure through public investment in large-scale manufacturing enterprises to ensure inputs for predominantly small and medium-scale industries.

However, the ideas related to coordination failure are not new. They go back to Scitovsky’s (1954) analysis of pecuniary externalities and Rosenstein-Rodan’s (1943) advocacy of big-push policies. In the earlier development literature, the coordination failure stemming from interdependent investments, economies of scale, and externalities was given a great deal of prominence. These thoughts to a large extent constituted the theoretical framework for the planning and import substitution in the 1950s and 1960s. This planning, as the World Bank

(1993: 92) points out, failed in many countries in part because it attempted to concentrate all relevant information in the government planning bureau.

Summary:

In section 3.3 I have mentioned many forces and policies that have contributed to Taiwan's high rates of savings and investments. But which were the most important? It seems clear that the economic growth rates and the demographic transition contributed significantly to the high savings rates that enabled Taiwan's investment boom.

Still, policies also played a role. According to the World Bank (1993: 241 -242) the most important policies were the fundamental policies. Admittedly, this is a general conclusion based on the experiences of all the HPAEs. However, more specifically the report concludes that "more selective interventions – forced savings, tax policies to promote (sometimes very specific) investments, sharing risk, restricting capital outflow, and repressing interest rates also appear to have succeeded in some HPAEs, especially Japan, Korea, Singapore, and Taiwan, China." (World Bank 1993, 242) So what made Taiwan and the other previously mentioned East Asian countries special? I will return to this question in chapter 5 in my discussion of initial conditions and institutions. Before that I will examine the significant debate concerning the merits of Taiwan's industrial policies.

3.4 Allocation of resources and Industrial Policies:

Chapter 3 of this thesis concludes that accumulation of resources tells an important part of the story of Taiwan's growth experience. Yet, accumulation of resources is not a guarantee for economic success, as the modern economic history of the Soviet Union and Eastern Europe shows. Accumulated resources need to be allocated to high-yielding activities. And although it seems that it was primarily Taiwan's accumulation of resources that has been extraordinary, Taiwan's rate of TFP growth has also been impressive. For example the World Bank (1993: 315) states that "on average, rates of productivity in industry in Japan (before 1973), Korea, and Taiwan, China, which are the only economies for which we have detailed sectoral estimates of TFP growth, were high by international standards; productivity-based catching up was taking place."

So how did Taiwan succeed in using its accumulated resources efficiently? Again, as with respect to the accumulation, good fundamentals tell the least controversial part of the story. Other explanations are significantly more controversial. As I touched upon early in this

chapter many would point to the export-push strategy to explain Taiwan's productivity performance. However, little empirical evidence has been produced to back up this explanation. What is more, the theoretical foundation for why an export push should boost the productivity of an economy is somewhat unclear. An even more controversial part of the story is the so called "industrial policies". In this section I will first discuss some of the less controversial fundamental policies, specifically flexible labour markets, which have contributed to Taiwan's productivity performance. As the export-push explanation has already been discussed I will not return to that discussion at this point. However, I will look at the interesting debate concerning Taiwan's industrial policies.

4.4.1 Fundamentals:

Again, according to the World Bank (1993) good fundamentals tell much of the story of the productivity performance of the HPAEs. According to this report "price distortions, while present, were limited, and markets were allowed to work. HPAE governments have relied primarily on market mechanisms to guide allocative decisions in both labour and capital markets." (World Bank, 1993: 260) I think that much of what I have mentioned in the previous section and what I am about to discuss with respect to financial allocation in this section, indicates that capital markets have operated far from freely in Taiwan. Government intervention has been significant. On the other hand labour markets appear to have been much more flexible.

Flexible labour markets:

Overall Taiwan's labour market has been very flexible throughout its era of rapid economic growth. Wage and employment were generally determined by supply and demand for labour services, instead of through government legislation or union pressure. The World Bank (1993) refers to a finding that shows no significant correlation between the growth of earnings and the growth of output within sectors in the case of Taiwan. Also, the size of the gap between skilled and unskilled wages in the non-agricultural sector was relatively modest. (see World Bank, 1993: 267 or Ranis, 1995: 516) Both observations point to a remarkably flexible labour market without a high-wage labour elite. In the event that the labour market does not perform well, there is a high risk that the economy will be unable to take advantage of human capital accumulation. A part of the Taiwanese government's active policy to create a flexible labour market was the suppression of independent trade unions. This suppression of wages

encouraged the use of more labour-intensive technology and contributed to keeping inflation low.

4.4.2 Selective Industrial Policies

Industrial policies could be defined as government efforts to alter industrial structure to promote productivity-based growth. The most important reason for the controversy concerning industrial policy and government intervention in financial markets is that these policies are not in line with the neoclassical framework of understanding economics. In this framework the market failures are relatively few. This view laid the foundation for the so-called “Washington Consensus”. For example the World Development Report (1991) “concludes on the basis of an exhaustive review of the experience of developing economies during the last thirty years [1960-1990] that attempts to guide resource allocation with nonmarket mechanisms have generally failed to improve economic performance”.

Revisionists, who take issue with the neoclassical interpretation of economics, argue that markets consistently fail to guide investment to industries that would generate the highest growth for the overall economy. A very influential proponent of this view in the case of the “East Asian growth miracle” in general and Taiwan specifically is Amsden (1989). According to her, governments in East Asia remedied market failures by deliberately “getting the prices wrong” – that is, changing incentives to support industries that would not otherwise have thrived.

Theoretically, there are several conditions that could justify government intervention:

- *Interdependent investments and economies of scale.* I discussed this market failure in my related discussion of the possible presence of coordination failure.
- *Pecuniary externalities.* These arise if, as the size of a competitive industry increases, the long-run supply curve falls. These productivity gains are related to economies of scope in the use of specialized equipment or greater specialization of individual skills.
- *Learning:* An important form of externalities is related to learning, and could occur when firms gain knowledge of production from other firms without incurring costs.

The possible presence of these market failures led many economists and policy makers to advocate the protection of so-called infant industries in the 1950s and 1960s. However, as the

many infant industries that have never grown up amply demonstrate, protection does not ensure that the promised learning and economies of scale actually materialise.

There is a big debate concerning the success of Taiwan's industrial policies. Yet, it seems clear that the Taiwanese government had a very clear plan for its industrial policies. The underlying philosophy behind these policies is that an economy will undergo certain stages of development, and at each stage there are key industries which through various linkages will bring about development of the entire economy.

