The Reliability of China's Growth Figures: A Survey of Recent Statistical Controversies

Oleksandr Movshuk
Assistant Research Professor, ICSEAD
and
Visiting Assistant Professor, Graduate School of Economics,
Kyushu University

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Oleksandr Movshuk*

The International Centre for the Study of East Asian Development.

11-4 Otemachi, Kokurakita-ku, Kitakyushu, 803-0814, Japan

e-mail: movshuk@icsead.or.jp

Abstract

This paper reviews the recent controversy regarding the reliability of China's official growth statistics, following the discovery by Rawski (2001) of a suspicious nexus of high economic growth and declining energy consumption in China during 1997-2000. After summarizing alternative estimates of China's economic growth during the reform period, two sources of exaggerated growth figures are examined in detail: (*i*) political pressure to report high economic growth at the local level, and (*ii*) the use of obsolete statistical methodology that persistently underestimates price inflation and exaggerates real economic growth. Then the paper estimates the likely effect of these two factors on China's reported economic growth.

Keywords: economic growth, statistical controversy, China.

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Introduction

According to official Chinese statistics, the launch of China's economic reforms in 1978 generated spectacular economic growth. Between 1978-2000, the average growth in gross domestic product (GDP) was 9.7%, with reports of double-digit growth rates in 1978, 1983-1985, 1987-1988, and 1992-1995 (National Bureau of Statistics, 2001, p. 49).

However, the reliability of these official data has been repeatedly questioned by many observers, who have argued that the true Chinese growth rates are much less outstanding. In recent years, the issue has attracted considerable interest not only in academic literature, but also in the mass media. There was a particular surge in interest in early 2002, when almost all major foreign news media cast doubt on official Chinese growth rates[1].

This paper reviews recent evidence concerning this statistical controversy. In section 1, we summarize alternative estimates of economic growth in China during the reform period. In section 2, we discuss major factors that are likely to distort the official rate of Chinese economic growth, with a particular focus on (*i*) political pressure to meet and surpass official growth targets, and (*ii*) outdated statistical methods that result in an upward bias in the growth of real GDP through underestimating the GDP deflator. After discussing the two sources of exaggerated growth rates, we provide estimates of their possible effect on China's official growth rates. Section 3 discusses the official response to critiques of Chinese statistical data. Our main conclusions are presented in section 4.

[1] A partial list of these news media includes *Newsweek* ("Why China Cooks the Books", April 8, 2002), *Washington Post* ("China's Economic Façade", March 26, 2002), *Business Week (*"How Much Is China Cooking Its Numbers?", April 8, 2002), *BBC* ("China admits economic data 'unreliable'", February 2002), *CNN* ("China posts big growth but skeptics abound", April 16, 2002), *The Economist* ("How Cooked Are The Books?", March 14, 2002), and others.

Section 1. Alternative estimates of economic growth in China

Skepticism about official growth rates in China has a long history (Rawski, 1991; Keidel, 1992). By the late 1990s, many independent scholars had reached a consensus that exaggerations in China's growth rates could be quite large (see, *inter alia*, Maddison, 1995, 1998; Ren, 1997; Woo, 1998; Wu, 1998). Nevertheless, Rawski (2001) undoubtedly hit a nerve when he asserted that in 1997-2000, the Chinese economy was growing much less than officially claimed, and might even *decline* in 1997-1998.

To support this claim, Rawski pointed to decreasing energy consumption in China between 1997 and 2000 (by 12.8%), which appeared inconsistent with official figures for GDP growth during the same period (by 24.7%). To check whether this growth episode in China was plausible, Rawski examined similar growth experiences in Japan (during 1957-1961), Taiwan (during 1967-1971) and Korea (during 1977-1981). He found that none of these countries experienced declining energy consumption during these periods, thus casting even more doubt on the reported growth in China.

This finding stirred up considerable controversy. Contradicting Rawski, Lardy (2002) pointed out that even though energy consumption was declining, there were substantial increases in Chinese government revenues and total imports between 1997 and 2001, by as much as 90% and 70%, respectively.

Lardy's claim, however, neglects the existence of a sizable underground economy in China, and the recent efforts of the Chinese authorities to legalize it, particularly after 1998. Consider the case of the reported increase in imports. These official imports do not include smuggling operations, which remain widespread in China, especially in coastal provinces. When the shortfall in customs revenues became especially troublesome in 1998, the Chinese authorities launched a vigorous

anti-smuggling campaign. Before long, its forceful implementation uncovered thousands of major cases of smuggling, which helped to increase customs revenues and reported imports. If this recent increase in official imports occurred *at the expense* of smuggling, then the increase in total Chinese imports might be overestimated in data on official imports (Rawski, 2002).

Though there is no reliable information on the extent of smuggling in China, a rough estimate can be obtained from the export data of China's trading partners. Consider trade between countries *i* and *c*, with *c* denoting China. Let $T^i_{i,c}$ and $T^c_{i,c}$ be two alternative valuations of the total trade flow from *i* to China, with $T^i_{i,c}$ recorded by *i*th trade statistics as *i*th exports to China, while $T^c_{i,c}$ is recorded by China's trade statistics as China's imports from *i*.

