Working Paper No. 2011/76

Rethinking China's Path of Industrialization

Harry X. Wu*

November 2011

Abstract

This study shows that China's post-1949 state-led industrialization has closely followed an underlying path that began in the late nineteenth century. It was initiated by pressing national defence needs and has since been motivated by the same and strong incentives for a faster catch-up with the West despite radical regime shifts. Government determined or influenced resource allocation benefited selected industries and hence nurtured vested interest groups connecting and integrating with the ruling elite, which have strengthened and sustained the path. This means that the path is inherently inefficient which is evidenced by a newly constructed dataset. Reform measures can only temporarily improve efficiency performance, but are unable to break the path in the absence of a genuine political democracy.

Keywords: government engineered industrialization, path dependence, central planning, economic reform, efficiency

JEL classification: N15, O14, O47, P21

*Hitotsubashi University, email: harry.wu@ier.hit-u.ac.jp

This study has been prepared within the UNU-WIDER project on Promoting Entrepreneurial Capacity, directed by Wim Naudé.

UNU-WIDER gratefully acknowledges the financial contributions to the project by the Finnish Ministry for Foreign Affairs, and the financial contributions to the research programme by the governments of Denmark (Ministry of Foreign Affairs), Finland (Finnish Ministry for Foreign Affairs), Sweden (Swedish International Development Cooperation Agency—Sida) and the United Kingdom (Department for International Development).

ISSN 1798-7237 ISBN 978-92-9230-443-0

Tables and figures appear at the end of the paper.

UNU World Institute for Development Economics Research (UNU-WIDER)
Katajanokanlaituri 6 B, 00160 Helsinki, Finland

Typescript prepared by Lisa Winkler at UNU-WIDER

1 Introduction

Economic theory can logically explain how a pre-industrialization economy may grow out of its traditional or agrarian constraints, and hence start an industrialization process that will go through a sequence of stages as described by 'stylized facts' in textbooks. However, economic history shows that there has never been a universal path of industrialization among countries (Maddison 1995, 2001).[1] One of the factors that make countries significantly diverge in their paths of industrialization is the role of state, that is, *how* and *to what extent* the government has influenced or intervened in the allocation of resources through policy instruments and hence has transformed and shaped the course of economic development.[2]

Though much has been written about the uniqueness of China's industrialization, the literature still lacks an integrated view—conceptually as well as empirically—on China's experiences with more than 100 years of industrialization prior to the market-oriented industrial reforms in the mid-1980s.[3] Most studies focus on the post-reform period's unprecedented growth spurt driven by a series of policy changes and institutional rearrangements using the performance of the planning era as a reference. The poorer productivity performance under central planning is widely considered as a fiasco resulting from an imported Soviet model of industrialization that completely ignored China's comparative advantage (see Lin, Cai, and Li 1996). However, I would argue that China's path of industrialization is not unique because of its distinct resource endowments as the world most populous country, its cultural and ideological heritages, or institutional traditions. What distinguishes China is the unique role of the state throughout China's long pursuit for modernization since the mid-nineteenth century when Western powers forced the country to open up. Chinese governments, under different regimes in the past over one and a half centuries intervened, engineered, and hence shaped the course of China's industrialization at almost every vital stage. This not only laid important foundations for, but also created constraints on the subsequent development. Heavy government intervention on such a large scale is not only inherently inefficient but is also likely to have made China's industrialization course path-dependent. This will be explored further in this paper.

Collecting, organizing, and interpreting historical evidence on the role of the state in China's industrialization is unavoidably subjective and cannot easily be done in a systematic way. Here I will rely on a more objective approach to analyse the role and impact of the state, using a newly constructed dataset designed to tackle major data shortcomings in standard growth accounting analysis. The data covers the Chinese

---

1 Also see Maddison (1970) for the role of government in driving and shaping the courses of economics development among countries through various industrial policies.

2 Of course, as correctly put by Mason (1960), the government, as part of the given society or history and inevitably shaped by it, cannot go and shape the course of the society's development as far as it likes. Ultimately, how far it can go depends on how the government intervenes in the principle of cost and benefit of the economy and the society.

3 Although popularly used in official documentation and by researchers, the year of 1978 can be accepted as the timeline to distinguish China's reform period from its planning past, the nationwide agricultural reform only began in 1979–80 and industrial reform in 1985 along with a dual-track price system.

aggregate economy and its major sectors since 1949 (Wu 2011). The industrial part of the dataset will be linked, in a preliminary fashion, with earlier series going back to 1912, the time when the Republican Revolution ended China's Qing Dynasty and set off a new wave of investment in modern industries.

To structure this paper, the second section briefly discusses the key factors explaining government intervention in the modern economic development in general. The next section attempts to use a novel approach to explore the role of the government in China's post-1949 industrialization, using India's growth path as a reference. Then, the fourth section attempts to identify trends in China's industrial production since the beginning of the twentieth century to substantiate my path-dependence conjecture. The fifth section sets out the new dataset to be used. Based on this data the sixth section presents a systematic analysis of the growth, sectoral change and productivity performance of the Chinese economy throughout both the planning and the reform periods, against the background of major policy regime shifts. The final section concludes the main findings with a deeper discussion of the nature of the 'China model' problems which will shed light on how to break the inefficient path that has been sustained and developed by strong state interests.

2 Why do governments intervene in economic development?

The direct reason for governments to intervene or even engage in economic activities lies in state interests, ranging from a concern for national security to a desire to catch up with the advanced countries, but the root cause of intervention is economic backwardness, which is essentially determined by the time when a country begins its course of industrialization. Gerschenkron (1962), who is one of the first authors to introduce the concept of backwardness, relates an increasing role of the state to the degree of backwardness found in the society in which the process of industrialization is being initiated. By influencing the goals of the society and the motivations of its political elites, backwardness can shift the responsibility of development to government because it can play an important role in the transfer of new technologies and the establishment of new industries as well as their required institutions. In this sense, backwardness may result in a government-facilitated process of accelerated catch-up in which a country can skip some of the earlier unnecessary stages of technological development.

Government intervention is widely observed with the post-Second World War late-industrializers that were pressured to pursue rapid catch-up. Amongst these, the newly industrialized countries in East Asia have been studied most thoroughly to identify the causes of their successes, especially with regard to the role of government. However, researchers still remain divided on how to relate various government interventions to the unprecedented growth performance of these countries.[4] The active role of the state is not only confined to the late industrializers but can also be observed in the countries which industrialized earlier. Concerns about technological backwardness, national security, and welfare improvement were the main driving forces. As shown by Aubrey (1949) with ample evidence, the adoption of the new English innovations by the French was stimulated by the Continental Blockade of the Napoleonic Era in Europe (1799–

4 For example, see different views in a NBER East Asia volume edited by Ito and Krueger (1995).

1815). The struggle for independence (1775–83), the self-imposed embargo (1807), and its war aftermath (1812–15) in the USA had similar functions. Governments took deliberate actions to foster the formation of national industries typically by establishing machinery industries, promoting mechanical production, and encouraging the widest possible distribution of the new technology because 'most governments were reluctant to see their industries decline under the impact of increased foreign productivity and to risk subsequent domestic shortages' (Aubrey 1951: 266–7). Government intervention became accentuated in the Schumpeterian gales of technological innovations and international competitions in the second wave of the industrial revolution that began in the 1850s, because of ever-increasing needs for the state to timely facilitate entrepreneurial initiatives by setting up venture capital support and by distributing the latest technical knowhow.

The nature of prevailing technological stage also matters. As argued by Amsden (1991), who conducted a thorough investigation in the determinants of South Korea's industrialization in 1989, the main reason for government intervention to become indispensable in East Asia is that late industrialization was driven by *imitating* the existing technologies rather than *innovating* new ones. This is because

> … [in] the absence of pioneering technology, low wages even in labor intensive sectors usually fail to provide a cost advantage at market determined prices. Persistent problems of competitiveness … have compelled the state to play a more active role than in the past (ibid.: 1991: 285).

In essence, the nature of the government intervention is subsidization, explicit or implicit, to help establish, strengthen or maintain a cost advantage.

I would argue that the timing of industrialization and the nature of technology determined by the timing of industrialization are still insufficient to explain the active role of the state. Here we should not disregard the role of the economies of scale reflected by the size of a country.[5] This argument is related to resource constraints. It is very costly for small countries to build up their own producer goods industries due to the lack of economies of scale.[6] Instead, small countries can benefit from exchanging goods and services in which they have a comparative advantage (typically natural resources or related services) for imports of manufactured goods from other countries. A small economy is necessarily more dependent on trade than a large economy (Kuznets 1958). Since it is small enough to be a price taker and hence has little influence on world market prices, it presents no threat to other countries and can rely on international alliances for purposes of national security. Since a small country can

---

5 See empirical evidence about the effect of country size on growth and structural change in Chenery and Syrquin (1975) and Perkins and Syrquin (1989).

6 How to define the 'size' of a country can be controversial. It depends on the purpose of the researcher. Resource-wise, both the size of population and the land area are important. If considering market power (price taker or price maker), per capita income has to be added in. The type of available natural resources may also be considered for atypical cases (e.g. oil-rich). When the purpose is set, both the cross-country mean and standard deviation should be considered when defining 'size'. For example, I would define large (small) countries to be above (below) one standard deviation from the mean, thus the rest of the countries are considered average in size. Such an empirical exercise is not pursued in this study. However, by any standard, China unquestionably falls into a large country category.

achieve modernization without going through a typical industrialization process involving the establishing of its own capital goods sector, it is not necessary for the state to play an active role, even in a latecomer country. This is not the case of large countries. Obviously, it is too risky for a large country to rely on other countries for the supply of key technologies, main producer goods, and basic needs as suggested by the free trade argument. This is because such supplies have to be large in magnitude and hence, if interrupted, they can significantly obstruct the operation of the economy.[7] Equally important, large size can help reduce the high initial cost of the development of heavy industry (benefiting from economies of scale). With much more resources and potentially a much larger market than a small country, it is appealing for the government to engineer industrialization through a planned allocation of resources in which heavy industries are prioritized.

Although all these considerations may well explain why a government has to intervene for the sake of economic development, they tell us little about the likely consequence of the intervention. Perhaps economic efficiency is the foremost consideration in assessing the consequence of government intervention, though efficiency as such is rarely an integral part of government objectives. If we argue that efficiency is one of the ultimate constraints that determine *how* and *to what extent* the state can play an active role in economic development, that is to say that there is an endogeneity between the intervention and its consequence. In fact, the efficiency issue is the core of the recently revitalized debate on whether the government industrial policy should be comparative advantage-conforming or defying (Lin 2009; Lin and Chang 2009). The issue of the efficiency of government intervention will be empirically examined in this study for the Chinese case, using newly constructed time series.

3 Exploring the role of government in China's post-1949 development

Studies on China's post-1949 industrialization are generally concerned with policy issues and in assessing the role of government in the development. They can be roughly divided into two categories: policy-focused and measurement-oriented studies. Policy-focused studies tend to document the details of important policy changes and then speculate about their likely impacts—benefits or mistakes that may have important implications for future policy changes or institutional reforms. Historical roots of the prevailing policies may be traced but the analysis is mostly ad hoc in nature.