Nevertheless, according to Hwang (1991: 62) "entering each new economic development stage was more the natural result of steering the economic forces already in progress to a desired economic orientation than a newly fabricated economic condition that had no connection with the previous state of the economy." Also, the practice of "picking winners" was facilitated by the fact that policy makers could look at Japan and more advanced countries to see the future course of the Taiwanese economy. This is related to the "flying geese-hypothesis" that I will return to in chapter 5. Still, there have been a few obvious mistakes in the course of this strategy. The policy to promote the development of Taiwan's automobile industry is an obvious case in point. This endeavour came at a point when the nation's general industrial capability was still too underdeveloped for such an ambitious plan and therefore failed.

After 1953 nine consecutive economic development plans were implemented. These plans could be quite detailed with respect to which industries that the government should support. For example, Taiwan's fourth economic development plan (1965-8) stated:

"For further development, stress must be laid on basic heavy industries (such as chemical wood pulp, petrochemical intermediaries, and large-scale integrated steel production) instead of end product manufacturing or processing. Industrial development in the long run must be centered on export products that have high income elasticity and low transportation cost. And around these products there should be development of both forward and backward industries, so that both specialization and complementarity may be achieved in the interest of Taiwan's economy." (quoted in Wade, 1990)

From time to time corporate tax holidays were offered as an incentive to encourage the establishment of new industries. Generally, Taiwanese businesses were quite responsive to all

forms of tax incentives. With respect to Taiwan's high tech industry the Taiwanese government played a particularly vital role. In 1973 the government began building the Industrial Technology Research Institute (ITRI). The Electronics Research Division is the largest division of ITRI, and it was singlehandedly responsible for the birth of Taiwan's important integrated circuit (IC) industry. (Hwang, 1991: 79) ITRI carries out industrial research in areas that might otherwise be underrepresented as a result of the continued predominance of small- and medium-scale firms.

The Science Park in Hsinchu was founded in 1980. It was inspired by Taiwan's successful experiences with Export Processing Zones (EPZs), where the government purchased land, put up roads and utilities, set up supporting and management services, built housing facilities, and invited investors to establish manufacturing operations in the processing zone. However, in the Hsinchu Science and Industrial Park only high tech corporations were allowed to operate.

With respect to Taiwan's IC industry the importance of government investments in education is also very evident. The students of the graduate program of Chia Tung University were the island's first group of individuals trained in IC technology, and most of Taiwan's IC companies were founded and owned by these graduates. (Hwang, 1991: 81)

So what were the results of this industrial policy? Did it increase the productivity of the Taiwanese economy? At this point there is a lively debate among researchers. Wade (1990) maintains that the success of Taiwan was at least partly attributable to an intensive government effort to direct the economy's sectoral evolution. Hwang (1991) also puts great emphasis on the importance of the Taiwanese government's industrial policies in explaining the island's growth performance.

However, there are also many critics. According to Crafts (1998: 29) "econometric analysis is tending to find that selective interventions on balance retarded rather than stimulated growth." That is however, a general statement that does not apply to Taiwan specifically. According to Krueger (1995: 24) "Recent studies have tended to support the view that, where there was intervention in Korea and Taiwan, it was harmful rather than helpful". The World Bank (1993: 21) is also very doubtful of the merits of industrial policies in explaining the phenomenal growth of the HPAEs; "we find very little evidence that industrial policies have affected either the sectoral structure of industry or rates of productivity change. Indeed industrial structures in Japan, Korea and Taiwan, China have evolved during the past thirty years as we would expect given factor-based comparative advantage and changing factor

endowments.” More specifically about Taiwan “the East Asian miracle report” states that “growth was market conforming; government intervention did little to alter the structure of production at the sectoral level” (World Bank, 1993: 334)

However, the authors behind the report admit that industrial policies in some cases might seem successful. The reason is that to evaluate the success of industrial policies, policy makers mainly looked at export performance. This use of a yardstick could have given enterprises an incentive to perform. In the words of the report: “Thus the seeming success of industrial policy in these three economies [Japan, South Korea and Taiwan] probably rests not on picking winners – that is, on the adroit selection of which industrial subsector to promote – but on the setting of export targets for promoted industries and the use of export performance to assess policies.” (World Bank, 1993: 355)

Financial Markets and Allocation:

An important part of the industrial policies of Taiwan was the direction of credit to “strategic industries.” The suppression of interest rates already mentioned created a surplus demand for credit and a need for the government to supervise a rationing. A large share of deposits of the financial system was held by publicly owned commercial banks. In addition there was the large proportion of total deposits in postal savings funds.

So how were these funds rationed and directed? For example, the government required banks to extend a proportion of their loans specifically to small and medium-scale enterprises. Also, there were many credit programmes directed at exports. Subsidised credit was mostly allocated on the basis of past performance, and exports were usually the criterion of success.

Industrial development banks, and primarily the Bank of Communications, also played an important role. The role of these banks was often to facilitate the credit access of capital- and technology-intensive producers and industrial development projects of “strategic industries”. One of the more extreme policies that the government instigated to prevent bad banking in the industrial development banks was in fact to make lending to a nonperformer a criminal offence, imposed on the loan officers of development banks. (World Bank 1993: 257)

These kinds of directed-credit programs have often failed spectacularly when employed in developing countries around the globe. Still, in the case of Taiwan, even the most market-friendly scholars have to admit some possible merits of these programs. For example “the East Asian miracle” report concludes that: “Elsewhere, directed-credit programs have been

catastrophic failures. In some HPAEs – particularly Japan, Korea and Taiwan, China – these programs have caused less damage to capital allocation and may have been beneficial.” (World Bank, 1993: 274)

What made these East-Asian countries different from other developing nations that failed in their efforts of directed-credit? Firstly, the use of export performance as a yardstick to determine which industries that continued to receive credit was important. Also, these financial sector policies employed up until the early 1980s took place in a world economy in which it was possible to close domestic capital markets. Most importantly, the East Asian governments that succeeded in these policies had competent and insulated bureaucracies and highly professional public financial institutions. This forms a vital part of the institutional framework that I will return to in chapter 5. The presence of a competent and relatively efficient bureaucracy enabled the use of economic performance criteria and a successful monitoring of firms by banks and bureaucrats.