Typically, $T^c_{i,c}$ should exceed $T^i_{i,c}$, because domestic imports are reported on a *cost including freight* (c.i.f.) basis, with extra charges for transportation and insurance, while exports are reported on a *free-on-board* basis (f.o.b.), and do not include these extra charges (Feenstra, Lipsey, Bowen, 1997). In Table 1, we have estimated the normalised difference between these two trade valuations, calculating $\left(T^c_{i,c} - T^i_{i,c}\right)\Big/T^i_{i,c}$ for total imports in China during 1994-2001. To obtain a benchmark in the estimated c.i.f.-f.o.b. margin, we made the same calculations for total imports in Japan, Hong Kong, South Korea, Singapore and Taiwan.

[INSERT TABLE 1 ABOUT HERE]

According to Table 1, in almost all Asian economies, total imports on a c.i.f. basis exceeded the corresponding valuation on an f.i.b. basis by about 9-16%. China, however, demonstrated the opposite pattern, with $T^c_{i,c}$ (i.e., China's official imports)

significantly *less* than $T^{i}_{i,c}$ (exports to China by Chinese trading partners). It is noteworthy that the shortfall became particularly pronounced in 1997, just prior to the launch of the anti-smuggling campaign. After 1998, however, $T^{c}_{i,c}$ quickly converged with $T^{i}_{i,c}$, and finally exceeded it by 8.3% in 2001.

Thus, even though in recent years China's c.i.f-f.o.b. margin has become comparable with that of other Asian countries, its negative values in previous years indicate that China's imports $T^{c}_{i,c}$ were significantly underestimated by domestic trade statistics. The magnitude of this under-reporting is illustrated in Figure 1, which compares the value of total Chinese imports in domestic and foreign trade statistics[2]. Though these alternative trade measurements essentially converged by 2001, there was a substantial shortfall in domestically reported imports in 1997. Lardy's calculation of a 70% increase in China's imports is based on these underestimated imports prior to the launch of the anti-smuggling campaign in 1998. If we use the foreign valuation of Chinese imports $T^{i}_{i,c}$ instead, the increase in imports during 1997-2001 is halved from 70% to 36%, principally due to upward adjustment for imports in the base period.

Likewise, the 90% growth in government revenues could be an indicator of the successful implementation of an anti-tax evasion campaign that started in 1998, rather than a sign of an expanding economy, as claimed by Lardy (2002). If this campaign increased tax collection *at the expense* of non-reported tax payments, the total tax base might not increase as much as officially reported[3]. Unfortunately, it is not

[2] To make domestic data on imports (on a c.i.f. basis) comparable with foreign data on exports (on an f.o.b. basis), the former were adjusted downward by 10%. Though this adjustment coefficient is arbitrary, it is close to China's c.i.f.-f.o.b. margin in 2001, and to typical margins in other Asian countries, as reported in Table 1.

[3] The campaign was implemented vigorously in the late 1990s, boosting the share of government revenues in GDP from 10.7% in 1995 to 15.0% in 2000 (National Bureau of Statistics, 2001, p. 246).

possible to estimate even roughly the extra effect of improved tax collection on growing tax revenues in China during 1997-2001.

Though the controversy over Rawski's paper attracted the lion's share of media attention, alternative estimates of China's growth were also made by other scholars of the Chinese economy. As reported in Table 2, the degree of agreement among these estimates is striking. With a single exception in Woo (1997) for 1979-1984, all other alternative estimates of China's growth fell short of the official data by about 2% a year. In the next section, we will examine the likely sources of overstated growth rates in China.

[INSERT TABLE 2 ABOUT HERE]

Section 2. Sources of exaggerated GDP growth in China

1. Political pressure to report exaggerated growth performance

Though the Chinese Communist Party (CCP) no longer sets the extravagant growth targets of which it was so fond during the 'Great Leap Forward'[4], the achievement of high economic growth still has a strong political significance for the CCP. The party continues to consider high growth performance as the primary indicator of its success in modernizing the Chinese socialist state. So even now, the CCP periodically sets target growth rates for the whole economy. Rather than being purely indicative, these growth targets are formally adopted by the National People's Congress (China's legislature), making non-compliance with these official targets much more difficult for local officials[5]. For instance, in 1998, the CCP initiated a campaign to achieve an 8% growth rate, while the current growth target for 2001-2005 is 7%. Chinese

[4] The goals at that time were to surpass, in terms of GDP per capita, the United Kingdom in 10 years and the United States in 20 years.

provinces, in turn, have set even more ambitious growth targets for 2001-2005, such as annual growth of 8-9% in Hubei, and 9% in Jilin (*People's Daily*, March 13-14, 2001).