On the other hand, the measurement-oriented studies are mostly data-driven and tend to put industrial policy or the role of government in industrialization under a kind of 'consequence test' typically in a production function framework. Scholars in this camp have also pursued more detailed breakdowns of economic performance, such as by industry, region, or ownership type. Data inadequacies have, however, remained as a major source of different and sometimes contradictory findings among researchers in

[7] There is also a silent unfavourable factor for very large countries that are engaged in trade. Large countries in international trade can induce a self-enhanced deteriorating terms of trade that harms themselves, i.e. what large countries can produce and hence export tend to lower international prices and what they have to import tend to push up international prices.

terms of real growth rates, structural change, and productivity performance of the economy either as a whole or by various breakdowns.[8]

In what follows, I first explore the role of government in China's post-1949 development using India as a benchmark. Instead of comparing per capita income growth, structural change, and productivity performance between the two economies as often made in existing studies, I first use a simple 'trend-benchmarking' approach to examine the *actual growth path* of each country over the long-run against a *hypothetical trend* based on its own growth experience at the earlier period of the growth path. The growth trend of the 1950s in each country is set as the hypothetical trend because the 1950s can be considered the first decade of peaceful development after the Second World War and the civil war in China (1949) and the independence in India (1947).

Based on the 'trend-benchmarking' I then make a comparison between the two economies. Despite some obvious incompatibilities between the world's two most populous countries, India is best suited to benchmark China not only because of their comparable size and stage of development, but also because both adopted a Soviet-type central planning in the 1950s. However, in contrast to China, India did not completely close down the market and eliminate the private sector, which makes good sense for us to explore the role of government.

Based on Maddison's (2003) estimates in the 1870s both China's population size and the level of GDP were about 40 per cent larger than those of India. After conversion into 1990 purchasing power parity (PPP) dollars, the two countries had almost the same level of per capita GDP.[9] However, their subsequent social and economic development paths diverged. As shown in Figure 1, by the early 1950s, China's per capita GDP was only about 60 per cent of that of the India, or US$380 versus US$620 (in 2010 PPPs, TCB 2011). This income gap can be used to represent the differences in the initial conditions for the post-war growth in the two economies.

The evolution of Chinese and Indian per capita GDP over the long period 1950–2010 is depicted in Figure 1 (in logarithmic scale), with an estimated trend for each country based on the performance in the 1950s. Note that the trend implicitly assumes a growth path that the initial conditions were able to support. Here, I propose the following working hypothesis: if the 1950s' trend growth rate was mainly determined by market forces or the underlying fundamentals rather than government intervention, the economy would be able to basically follow the trend extrapolation, experiencing normal cycles, but not substantially deviating from the trend.

Strikingly enough, despite a much lower starting level of per capita income, hence less ability to save and invest, China's trend growth rate in the 1950s was much higher than that of India: 4.6 against 1.6 per cent per annum. Nonetheless, China's growth path was much more volatile than that of India. A more important observation is that in spite of episodes of faster growth as revealed by the short-term growth trends, China underperformed relative to its 1950s trend for most of the period, and only returned to

---

8 In a review of studies measuring China's total factor productivity. I show that how contradictory results could be caused by severe data problem in measuring labour, capital, and output (Wu 2011).

9 Measured in 1990 Geary-Khamis dollar (see Maddison 2003).

the extrapolated trend around 2005. By contrast, India basically followed its 1950s trend extrapolation till about the end of the 1980s, when, at an income level of about US$1,270 per capita (taking the annual average of per capita incomes of 1988–90 from Figure 1), it embarked on an unprecedented acceleration, which seemingly established a new trend with an annual growth rate of 4.8 per cent (indicated by the triangles in the figure). Interestingly, this new trend more or less replicates the growth rate that China had achieved in the 1950s (4.6 per cent) starting from a much lower initial level of income of US$380. This observation clearly suggests that there were stronger non-market forces affecting the course of industrialization in China than in India.

The initial income level of China and India at the beginning of the 1950s was very low by international standards, only 17 and 28 per cent of the world average of US$2,200 (an average of 1950–52), respectively. Compared to the rest of Asia (excluding Japan, China, and India), with a level of per capita income of US$730 at the beginning of the 1950s and an annual growth rate of 2.2 per cent over the 1950s (TCB 2011), India's annual growth of 1.6 per cent does not look atypically slow even taking its lower income level (US$620) into account. In comparison, China's much higher annual growth rate of 4.6 per cent starting at an even lower initial income level (US$380), implying less capabilities to save and invest, does not seem plausible without pre-existing production capacity (to be discussed below) and/or state engineered investment through forced savings.[10] If we follow neoclassical convergence theory, a country's saving rate is one of the conditions that needs to be controlled for poorer economies to grow faster than richer ones (Barro and Sala-i-Martin 1992; Mankiw, Romer, and Weill 1992). Indeed, such a high-growth performance in China was achieved at the time when the state closed the market and mobilized resources through radical nationalization, confiscation, land reform and collectivization, in other words by forced savings, to facilitate a Soviet-type, ambitious heavy industry-oriented Five-Year Plan (FYP) (1953–57).

Undoubtedly, China's growth drive in the 1950s was already overstretched given the existing conditions. Therefore, it is almost impossible for China to achieve an even faster growth rate subsequently without a more active role of the state to mobilize the required resources. Of course, one should not forget that the nature of the central planning also matters in understanding the ability of the government in resource mobilization. In China, the central planning system was adopted as a coherent part of the Marxist ideology that laid the very foundation of the regime. Thus, industrial policies were implemented with strong political reasoning and underpinning, hence unchallengeable. By contrast in India, constitutionally a democratic system was implemented and maintained. The central planning system was adopted mainly as the means to achieve faster industrialization. The government's industrial policies could still be debated and challenged without fear of political prosecution. It is impossible to implement an unrealistic high-growth or leap-forward plan at any expense. In China, the planning control was all-embracing and far-reaching and replaced the market system. Resources, including consumer goods, were administratively allocated according to

---

10 Taking into account the initial income level at the beginning of the 1950s, China's high growth rate over the 1950s also seems incompatible with its Eastern European socialist counterparts. Of those with similar economic structures or more of agrarian economy-based, Albania grew by 3.6 percent a year but with an initial income of US$1,300 and Bulgaria grew by 3.7 percent a year with an even higher initial income of US$2,400 (TCB 2011).

national plans, leaving little room for private activities. Although the planning authorities in India also had tight controls over resource allocation, the market still functioned though subject to some degree of distortion, and there was still room for private initiatives.

My question is whether such a scale of domestic resource mobilization was sufficient for implementing an ambitious heavy industrialization plan so successfully (as suggested by China's high performance of the 1950s). In this regard, studies often emphasize the importance of the Soviet assistance with 156 key heavy industry projects (Lin, Cai, and Li 1996). Nevertheless, the financing of those projects was not through aids but through loans, and they were fully paid for by Chinese exports by the early 1960s (Zeitz 2010). In other words, these projects were supported by Chinese savings. To have successfully implemented and operated these ambitious projects in a war-torn huge country, there must have been an industrial base in China, not only in terms of infrastructure and complementary industries, but also in terms of human capital stock. Admittedly, the Soviet Union also provided engineers for implementing the imported plants (they were part of the loans), but there must have already a large number of skilled workers and technicians who were able to work in those modern capital- and technological-intensive factories. Besides, even more importantly, there must have also been sufficient numbers of professionals, ranging from administrators, managers and accountants to scientists, engineers, and technicians, whose training and experiences satisfied the basic requirements of a planning system operating in a large country like China. Before I go further with this inquiry, let us again look at Chinese and Indian growth performances over the entire period in Figure 1.

Intuitively, China's high-growth path appeared to be less 'natural' than that of India. Remarkably, each of the subsequent greater efforts to achieve more rapid growth in China had to make up for the losses caused by the previous shocks apparently caused by policy mistakes or political instabilities. This implies that China had to save and invest more in order to achieve the given rate of growth, which can be clearly seen by zooming in on the Chinese growth path in Figure 1 (based on per capita real income). For example, a faster annual growth of 7.6 per cent obtained in 1963–66, a period that saw a significant policy retreat from the Maoist feverish Great Leap Forward (GLF) campaign. This growth rate somehow compensated for the high cost of a significant decline in per capita GDP by 5.7 per cent a year in the disastrous GLF aftermath in 1959–62. In fact, the average growth from 1959 to 1968 was virtually zero.

Another almost equally rapid yet shorter-lived growth spurt was achieved in 1969–70, with growth at 7.1 per cent per annum, seemingly engineered to support Mao's triumph over his political enemies in vital struggles in 1967–68 (the most chaotic period of the Cultural Revolution) that had caused a decline by 5 per cent a year in per capita income. Next, the period 1971–79 witnessed an average growth rate of 3.2 per cent per annum, which was also highly volatile, including a long period of stagnation between 1971 and 1976 when GDP per capita merely grew by 1.5 per cent a year as a result of prolonged political struggles that were ended by Mao's death, and a neo-GLF campaign period in 1977–78 when growth jumped to 6.9 per cent a year to economically proclaim Deng's victory over Madam Mao's elite group (the Gang of Four).

Since the late 1980s the duration of slowdowns has become shorter and the duration of growth episodes has become longer, thanks to Deng's reforms and opening-up. However, there have still been policy-induced shocks that slowed down growth. For

example, the forced retreat from the neo-GLF slowed down growth to 3.3 per cent per annum in 1980–81; the Tiananmen movement (1989) and its aftermath reduced the annual growth rate to 1.1 per cent in 1989–90; and an overdosed austerity policy in 1996 forced China into a hard landing resulting in merely 1 per cent growth, down from 13 per cent in 1995. This was followed by the Asian financial crisis that caused negative growth in 1998.[11] Again, these downturns were followed by two fast growth periods, one of 9.4 per cent a year in 1992–95 when Deng decreed bolder reforms and another one with growth of 10.2 per cent a year in 2001–10, which is the fastest and longest growth spurt in the history of Chinese industrialization, mainly attributed to a new type of government support that aimed to facilitate China's entry to World Trade Organization (WTO) and competition in the world market, an issue that will be revisited at the end of this paper.

Some simple 'what-if' calculations suggest that China has indeed paid a very high 'cost' for disastrous policy mistakes and institutional shocks. Just before the global financial crisis at the end of 2008, China's per capita GDP was about twice that of India (about US$6,200 versus US$3,000 in 2010 PPP$, TCB 2011). The Chinese path is seemingly superior to the Indian path if judged in this way. However, had the 1950s' trend been closely followed, China could have surpassed India by the early 1960s at a level of US$1,080 per capita rather than two decades later (around 1984). Putting it a different way, if China did not swing like a roller coaster, it could have grown steadily by 3.4 per cent a year till it overtook India. Nonetheless, my purpose here is not to gauge the cost of China's government-engineered industrialization, but to address the question why China seems willing to stick to a costly and inefficient track? Or to put it differently: was the course of China's industrialization so heavily path-dependent, that breaking away from that path was even more costly than continuing it?

4 History matters

By assuming that present practice is path-dependent, it argues that past choices and their outcomes along the way influence the present and hence alter the course of history (David 1985). What happens at the beginning may only be a small initial advantage or a few minor random shocks that result in an initial advantage. However, subsequent increasing returns from that initial advantage induce more choices to be made or more actions to be taken, hence creating a set of forces and complementary institutions that encourage and facilitate the sustaining of the earlier choices (North 1990; Page 2006). A path is then shaped in such a process and becomes self-reinforcing. In this sense, history matters (Page 2006).