3.4.3 Agricultural Policies

The importance of agricultural policies in explaining Taiwan’s growth miracle should not be underestimated. After all, agriculture accounted for a larger share of output than industry up until 1962. The role of agricultural savings in helping to finance the rapid expansion of non-agricultural output was substantial. Also, productivity gains in agriculture released workers for industrial production. (Kuo, 1983) This development partly explains the Taiwanese government’s decision to focus on labour-intensive industries in the late 1950s. Most extremely, the government directed the small- and medium-sized labour intensive industries to set up plants in the rural areas, in order to provide jobs for the surplus rural labour force. (Hwang, 1991: 34). In 1952 the agricultural sector generated 33 percent of the net domestic product, 60 percent of total employment, and 90 percent of still relatively modest exports. By 1988 these figures had declined to 6, 14, and 6 percent, respectively. (Ranis 1995: 512)

Summary:

Rodrik (1997: 417) states that “there is wide agreement about one key feature of the East Asian miracle: this was a miracle of accumulation rather than of total factor productivity (TFP) growth.” Still, referring to Chapter 3 of this thesis, TFP growth has also been impressive in the case of Taiwan. I think this section shows that it would be incorrect to claim that there exists anything close to agreement on the causes of this productivity performance.

Some analysts would point to exports in interaction with human capital as a driver of productivity in Taiwan. Others would put a lot of emphasis on industrial policies. The contribution of solid fundamental policies that provided a sound macroeconomic environment and flexible labour markets are less controversial

Chapter 5: External Factors, Initial Conditions and Institutions

What is perhaps most striking about many of the policies employed by Taiwan that I have discussed in chapter 3, is their similarity to those commonly employed in many other developing economies with much less fortunate outcomes. Why have these policies been successful in Taiwan when they failed miserably so many other places?

Fortunate external factors that contributed to a beneficial institutional framework and initial conditions stand out. The discussion of these vital underlying causes behind Taiwan's growth miracle will be the issue of this chapter. Firstly, I will look at some external factors related to geography, ethnicity and history. With respect to geography I will present the "flying geese" hypothesis, according to which Taiwan benefited from being located in the same region as the "lead goose", namely Japan. The homogeneity of Taiwan's population may also very well have been important, but I will not discuss this at great length. However, I will look more thoroughly at important historical factors related to being a Japanese colony and the island's special relationship with the US.

Secondly, I will look at three interconnected initial conditions, namely 1) the relatively equal initial distribution of income and wealth 2) a skilled labour force and 3) an efficient and insulated bureaucracy. It has to be said that to what extent these can be termed "initial conditions" or results of policies, is debatable. This highlights the blurred separation between policies and institutions. Institutions are constantly changing, although slowly, partly as a result of policies that again are affected by the institutional framework. Lastly, I will look at the importance of cultural factors related to nationalism and Confucianism in explaining economic growth in Taiwan.

The importance of institutions in fostering economic growth has been emphasised in development economics for a long time. Simon Kuznets, an important figure in this field, underlined the significance of a social climate that induces the pursuit and application of

science. Weingast (1995) points at the importance of political and institutional structures which permit strong yet restrained and predictable government. The cross-section growth regressions literature gives support of the view that institutional quality is essential for high economic growth. Important contributions in this field are Barro (1997) and Knack and Keefer (1995) which use the International Country Risk Guide (ICRG) as a measure for institutional quality. The influential paper of Acemoglu et.al (2001) also outlined the importance of institutions in explaining economic growth.

5.1 External Factors

5.1.1 Geography and “Flying Geese”

Taiwan is an island. To the extent that the export-led growth hypothesis explains Taiwan’s growth experience that simple fact has been a vital prerequisite for high economic growth. The country’s location in East Asia has probably also been beneficial as this is a region with many high-growth countries. These benefits have been reaped through fast growing export markets nearby as well as the “flying geese” (FG) - hypothesis. The FG hypothesis tries to explain a sequential development of manufacturing industries in developing countries. According to Kojima (2000) the phrase “flying geese pattern of development” was first employed by Akamatsu (1935 and 1937). As these articles were written in Japanese they were not presented to world academia before after the war in 1961 and 1962. Since then, many scholars have used the framework to explain the industrial development of the High Performing Asian Economies (HPAEs) (see for example Cumings, 1984 or Bernard & Ravenhill, 1995).

According to the FG hypothesis the countries in the East Asian region can be considered to be “aligned successively behind the advanced industrial nations in the order of their different stages of growth in a wild-geese-flying pattern”. (Ozawa, 2005: 9) The lead goose in this pattern is Japan, the second-tier of countries are the “four tigers” (South Korea, Taiwan, Singapore and Hong Kong), whereas the third stage consisted of countries such as Indonesia, Thailand and Malaysia. Mainland China and Vietnam could be thought to make up the rear guard in the formation.

The driver in the FG framework is increasing labour costs, which causes labour-intensive industries to relocate within the region. For example, Cumings (1984: 150-151) states that “Taiwan and Korea have historically been receptacles for declining Japanese industries.”

Landes (1999) signified the burden of high temperatures, diseases and variable rainfall in the tropics. Taiwan, with its tropical climate, contradicts this claimed hindrance related to being located in the tropics. Another factor that is closely related to geography is population density. Taiwan is one of the world's most densely populated countries. There are potential benefits related to economies of scale and scope as a consequence of a high population density.

5.1.2 Ethnic homogeneity

Taiwan is an exceptionally ethnically homogenous country as 98% of the population is Han Chinese.⁸ Several researchers, most prominently Easterly & Levine (1997), argue that ethnic homogeneity is beneficial with respect to creating institutions that are conducive to economic growth. In the view of Easterly & Levine ethnic fragmentation leads to lower public expenditure on schooling, worse financial institutions and lower spending on infrastructure. Thus Taiwan's ethnically homogenous population could have been an enabling element in explaining the island's high rates of investment in infrastructure and human capital. Other scholars, like North (1987) and Collier (1998), point at lower transaction costs as a benefit of ethnic homogeneity.