Under the Chinese one-party system, there is heavy political pressure for regional authorities to meet (and, preferably, to exceed) these growth targets, no matter how impossible or unrealistic these targets are. The ability to surpass central growth targets is an important criterion for career promotions in China (Gilley, 2001, p. 18). Consequently, local and provincial officials have very strong incentives to fabricate exaggerated reports for the central authorities, as reflected in a popular Chinese one-liner: "officials make statistics and statistics make officials" (Zhang, 1999).

Though the pervasive practice of "water content" (*shuifen*) in official statistics is well documented even by Chinese sources (Young, 2000, p.4), its clandestine nature makes any estimate of its scale a daunting task. Yet a recent study by Watson and Pauly (2001) on large-scale distortions in the reported fish catch in China provides some insight, and we will now examine this study in more detail.

Despite the fact that major fish populations along the Chinese coast had long been considered overexploited, the officially reported fish catches in China kept on rising exponentially in the 1990s. Between 1990 and 1999, fish catches increased from 4.1 million to 10.1 million tonnes, giving an extraordinary annual growth rate of 10.5%.

In their paper, Watson and Pauly (2001) described a statistical model of the world fishery catch, which related fish catches to various oceanographic and ecological variables. In most areas of the world, the model could correctly predict the

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[5] In fact, it is common for Chinese provinces subsequently to set their own growth targets that often exceed the growth target for the whole economy.

actual fish catch. However, China was a notable exception. For example, the model predicted a catch of 5.5 million tonnes in 1999, while China's officially reported catch was almost twice as large (10.1 million tonnes).

In explaining this large discrepancy, the authors focused on systematic over-reporting by Chinese local officials, who were eager to meet official growth targets as they hoped to "be promoted on the basis of production increases from their areas or production units" (p.535). If, indeed, their predicted fish catch was close to the true output of 1999, this implies that average growth during 1990-1999 was just 3.3% a year, while the "water content" accounted for the remaining $10.5 - 3.3 = 7.2\%$ of the official growth figure.

China's National Bureau of Statistics (NBS) is not unaware of such *shuifen* abuses at the regional level. From 1999, the NBS stopped relying on locally-supplied data alone, and switched to direct reporting by the 5,000 biggest industrial enterprises, assuming that "these enterprises generally have rather sound business accounts and high professional quality of accountants and statisticians" (OECD, 2000, p. 27)[6]. As for smaller enterprises, the NBS estimates their output by means of sampling, but this conceptually correct approach is used only in the industrial sector. Finally, the NBS checks regional figures using its own survey of crop production.

However, the NBS still lacks an adequate number of employees and sufficient resources to conduct comprehensive and nationwide surveys of *all* segments of the Chinese economy, so that even now the NBS is unable to verify local data on fisheries, forestry, construction, and the whole of the service sector. With only 26 employees in the late 1990s (OECD, 2000, p. 12), the national accounts department of the NBS was far too understaffed to be able to validate regional reports by means of comprehensive

[6] This statement, however, remains a matter of faith, since the NBS does not make any independent checks of data provided by SOEs. Steinfeld (1998) examined the reliability of statistical reports

sampling studies. For the sake of comparison, it should be noted that national accounts departments in the United States, Canada and Australia have 150-200 staff members (*ibid*).

In addition, there is some evidence that political pressure to report high growth can spread to local branches of the NBS. One former head of the NBS complained (but only after his retirement) that "some local leaders insist that statistical workers completely change their point of view when working on local statistics" (Zhang, 1999), even threatening to fire local statisticians unless they forward embellished statistical reports to the central government.

Moreover, the political pressure to report high growth rates appears to affect the central statistical office as well. For example, when the NBS conducted a nationwide industrial census in 1995, it discovered that collective-ownership enterprises (COEs) had substantially exaggerated their output figures, which had already been published in the *1995 Chinese Statistical Yearbook*. After making this discovery, NBS decreased the cumulative growth of COEs in 1990-1994 from 3.69 to 3.11 times (see Table 3)[7].

[INSERT TABLE 3 ABOUT HERE]

Strangely enough, this adjustment did not result in *any* reduction in the official GDP growth rates for the total economy (as shown in the last two columns of Table 3), even though COEs accounted for more than one-third of China's total output.

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supplied by large Chinese SOEs in the iron and steel industry, and concluded that "essentially insolvent firms in China today can still appear relatively healthy on paper" (p. 111).

[7] It is noteworthy that the *2000 China Statistical Yearbook* acknowledged that, "data for gross industrial output in 1991-1994 have been adjusted in accordance with the data compiled from the 1995

(2) Biased growth due to obsolete statistical methodology

Many scholars argued that the growth of China's real GDP has been exaggerated by methodological peculiarities in Chinese statistics that result in underestimation of the GDP deflator (Woo, 1998; Wu, 1998). Contrary to international practice, the NBS does not construct the GDP deflator by means of separate price surveys that use random sampling methods. Instead, price deflation is essentially estimated by reporting enterprises themselves. This is done as follows:

1) All reporting entities submit three series to the central authorities: nominal gross output (*XN*), real gross output in base year prices (*XR*), and nominal value added (VN);
2) Using *XR* and *XN*, the NBS constructs implicit price deflators for each reporting enterprise;
3) This deflator is used to calculate the real value added (VR) by single deflation using $VR = VN / \{XR / XN\}$.

