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**The Reliability of China's Economic Data:
An Analysis of National Output**

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Executive Summary

China's recent economic weakness has revived questions about the quality of its economic data. Critics charged that official statistics overstated the economy's growth and understated inflation in China's economy. The recent complaints followed a long period of questioning whether China, a developing country and authoritarian state, has the institutional capacity and political will to publish accurate statistics. Because China is now the world's second-largest economy, and is suffering from economic imbalances, the debate carries more weight than in the past.

This report focuses on China's national output statistics, or gross domestic product (GDP). It concludes that China's official statistics are not as reliable as those produced in the United States and Europe. Several findings support this conclusion. The first is that there are serious deficiencies in the way the Chinese government gathers, measures, and presents its data. Although China's National Bureau of Statistics (NBS) now uses sample surveys to measure the economy, survey coverage remains incomplete, particularly in services and the private sector. Economic censuses, in turn, prompt inordinately large revisions of statistical data, and are themselves not on par with international standards. At the same time, many industrial enterprises still report their output directly to the government, keeping in place a Soviet-style reporting system based on state-owned enterprises.

The measurement and presentation of data in China reveals problems as well. Statistical work remains highly decentralized, and the quality and methods of statistical work vary across reporting units in China's vast economy. Other deficiencies are more specific. Measures of consumption rely too heavily on retail sales, while overlooking other forms of consumption. Many of the right laws are now on the books to guarantee accurate reporting of investment, but there is a lack of information to distinguish real investments from those that only exist on paper. Figures on official inflation are even more perplexing. The Chinese government continues to be secretive about the weights it uses to calculate this important measure. The consumer price index, which forms the basis of inflation measures, does not adequately factor in the role of the Chinese service sector and private industry. In addition, China's statistics undergo large and frequent revisions even after they are made public, further calling the government methodology into question.

Manipulation remains an important cause of unreliable statistics. In the past, systemic falsification was more prone to occur during periods of economic and political instability, such as the Asian Financial Crisis in 1998. Nowadays, enhanced scrutiny in- and outside China makes that less likely. Rather, manipulation has become more subtle. In the enterprise sector, both private and state-owned enterprises have incentives to misreport income and output – in some cases to avoid taxes and regulation, in other cases to appease officials. Local officials are not necessarily willing to manipulate statistics simply to overstate economic growth, since they are being evaluated on other performance metrics as well. And yet, anecdotal, statistical, and legal evidence suggests that many local statistics cannot be trusted. The central government would ideally act as a corrective for local-level manipulation, and many experts trust that it is. But Beijing can also tweak data through slight revisions and adjustments. At the very least, the NBS provides too little transparency on how its statistics are calculated.

Further evidence for a lack of reliability lies in the statistics themselves. Alternative measurements of economic activity, such as electricity production and automotive sales,

provide a useful way to cross-check official data on national output. An examination of several such alternative indicators over the past decade shows that official statistics mask the volatility, and potentially also the growth rate, of national output since the financial crisis in 2009. Furthermore, there is a marked inconsistency among official statistics. Nominal GDP published at the provincial and national levels does not always add up. Different measures of national output – the production and expenditure methods – are contradictory as well. These incongruities raise the likelihood of inaccurate statistics.

To be sure, the Chinese government has made statistical reform a priority over the past thirty years, in the process of transitioning from a Soviet-style command economy to more of a market economy. These reforms are all the more impressive given the rapid structural changes that have taken place in China's economy. China's National Bureau of Statistics has achieved several landmarks over the years, including: the switch to an international system of accounting in 1995; the first national economic census in 2004; and in 2011, the introduction of a seasonally adjusted measure of quarterly GDP growth.

More reliable statistical methods must be put in place to inform officials, the public, and businesses on the risks they face. Such measures could include annual consultations between academic economists and the government. To its credit, the U.S. government has stressed the importance of accurate statistics in dealings with the Chinese government, through both lobbying and technical assistance efforts. For instance, the U.S.-China Joint Commission on Commerce and Trade (JCCT) has repeatedly emphasized the need to harmonize customs statistics on both sides of the Pacific.

Even so, more could be done. The Office of the U.S. Trade Representative, in tandem with its advocacy for China's WTO compliance, could make independent data gathering by foreign and private entities in China a priority. The British bank HSBC has collected independent purchasing managers' indexes (PMI) in China since 2007 – a positive precedent that could be followed elsewhere. The diffusion of best practices is bound to improve the work of China's statisticians at all levels of the reporting hierarchy. The availability of alternative data sources would also reduce the leeway for manipulation.

Ultimately, accurate statistics can contribute to the overarching goal of fostering more open, transparent, and market-oriented institutions in China.