5.1.3 History

Japanese influence:

According to Hwang (1991) Chinese historians and economists have noted that modern economic development in Taiwan actually started during the Japanese colonisation period. This period began in 1895 when Taiwan was ceded to Japan as a payment for war damages following China's defeat in the Sino-Japanese war, and ended in 1945 when Taiwan was retroceded to China after the Japanese surrender at the close of World War 2. The merits of this legacy is disputed, but much less so than the controversy over the economic effects of Japan's colonisation of South Korea.

Firstly, the Japanese built infrastructure. During the colonial period, the South-North railroad and the modern ports of Keelung and Kaoshiung were built. Japan did not do this out of pure benevolence. The infrastructure was needed to transport sugar cane harvested across the island to sugar mills for processing, and to ship rice and processed sugar to Japan. The

⁸ Source: the ROC Yearbook 2009: <http://www.gio.gov.tw/taiwan-website/5-gp/yearbook/ch02.html>

Japanese also built a highway system, postal and communications system as well as hydroelectric power plants.

Under a policy of “agriculturalising” Taiwan and industrialising Japan, the Japanese invested heavily in Taiwanese agriculture. Hwang (1991: 21), citing the Executive Yuan, Council on Economic Development, writes that “Taiwan’s colonial history left the island with an economical structure heavily rooted in agriculture. At the time of retrocession, agricultural exports constituted 95 percent of total export income.” Taiwan’s main agricultural products during this period were rice and sugar.

On the other hand, industrial growth in Taiwan during the colonial period was slow. The most important industries were sugar and tea processing, as well as food canning. Yet, in 1937 in preparation for war, the Japanese decided to launch a five-year economic development plan on Taiwan. Much of this industry was destroyed or laid idle during the war.

After retrocession, Japan has influenced Taiwan heavily as a model for economic development. This has been discussed under my presentation of the “flying geese” – framework. For example, during its early stage, the Nationalist government faithfully followed the development sequence established by the Japanese – obtaining technical assistance, increasing agricultural production and concentrating on labour-intensive industry for export. The government also borrowed a number of government organisation models from the Japanese. For example, the China External Trade Development Council and the Bureau of Industrial Development were based on Japanese models.

Apart from the human suffering and deprivation of civil liberties inflicted on the Taiwanese during the colonial period, the legacy of being a colony also posed some significant economic challenges. Importantly, the colonial Japanese had forbidden the Taiwanese from occupying any managerial positions. Consequently, Taiwan had no native, trained managerial personnel at the time of retrocession. Also, colonial law prohibited the Taiwanese ownership of any stock companies during the period 1908-23. Thus, most industrial and trading activities were in Japanese hands. For example, the oligarchical Mitsui gained control of the total rice trade in Taiwan. (Hwang 1991: 72)

American influence:

Economic aid from the US was vitally important for Taiwan in the period 1950-1965. The Americans overriding goal was to secure the political stability and to lift the economy out of

conditions that could make Taiwan susceptible to Communism. In the beginning, around 1951-1955, this economic aid concentrated on promoting economic and political stability. From 1956 the objective of US aid shifted from military strength and monetary stability to economic development, while in 1961 US assistance to Taiwan was focused less on general economic development and more on nurturing of private enterprise, promoting exports in preparation of an end to American aid in 1965. Paradoxically, as Hwang (1991: 143) notes this new external orientation “unwittingly subjected its economy to US influence in an even greater measure”, as a result of the importance of the US as an export market.

Between 1950 and 1965 the average annual economic aid from the US to Taiwan was \$1,5 bn. This aid money eliminated the need for the government to continue its desperate inflationary practice of printing money and thus stabilised the island’s public finances. The heavy military assistance component of the US aid package enabled the Nationalist government to commit more of its resources to economic development. The American aid was also the start of Taiwan’s economic plans. A requirement for US economic aid was that the Taiwanese had a comprehensive economic plan for developing its economy. The first in a series of six-year and four-year economic plans was implemented in 1953.

The special relationship between the US and Taiwan has also been important as a result of the contribution of the American educational system to human capital accumulation on Taiwan. For years, the Taiwanese have constituted the largest foreign student body in US universities. Every year from 1960 to 1967 approximately 15 percent of Taiwan’s college graduates went to the US for postgraduate study, two-thirds of them in science and engineering, but only 4,5 percent of them returned each year. In the beginning of the 1970s the Taiwanese government started an active campaign to encourage these high-talent workers to return to Taiwan, actively recruiting in such locations as California’s Silicon Valley. By 1986 more than 90 percent of these highly trained graduates returned. (Ranis, 1995: 529) This has contributed significantly to the growth of Taiwan’s high-tech industry.

5.2 Initial Conditions

5.2.1 The distribution of income and wealth

According to Rodrik (1995) one of the aspects that made South Korea and Taiwan stand out by 1960 was their exceptionally equal distribution of income and wealth. The empirical evidence on inequality and growth suggests that large income inequalities can inhibit

economic growth and that regimes that inherit large inequalities are constantly under pressure to implement growth-retarding economic policies (Alesina and Rodrik, 1994; Persson and Tabellini, 1994). For example Alesina and Rodrik (1994: 485) state that “inequality in income and land distribution is negatively associated with subsequent growth.”

The notion of shared economic growth was important in Taiwan after the Kuomintang (KMT) was displaced to Taiwan. Too large economic inequalities were given a large portion of the blame for the KMT’s loss of power in Mainland China. This realisation, combined with pressure from the US to undertake social and economic restructuring, led the KMT to adopt shared growth as an important aspect of its rule in Taiwan.

A vital part of the strategy of shared economic growth was land reforms and the focus on labour-intensive industrial production. The KMT conducted a land reform law, which was inspired by the one that the Americans enacted in occupied Japan. The government seized land from the landlords, compensating them with shares in state enterprises. The seized land was sold to the tillers at favourable prices and credit terms. The land reforms also paid special attention to the place of the family in Chinese life as these reforms encouraged the family as a production unit. (Hwang, 1991: 64) The strategic decision to promote labour-intensive industrial production has already been touched upon several times in this thesis.