China's industrialization and modernization did not begin in 1949, neither did government intervention in China's economic development. Admittedly, government intervention may take different forms under different regimes in history. However, there

---

11 There is a controversy about the real growth rate of 1998 when China was badly hit by the Asian financial crisis, though this is denied by the authorities. While the official growth rate is reported as 7.8 percent, conjectures (e.g. Rawski 2001) and alternative estimates (Maddison and Wu 2008) suggest it possibly to be around zero or even negative, which is further confirmed by my recent work (Wu 2011). Nonetheless, a substantial revision of the national accounts for the period 1992–2004 following China's First National Economic Census left 1998 untouched (Wu 2007).

is clear evidence that even with regard to central government industrial planning there was no sharp break in 1949. Thanks to Kirby's (1984, 1990) careful studies with convincing facts, we now know that it is incorrect to completely attribute China's post-1949 planned industrialization to the influence of the Soviet Union (Eckstein 1975) or to the onset of the communist system (Cheng 1963) as widely believed by scholars in this field. Thus, the assumption that the assembling of China's planning machine only began in the north east region (Manchuria) during the civil war period (1946–49) also implies that government-engineered industrialization began with the communist system in China (Donnithorne 1964; Levine 1987). It is also historically incorrect to relate China's post-1949 development mainly to the pre-1949 private sector, which assumes that the role of the state in the China's modern economic development was insignificant prior to the communist regime (Rawski 1980). Equally important, as put by Bian (2005)

> …[t]he basic institutional arrangement of China's state-owned enterprise—the bureaucratic governance structure, the distinctive management and incentive mechanisms, and the provision of social services and welfare—took place during the Sino-Japanese War and was not derived from the Soviet model as is conventionally believed (ibid.: 213).

Taking a historical view, the first and foremost pre-1949 legacy for China's post-1949 industrialization is the state-owned and state-controlled industries that resorted under the National Resources Committee (NRC) of the nationalist government. The NRC was established in 1932[12] as a state agency that was mandated to 'develop, operate and control' all the nation's basic industries and mines, as well as 'such other enterprises as designated by the government' (Kirby 1990: 127). Notably, it performed a role similar to that of the post-1949 State Planning Commission (SPC) under the communist government.[13] By August 1947, after a significant wartime development and an equally important post-war expansion and restructuring that integrated the existing state establishments with the confiscated enterprises formerly under the control of the Japanese occupation authorities or the Chinese puppet government during the war, the NRC employed about 33,000 staff members (including scientific and engineering professionals as well as administrators and managers) and 230,000 workers (more than 500,000 if we include joint ventures with provincial governments). It accounted for 67.3 per cent of China's total industrial capital.[14] These numbers seem to have been growing without a significant break throughout the civil war period and over the time when the communist forces took power in 1949, thanks to the collaboration of the NRC senior management and staff members (Shao and Sun 1994).

---

12 Originally, the NRC was set up as the Defense Planning Committee under the General Staff Headquarters. In May 1935, it was brought under the administration of the National Military Committee as NRC. In March 1938, it was relocated to the Ministry of Economy, and in March 1946, it was put under the administration of the Executive Yuan (State Council).

13 Indeed, two of the prominent members of NRC, Qian Changzhao and Sun Yueqi, who were also the last two NRC chairmen, served as vice-chairmen of the Central Financial and Economic Planning Bureau under the State Council's Financial and Economic Commission, which was founded in 1951 and the direct predecessor of the SPC set up two years later (Kirby 1990: 135).

14 See Kirby (1990: 132, footnote 32) for sources of information.

By the end of 1949, based on my reconstructed data from official sources, there were already 3.15 million workers engaged in the state industrial sector, half of whom were engaged in heavy industries (Wu and Yue 2010). This estimate is close to another source of information that gives an estimate of 1.29 million workers in 1949 who came from the former NRC system and its nationwide industrial network and from the enterprises owned by the nationalist party, military and various government ministries (Wang 2010). The rest come from other sources such as enterprises seized by the communists in the north east (which were not all included in the NRC network and statistics), enterprises confiscated as a result of the civil war, and foreign enterprises purchased through forced acquisition (Wang 2010). By the end of 1952, or just before the Soviet technical assistance and loans became available, the state industrial sector had already employed 4.33 million staff and workers and had produced 18.8 billion yuan of output (gross value added at 1990 prices), which accounted for about 45 and 60 per cent of the national totals, respectively (estimated based on Wu 2011).

These simple figures suggest something very important, that is, China must have already developed a physical and human capital foundation by 1949 that was capable of accommodating the state-driven heavy industrialization under the new regime. The Soviet assistance and loans were undoubtedly important for China to recover and to expand with the implementation of the first Five-Year Plan in 1953–57. But it was more like a compensation for the destruction of the wars rather than a change of the underlying path. To explore this conjecture, I have made an attempt to construct China's path of industrialization over the past century by linking my new estimates for industrial value added (Wu 2011) to those of Chang (1969) for the earlier period.[15] The result is astonishingly supportive of the notion of continuity between the pre-1949 and post-1949 periods, as shown in Figure 2. Despite all abnormal shocks because of wars and regime shifts, the underlying growth path does not seem to have changed as suggested by the estimated exponential trend.[16]

In the first place, Figure 2 reveals that the underlying path might have started at least at the beginning of the 1900s (as far as the data can reach) and then developed steadily until being interrupted by the Japanese invasion in 1937. In the second place it shows that the post-war recovery growth began in 1947 and, despite a major interruption in 1948 due to the impact of the civil war, it brought the industrial growth back to the earlier established track by 1952. This implies that the above-cited strong performance figures of the state industrial sector in 1949–52 may reflect largely, and logically, a

---

15 Chang's work is perhaps the best of a limited number of the existing studies that have attempted to construct China's industrial production index for the pre-1949 period. Chang's index covers the entire economy including Manchuria in 1931–45 and the other Japanese occupied areas of China during the Sino-Japanese war in 1937–45 (Chang 1969). His index is based on carefully constructed 15 factory-produced commodity series in five key industry groups: coal mining, other mining products, ferrous metals, power generation, and consumer goods. He has shown with evidence that the excluding of other commodities especially consumer goods due to poor data would not significantly affect the trend of the index. Chemicals and machinery industries are not included also due to data problem as well as insignificant development before the war. But he argues that their trends should have been captured by other heavy industries included in the index.

16 The approach used here is very different from the one in Figure 1 in which the growth trend extrapolation of one period, i.e. the 1950s, is used to benchmark China's per capita GDP growth over the period 1950–2010. In Figure 2 China's real industrial growth over the period 1912–2009 is depicted against an estimated underlying trend.

result of a post-war recovery that made good use of the unemployed industrial capacities caused by the war and idle human resources including accumulated knowledge and experiences of the pre-war industrialization. Third, China's post-1949 high-growth path, often considered as beginning with China's first FYP and attributed to the Soviet Union's assistance, still closely followed the underlying path that began at least in the beginning of the twentieth century. In other words, there was no such thing as a 'revolutionary path' established and sustained by the new regime. The first FYP, the GLF drama or the post-1978 reforms did not create a new path that deviated from the underlying long-run path.

The fact that history matters does not mean that all history is relevant. What matters in history is the sequencing of events that change the course of the future (Page 2006). If we argue that China's post-1949 state-planned and state-engineered industrialization is path-dependent, we need to consider which pre-1949 events in China induced or led to the subsequent events and hence shaped the course of China's industrialization after 1949. As discussed earlier, whether government plays an active role in a country's industrial development is determined by two key factors: the timing of industrialization and the size of the country. I have argued that the catch up pressures on a latecomer could be enhanced if industrialization was motivated by the needs for national or regime security. This is very much the case for China.

China's modern industries were initially bred by the state in the second half of the nineteenth century especially during the government's self-strengthening movement (*yang wu yun dong*) (1861–95). The movement was primarily motivated by China's series of military defeats and concessions to the Western powers since the First Opium War (1839–42) as well as several devastating domestic uprisings of which the Taiping Rebellion (1850–64) was most regime-threatening and damaging. The main purpose of the self-strengthening movement was to catch up with the West by modernizing and industrializing. Because of increasing domestic and foreign threats to the regime, the state's industrialization projects were essentially defence-oriented, stressing capital goods industries and supportive infrastructures. Powerful provincial governor-generals, instead of the weak imperial government, played a key role in the early industrialization. However, driven by strong local interests, competition among provincial governments enhanced the role of the state and speeded up the industrialization process. Government power was used to mobilize resources to build arsenals throughout coastal China in the 1860s and to develop infrastructures and commercial industries in the 1870s. Government power was also used to promote and adopt Western technologies and practices. In 1876, China's first modern coal mine company and first telegraph company were established, followed by the first railway, first iron and steel works, and modern textile factories. These burgeoning industries were administered by a principle called *guan du shang ban* (literally 'government supervision with merchant operation') in which while the day-to-day running of the companies was in the hands of merchants, all major decisions were handled by officials. Importantly, this movement also helped nurture the development of state economic agencies that were responsible for planning, financing, and supporting the industrial projects.

The defeat of the Qing Imperial Navy in the first Sino-Japanese War in 1894 was the last straw for the Qing Dynasty. It also enhanced the new regime's sense of national crisis and encouraged Chinese national elites to believe in an active role of the state in

China's modernization. This is clearly reflected in the founder of the republican China, Sun Yat-sen's *Industrial Plan* (1922).[17] In Kirby's view

> … the most 'statist' reading of Sun's economic thought was the prevalent interpretation during the mainland period of the Nationalist rule, which stressed Sun's commitment to the state-planned development of all basic heavy industries and infrastructure (ibid.: 1990: 125).

The pursuit for a central government-planned industrialization began soon after the establishment of the Nanjing regime in 1927. Prior to the set-up of the NRC, various government ministries already began proposing different versions of national plans in line with Sun's blueprint, such as the reconstruction ministry's Ten-Year Plan in 1928, the industry ministry's Ten-Year Plan in 1930, and Four-Year Plan in 1932, and the National Economic Council's Three-Year Plan in 1931. It appears that to compete for limited resources, all these government ministries did was to make appealing plans—the more detailed and ambitious, the better. In fact, the rising national security concern encouraged ambitious plans for fast industrialization. Kirby (1990) noted that

> … planning agencies and personnel expanded significantly after the Manchurian Incident [1931, plotted by the Japanese], stressing the rapid growth of military-related state capitalism. … The greatest progress occurred under the National Resources Commission (NRC), the technical and managerial agency that came to dominate state industry (ibid.: 125).

Nevertheless, Figure 2 does not convincingly show that the ambitious heavy industrialization plan that was implemented and managed under the NRC created a new path. Rather, the so-called nationalist 'golden decade' in China's industrialization in 1927–37 was a fairly smooth continuation of the earlier development that was rooted in the late Qing's self-strengthening movement.[18] In the light of the absolute size of the country, the heavy industry projects undertaken during that movement might be considered insignificant. But they were momentous if one takes the limited availability of national savings at that time into account. As argued by Page (2006: 90) 'any constraint, be it a budget constraint, a spatial constraint, or a time constraint, imposes negative externalities [on other options] and … the exclusion of other options drives the path dependence'.