Introduction

Since the 1980s, China has consistently registered high and stable rates of economic growth. Few doubt that China's economy has indeed performed strongly, based on favorable demographics, market reforms, and other factors. And yet, economists have questioned just how accurate economic statistics are in an authoritarian, post-Soviet state undergoing rapid economic restructuring. Is the Chinese government willing and capable of providing accurate statistics? Because China is now the world's second-largest economy, and is suffering from economic imbalances, the answer to these questions is more crucial than ever. Reliable statistics are the foundation for economic analysis, which informs the actions of U.S. businesses and policymakers.

The reliability of China's economic data is questioned in many areas, including unemployment, income distribution, debt, and capital flows.ⁱ This report focuses on national output, or gross domestic product (GDP). The concern is that official figures do not accurately reflect the rate, stability, and composition of GDP growth. The latest wave of criticism regarding China's statistics came in June 2012. That month, Beijing announced 7.6 percent year-on-year growth for the second quarter of the year, a figure that many analysts considered inflated.¹ Similar concerns surfaced in 2009, when China's economy continued to perform strongly during the global financial crisis.

This report employs two methods to test the reliability of China's national output statistics. The first is to analyze China's statistical work, or how well data is gathered, measured, and presented. China's statisticians continue to be burdened by the institutional legacy of Soviet planning, and by the complexity of a large economy in transition. Moreover, in China's one party state, political manipulation at the national and local level merits scrutiny.

A second method is to conduct "consistency checks". An "external" check – popular among financial analysts – compares official GDP to alternative indicators of economic activity, such as energy use, transport, and automobile sales. Another type of check searches "internally" for discrepancies between different official measures of national output, such as GDP reported by different levels of government.

The report draws on diverse sources of data. Official Chinese statistics were culled from the ISI Emerging Markets CEIC China Premium Database. Academic articles on Chinese statistics proved useful, though many are based on data from the 1990s. Western financial media and policy analysis, in turn, provided timely insights on current events. Chinese language sources helped to gauge debates within China.

China's statistical work has improved markedly since the 1980s. Nonetheless, there is substantial evidence that China's national output figures continue to be less reliable than in the United States and Europe. External and internal consistency checks reveal irregularities. In terms of statistical work, data gathering, measurement, and presentation demonstrate

ⁱ (1) The unemployment rate is regularly cited as the most inaccurate statistic in China, due to different measurements for rural and urban areas, and the inadequate counting of unregistered urban migrants; (2) Income distribution data is skewed, primarily due to underreported income by wealthy households and migrant workers; (3) National debt levels are hard to measure, in part due off-balance sheet budgets in business and government; (4) China's rising outbound direct investment is distorted by activities like "off-shoring" to tax havens and "round-tripping" through Hong Kong.

deficiencies in design and execution. There is evidence of political manipulation at the local level, and to some degree, also in the central government.

Unfortunately, economists have not debated this complex subject in-depth since the early 2000s. As China's statistics become more vital to U.S. businesses and policymakers, more mechanisms should be put in place to systemically assess their reliability. This could help to better inform relevant actors about potential risks and countermeasures.

Section I: The Quality of Statistical Work

China's government, led by its National Bureau of Statistics (NBS), has implemented a series of reforms since the 1980s to improve statistical work. Because China was once a Soviet-style command economy, the underlying challenge has been to introduce new methods suited to a market economy, while restructuring the old statistical apparatus. This structural reform has taken place against the backdrop of a rapidly transforming economy. To its credit, the government is now able to present frequent, accurate data on large parts of the economy.

However, the pace of reform has slowed under the administration of President Hu Jintao over the past decade. It is also questionable how well the existing laws, regulations, and administrative processes are being implemented. A statement made a decade ago by economist Thomas Rawski, a prominent U.S. economist, still rings true: "The result [of China's reforms] is a statistical edifice that increasingly resembles standard practice in market systems. Ironically, gradual implementation of the new measures does not seem to have improved the accuracy of China's industrial statistics."²

The following sections explore the ongoing challenges of gathering, measuring, and presenting data in China's statistical edifice. These findings are then qualified by a review of China's ongoing statistical reforms.

Data Gathering

Incomplete Survey Coverage

Surveys are the prevailing method of data gathering in advanced economies. As such, they represent the future of China's statistics. And yet, NBS surveys continue to provide inadequate samples of important sectors of China's economy. Small-scale businesses in manufacturing and retail are hard to capture, while sectors like transport logistics are almost completely unaccounted for. Although the NBS measures 94 sectors of the economy on an annual basis, it does so for just 17 sectors on a quarterly basis.³