There are several problems with this statistical practice. First, the base years for reporting *XR* are rarely changed (typically, they are set at the beginning of a new decade, such as in 2000, 1990, and so on), while many newly established enterprises may not have existed even in the most recent base year. Let us consider the case of a COE that was created recently (say, in 1995), and has to report its output for 1999. Since the COE did not exist in 1990, it has no idea how properly to estimate its real output in terms of '1990 base prices'. SOEs are less likely to be affected by this conundrum, but they still have trouble estimating *XR* for new products that did not exist in the base year, or which use technology that was not available in the base year.

Industrial Census and therefore differ from the data in previous yearbooks" (p.409). Yet the *Yearbook* does not mention any corresponding adjustment in GDP growth.

Though the problem of new goods in the construction of statistical indices is not limited to China, in other countries the task is typically handled by central statistical agencies, which can professionally construct 'hedonic price indices' to account for changes in product quality and the emergence of new goods. In China, on the other hand, this difficult task is essentially delegated to reporting enterprises. Since the proper estimation of *XR* has no operational or financial significance for Chinese enterprises, in practice many of them choose not to bother at all, and report *identical* nominal and real output (Woo, 1997), which implies no price change since the base year. Paradoxically, even though the NBS now calculates its own producer price indices by means of random sampling surveys, the statistical agency does not use these conceptually correct price indices to deflate nominal output.

The magnitude of the resulting downward bias in the GDP deflator can be evaluated by comparing price deflators for SOEs and COEs. Typically, COEs are subject to comparatively less stringent control from the government, so they have more incentives to report identical nominal and real output, generating, as a result, smaller price deflators in comparison with deflators for SOEs. Fortunately, until 2000, the *China Statistical Yearbooks* reported nominal and real output for SOEs and COEs, so this hypothesis can be checked. Unfortunately, these data were available only for the industrial sector[8], so no conclusion can be drawn for the whole economy.

As shown at the bottom of Table 4, the median increase in the sampling-based producer price index (PPI) was 6.5% during 1990-1999, while the implicit GDP deflator was lower, at 4.8%. As expected, there was a large gap between SOEs and COEs in terms of reported price deflation: while the price increase for SOEs was 5.8% (which is quite close to the inflation estimate using PPI), COEs reported a much lower price increase of just 0.4% on average.

[8] In Chinese statistics, industry includes mining, manufacturing, electricity, gas, and water.

[INSERT TABLE 4 ABOUT HERE]

Figure 2 shows the cumulative impact of under-reported price deflation by COEs. According to the survey-based PPI, prices almost doubled during 1990-1999, but the implicit price deflator, reported by COEs, shows a much smaller increase in price.

[INSERT FIGURE 2 ABOUT HERE]

Since the NBS calculates real value added VR by the single deflation, the downward bias in *XR/XN* is translated into an upward bias for growth in real value added, and eventually into exaggerated growth figures for total Chinese GDP. Specifically, the use of enterprise-level deflators (instead of survey-based PPIs) produces a downward bias of approximately $6.5 - 4.8 = 1.7$ % in the GDP deflator (as shown in Table 4), and a corresponding upward bias in GDP growth for industry as a whole.

To examine the overall bias for the whole of the Chinese economy, we followed Ren (1997) and substituted implicit GDP deflators from China's national accounts using similar survey-based price indices for seven major sectors of the Chinese economy, as listed in Table 5.

[INSERT TABLE 5 ABOUT HERE]

The extension of survey-based price indices to seven sub-sectors of the Chinese economy resulted in a downward adjustment of China's growth rates, particularly during 1993-1995 (Figure 3). Overall, the underestimated GDP deflator

overstated China's growth in terms of real GDP by about 2% during 1991-1999. In the same way, Maddison (1998) and Young (2000) concluded that the use of enterprise-level deflators exaggerated China's growth rates by 2.4% and 1.7% during 1978-1995 and 1978-1998, respectively.

[INSERT FIGURE 3 ABOUT HERE]

If, in addition to these adjustments in GDP deflators, one takes into account the impact of *shuifen* at the local level, the total extent of overstated growth rates in China may be much larger than 2%.

Section 3. Official response to the skepticism about growth rates in China

Typically, official reactions to the criticism of Chinese growth figures have flatly rejected the idea that China's growth could be lower than officially reported, but without touching on the aforementioned political or methodological factors behind exaggerated growth rates.

Most often, the skepticism regarding Chinese growth rates is rejected using the rather simplistic argument that 'seeing is believing'. For example, Prime Minister Zhu Rongji rejected the conclusions presented by Rawski (2001), wondering "if the professor has ever been to China. If he had, he would see that had there not been such rapid growth, China would not be what it is today" (Roach, 2002). Remarkably, the same line of reasoning was used by official Soviet statisticians to reject alternative estimates of Soviet growth performance, which found that Soviet official statistics grossly overstated the true growth of the former Soviet Union[9].