Given a high resource constraint in the late Qing period, the industrial initiatives of the state inevitably created increasing returns to the selected industries while imposing costs upon other activities that could be more in line with China's comparative advantage. In this situation, the government aiming at accelerated catch up was no longer a provider of public goods that was supposed to ensure that any external costs must be paid (through taxes). Instead, it reaped the benefits. Beneficial opportunities not only retained the resources already invested in the industries selected by the state, but also attracted even more physical and human capital investment to those industries. Consequently, supportive institutions grew, private businesses fought for government projects or procurements, and foreign investors pursued state preferential treatment or

---

17 The Industrial Plan was originally distributed in Chinese as *Shiye Jihua*, and later published in English as *The International Development of China* in 1922, and a new edition in 1953.

18 My hypothesis here is preliminary and requires further explorations with empirical evidence.

joint ventures with the government. Frequent foreign invasions and internal threats pressured the government to expand its role and hence enhanced the process. All these helped sustain and strengthen the path rather than deviate or unlock from it. This path dependence view helps provide light on the state-engineering nature and the inefficiency problem of China's subsequent industrialization in both the pre-1949 nationalist regime and the post-1949 communist regime.

5 Data issues

Data inadequacy has been a major obstacle to a proper assessment of China's post-1949 growth and productivity performance. Official output and employment data contain serious flaws (Maddison and Wu 2008; Wu and Yue 2010) and official estimates on capital stock are lacking (Wu 2008). Recently, I improved Maddison and Wu's earlier estimates of real output (gross value added), reconstructed employment for three broad sectors, primary, secondary, and tertiary and estimated net capital stock for the Chinese economy as a whole. In the following paragraphs the shortcomings of previous datasets are discussed, and the generation of new estimates is explained.

5.1 Employment

The new employment data used in this study is the result of two major adjustments. The first was to fix a structural break in the official employment series that depicts a substantial jump of over 17 per cent or 94.2 million workers between 1989 and 1990. This jump created a subsequent huge discrepancy between total national employment and the sum of sectoral and industry level employment figures (Maddison and Wu 2008). The second adjustment was to improve Maddison's earlier estimates for employment of the so-called 'non-material/non-market services'[19] (Maddison 2007).

My hypothesis for the 1990 structural break is that it was created by a gap or inconsistency between the census that captured the information sector's activities and the regular statistical reporting system that only focused on the employment of the formal sector. If this is true, the gap should have appeared at the time when the planned employment system began to change. I investigated the earlier 1982 population census––the first most comprehensive population census in almost two decades—and compared this with later censuses and annual estimates. My discovery supported the hypothesis. It suggests that the break could have appeared in 1982 because the annual estimates did not take into account the employment emerging outside the labour planning and administration system as a result of policy change in the early 1970s that encouraged small, collective enterprises to employ surplus labour especially in rural areas. In the adjustment, I first made an interpolation between 1982 and 1990 using 1987 1 per cent population survey as the mid-point, thus the 1990 break was 'moved' to 1982. I then set

---

19 The term of 'non-material services' refers to service activities that are excluded from the 'material product' in the old Soviet-style national accounts or MPS (material product system). They include both market and non-market (governmental) services: banking, insurance, housing services, administration of real estate, social services, health, education, entertainment, personal services, R&D activities, the armed forces, police, government, and party organizations. They are now incorporated in the Chinese accounts, but the estimates are not shown explicitly. Official estimates show an estimate for the 'tertiary' sector as a whole, and a breakdown for two 'material' component sub-sectors (transport-telecommunication and commerce).

1970 (unchanged) and 1982 as the starting and ending points to absorb the additional (outside-planning) employment using a 'trend-deviation' method. Finally, the additional numbers of employed in 1971–89, as a result of the exercise, were allocated into major sectors according to adjusted sectoral weights.[20]

The second adjustment is based on newly gathered information on military services to make the inclusion of military personnel from 1949 to 1990 consistent over time and reflect annual changes.[21] This has improved Maddison's earlier work which simply added a fixed 3 million military personnel to each year's 'non-material service' employment (Maddison 2007: 168). The results have a significant impact on the early 1950s when the size of the military personnel was much larger than later. This provides a new employment base for improving Maddison's earlier real output estimates for this sector (Maddison 2007).

In addition to the two major adjustments, at the aggregate level of the economy, I made a further adjustment to the estimated workforce for 'quality change' using educational attainment as a proxy[22]. The quality adjusted estimates of labour input have been used in the growth accounting exercise presented below.

5.2 Value added

The new estimates of China's value added are the results of two major adjustments. The first was to improve Maddison's value added estimates of 'non-material services' and the second was to improve my earlier value added estimates for industry.[23] My work on the value added by 'non-material services' is also labour productivity-based, but it allows for annual labour productivity growth since the reform period rather than adopting Maddison's 'zero labour productivity growth' hypothesis for the entire period. My closer examination has shown that there was indeed zero labour productivity growth in 'non-material services' from the early 1950s to the early 1980s, but the following growth was abnormally fast and looked implausible relative to other services in China (Maddison and Wu 2008) and compared with the experiences of other countries (van Ark 1996). My adjustment used my new employment estimates for 'non-material

---

20 Since the additional labourers are least skilled and educated, they should be mainly engaged in labour-intensive manufacturing and services. Thus, at the broad sectoral level, I allocated them into agriculture, industry, construction, and so-called material services according to their weights, excluding 'non-material/non-market services' (see the proceeding footnote). However, given the situation of underemployment in the farm sector, I downward adjusted the agricultural share by 40 percent (Wu 2011).

21 From 1990 onwards military personnel have been included in the official employment estimates (Wu 2011).

22 For the initial stock, I assume a level 500 million years of primary level-equivalent schooling, equivalent to about 15 years of education production after 1949. Following Maddison (1998), I derive primary school equivalent annual flows. However, similar to Wang and Yao (2001), I use the number of annual graduates rather than annual enrollment as in Barro and Lee (2001) and Maddison (1998) which depend on a strong assumption of the completion rate of each level of education (Wu 2011).

23 For agriculture, I adopted and updated Maddison's quantity output-based value added estimates as he showed that the official statistics were basically reliable (Maddison 1998). For construction and 'material services' I simply accepted the official value added estimates because there is no useful information for any adjustment, the same treatment as that in Maddison and Wu (2008).

services' with an assumption of zero labour productivity growth in 1952–77, 1 per cent annual growth in 1978–92 and 2 per cent annual growth afterwards.

My latest work (Wu 2011) to improve China's industrial value added is not a simple update of my earlier work that investigated the upward bias hypothesis[24] for the official estimates (Wu 2002; Maddison and Wu 2008). It is still based on the physical output of commodities but instead of using single-benchmark weights and assuming a constant value added ratio, it incorporates multiple input-output table weights and time-variant value added ratios. A clear Gerschenkron effect is revealed in this new exercise that suggested the existence of substitution bias in my earlier estimates based on 1987 input-output table weights—hence exaggerating the growth as explained by Gerschenkron (1951).[25] This supported the shift from the single 1987 weights to multiple weights based on three Chinese full input-output tables for 1987, 1992, and 1997.[26] Next, based on available Chinese input-output tables including full tables and reduced forms since 1981 when the first MPS type input-output table was constructed and earlier work by Wu and Yue (2000), I can show that reform was accompanied by a declining value added ratio in industry from 38 per cent in 1978 to 23 per cent in 2007 (the most recent available input-output table) whereas the ratio stayed at 38–40 per cent in the pre-reform period. This means that my earlier estimates based on a fixed (1987) value added ratio still exaggerated China's real industrial growth.

The results of the new exercise further confirmed my previous findings that the alternative estimates suggest a slower but more volatile growth rate of industrial value added than the official estimates. For the planning period 1953–78, the annual growth rate of the alternative estimates for the industrial sector is 9.54 per cent per year compared to 10.89 per cent of the official estimates, while for the reform period 1979–2009, the corresponding figures are 7.48 and 10.87 per cent per year, respectively. For the whole period, the coefficient of variation of the annual growth rate is 1.72 for my estimates and only 1.18 for the official estimates. The new results look more plausible than my earlier work not only because they have highlighted the effects of policy shocks on China's industrialization, but also because they have revealed an underlying path for the post-1949 period that can be well integrated with the pre-1949 path as shown in Figure 2.[27]

---

24 See Maddison (1998), Ren (1997), Woo (1998), Keidel (1992), Perkins (1988) and Rawski (2001, 1993). The upward bias hypothesis states that official Chinese estimates systematically overestimate Chinese rates of economic growth.

25 Since changes in prices are negatively correlated with changes in quantities of commodities (assuming that buyers are rational), a quantity index based on a later period would fall short of a quantity index based on an earlier period. In other words, the fixed-weight quantity index will overstate the growth rates after the benchmark year and understate the growth rates prior to the benchmark year.

26 Input-output weight refers to input and output relationship or the ratio of GVA to gross value of output that can be derived from an input-output framework in national input-output tables. Multi input-output table weights as in the new exercise are better than single input-output table weights because they better capture structural changes over time.

27 One of the main criticisms to my commodity-based output index is that it underestimated the effect of quality change, i.e. the quality change was miscounted as a price effect and hence removed (Holz 2006a; Rawski 2008). To see if there was an obvious underestimation of the growth rate due to insufficient representation of quality change, I derived a gap series by subtracting my rates from the official rates and then estimated a trend to filter out the noises. If the critique were correct and the gap

5.3 Net capital stock

Estimates of the net capital stock are required to examine China's total factor productivity (TFP) performance. Compared with other studies, I used the National Bureau for Statistics (NBS) gross fixed capital formation (GFCF) rather than more problematic indicators such as total investment in fixed assets (TIFA) and newly increased fixed assets (NIFA) as the investment variable.[28] I estimated a depreciation rate based on service life and declining balance measures at industry level rather than taking an arbitrary rate as in many existing studies, and constructed an alternative deflator rather than sticking to the official deflator for fixed assets investment.

There are three major steps in my capital stock construction (Wu 2011). In the first step the GFCF series from the expenditure accounts is deflated by two alternative deflators, i.e. official implicit investment deflator derived from the expenditure accounts and my deflator based on producer prices for capital goods (machinery and building materials). In the second step the initial stock for 1952 K_0 is estimated assuming that $K_0 = I_0/(\delta + \bar{g}_T)$, where I_0 denotes the initial GFCF, $\bar{g}_T$ stands for the annual average GDP growth rate of the selected period T (here set as 1952–55) and δ stands for a geometric depreciation rate.[29] In the last step, the estimates of China's net capital stock are obtained by applying the perpetual inventory method (PIM) $K_t = I_t + K_{t-1}(1-\delta)$ to the above constructed variables.

The results are approximately reconcilable with my estimates of industry level capital stock which are independent from the estimation for the aggregate economy (Wu 2008). As correctly put by Chow (2006), one of the important assessments of the estimated capital stock is the rate of return to capital implied by the capital stock. It follows that for 1954 Chow's (1993) estimated capital stock implies a rate of return to capital of 0.22, whereas Holz's (2006b) work implies 0.993. Based on a market economy assumption for the Chinese economy in the early 1950s, Chow (2006) considers Holz's result to be implausible. Although there are conceptual problems in Holz's work (Wu

---

indeed captured mainly the missing quality change, China's industrial development seemed to have experienced a continuous quality improvement from the mid-1960s to the mid-1980s but a significant quality deterioration since the industrial reform from the mid-1980s which did not look plausible at all (Wu 2011).