What were the effects of these policies to reduce economic inequalities? Economic inequality is usually measured by the so-called Gini coefficient. It’s difficult to estimate the Gini in Taiwan for 1950, due to lack of reliable data. Nevertheless, Fei, Ranis and Kuo (1979) estimates the rural income Gini in 1950 to be 0,50 with farm size as a proxy. In any case, in 1964 the Gini coefficient for Taiwan was 0.321⁹, which was exceptionally low, especially compared with other developing countries. By 1980 this figure had fallen to 0,277, indicating that the distribution of income had improved in step with Taiwan’s advancing economic development. This contradicts the Kuznets - Lewis prediction that during a period of labour surplus the profit share would have to rise and the labour share fall causing increased income inequality. The shift that took place was not from an egalitarian agricultural sector to a less egalitarian non-agricultural sector, but from an egalitarian sector to an even more egalitarian non-agricultural sector. (Gustav Ranis 1995: 522) It is quite possible that the nature of the ownership in Taiwanese industry, with many public enterprises, can explain some of this.

⁹ Source: *The 2000 Survey Report on Family Income and Expenditures in the Taiwan Area, Republic of China* (in Chinese). Taipei: Directorate-General of Budget, Accounting and Statistics, Executive Yuan, Republic of China.

Since 1981, the Gini coefficient for Taiwan has risen. In 1995 it had reached 0,317. One reason is related to statistics. As large households were slowly broken down into smaller ones, income appeared increasingly less equally distributed. Also, as industries became more technologically advanced and knowledge-intensive, demand for people with specialised skills increased. The skill-premium in the economy has consequently increased

5.2.2 Human Capital

A favourable human capital endowment is the second advantageous initial condition that Rodrik (1995) points at that enabled government intervention to play a productive role. In Taiwan educational progress under the Japanese was impressive, especially at the primary level; by 1944, 81% of boys and 61% of girls of school age were enrolled in school. (Tsurumi, 1977, Table 13) According to Tsurumi (1977: 222), with the exception of the Americans in the Philippines, “no other colonial power in Asia or elsewhere approached native education with anything like the seriousness of purpose of Japanese educators in Taiwan” The respectable initial stock of human capital was, moreover, substantially enhanced by the massive influx of small traders and entrepreneurs from China in 1949. (Ranis, 1995)

By 1960 Taiwan had a skilled labour force, relative to their levels of physical capital and income. This was an important prerequisite for the high rate of return on physical capital accumulation, discussed in chapter 4. Table 2, which is based on Rodrik (1995, Table 4) shows actual school enrolment and literacy rates in Taiwan in 1960, and also the corresponding rates that would have been expected on the basis of these countries’ per-capita income levels alone. The latter are derived from cross-section regressions of educational indicators on per-capita income and its square.

Table: 2

	Primary enrolment rates	Secondary enrolment rates	Literacy rate
Predicted	0,62	0,12	0,36
Actual	0,96	0,28	0,54

Table 2: Predicted and actual enrolment and literacy rates for Taiwan in 1960. Source: Rodrik (1995, Table 4)

These numbers clearly show the imbalance between an educated population and a low physical capital stock and income level that existed in Taiwan in 1960. This initial condition was a result of policies both during and after the Japanese colonisation.

The idea that an initial imbalance between human and physical capital speeds up growth is supported by certain growth theories (Mulligan and Sala-i-Martin, 1993). However, such an imbalance does not necessarily translate into high growth. Rodrik (1995) points to four countries that had roughly the same capital advantage as South Korea and Taiwan, but did not experience correspondingly high growth rates: the Dominican Republic, the Philippines, Paraguay and Sri Lanka. The differing outcomes are presumed to be closely related to different government policies.

The interconnection between human capital and income inequality is evident. A highly skilled initial labour force and subsequent human capital accumulation reduced income inequality by increasing the relative abundance of educated workers, thereby lowering the scarcity rents with cognitive skills. (World Bank, 1993: 349)

5.2.3 Efficient bureaucracy:

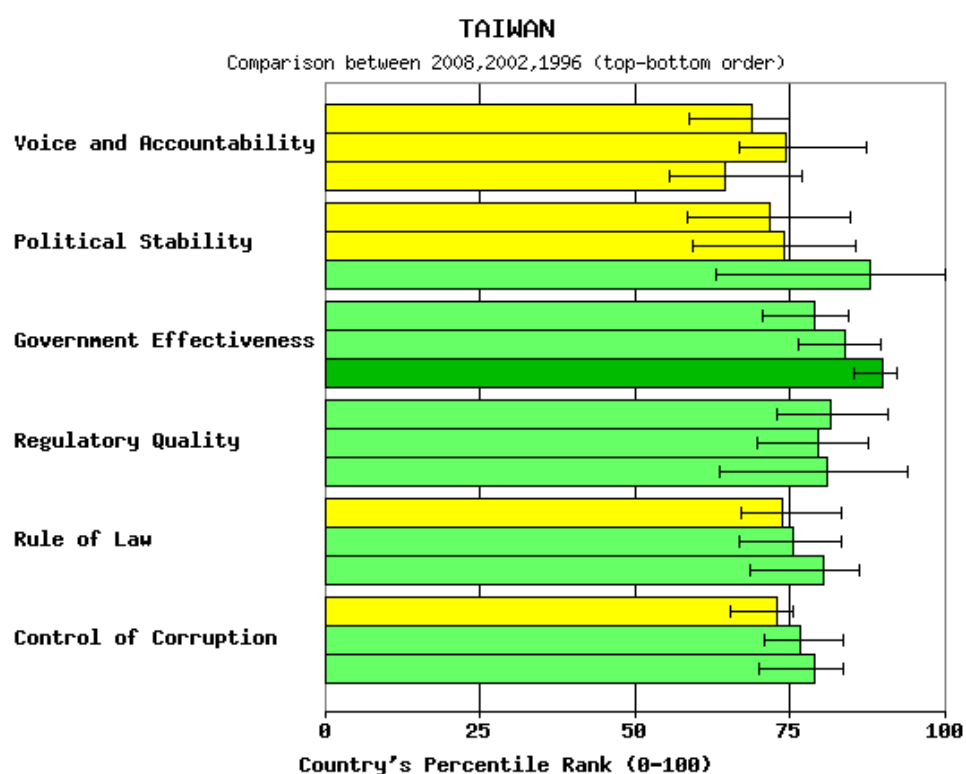
Many scholars point to the importance of powerful, efficient and technocratic bureaucracies in explaining the growth miracles of the East Asian countries, among them Taiwan. East Asian political regimes are described as “developmental states” where powerful technocratic bureaucracies, shielded from political pressure, intervene in the economy in an efficient way. (World Bank, 1993: 13) Although the leadership of Chiang Kai-shek was highly authoritarian, he gave a considerable amount of freedom and authority to a technocratic elite. Hwang (1991: 51) states that the presidencies of Chiang Kai-shek and Chiang Chien-kuo have been termed “the political leadership of a strongman”. This strong leadership might have contributed to the cohesion within the bureaucracy that enabled the government to effectively play a facilitating role.