[9] Ericson (1990) reported that just before the collapse of the Soviet Union, official Soviet statisticians rejected lower estimates of Soviet growth, claiming that if they were correct, "the Soviet Union could

The controversial findings of Rawski (2001) were also criticized by Qiu Xiaohua, deputy director of the National Bureau of Statistics. The official flatly asserted that, "there are no grounds for holding a skeptical attitude toward China's economic growth statistics", and insisted that not only China, but also "the United States, Japan, the Republic of Korea and Germany witnessed declines in energy consumption, but growth in the economy for many years" (*People's Daily*, April 19, 2002).

In fact, Rawski (2001) did make comparisons with similar growth episodes in Japan, the Republic of Korea and Taiwan, but did not find anything similar to the Chinese growth pattern in 1997-2000. In contrast, the Chinese official provided no specific figures to corroborate his opposite claim. To clarify the link between growth and energy consumption, we have examined the growth experiences of Japan and South Korea for longer periods than in Rawski (2001), and then compared these countries with China during the period under discussion (1997-2000).

Panel (a) of Figure 4 examines the pattern of Japan's growth during 1955-1998. In general, economic growth in Japan was positively related to energy consumption (the Spearman rank correlation is 0.808, p-value < 0.001). There were, however, six cases when growth in Japan was accompanied by a decline in energy consumption: in 1958, 1975, 1977, and 1980-1982.

However, it should be noted that, except for 1958, all the other atypical cases happened in the aftermath of the two major oil shocks of 1974 and 1979, when oil prices more than tripled and doubled, respectively, within a short period of time. Nothing similar took place in China during the late 1990s. In 1997-1999, oil prices were oscillating around US$20 for barrel, and even declined to US$13 in 1998. Oil

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not have industrialized, won the [Second World] war, or became a superpower competing "as an equal" with the United States" (p. 88).

prices did rise in 2000 by about 50% compared with 1999, but this price surge had much less of an effect than the previous oil shocks of the 1970s.

[INSERT FIGURE 4 ABOUT HERE]

As shown in Panel (b) of Figure 4), Korea also experienced a positive correlation between growth and energy consumption during 1971-2000 (the Spearman rank correlation is 0.476, p-value < 0.01). There was just a single occurrence when energy consumption declined slightly by 0.2%, while GDP grew by 7.2%. Similarly to Japan, this happened in 1982, in the aftermath of the second oil crisis.

Overall, though there were few cases of declining energy consumption in Japan and Korea, almost all of them occurred in the aftermath of the two major oil shocks in 1974 and 1979. Since China's economy did not have any similar experiences in 1997-2000, the dubious nexus of a growing economy and declining energy consumption in China during that period cannot be justified by references to supposedly similar occurrences in Japan or Korea.

To verify whether the cases of Japan and Korea are typical for other high-growing economies in Asia, we also examined the case of Taiwan (Panel (c) of Figure 4). Between 1958-2000, Taiwan experienced a positive relationship between growth and energy consumption, with a Spearman rank correlation of 0.655, and a p-value of < 0.001. Similarly to the Korean economy, there was just a single occurrence of negative energy consumption and economic growth, which occurred in 1981, and again this happened in the aftermath of the second oil shock.

In sum, the growth experience of fast-growing Asian economies has demonstrated that declining energy consumption during economic growth has been uncommon. When energy consumption did decline, this occurred in the aftermath of

major oil shocks. Since China did not experience anything like these oil shocks in 1997-2000, it is misleading to justify falling energy consumption in China using references to Japan, South Korea, or Taiwan.

Similarly, the official response to Watson and Pauly (2001) did not acknowledge the systematic exaggeration of Chinese fishing output, with a Chinese official in charge of fisheries arguing that, "the figure for China's marine fishing output reported to the international community is credible" (*People's Daily*, December 18, 2001). Acknowledging that the current system of vertical reporting by local administrations to the central government can have problems, the official nevertheless claimed that the alternative system of independent statistical sampling may not fit China because "fishing in China has its own characteristics", such as the fact that "jellyfish and crab … account for a considerable portion of out total output" (*ibid*). However, the official did not elaborate on how these apparently innocuous characteristics could preclude the use of statistical sampling in China.

Conclusions

Though the enormous size of the Chinese economy makes the accurate estimation of its actual growth an extremely daunting task, in recent years the NBS has made admirable efforts to move China's statistical system closer to international standards. However, the task is not yet complete, and various remnants of statistical practices from the centrally planned period continue to skew official growth reports in China. What is more problematic, the political pressure to report high growth is unlikely to diminish as long as high growth performance continues to have special importance to the CCP. This survey showed that alternative estimates of Chinese GDP growth have repeatedly indicated in recent years that official figures overestimate actual growth by at least 2-3%. More importantly, recent debates on the veracity of Chinese statistics

have finally produced a more realistic attitude to official growth figures, so that they are no longer considered to be above suspicion.