28 There have been controversial views on which investment indicator should be used. Wang and Szirmai (2011) provide a good review of the literature on this topic. As explained in Wu (2008 and 2011), while both TIFA and NIFA have coverage problem, TIFA contains serious double counting and it has been worsening since the property bubble in the mid-2000s that increased land transaction costs, and to some extent TIFA blurred the line between fixed capital formation and inventory (see Chow 1993). Frankly, many studies have misunderstood these concepts, especially Holz (2006b). Wang and Szirmai (2011) have made a good effort in adjusting NIFA and brought our attention to the concept of productive NIFA. However, due to long price distortions of residential housing, I opt for the indicator of GFCF.

29 The assumed geometric decay function follows age-efficiency argument supported by empirical evidence (Hulten and Wykoff 1981), rather than hyperbolic function as used in Wang and Szirmai (2011). Choosing a more proper decay function for economic depreciation in the context of the Chinese economy is certainly an important issue that deserves further study. As for the value of δ, since it is found to be from 5.7 to 6.6 per cent over time in my work on industries (Wu 2008), alternative estimates are therefore made as 5, 6, and 7 per cent, as well as multiple rates assuming accelerated depreciation along with market-oriented reforms (Wu 2011).

2011), assuming that the economy in the early 1950s was a typical market one can also be questioned given our clear evidence that the state already owned and controlled the majority of the modern economy. Thus, an abnormally high rate of return to capital is quite reasonable though it may not be as high as what Holz's results have implied. For a comparison, the rate implied by my estimated capital stock is 0.763 and by Wang and Szirmai's work is 0.673, both lower than that of Holz but still much higher than that of Chow.[30]

6 Growth, structural change, and productivity performance

This section uses my newly constructed dataset (Wu 2011) to examine China's post-1949 industrialization in terms of growth, structural change, and productivity performance. The focus of the examination is the aggregate economy and its major sectors instead of the industrial sector alone in order to see the effect of the industrialization on other sectors.

Path dependence is by no means efficient simply because it rules out alternatives and market-based competition, particularly if state is a main factor determining and sustaining the path. My working hypothesis is that if the state sector is generally less efficient than the private sector as both economic theory and empirical evidence have suggested and if China's course of industrialization has indeed followed a path that has been developed and sustained by strong government interests, the Chinese economy would have been inherently inefficient.

6.1 Division of the period covered

Given the available data, the examination focuses on the period 1953–2009. The whole period is first divided into planning and reform periods, each further divided into several sub-periods to capture the effects of major policy regime shifts on the Chinese economy. More detailed events in each sub-period are given in the table in the Appendix.

In the following analysis the planning period is divided into four sub-periods: the implementation of the Soviet-style central planning system through the first FYP in 1953–57; the Maoist feverish GLF campaign and its disastrous aftermath in 1958–65, the defense industry-oriented 'Great Third Front' campaign together with the chaotic time of the Cultural Revolution in 1966–71, and the new policy efforts including the neo-GLF attempting to get the economy out of the shadow of the Cultural Revolution in 1972–78.

As for the reform period, it is also split into four sub-periods: the initial agricultural reform in 1979–84; a nationwide industrial reform through a dual-track price system in 1985–91; the state sector reform following the adoption of 'socialist market' system in

[30] All of these estimates conform to the 'diminishing return to capital' theorem, though their implied diminishing rates vary substantially. Using 1998 as an example, to follow Chow's timeframe, the estimated rate of return to capital is ranged from 0.122 by Holz (2006b), 0.158 by Chow (1993), 0.162 by Wu (2011) and 0.279 by Wang and Szirmai (2011). Compared to the corresponding rates in 1954, this suggests that the decline of the rate of return to capital between 1954 and 1998 is 2, 0.7, 3.5, and 4.7 per cent, respectively.

1992–2001; China's emergence as the 'world factory' following its WTO entry in 2002–09.

6.2 Growth and structural change

With this new dataset, let us first examine the growth performance at the sector level and hence structural changes of the Chinese economy against policy regime shifts as reported in Tables 1 and 2. The following observations are noteworthy. In terms of the real output growth, first, the period of GLF and its aftermath exhibited the slowest growth, while China's post-WTO period showed the most rapid growth in the entire period in question.[31] Under central planning, it is not surprising that the industrial sector (mining, manufacturing, and utilities) was the fastest growing sector, contributing 50 per cent to the aggregate growth whereas only 4 per cent made by construction, 18 per cent by agriculture, and 28 per cent by services.[32] In the reform period, services outpaced industry on average. As a result, the contribution of services to the aggregate growth rose to 41 per cent and the contribution of construction rose to 7 per cent, whereas the contribution by agriculture and industry declined to 15 and 37 per cent, respectively. Effects of policy and institutional changes are clearly evident especially with the high-growth performance of industry and construction in the first FYP period (1953–57), in the first phase of the 'Third Front' campaign (1966–70, Appendix) and in the period following China's WTO entry, agriculture during the initial period of the agricultural reform (1979–84) and services in the early reform, as well as following the official adoption of the so-called 'socialist market system' (1993, Appendix). Besides, the substantial resource mobilization to support industrial development had strong negative impact on the growth of agriculture during the GLF period and on services during the 'Third Front' campaign.

Second, changes of employment over the planning and reform periods also suggest strong policy and institutional effects. Industry and construction exhibited the most volatile employment growth among all sectors, though in general it was slower than its real output growth. Particularly, the post-GLF retrenchment resulted in a very slow growth in industrial employment and negative growth in construction employment during the period 1958–65, while the promotion for local and especially rural enterprises in 1972–78 resulted in the most rapid industrial employment growth that outpaced the industrial real output growth. During the planning period, agriculture and services maintained a somewhat 'balanced growth' between the real output and employment that to a large extent 'reduced' the pressures on job creation. However, in spite of the economy's four decades of high-growth, China's agriculture did not experience an absolute decline of employment until the 1990s. As shown in Table 1, the post-WTO period was accompanied by the fastest decline of agricultural employment of 2.3 per cent a year thanks to the WTO-induced new round of industrial expansion that enhanced China's export-oriented labour-intensive manufacturing.

---

31 Of course, the fastest and largest ever money injection in 2009 to fight the global financial crisis helped sustain this period's strong growth. However, even if the two crisis-hit years of 2008–09 are removed, China's post-WTO period still exhibited the fastest growth in history.

32 Sectoral contribution to aggregate growth rate is derived based on the growth rates in Table 1 and GVA weights (at 1990 prices) in Table 2. There are small discrepancies between the aggregate growth rate and the sum of the weighted sectoral growth rates due to the underlying index number problems.

Third, as Table 2 shows, different growth performances across sectors also resulted in structural changes in output and employment. The share of the industrial sector in the real output increased over the 1950s–60s, remained almost unchanged over the 1970s–1990s, and then rose rather substantially following China's WTO entry. It should be noted that the change of the real output structure in agriculture and services in the 1960s reversed: the share of agriculture increased rather than continued to decline, and the share of services declined rather than continued to rise. In fact, for services this decline continued in the last planning period 1972–78.

In terms of employment structure, the regress was even more evident. In 1966–71, both industry and services moved back almost to their initial employment shares in the 1950s. In the same period, the significant decline of industry's share in employment along with the rise of its share in the real output reflected misallocation of labour. During the reform period, deregulation in the labour market and the growth of labour-intensive industries and services started and sustained China's most significant transformation of labour in history from agriculture to industry, construction and services. From the early 1980s to the end of 2000s, the share of agriculture in employment declined from 65 to 45 per cent whereas the share of services in employment rose from 14 to 31 per cent. Yet, as of the most recent period China still used 45 per cent of its workforce in agriculture to produce 16 per cent of GDP, which suggested that the industrialization had not brought about an efficient allocation of labour resources.

6.3 Productivity performance

We now examine China's industrialization from a productivity perspective. Table 3 presents a decomposition of annual change of the aggregate labour productivity into the contribution of sectoral labour productivity change and the effect of resource reallocation across sectors in terms of percentage point. The latter measures the contribution of resources that have moved from sectors with lower labour productivity to sectors with higher labour productivity.[33]

For the aggregate economy, labour productivity growth in the reform period was on average more than double that of the planning period (5.3 versus 2.3 per cent per annum). Before the reform, 35 per cent of labour productivity growth was attributable to industry, 5 per cent due to construction and 60 per cent due to the reallocation effect, leaving agriculture and services making no contribution at all. A closer examination of the sub-periods of the planning period in Table 3 shows that the first FYP period appeared much healthier than other periods with the highest labour productivity growth (4.5 per cent) and a positive reallocation effect (1 percentage point or ppt). In 1958–65, however, a significant labour productivity decline in agriculture (-0.7 ppts) and almost nil gain in the allocation effect offset about 40 per cent of labour productivity gain in other sectors. Inefficiency was also evident in the period of 1972–78 during which more

[33] To measure the reallocation effect, sectoral labour productivity needs to be weighted by nominal output (GVA). Therefore, the sum of so-weighted sectoral labour productivity is not equal to the aggregate labour productivity measured in real terms. That is, the growth rate of total labour productivity in Table 3 is not simply a result of subtracting the growth rate of total employment from the growth rate of total GVA in Table 1.

than 50 per cent of the gain from resource reallocation (3.7 ppts) was offset by the drop in labour productivity in industry (-2.1 ppts).

Table 3 also shows that the growth of labour productivity during the reform period was 5.3 per cent per year, of which 2 ppts were attributable to industry, 0.2 ppts to construction, 1 ppt to agriculture and services, respectively, and 1.2 ppts to the reallocation effect. The fastest labour productivity growth during the reform era was observed in 2002–09 as 8.7 per cent per year following China's WTO entry, of which 3.5 ppts were attributable to industry, 0.6 ppts to construction, 0.8 ppts to agriculture, 1.8 ppts to services, and 2 ppts to the reallocation effect. The reform of 1979–84 brought about perhaps the most rapid labour productivity growth in agriculture in China's post-1949 history. In this period, aggregate labour productivity grew by 3.6 per cent per year of which 40 per cent (1.6 ppts) came from agriculture. Since the 1990s, services have enjoyed a high labour productivity growth thanks to the government's promotion for the so-called 'socialist market economy' and more rapid industrialization and urbanization, especially after China's WTO entry. During the periods 1992–2001 and 2002–09 total labour productivity grew by 6 and 8.7 per cent per annum, respectively, of which over 20 per cent came from services.

Labour productivity is only a partial measure of productivity because it incorporates the effect of changing capital-labour ratios. Besides, labour productivity that is measured by numbers employed also improperly assumes that the human capital embodied in the workforce is constant. Obviously, efficiency will deteriorate if an increase in physical or/and human capital does not bring about the same increase in the real output. A full picture of the Chinese economy's efficiency and productivity performance is depicted in Table 4 including the contribution of measured inputs, i.e. employment, physical and human capital, and TFP for each period. The results are also depicted in Figure 3 for an intuitive examination. The TFP is estimated by using time-variant factor income shares based on available Chinese input-output tables since 1987 and estimates for the period prior to 1987 (Wu 2011).

The estimated TFP performance does not suggest that there has been a stable improvement of efficiency or a sustained productivity growth for the entire period. The central planning period saw a TFP decline by 1.2 per cent per year while the reform period exhibited a TFP growth by merely 0.3 per cent per year. It also appears that the investment in physical capital was the primary driving force of the Chinese economy in all periods contributing about 83 per cent of the annual growth in the planning period and 86 per cent in the reform period.