In the aftermath of the civil war on the mainland, the influx of immigrants to Taiwan displaced and disempowered the indigenous elites. According to Hwang (1991) this ended the long tradition of government officials linking closely with local powers. This may have made the job of establishing a new efficient bureaucracy easier.

An indication of the quality of a country’s governance is the World Bank’s Worldwide Governance Indicators (WGI). Figure 9 shows Taiwan’s performance on six different

indicators of government quality in the years of 1996, 2002 and 2008. The figure shows that Taiwan is within the 75th-90th percentile on most indicators with the notable exception of “voice and accountability”. Admittedly, these are very recent observations that do not necessarily implicate that the quality of Taiwan’s government was high in the 1960s or 1970s. Still, it is a clear indication of the general high quality of Taiwan’s bureaucracy. Nevertheless, according to Field (1995: 166) bribery related to campaign financing has become an issue in recent years.

Figure 9:



Source: Kaufmann D., A. Kraay, and M. Mastruzzi 2009: Governance Matters VIII: Governance Indicators for 1996-2008

Note: The governance indicators presented here aggregate the views on the quality of governance provided by a large number of enterprise, citizen and expert survey respondents in industrial and developing countries. These data are gathered from a number of survey institutes, think tanks, non-governmental organizations, and international organizations. The WGI do not reflect the official views of the World Bank, its Executive Directors, or the countries they represent. The WGI are not used by the World Bank Group to allocate resources.

Figure: 9 Taiwan's performance with respect to worldwide governance indicators. Source: The World Bank's worldwide governance indicators 1996-2008.

An important aspect of creating a well-functioning bureaucracy is merit-based recruitment and promotion. In this regard Confucian thought, with its veneration of scholars and preoccupation with written tests, especially civil service exams, have probably played a

significant role. Again, the availability of relatively skilled labour has enabled the formation of a competent bureaucracy.

The creation of an effective bureaucracy is also interlinked with wealth-sharing mechanisms. The reason is that these mechanisms reduce the potential gain for interest groups of intervening in policy making and implementation, as some share of the fruits of growth has already been assured.

The faith of Taiwanese business people in the government's ability and will to help business is enormous. An anecdote from Hwang (1991) is telling. She writes that "a large group of business representatives showed up at the front gate of the Ministry of Legislation building following the 1987 stock market crash to demand that the government reinstate an earlier market price." Hwang (1991: 54) In other words, parts of Taiwan's business community thought the government could change stock prices at will.

5.3 Nationalism, Confucianism and Entrepreneurship:

The importance of nationalism and Confucianism does not get too much attention in most accounts of Taiwan's growth experience. These are cultural factors that are practically impossible to quantify and thereby distrusted by most economists. Still, some scholars, especially Asian and Taiwanese, put emphasis on this aspect. According to Hwang (1991: 41) "it was nationalism that gave Chinese the determination and commitment to improve their technology and overall economy." Hwang thinks this nationalism was born out of foreign aggressions, beginning with the Opium War and ending with the surrender of Japan at the close of World War 2.

In her opinion this determination and commitment stemming from nationalism is essential to understand Taiwan's economic success. The reason is that Taiwanese regard business success in the international market as an honourable way for citizens to fulfil their responsibility to their country. In Hwang's words; "Whereas filial obligations to family and loyalty to country were the two primary duties of the Confucian Chinese, in postwar Taiwan business success fulfilled both fundamental duties." (Hwang, 1991: 122) This attitude can explain the exceptionally high ratio of enterprises to population size. However, another possibly important explanation is that the family had traditionally been the basic economic unit in China, and there is an unusually high proportion of family-owned businesses in Taiwan.

Confucianism plays a part as far as Taiwanese business persons are faithful practitioners of the Confucian virtue of diligence and perseverance. The admiration of frugality can perhaps explain some of the high propensity to save in the Taiwanese population. Nevertheless, there are also aspects of Confucianism that are not conducive to entrepreneurship and high economic growth, like the contempt for material consumption. The traditional Chinese culture considered moneymaking “unclean”, as, in the view of the Chinese, it often involved dishonesty and taking advantage of others.

Concluding remarks

This thesis has reviewed the literature on the explanations of Taiwan’s growth miracle. Chapter 3 surveyed the substantial body of empirical literature on the decomposition of the “East Asian growth miracles”, with a particular focus on Taiwan. At this point there is a substantial debate over the importance of TFP growth. Despite the uncertainty created by methodological problems, it seems clear that the largest share of Taiwan’s economic growth can be explained by accumulation of human and physical capital.

So what has driven this accumulation of physical and human capital in Taiwan? With respect to physical capital, the reasons can primarily be traced to the high savings rates. These high savings rates can to a substantial degree be explained by the high economic growth in itself and demographic changes. Nevertheless, policies also probably played a significant role. In Taiwan’s case public investments and public enterprises were significant in increasing the investment rate of the economy. The merits of other direct interventions to increase savings are more controversial.

Yet, TFP-growth has also been substantial in Taiwan. The explanations of the increasingly productive use and allocation of Taiwan’s resources are disputed. Many have pointed to the export-led hypothesis, but this explanation is controversial. Even more controversial are the industrial policies. In any case it seems that some policies that have failed in many other countries, have been conducive to economic growth in Taiwan. The reasons can be traced to beneficial external factors and the institutional framework.

External factors related to geography, ethnicity and history have served to establish this beneficial institutional framework. Key elements of the institutional framework are an initial imbalance between a highly educated population and low levels of physical capital and income, low income inequality and an efficient bureaucracy.

Lastly, path dependency should not be underestimated. A central hypothesis of endogenous growth theory is that accumulation of knowledge is not subject to diminishing returns or depreciation. Under that hypothesis, once growth starts, there could be factors that perpetuate the growth. Consequently, growth rates will be highly correlated over time. In other words, nothing succeeds like success.