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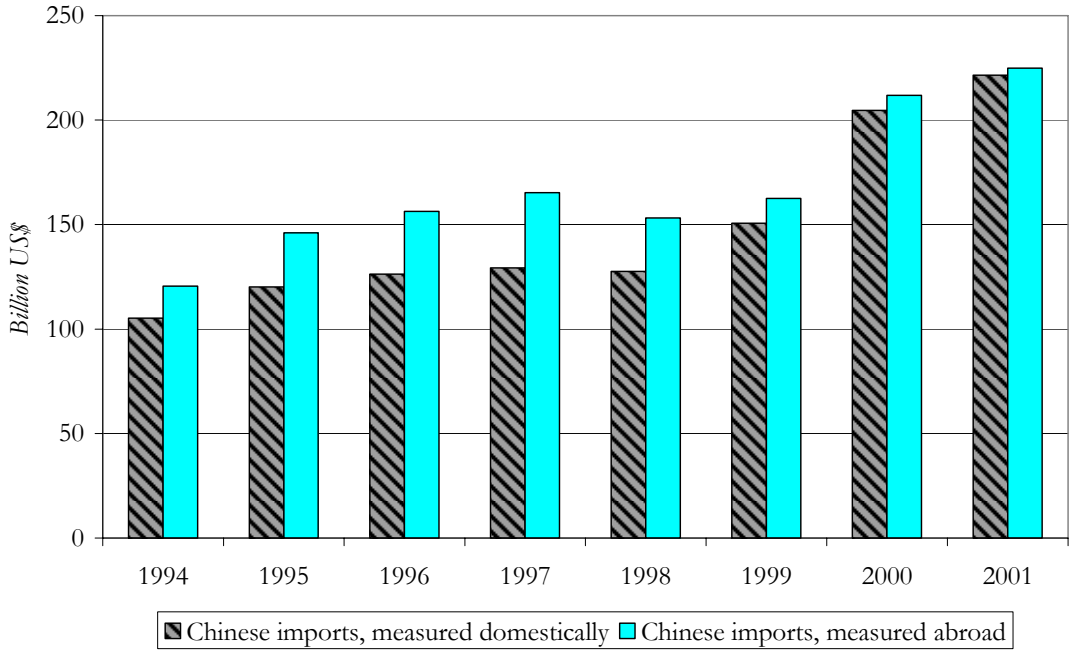
Table 1. Differences in import measurements by domestic and foreign trade statistics (%)

	1994	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*Median*
China	-4.0	-9.5	-11.1	-14.0	-8.3	1.9	6.3	8.3	-8.3
Japan	12.0	13.4	11.4	11.4	11.9	12.2	9.9	9.5	11.9
Hong Kong	13.0	13.7	18.3	11.2	17.1	16.5	16.4	16.0	16.4
South Korea	14.1	14.4	16.0	17.8	17.5	10.2	9.7	7.1	14.4
Singapore	8.5	8.9	9.1	9.4	6.6	5.7	5.9	3.6	8.5
Taiwan	9.2	9.1	8.8	10.0	9.6	5.6	11.5	na	9.2

Note: This table reports the differences between two valuations of trade between a country *i* and the world *w* $\left(T^{i}_{w,i} - T^{w}_{w,i}\right) \Big/ T^{w}_{w,i}$.

Source: International Monetary Fund (various years).

Figure 1. Convergence in domestic and foreign valuations of total Chinese imports



Source: International Monetary Fund (various years).

Table 2. China's GDP growth: comparison of official and alternative estimates

Source	*Period*	*Alternative*	*Official*	*Difference*
Maddison (1995)	1978-1992	7.6	9.4	-1.8
Woo (1997)	1979-1984	8.9	8.9	0.0
Woo (1997)	1995-1993	7.5	9.7	-2.2
Ren (1997)	1985-1994	6.0	9.8	-3.8
Maddison (1998)	1978-1995	7.4	9.8	-2.4
Wu (1998)	1985-1995	7.9	10.1	-2.2
Young (2000)	1978-1998	7.4	9.1	-1.7

Table 3. Revisions in Gross Output and Value Added in Industry After the 1995 Industrial Census

	Gross output (total)		*Gross output (SOE)*		*Gross output (COE)*		*Value added (national accounts)*	
	Original	*Revised*	*Original*	*Revised*	*Original*	*Revised*	*Original*	*Revised*
1989	22,017	22,017	12,343	12,343	7,858	7,858	6,484	6,484
1990	23,924	23,924	13,064	13,064	8,523	8,523	6,858	6,858
1991	28,248	26,625	14,955	14,955	10,085	8,783	8,087	8,087
1992	37,066	34,599	17,824	17,824	14,101	12,135	10,285	10,285
1993	52,692	48,402	22,725	22,725	20,213	16,464	14,144	14,144
1994	76,909	70,176	26,201	26,201	31,434	26,472	18,359	19,360
Corresponding cumulative growth rates								
	Gross output (total)		*Gross output (SOE)*		*Gross output (COE)*		*Value added (national accounts)*	
	Original	*Revised*	*Original*	*Revised*	*Original*	*Revised*	*Original*	*Revised*
1990	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1991	1.18	1.11	1.14	1.14	1.18	1.03	1.18	1.18
1992	1.55	1.45	1.36	1.36	1.65	1.42	1.50	1.50
1993	2.20	2.02	1.74	1.74	2.37	1.93	2.06	2.06
1994	3.21	2.93	2.01	2.01	3.69	3.11	2.68	2.82

Source: "Original" figures are from the *1995 China Statistical Yearbook* (p.32, 377), "Revised" figures are from the *1996 China Statistical Yearbook* (p.42, 403).