Comparing the TFP performance over different periods, one may be convinced that policy and institutional shocks are the best candidates to explain the changes of China's TFP growth. Interestingly, two significant positive TFP gains are somewhat 'related' to the central planning system: one with China's shift to central planning in 1953–57 and the other with China's departure from the central planning system in 1979–84. However, I would argue that the most significant TFP gain in 1953–57 was mainly attributed to the better use of the idle production capacity (in terms of both physical and human capital) caused by wars and instabilities due to the 1949 revolution rather than the implementation of the first FYP. Besides, positive incentives because of the arrival of the long-awaited peace also might contribute the TFP growth. On the other hand, the TFP gain in 1979–84 was mainly caused by the *de facto* privatization in agriculture

which improved farmers' incentives, as well as initial reform measures in the rest of the economy. This was, not surprisingly, only a one-off gain.

All major political and ideological campaigns in the pre-reform era, whether or not aiming at economic growth, resulted in severe negative TFP growth. The period 1972–78 experienced the most rapid growth in investment and employment under central planning, but it was extremely inefficient because of wasteful investment together with long deteriorating incentive problems. During this period nearly 40 per cent of the growth vanished because of inefficient use of inputs (estimated based on Table 4).

On the other hand, perhaps contrary to what many believed, the reform measures between the mid-1980s and the beginning of the 2000s were not TFP growth-promoting. The industrial reform that began in 1985 brought about a shock reflected by a negative TFP growth in 1985–91. In the following period 1992–2001, the period of the fastest ever growth in physical investment resulted in the most rapid economic growth since 1949. The efficiency of the economy in this period slightly improved but TFP growth still remained negative.

China's WTO entry at the end of 2001 resulted in significant positive TFP growth, though not as high as those estimates using unadjusted official data in other studies (Wu 2011). However, this may not simply suggest that China benefited from its comparative advantage in labour-intensive manufacturing through a substantially enlarged external market. In fact following the WTO entry, China found itself in a favourable position given that the investment in the 1990s had built up a huge production capacity, of which a large part was under-utilized, evidenced by China's long deflation from 1996 to 2002 in which producer prices declined by 1.3 per cent per year (NBS 2010).[34]

To show a cumulated productivity effect on the Chinese economy as well as its long-run trend, I construct a TFP index and present it in Figure 4. The index is based on 1978 to highlight the impact of the reform. A closer examination of China's TFP locus reveals more details. It shows that compared with the 1978 level China's initial level of TFP was 50 per cent higher. This simply means that the planning period suffered from a general and sustained productivity deterioration. The GLF caused a huge damage to productivity and the economy has not yet emerged from the shadow of this event. The policy retreat in 1963–65 only resulted in a short-term turnaround in productivity performance. It then entered another long decline during most of the 1970s until the agricultural reform in 1979. The initial reform was TFP promoting. However, the industrial reform with the dual-track price system of 1985 was accompanied by a significant decline in TFP. Deng's push for bolder reform in 1992 produced a short spell of positive TFP growth in 1992–95, China entered the longest TFP decline in the reform period in 1995–2001 that was ended by its WTO entry. The post-WTO TFP growth was halted again by the global economic crisis in 2008.

The trend line (estimated by a polynomial function) in Figure 4 helps 'filter out' most short-term fluctuations and noises—hence the effect of changes in capacity utilization can be more or less 'observed'. The figure thus depicts China's productivity growth over the long-term, reflecting the country's inefficient path of industrialization under the

---

[34] Note that business cycle effect is not removed in this type of growth accounting. Therefore, an expansion with underutilized capital stock can 'generate' positive TFP growth, ceteris paribus.

communist government. This productivity trend shows that although the reforms since 1978 reversed a long period of productivity deterioration that began by the end of the 1950s, it will still take a long time before the country can make up for its productivity losses due to past policy mistakes and institutional shocks.

7 Concluding remarks

In this paper I started out by exploring the role of the government in China's industrialization by comparing China and India in their post-Second World War growth paths. Following the path dependence theory, I then took an even longer historical perspective to show that China's industrialization was initiated and engineered by the state from the very beginning. It was motivated by the pressing needs to secure the regime's position and to enhance national security in the period from the 1860s to the 1890s. I also showed how industrialization was subsequently sustained by the nationalist government in even more ambitious heavy industry-oriented plans from the mid-1920s to mid-1930s, and how it was further enhanced during the wartime motivated by mounting national defence needs. My empirical evidence shows that China's post-1949 state-led industrialization, strongly motivated by the urge to achieve a fast catch-up with the West, has closely followed an underlying path that began at least in the beginning of the twentieth century. Opposed to conventional wisdom, neither the new communist regime in 1949 nor the reform in 1978 created a new path for China.

I have argued that if the state sector is generally less efficient than the private sector or if government intervention tends to distort the incentives of economic agents hence reducing efficiency as both economic theory and empirical evidence have suggested, and if China's course of industrialization has indeed followed a path that has been developed and sustained by strong government interests, the Chinese economy would have been inherently inefficient. My hypothesis is well supported by an analysis of China's post-1949 productivity growth using a newly constructed dataset for the total economy with a breakdown of major sectors. The findings show that there has been almost no steady and continuous productivity growth or efficiency improvement since 1949. Reform efforts through policy and institutional instruments to improve efficiency have been virtually ineffective after some initial gains.

The key factor behind such an inefficient path is not the inefficient use of resources that have sustained and developed the path, but lies in the interest groups nurtured by the state-led industrialization that have influenced the allocation of resources. These interest groups in many cases are deeply rooted in the communist party and the government bureaucracy. They will fight to defend their interests if any reform is seen as a potential threat to them. Although deteriorating inefficiency from time to time forced the government to retreat from comprehensive and rigid planning controls and eventually forced it to adopt market-oriented reforms by the end of the 1970s, the state interests in the economy and their influences have never been weakened. For the government, reform is in essence only a means not a goal. The reforms search for a better way to speed up income growth albeit at the expense of high inequality. This explains the growth of tax revenue and national savings for the development of industries selected by the state, so that they can continuously enjoy cheap credit, easy access to scarce resources, and protected markets.

As a result, the market-oriented reforms that have allowed the private sector and foreign enterprises to play a role and opening up for international competition are still subject to state interests and government interventions and they are highly growth-motivated without any efficiency concerns. Indeed, Wu and Shea (2008) show that it is the government factor rather than the development of market institutions that has played a key role in driving China's growth while maintaining stability in the reform era. Their findings have answered the great 'China puzzle' of high-growth and low volatility in the absence of healthy market institutions. Inefficiency problems become worse when growth is increasingly driven by competition between local governments following fiscal decentralization. While some Chinese economists have highly praised the role of such inter-governmental competition in promoting fast growth (Zhang and Zhou 2008), they have virtually ignored that when pursuing high growth—government bureaucracies do not act to maximize profits or minimize costs.

China's WTO entry appears to be the best chance for China to break the long inefficient path through institution-building and efficiency improvement via more international competition. However, I have become convinced that it is too naïve to believe this. The main obstacle is still the interests of the party and the government. As Wu and Shea put it (2008)

> …the collapse of the communist governments in the Eastern Bloc had further convinced the Chinese communists that the legitimacy of their regime would only be secured by maintaining social stability and delivering economic growth. Ironically, this endeavor to safeguard its legitimacy has compromised the government's commitment to the market-oriented reform and created strong incentives for the government to engage in or interfere with business decisions, especially regarding financial resource allocation, even if it requires the sacrifice of market efficiency and institution building. From government officials' perspective, direct intervention in business decisions could help protect their vested interests…, while building up strong institutions would certainly do the opposite (ibid.: 126).

WTO accession may act as a counterforce to the ideological and political constraints. It will encourage the government to strengthen the financial institutions in order to facilitate a smooth integration with the global economy. However, uncertainty about the consequences of further opening up to global competition due to ideological and political constraints increased the government's preoccupation with growth and stability, which watered down the efficiency improvement effects of WTO entry.

China's post-WTO emergence as the world's manufacturing power house is not an archetypal market fairytale but a story of how the government has successfully manipulated various policy instruments to make the market serve its best interests. To a growth-motivated local government inefficiency is an unobservable, external cost (negative externality) born by other localities, by the general public or by future generations. To attract investment, no matter whether foreign or domestic, land costs can be lowered or waived, environmental charges can be bypassed or postponed thus raising national health costs, low wage rates can be maintained for a long period, and water and energy can be subsidized. In doing so, these governments are actually rewarding current growth while incurring costs for the future. This is, however, not the end of the story. The unpaid or underpaid costs will artificially raise profits and then

encourage overinvestment and overproduction. Consequently, it will intensify competition that in turn calls for further government support. When this goes on, both Chinese producers, who produce consumer goods for exporting, and foreign consumers in high-income countries are ‘subsidized’ by the Chinese government. In my view, such a dual-subsidization is to some extent responsible for the existing global imbalances.

The ‘success’ of the Chinese model cannot be easily replicated under any type of true democracy. Breaking away from this inefficient path requires a genuine political reform in China—an important stage that China cannot bypass prior to achieving modernity. In such a process the state has to substantially withdraw from business and to become the real public goods provider. It should promote and help build up market institutions, remove barriers to factor mobility, and ensure all external costs of production to be paid or externalities to be internalized.

Appendix

China's major economic and political events in 1953-2009

Period	Economic planning and policy	Political and institutional event
Planning:		
1953–57	The 1st FYP; Soviet financial loans and technical assistance; Soviet-type central planning	Socialist transformation in industry, handicrafts, and services (1953–56); collectivization in agriculture (1955–56); the 'Anti-Rightists' movement (1957)
1958–65	The GLF (1958-59); the 2nd FYP (1958–63); the Great Famine (1960–62); the first decentralization (1958); the post-GLF retrenchment (1960–62); recentralization (1961–65)	Communization in agriculture (1958-59); 'anti-Rightist Wing' within the Communist Part of China (CPC) (1959); Sino-Soviet breakup (1960); policy retreat (1960–65)
1966–71	The 3rd FYP (1966–70), i.e. the first five years of the 'Great Third Front' construction (1966–75); the second decentralization (1970)	The chaotic period of the Cultural Revolution (1966-68); Mao's triumph over the 'capitalist roaders' (1969)
1972–78	The 4th and 5th FYPs (1971–75; 1976–80); promotion for local and rural enterprises; the neo-GLF campaign (1976–78)	Sino-US rapprochement (1972); Mao's death (1976); the fall of the Gang of Four (Madam Mao's elite group) (1976)
Reform		
1979–84	Agricultural reform; abolishment of the 'Great Third Front' construction; fiscal decentralization; special Economic Zones (1980); experimental industrial reform; the 6th FYP (1981–85)	The beginning of Deng's era (at the end of 1978); rehabilitation of the 'Rightists' (1979); decollectivization in rural China (1982–83)
1985–91	Nationwide industrial reform (1985); dual-track price reform; trade and foreign exchange regime reform; the 7th FYP (1986–90); legal developments for foreign direct investment (1986–88)	Crackdown of the Tiananmen Movement (1989); CPC's debate of the nature of the reform (socialism or capitalism?) (1990-91)
1992–2001	Deepening state-owned enterprises (SOE) reform; de facto privatization of small SOEs (1997); the longest deflation since the reform (1997–2002); the 8th and 9th FYPs (1991–95; 1996–2000)	Deng's push for bolder reform and opening up (1992); CPC's adoption of Deng's 'Socialist Market Economy' (1993)
2002–09	China's WTO entry (at the end of 2001); Strategic adjustment and advancement of the state sector; abolition of agricultural tax (2006); the 10th and 11th FYPs (2001–05; 2006–10)	CPC's adoption of Jiang's more capitalist philosophy ('three represents') (2002); Hu's new ideological promotion for a 'harmonious society' (2005); Adoption of the controversial PRC's first Property Law (2007)

Sources: Based on information and materials in Wang (2010).