List of references

- Abramovitz, M. (1986), "*Catching-Up, Forging Ahead, and Falling Behind*", *Journal of Economic History*, 36, pp. 385-406.
- Acemoglu, D.; Johnson, S. & Robinson, J. (2001), "*The Colonial Origins of Comparative Development: An Empirical Investigation*", *American Economic Review*, December, vol.91.
- Akamatsu, K. (1961), "*A theory of unbalanced growth in the world economy*", *Weltwirtschaftliches Archiv*, *Review of World Economics*.
- Akamatsu, (1962), "*A historical pattern of economic growth in developing countries*", *Journal of Developing Economies*, 1(1):3.25, March-August.
- Alesina, A. & Rodrik D. (1994), "*Distributive Politics and Economic Growth*", *Quarterly Journal of Economics*.
- Amsden, A. (1989), "*Asia's Next Giant: South Korea and Late Industrialisation*", Oxford University Press, New York.
- Arrow, K. J. (1969), "*Classificatory Notes on the Production and Transmission of Technological Knowledge*", *American Economic Review* 59(2): 29-35.
- Barro, R.J. (1997), "*Determinants of Economic Growth*", MIT Press, Cambridge, Massachusetts.
- Bernard, M. and Ravenhill, J. (1995), "*Beyond product cycles and flying geese regionalism, hierarchy, and the industrialization of East Asia*", *World Politics*, 47, pp. 171-209.
- Booth, A. (1999), "*Initial Conditions and Miraculous Growth: Why is South East Asia Different from Taiwan and South Korea?*", *World Development*, Vol. 27, No. 2, pp. 301-321.
- Chow, G. and Lin, A.L. (2002), "*Accounting for economic growth in Taiwan and Mainland China: A comparative analysis*", *Journal of Comparative Economics*, 30(3), pp. 507 – 530.
- Collier, P. (1998), "*The Political Economy of Ethnicity*", paper prepared for the Annual World Bank Conference on Development Economics, Washington.
- Collins, S. M. and Bosworth, B.P. (1996), "*Economic Growth in East Asia: Accumulation versus Assimilation*", *Brookings Papers on Economic Activity*, 2, pp. 135-191.
- Crafts, N. (1998), "*East Asian Growth Before and After the Crisis*", *International Monetary Fund Working Paper*, 98/137.

- Cummings, B. (1984), *"The Legacy of Japanese Colonisation in Korea"*, in Myers, R.H. and Peattie, M. R. (eds.), *"The Japanese Colonial Empire , 1895-1945"*, pp. 478-496, Princeton: Princeton University Press.
- Deaton, A and Paxton C. (1992), *"Savings, Growth, and Aging in Taiwan"*, paper presented at an NBER Conference on Aging, Caneel Bay, US Virgin Islands.
- Dessus, Sebastien (1999), *"Total Factor Productivity and Outward Orientation in Taiwan: What is the Nature of the Relationship?"* in Tsu-Tan Fu, Cliff, J. Huang and C.A. Know Lovell (eds.), *"Economic Efficiency and Productivity Growth in the Asia-Pacific Region"*, Edward Elgar Publishing, Massachusetts, pp. 191-213.
- Drysdale, P. & Huang, Y. (1997), *"Technological catch-up and economic growth in East Asia and the Pacific"*, *Economic Record*, 73, pp. 201-211.
- Easterly, W. and Levine, R. (1996), *"Africa's growth tragedy: Policies and ethnic divisions"*, World Bank.
- Economist, The (2005), *"Survey: Taiwan, The Dragon next door"*.
- Fei, J., Ranis, G. and Kuo, S. (1970), *"Growth with equity: The Taiwan case"*, Oxford University Press.
- Felipe, J. (1999), *"Total Factor Productivity Growth in East Asia: A critical survey"*, *Journal of Development Studies* 35(4).
- Field, G. (1995), *"Economic Growth and Political Change in Asia"*, St. Martin's Press, Ch. 6 pp. 153 – 183.
- Fischer, S. (1993), *"The Role of Macroeconomic Factors in Growth"*, *Journal of Monetary Economics* 32, pp. 485-512.
- Gerschenkron, A. (1962), *"Economic Backwardness in Historical Perspective"*, Harvard University Press, Cambridge, MA.
- Heston, A., Summers, R. and Aten, B., *Penn World Table*, Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania.
- Hobday, M. (1995), *"Innovation in East Asia"*, Aldershot: Edward Elgar.
- Hwang, Y.D. (1991), *"The Rise of a New World Economic Power: Postwar Taiwan "*, Greenwood Press, New York.
- Huang, X. (2008), *"Institutional Competitiveness and Institutional Aging: the Dynamism of East Asian Growth"*, *Journal of the Asia Pacific Economy*, Vol. 13, pp. 3-23.

Islam, N. (1995), "*Growth Empirics: A Panel Data Approach*", *Quarterly Journal of Economics*, 110, pp. 1127-1170.

Kim, J. I. and L. Lau (1994), "*The Sources of Economic Growth of the East Asian Newly Industrialised Countries*", *Journal of the Japanese and International Economies* 8, pp. 235-71.

Kojima, K. (2000), "*The flying geese model of Asian economic development: origin, theoretical extensions, and regional policy implications*", *Journal of Asian Economics*, pp. 375-401.

Knack, S. And Keefer, P. (1995), "*Institutions and Economic Performance: Cross-Country Tests using Alternative Institutional Measures*", *Economics and Politics*, 7, pp. 207-227.

Krueger, A. O. (1985), "*The Experience and Lessons of Asia's Super Exporters*", in Corbo V. et al (eds.), *Export-Oriented Development Strategies: The Success of Five Newly Industrialising Countries*, Westview Press, London.

Krueger A.O and Ito T. (1995), "*Growth Theories in Light of the East Asian Experience*", National Bureau of Economic Research-East Asian Seminar on Economics.

Krugman, P. (1994), "*The Myth of Asia's Miracle*", *Foreign Affairs*, Vol. 73, November/December, pp. 62-78.

Kuo, S. (1983), "*The Taiwan Economy in Transition*", Westview Press, Boulder.

Kuznets, S. (1965), "*Economic Growth and Structure*", W.W. Norton, New York

Landes, D. (1999), "*The Wealth and Poverty of Nations*", Norton & Company, New York.

Lee, M., Liu, B. and Wang, P. (1994), "*Education, human capital enhancement and economic development: Comparison between Korea and Taiwan*", *Economics of Education Review*, 13(4), pp. 275-288.