Table 4. Growth rates for alternative deflators for industrial output

	Survey-based producer price index	*Implicit GDP deflator (all industry)*	*Implicit GDP deflator (SOE)*	*Implicit GDP deflator (COE)*
1991	6.2	3.1	5.4	-13.0
1992	6.8	4.9	6.0	3.6
1993	24.0	14.5	20.6	0.5
1994	19.5	15.1	8.3	28.7
1995	14.9	12.0	10.1	10.3
1996	2.9	4.6	10.2	-3.5
1997	-0.3	0.1	-1.6	0.3
1998	-4.1	-5.4	-6.6	-3.3
1999	-2.4	-3.5	-2.8	-8.0
Mean	7.5	5.1	5.5	1.7
Median	6.5	4.8	5.8	0.4

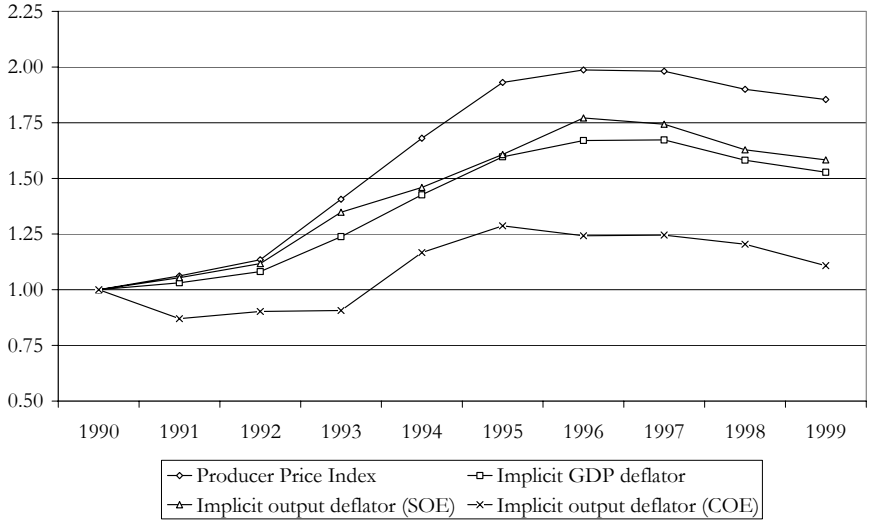
Source: *2000 China Statistical Yearbook*, p.305, 409.

Table 5. Survey-based indices for alternative estimation of GDP growth

Sector	*Deflator*
1. Primary industry	General purchasing price index of farm products
2. Industry	Ex-factory price index of industrial products
3. Construction	Price index of construction and installation
4. Telecommunications services	Weighted average of retail price indices of telecommunications and postage services[a]
5. Transport and storage	Retail price indices of transport
6. Wholesale & retail trade, catering services	Retail price indices of catering and trade
7. Other services	Consumer price index of services

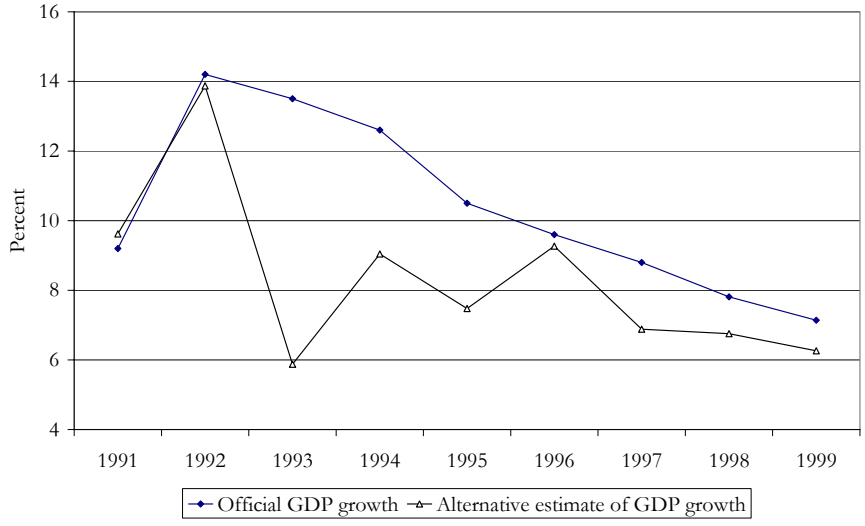
Note: [a]Weights are taken from China's 1997 Input-Output Table.