References

Amsden, A. H. (1991). 'Diffusion of Development: The Late-Industrializing Model and Greater East Asia', *American Economic Review*, 81 (2): 282–86.

Aubrey, H. G. (1949). 'Deliberated Industrialization', *Social Research*, June: 159–74 .

—— (1951). 'The Role of the State in Economic Development', *American Economic Review*, 41 (2): 266–73.

Barro, R. J., and J. W. Lee (2000). 'International Data on Educational Attainment: Updates and Implications'. Working Paper 42. Cambridge, MA: Harvard University, Center for International Development.

Barro, R. J., and X. Sala-i-Martin (1992). 'Convergence', *Journal of Political Economy*, 100 (2): 223–51.

Bian, M. L. (2005). *The Making of the State Enterprise System in Modern China: The Dynamics of Institutional Change*. Cambridge, MA: Harvard University Press.

Chang, J. K. (1969). *Industrial Development in Pre-Communist China, 1912–1949*. Edinburgh: Edinburgh University Press

Chenery, H. B., and M. Syrquin (1975). *Patterns of Development 1950–1970*. Oxford: Oxford University Press.

Cheng, C.-y. (1963). *Communist China's Economy, 1949–1962: Structural Changes and Crisis.* South Orange, NJ: Seton Hall University Press.

Chow, G. C. (1993). 'Capital Formation and Economic Growth in China', *Quarterly Journal of Economics*, 108 (3), 809–42.

—— (2006). 'New Capital Estimates for China: Comments', *China Economic Review*, 17, 186–92.

David, P. (1985). 'Clio and the Economics of QWERTY', *American Economic Review*, 75 (2): 332–37.

Donnithorne, A. (1968). 'China's Economic Planning and Industry'. In C.-m. Li (ed.), *Industrial Development in the Twentieth Century*. Ann Arbor, MI: University of Michigan Press.

Eckstein, A. (1975). *Chinese Economic Development: The Interplay of Scarcity and Ideology.* Ann Arbor, MI: University of Michigan Press.

Gerschenkron, A. (1951). *A Dollar Index of Soviet Machinery Output, 1927–28 to 1937*. Santa Monica CA: Rand Corporation.

—— (1962). *Economic Backwardness in Historical Perspective, A Book of Essays*. Cambridge, MA: Belknap Press of Harvard University Press.

Holz, C. A. (2006a). 'China's Reform Period Economic Growth: How Reliable Are Angus Maddison's Estimates?', *The Review of Income and Wealth*, March: 85–119.

—— (2006b). 'New Capital Estimates for China', *China Economic Review*, 17: 142–85.

Hulten, C. R., and F. C. Wykoff (1981). 'The Measurement of Economic Depreciation'. In C. R. Hulten (ed.), *Depreciation, Inflation, and the Taxation of Income from Capital*. Washington, DC: The Urban Institute Press.

Ito, T., and A. O. Krueger (eds) (1995). *Growth Theories in Light of the East Asian Experience*, NBER-EASE Volume 4. Chicago: University of Chicago Press.

Keidel, A. (1992). 'How Badly do China's National Accounts Underestimate China's GNP?', Paper E-8042. Bloomington, IN: Rock Creek Research Inc.

Kirby, W. C. (1984). *Germany and Republican China*. Palo Alto, CA: Stanford University Press.

—— (1990). 'Continuity and Change in Modern China: Economic Planning on the Mainland and on Taiwan, 1943–1958,' *The Australian Journal of Chinese Affaires*, 24: 121–41.

Kuznets, S. (1958). 'Economic Growth of Small Nations'. In A. Bonne (ed.), *The Challenge of Development*. Jerusalem.

Levine, S. I. (1987). *Anvil of Victory: The Communist Revolution in Manchuria, 1945-1948*. New York: Columbia University Press.

Lin, J. Y. (2009). *Economic Development and Transition: Thought, Strategy, and Viability*. Marshall Lectures, 2007/8. Cambridge: Cambridge University Press.

Lin, J. Y., F. Cai, and Z. Li (1996). *The China Miracle: Development Strategy and Economic Reform*. Hong Kong: The Chinese University Press.

Lin, J. Y., and H.-J. Chang (2009). 'Should Industrial Policy in Developing Countries Conform to Comparative Advantage or Defy It? A Debate between Justin Lin and Ha-Joon Chang', *Development Policy Review*, 27 (5): 483–502.

Maddison, A. (1970). *Economic Progress and Policy in Developing Countries*. London, Norton, and New York: Allen and Unwin.

—— (1995). *Explaining the Economic Performance of Nations: Essays in Time and Space*. Cheltenham: Edgar Elgar.

—— (1998). *Chinese Economic Performance in the Long Run*. Paris: OECD. Out of print, available at: www.ggdc.net/Maddison.

—— (2001). *The World Economy: A Millennial Perspective*. Paris: OECD.

—— (2003). *The World Economy: Historical Statistics*. Paris: OECD.

—— (2007). *Chinese Economic Performance in the Long Run, 960-2030*. Paris: OECD.

Maddison, A., and H. X. Wu (2008). 'Measuring China's Economic Performance', *World Economics*,. 9 (2): 13–44.

Mankiw, N. G., D. Romer, and D. N. Weil (1992). 'A Contribution to the Empirics of Economic Growth', *Quarterly Journal of Economics*, 107 (2): 407–37.

Mason, S. E. (1960). 'The Role of Government in Economic Development', *American Economic Review*, 50 (2): 636–41.

National Bureau of Statistics, China (NBS) (2010). *China Statistical Yearbook*, 2010, Beijing: China Statistics Press.

North, D. C. (1990). *Institutions, Institutional Change, and Economic Performance*. Cambridge: Cambridge University Press.

Page, S. E. (2006). 'Path Dependence', *Quarterly Journal of Political Science*, 1: 87–115.

Perkins, D. H. (1988). 'Reforming China's Economic System', *Journal of Economic Literature*, 26: 601–45.

Perkins, D. H., and M. Syquin (1989). 'Large Countries: The Influence of Size'. In H. Chenery and T. N. Srinivasan (eds), *Handbook of Development Economics*, Volume II. North-Holland: Elsevier Science Publishers.

Rawski, T. G. (1980). *China's Transition to Industrialism: Producer Goods and Economic Development in the Twentieth Century*. Ann Arbor, MI: University of Michigan Press.

—— (1993). 'How Fast has the Chinese Industry Grown?'. Policy Research Working Paper 1194. Washington, DC: World Bank.

—— (2001). 'What is Happening to China's GDP Statistics?', *China Economic Review*, 12: 347–54.

—— (2008). 'Can China Sustain Rapid Growth Despite Flawed Institutions?'. Paper for The Sixth International Symposium of The Center For China-US Cooperation, University of Denver, 30–31 May.

Ren, R. (1997). *China's Economic Performance in International Perspective*. Paris: OECD.

Shao, L., and J. Sun (1994). 'Sun Yueqi and Shao Lizi—An Interview with Sun Yueqi, the Former President of National Resource Committee, the Godfather of Chinese Modern Industry', *Nanjing History Record* 1.

The Conference Board (TCB) (2011). *The Conference Board Total Economy Database*, January 2011 Release, New York, available at: www.conference-board.org/economist

van Ark, B. (1996). 'Sectoral Growth Accounting and Structural Change in Postwar Europe'. In B. van Ark and N. Crafts (eds), *Quantitative Aspects of Post-war European Economic Growth*. Cambridge: Cambridge University Press.

Wang, H. (2010). *Industrial Economic history of Modern China, 1949.10–2009*. Shanxi: Shanxi Economic Press.

Wang, L., and A. Szirmai (2011). 'Capital Inputs in the Chinese Economy: Estimates for the Total Economy, Industry and Manufacturing', *China Economic Review*, forthcoming.

Wang, Y., and Y. Yao (2002). 'Sources of China's Economic Growth, 1952–99: Incorporating Human Capital Accumulation', *China Economic Review.*

Woo, W. T. (1998). 'Chinese Economic Growth: Sources and Prospects'. In M. Fouquin and F. Lemonie (eds), *The Chinese Economy*. Paris: Economica Ltd.

Wu, H. X. (2002). 'How Fast has Chinese Industry Grown? – Measuring the Real Output of Chinese Industry', *The Review of Income and Wealth*, 48 (2): 179–204.

——. (2007). 'The Chinese GDP Growth Rate Puzzle: How Fast Has the Chinese Economy Grown?', *Asian Economic Papers*, 6 (1): 1–24.

——. (2008). 'Measuring Capital Input in Chinese Manufacturing and Implications for China's Industrial Growth Performance, 1949-2005'. Paper presented at 'the 2008 World Congress on National Accounts and Economic Performance Measures for Nations', Washington, DC, 12–17 May.

—— (2011). 'Accounting for China's Growth in 1952–2008—China's Growth Performance Debate Revisited with A Newly Constructed Data Set. Discussion Paper/11-E-003. Tokyo: RIETI.

Wu, H. X., and E. Y. P. Shea (2008). 'The 'China' Chapter—Institutions, Domestic Financial Architecture and Macro Volatility'. In José M. Fanelli (ed.), *Macroeconomic Volatility, Institutions and Financial Architecture*. Basingstoke: Palgrave Macmillan.

Wu, H. X., and X. Yue (2000). 'Reconstructing the Post-War Chinese Industrial GDP with a Laspeyres' Quantity Index Approach: A Further Inquiry'. In K. Odaka, Y. Kiyokawa, and M. Kuboniwa (eds), *Constructing A Historical Macroeconomic Database for Trans-Asian Regions*. Tokyo: Hitotsubashi University, Institute of Economic Research.

Wu, H. X., and X. Yue (2010). 'Accounting for Labor Input in Chinese Industry, 1949–2005'. Paper presented at the 31st IARIW General Conference, St. Gallen, Switzerland, 22–28 August.

Zeitz, P. (2010). 'Trade in Equipment and Technological Development: Evidence from the Sino-Soviet Split'. Mimeo. Palo Alto, CA: Stanford University.

Zhang, J., and L. Zhou (eds) (2008). *Competition for Growth—Political Economy of Growth in China*. Shanghai: Shanghai People's Press.

Table 6.1**:** Growth of output and employment by major sector, 1953-2009
(Per cent per annum)

	Growth value added (at 1990 Prices)					Employment				
	Total	A	I	C	S	Total	A	I	C	S
Planning:										
1953-1957	5.6	3.7	16.0	17.2	3.7	2.5	1.6	4.1	25.5	2.9
1958-1965	3.5	0.6	7.2	2.3	5.2	2.4	2.5	3.0	-6.8	3.4
1966-1971	4.8	3.1	10.3	8.4	1.9	3.7	3.3	9.6	4.7	2.4
1972-1978	4.4	2.2	6.9	3.6	4.0	3.1	1.2	12.0	4.0	5.8
1953-1978	***4.4***	***2.2***	***9.5***	***7.0***	***3.8***	***2.9***	***2.2***	***7.2***	***5.0***	***3.7***
Reform:										
1979-1984	7.4	7.1	5.4	9.7	9.7	3.4	2.1	4.6	9.3	7.1
1985-1991	4.7	3.5	4.8	8.6	5.2	2.5	1.6	2.2	7.7	4.8
1992-2001	7.0	3.8	6.6	9.6	8.9	1.1	-0.7	0.4	5.2	5.0
2002-2009	9.2	4.3	12.4	12.4	7.7	0.9	-2.3	4.0	2.0	3.3
1979-2009	***7.1***	***4.5***	***7.5***	***10.1***	***7.9***	***1.8***	***0.0***	***2.5***	***5.7***	***4.9***

Notes: A: Agriculture, I: Mining, manufacturing and utilities, C: Construction, S: Services.