Liang, C. Y. (2002), "*The international comparison of total factor productivity changes, 1960-1993*", *World Economy*, 25(8), pp. 1169-1195.

Liang, K-H and Lee, T-H (1975) "*Chapter 7: Taiwan*", in Ichimura, S. (ed.) "*The Economic Development of East and Southeast Asia*", pp. 269-349.

Liang, K.S. and Hou, C.I. (1984), "*Trade, Technology Transfers, and the Risks of Protectionism: The Experience of the Republic of China*", *Industry of Free China*, January.

Lin, T. (2003), "*Education, technical progress, and economic growth: The case of Taiwan*", *Economics of Education Review*, 22(2), pp. 213-220.

Lin, I. M. D. (1973), "*Industrialisation in Taiwan, 1946-72: Trade and Import-Substitution Policies for Developing Countries*", Praeger, New York.

- Little, I. M. D. (1994), *“Trade and Industrialisation Revisited”*, Nuffield College, Oxford.
- Maddison, A (2001), *“Historical Statistics: World Population, GDP and Per Capita GDP, 1-2001 AD”*, Univesity of Groningen, the Netherlands.
- Mankiw, N. , Romer D. and Weill D. (1992), *“A Contribution to the Empirics of Economic Growth”*, Quarterly Journal of Economics 107(2), pp. 407-438.
- Marti, C. (1996), *“Is There an East Asian Miracle?”*, Union Bank of Switzerland Economic Research Working Paper, October, Zurich.
- Mason, A. and Kinugasa, T. (2008), *“East Asian economic development: Two demographic dividends”*, Journal of Asian Economics, 19, pp. 389-399.
- Modigliani, F. (1970), *“The Life Cycle Hypothesis of Savings and Intercountry Differences in the Savings Ratio”*, in Eltis W.A. et. al (eds.), *“Induction Growth and Trade: Essays in Honor of Sir Roy Harrod”*, Clarendon Press, Oxford.
- Mulligan, C. and Sala-i-Martin, X. (1993), *“Transitional Dynamics in Two-Sector Models of Endogenous Growth”*, Quarterly Journal of Economics.
- National Statistics, R.O.C (Taiwan), National Accounts 1950- 2000, Capital Formation.
- Nelson, R. (1981), *“Research on Productivity Growth and Productivity Differences: Dead Ends and New Departures”*, Journal of Economic Literature XIX (September), pp. 1029-1064.
- Nelson, R. & Pack, H. (1999), *“The Asian Growth Miracle and Modern Growth Theory”*, Economic Journal, July.
- Norman, V. (1995), *“Comment on Getting interventions right: How South Korea and Taiwan grew rich”*, Economic Policy, No. 20 (April 1995), pp. 55-107.
- North, D. C. (1987), *“Institutions, Transactions Costs and Economic Growth”*, Economic Inquiry, 25(3), pp. 419-428.
- Ozawa, T. (2005), *“Institutions, Industrial Upgrading, and Economic Performance in Japan – The ‘Flying-Geese Paradigm of Catch-up Growth”*, Edward Elgar Publishing , Massachusetts.
- Page, J. (1994), *“The East Asian Miracle: Four Lessons for Development Policy”*, NBER Macroeconomic Annual, Vol. 9, pp. 219-269.
- Persson, T and Tabellini, G, (1994), *“Is Inequality Harmful to Growth”*, American Economic Review.
- Ranis, G. and Stewart, F (1995), *“Another look at the East Asian miracle”*, World Bank Economic Review, Vol. 9, pp. 509-534.

ROC Yearbook 2009: <http://www.gio.gov.tw/taiwan-website/5-gp/yearbook/ch02.html>

Rodrik, D (1995), "*Getting Interventions Right: How South Korea and Taiwan Grew Rich*", Economic Policy 20, April.

Rosenstein-Rodan, P. (1943), "*Problems of Industrialisation of Eastern and South-Eastern Europe*", Economic Journal.

Scitovsky, T. (1954), "*Two Concepts of External Economies*", Journal of Political Economy, 62(2), pp. 143-151.

Singh, N. & Trieu, H. (1999), "*Total Factor Productivity growth in Japan, South Korea and Taiwan*", Indian Economic Review, 34(2), pp. 93-112.

Solow, R. M. (1960), "*Technical Change and Aggregate Production Function*", in Arrow K.J., Karlin S. and Suppes, P. (eds.), *Mathematical Methods in Social Sciences*, Stanford University Press, Stanford.

Sundrum, R.M. (1990), "*Economic Growth in Theory and Practice*", Basingstoke: Macmillan.

Taiwan Statistical Data Book, 1982 and 1991, Council for Economic Planning and Development.

Tsian, S.C. (1984), "*Taiwan's Economic Miracle: Lessons in Economic Development*", in A.C.Harberger (ed.), *World Economic Growth*, ICS Press, San Francisco.

Tsurumi, E.P. (1977), "*Japanese Colonial Education in Korea and Taiwan, 1895-1945*", Cambridge: Harvard University Press.

Wade, R. (1990), "*Governing the Market: Economic Theory and the Role of the Government in East Asian Industrialisation*", Princeton: Princeton University Press.

Weingast, B. (1995), "*The Economic Role of Political Institutions: Market-Preserving Fiscal Federalism and Economic Development*", Journal of Law, Economics and Organization, 11, pp. 1-31.

World Bank (1991), "*World Development Report 1991*", the World Bank, Washington DC.

World Bank (1993), "*The East Asian Miracle. Economic Growth and Public Policy*", Oxford University Press, New York.

Wu, Y.-S. (2007), "*Taiwan's Developmental State: After the Economic and Political Turmoil*", Asian Survey, Vol. 47, pp. 977-1001.

Yang, C.-H. (2006), "*Is Innovation the story of Taiwan's economic growth?*", Journal of Asian Economics, 17, pp. 867-878.

Yoshida, M. Akimune, I., Nohara, M. and Sato, K. (1994), "*Regional economic integration in East Asia: Special features and policy implications*", in Cable, V. and Henderson, D. (eds.), "*Trade Blocks? The Future of Regional Integration*", Royal Institute of International Affairs, London.

Young, Y. (1994), "*Lessons from the East Asian NICs: A contrarian view.*" *European Economic Review*, 38(3-4), pp. 964-973.