Surveys also fail to capture "opaque spots" in the economy. One of the most egregious is household income. In the United States, tax returns provide a proximate indication of household income. Indeed, personal income tax accounts for about 40 percent of U.S. government tax revenue. But in China, the personal income tax in 2011 makes up just six percent of revenue. A big reason for this is that even the wealthiest Chinese households are taxed directly on their wages, but not on their non-wage income, such as real estate, stocks,

bonuses, and personal gifts.⁴ Households must actively report such income – but many understate their income in tax returns, or refuse to participate in sample household surveys. In this way, they can evade taxes and also avoid the political implications of having excessive wealth in a nominally socialist state. Chinese economist Wang Xiaolu has determined that national spending on real estate, luxury goods, and travel in China implies much higher income among the top 10 percent of earners than is given in official income data.ⁱⁱ In January 2012, the NBS in fact admitted that it does not publish the Gini coefficient – a leading measure of income inequality – because data on high earners is inaccurate.⁵ It is also notable that, in an economy with a large state sector, government officials have only recently begun to disclose their own salaries and wealth to the public, and none are under any legal obligation to do so.⁶

Opacity extends to other sectors as well. Many state-owned enterprises remain secretive about their income statements, especially if they are not publicly listed. New types of large corporate entities, such as fund management companies and real estate arms of conglomerates, often go unaccounted for in both the direct reporting and enterprise survey systems. In local governments, “off-balance sheet” budgets can also skew fiscal revenue and expenditure (**Table 1**).⁷ And in a banking system that heavily favors state-owned enterprises, many individuals and small businesses have turned to underground banking networks to access credit.

Table 1:
Opaque Areas of the Economy

Unit	Areas Lacking Transparency
Households	Unreported income
Firms	Conglomerate structures and real estate arms
Governments	Off-balance sheet budgets
Banks	Informal credit market

The Outdated System of Direct Reporting

Enterprise revenue determines which firms are eligible for China’s direct reporting system. As China’s economy grows, so does the number of firms with sizable revenue, which combines to overwhelm the data processing capacity of the NBS. The NBS has tried to reduce the number of firms by continually raising the revenue threshold for direct reporting, among both state-owned enterprises and the non-state sector. When this reform began in 1998, the number of direct reporting firms was decreased from 460,000 to 165,000. However, by 2009, 434,000 firms were again reporting. As of 2011, only firms

ⁱⁱ According to Wang, the “grey” economy, already very large, grew significantly after the Chinese government introduced its giant stimulus package in late 2008 in response to the global economic crisis. Using innovative research techniques that bypassed official data, Wang estimated that not only were trillions of renminbi failing to appear in official assessments, but about two-thirds of it belonged to the top 10 percent of the population. He concluded that the rich were hiding their wealth, and society was far more unequal than the government was admitting. Wang Xiaolu, “Woguo Shouru Fenpei Xianzhuang, Qushi ji Gaige Sikao [The Current Status, Trends, and Reform Initiatives Regarding Income Distribution in China],” *Zhongguo Shichang* 20 (2010): 8-19.

with annual revenue exceeding RMB 20 million report to the NBS, a measure that has again reduced the number of reporting units **(Table 2)**.⁸

This approach is based on the risky presumption that firms no longer eligible for direct reporting will be adequately accounted for through enterprise surveys. It also “kicks the can down the road” regarding the future of the direct reporting system, which has no place in the statistical work of a modern market economy. Its future sustainability will likely depend on further increasing the reporting threshold. It may also require maintaining a large enough pool of state-owned enterprises, as these are most entrenched in the system.

Table 2:
Direct Reporting Participants

Direct Reporting Participants		
	Reporting Participants	Number surveyed
<i>Firms Reporting</i>		
1994-1997	All firms village level and above	460,000 (1997)
1998-2006	All SOEs, only private firms with revenue >CNY 5 mn	165,000 (1998)
2007-2010	Only firms with revenue >CNY 5 mn	434,000 (2009)
2011-present	Only firms with revenue >CNY 20 mn	n.a.
<i>Fixed Asset Investments Reported</i>		
1997-2010	Only investments >CNY 500,000	159,000 (1997) 661,000 (2010)
2011-present	Only investments >CNY 5 mn	n.a.

Source: Adapted from Tom Orlik, *Understanding China's Economic Indicators* (Upper Saddle River, NJ: FT Press Science, 2012); Xu Xianchun, “Zhongguo Guomin Jingji Hesuan Tixi de Jianli, Gaige he Fazhan [The Establishment, Reform and Development of China's National Economic Accounting System]” *Zhongguo Shehui Kexue* (China Social Science) 6 (2009): 58-59.

The Asymmetric Impact of Censuses

To some extent, China's economic censuses have been a success story, since they are incredibly difficult to carry out in a large and developing economy. But they exert a very destabilizing impact on statistics. The 2004 census added a massive 16.8 percent to real GDP. The government argued that this was due to service sector activity that was unaccounted for. A new survey system was subsequently established for 11 service industries, including commerce, real estate, and information technology, and pilot surveys were conducted for small-scale retail, logistics, and gastronomy services. The 2009 national economic census subsequently added 4.4 percent to GDP.⁹ Although this was a relative improvement over 2004, it was large enough to raise serious questions about the reliability of annual data. The next economic census, scheduled for 2014, may again lead to major revisions.