Source: Based on estimates in Wu (2011), updated using *China Statistical Yearbook 2010* (NBS 2010), with adjustments.

Table 6.2: Structural changes of output and employment, 1953-2009
(Total = 100)

	GVA (at 1990 prices)				Employment			
	A	I	C	S	A	I	C	S
Planning:								
1953-1957	51.2	14.0	2.2	32.6	81.0	6.2	2.5	10.3
1958-1965	36.3	21.2	2.5	40.0	72.9	9.0	4.2	13.9
1966-1971	39.0	25.8	2.5	32.6	79.9	7.1	2.0	11.0
1972-1978	33.9	34.1	2.9	29.1	74.0	12.8	2.0	11.3
1953-1978	***39.1***	***24.4***	***2.6***	***33.9***	***76.4***	***9.0***	***2.8***	***11.8***
Reform:								
1979-1984	29.5	35.5	3.1	31.9	64.9	18.3	2.4	14.4
1985-1991	27.1	33.6	4.1	35.2	59.9	17.6	4.3	18.2
1992-2001	22.4	33.4	5.3	39.0	52.7	17.2	5.6	24.6
2002-2009	15.6	39.5	6.0	39.0	44.7	18.0	6.2	31.1
1979-2009	***23.1***	***35.4***	***4.8***	***36.7***	***54.6***	***17.7***	***4.8***	***22.9***

Notes and source: See Table 1.

Table 6.3: Sectoral contribution to labor productivity growth and reallocation effect, 1952-2009
(Percent per annum)

	Labor productivity growth	Sectoral contribution and reallocation effect (percentage point)				
		A	I	C	S	Reallocation
Planning:						
1953-1957	4.5	0.9	2.6	-0.3	0.2	1.0
1958-1965	1.8	-0.7	1.4	0.4	0.5	0.2
1966-1971	1.6	-0.1	0.2	0.1	-0.1	1.5
1972-1978	1.5	0.3	-2.1	0.0	-0.4	3.7
1953-1978	***2.3***	***0.0***	***0.8***	***0.1***	***0.0***	***1.4***
Reform:						
1979-1984	3.6	1.6	0.3	0.0	0.6	1.1
1985-1991	2.2	0.5	1.0	0.0	0.1	0.6
1992-2001	6.0	0.8	2.5	0.3	1.4	1.0
2002-2009	8.7	0.8	3.5	0.6	1.8	2.0
1979-2009	***5.3***	***1.0***	***2.0***	***0.2***	***1.0***	***1.2***

Notes: The sectoral contribution and reallocation effect estimates are calculated using the formula: $\Delta \ln y_t = \sum_i \overline{\omega}_{i,t} \Delta \ln y_{i,t} + (\sum_i \overline{\omega}_{i,t} \Delta \ln L_{i,t} - \Delta \ln \sum_i L_{i,t}) = \sum_i \overline{\omega}_{i,t} \Delta \ln y_{i,t} + R_t$, where y and L stand for labor productivity and employment, respectively, whose annual growth rate is defined as log difference, $\overline{\omega}_{i,t}$ stands for sectoral output weight in nominal terms with a bar denoting an average of two adjacent periods, and R stands for the reallocation effect across sectors.

Source: See Table 1.

Table 6.4: Sources of growth of the Chinese economy, 1953-2009
(Percent per annum)

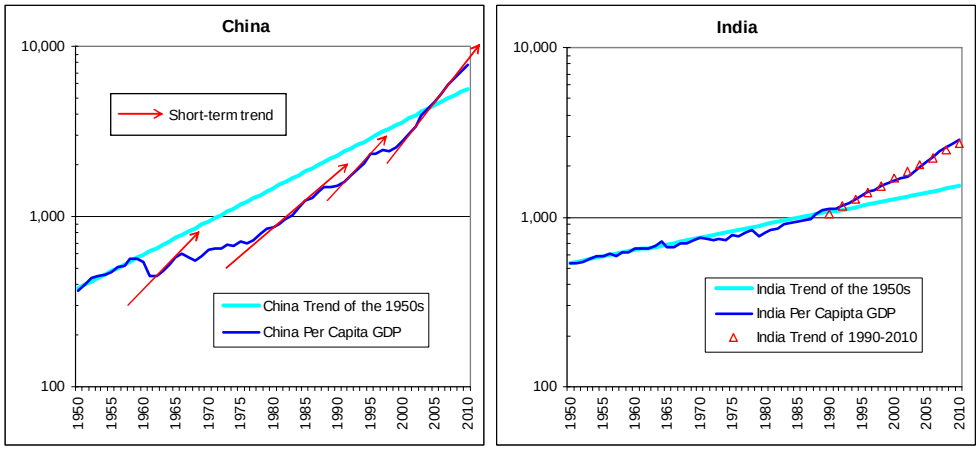
	Growth of gross value added	Factor Contribution (percentage point)			
		Employment	Human capital	Physical capital	TFP
Planning:					
1953-1957	5.6	0.7	0.4	3.6	0.9
1958-1965	3.5	0.6	0.7	3.7	-1.6
1966-1971	4.8	0.9	1.0	3.6	-0.7
1972-1978	4.4	0.7	1.4	4.8	-2.6
1953-1978	***4.4***	***0.7***	***0.9***	***3.9***	***-1.2***
Reform:					
1979-1984	7.4	0.8	0.4	4.6	1.7
1985-1991	4.7	0.6	0.1	4.9	-0.9
1992-2001	7.0	0.3	0.4	7.0	-0.7
2002-2009	9.2	0.2	0.4	7.1	1.5
1979-2009	***7.1***	***0.4***	***0.3***	***6.1***	***0.3***

Notes: The estimates are obtained by the standard growth accounting approach using input-output table factor income weights as explained in text. The underlying neo-classic framework imposes strong institutional and behavioural assumptions (such as free mobility of factors and profit maximization of firms) which may not be appropriate to an economy like China. However, to compare with many existing studies these assumptions are accepted in this study. Since the Chinese economy may not be operating on the production possibility frontier, TFP growth may capture both technological progress and efficiency improvement.

Source: See Table 1.

Figure 1: Chinese and Indian per capita GDP level and growth trends, 1950–2010

(In 2010 PPP dollar and logarithmic scale)

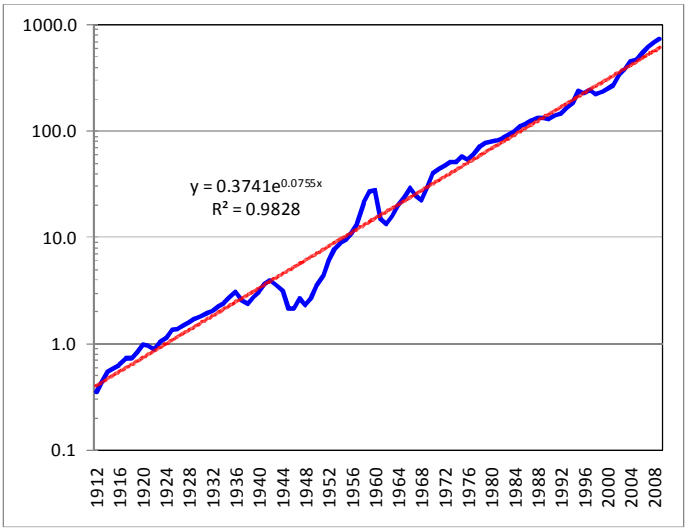


Notes: The TCB-TED measure of per capita GDP is in 2010 EKS PPP dollars. The pre-2003 TCB series for China is largely based on Maddison and Wu (2008) which used the Geary-Khamis PPP approach. The values for 2010 are preliminary. The trends are obtained by regression approach.

Source: Wu (2011), Maddison and Wu (2008), and TCB (2011).

Figure 2: China's century-long industrial development

(Real industrial output, 1984 = 100)

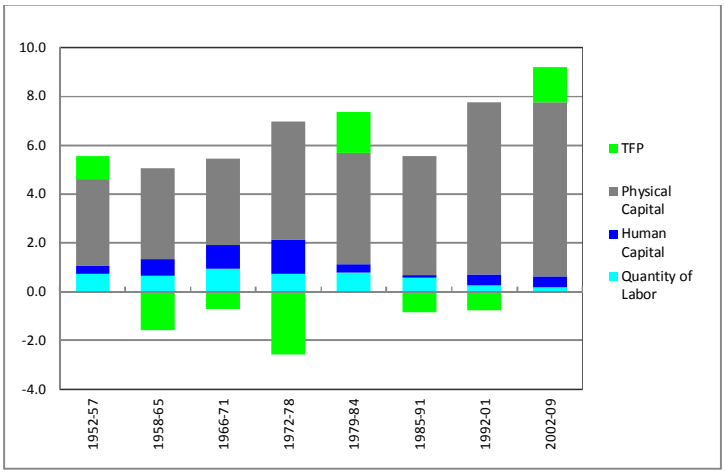


Notes: The original data are two separate series covering 1912–1948 and 1949–2008, respectively. The data series for 1912–1948 is constructed using commodity-based estimates of industrial net value added (NVA) by Chang. The data series for 1949–2008 is also based on commodities but conforming to the SNA concept of gross value added (GVA). The two data series are linked assuming that the change of capital consumption was similar to the change of NVA. The trend is estimated by an exponential function.

Sources: Based on Wu (2011) and Chang (1969).

Figure 3: Sources of growth of the Chinese economy

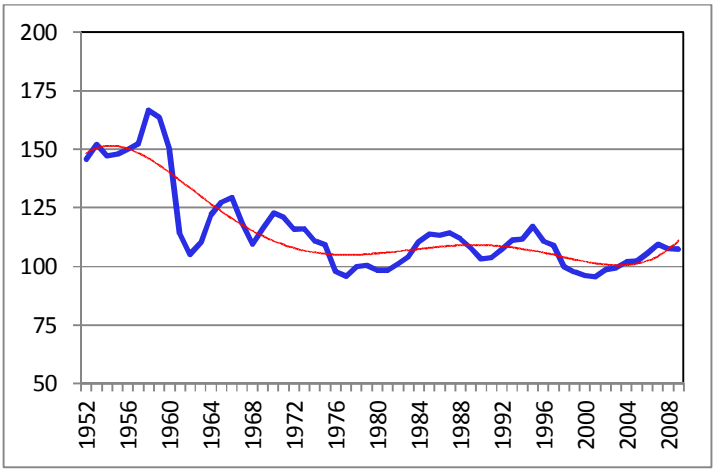
(Per cent per annum; period average)



Notes and source: See Table 4.

Figure 4: Total factor productivity index of the Chinese economy

(1978=100)



Notes and source: See Table 4.