Figure 2. Comparison of alternative output deflators (1990=1)



Source: See Table 3.

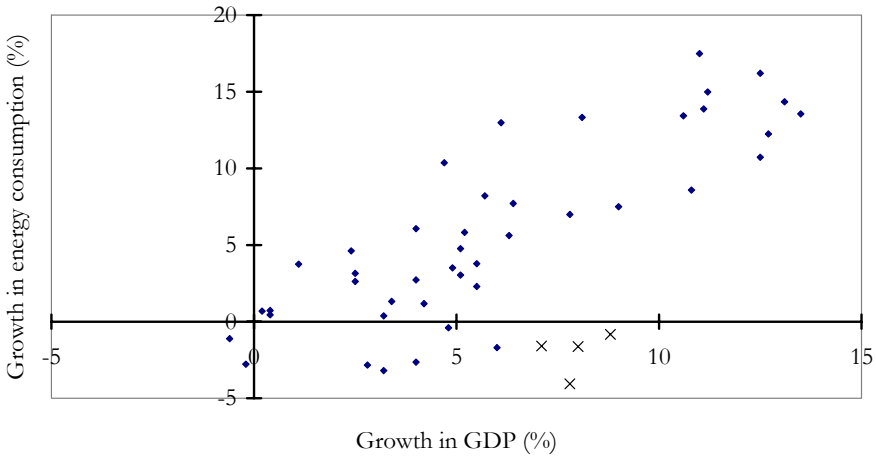
Figure 3. China's GDP growth: official and alternative, calculated using survey-based price indices



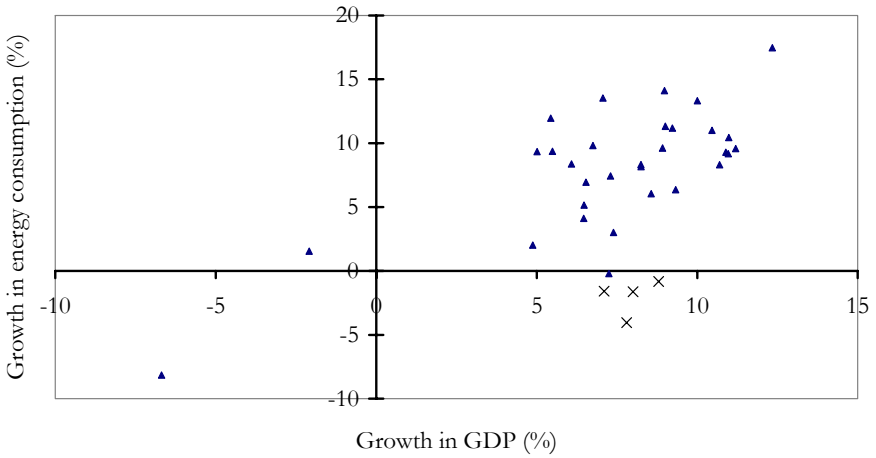
Note: The list of alternate price indices is given in Table 4. Nominal GDP is taken from the *2001 China Statistical Yearbook*, p.49, 53.

Figure 4. Growth in GDP and energy consumption: comparison of China (1997-2000) and other Asian economies

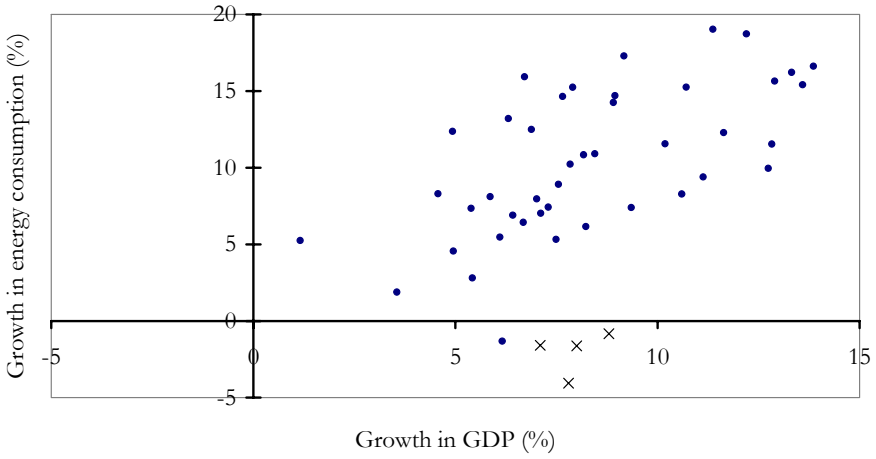
(a) Japan (1955 - 1998)



(b) South Korea (1971 - 2000)



(c) Taiwan, 1958 - 2000



Legend: × - China , ♦ - Japan, ▲ South Korea, ● – Taiwan
Sources: For Japan, Management and Coordination Agency (various years), Economic Planning Agency (various years), Institute of Energy Economics (1996); for Korea, html://www.nso.go.kr/eng; for Taiwan, Executive Yuan (various years).