Second, the census does not necessarily provide the most accurate picture of the economy. One issue is the complete enumeration of units – most respondents are surveyed

individually by the census takers, and only a few are sampled. The enumeration method is not only costly and inefficient, but also infeasible, given the large number of self-employed persons and labor migrants in the country. Inevitably, many reporting units are overlooked, and that ultimately distorts the results of the census.¹⁰ Another factor affecting census-taking is financing – because a large part of the costs are borne by local governments, and their fiscal capacity varies, the quality of census work is not uniform across China's many jurisdictions.¹¹

Data Measurement and Presentation

Consumption and Investment

China's data measurement is deficient in several respects. The first relates to consumption and investment. Over the past decade, China's growth has increasingly shifted toward investment, while household consumption has declined as a share of GDP, and the contribution of net exports has remained roughly constant. The goal of "rebalancing" China's economy therefore hinges on a reduction in investment and increase in consumption. The central question is how dependable the data on these two crucial indicators really is.

China continues to rely on value added by industry as the primary measure of GDP. This measurement adds up the net output of agriculture, industry, and services, focusing on what the economy supplies rather than what it consumes. Most advanced economies, including the United States, prefer the expenditure measure of GDP, which adds up consumption, gross capital formation, and net exports. Most economists consider the latter measure to be superior, because it represents what comes out of the economy that is actually used by citizens, business, government, and the rest of the world.¹²

The NBS does publish expenditure GDP on an annual basis, but only partially. It does not publish inflation-adjusted real GDP growth based on expenditure accounts, nor does it provide expenditure account GDP on a quarterly basis. Consequently, many economists come up with their own erroneous guesstimates. Some critics also suspect that the expenditure figure is adjusted only after the value-added GDP calculation has been done, so that expenditure GDP is arbitrarily adjusted to match the official value-added figure.¹³

Further, the supply-side bias of the value-added GDP figure, combined with the faulty construction of GDP components, serves to skew the measurement of consumption and investment. The implications of this are explored below.

1. Household Consumption

Household consumption measures rely primarily on retail sales data. Other data sources, based on services and household spending surveys, are not sufficiently factored in. Ironically, this crude measurement can serve both to understate and overstate consumption.

Some argue that the retail sales figure itself is overstated because China's statistics tend to measure output more than demand. Retail sales are thus counted when suppliers ship

goods to retailers, rather than when goods are actually sold. In other words, unwanted goods may be “dumped in warehouses” but are still valued equally as sold goods.¹⁴ In its defense, the NBS maintains that official regulations governing statistical work require retail sales to be counted based on sales by wholesalers and retailers.¹⁵ It is hard to tell who is right, since there is little public inventory turnover data available to determine whether warehoused goods are counted in the retail data or not.¹⁶

Older survey-based studies, done in the 1990s, suggest that actual spending by households does not grow as quickly as official GDP expenditure data.¹⁷ That finding would corroborate the claim that retail sales exaggerate household consumption. Unfortunately, more recent studies were not found in the process of compiling this report.

Viewed in relation to wages and household savings, retail sales do appear overstated. When consumption rises, as it has in China for most of the past decade, this should be accompanied by a proportionate increase in wages or a decrease in household savings. But as economist Derek Scissors of the Heritage Foundation has noted, retail sales in China continue to outpace personal income, while personal savings have not decreased proportionately.ⁱⁱⁱ A plausible explanation is that consumption data, based on exaggerated retail sales figures, is inaccurate.

On the other hand, the focus on retail sales may lead to an understatement of consumption as well, because it excludes some of the fastest-growing types of services that are consumed outside the retail sector.¹⁸ That is a point that the NBS actually likes to emphasize, since it implies that China’s economy is rebalancing faster than official figures would indicate. Indeed, NBS researchers recently surveyed housing rents in China’s four largest cities to prove this point. The study found that rents are not fully accounted for in the official consumption measure, especially when undocumented urban migrants are renting. The survey concluded that, if expenditure on rents in China were measured accurately, national household consumption in 2010 would have been 8 percent higher. The revision would also increase household consumption in China’s four largest cities by up to 11 percent. Needless to say, national GDP would be larger as well **(Table 3)**.^{iv}

ⁱⁱⁱ For example, in the first half of 2012, personal income grew 13.9 percent, retail sales 14.4 percent, and personal savings 16.4 percent. Derek Scissors, *How the Party Says China’s Economy is Doing*. Heritage Foundation, July 13, 2012, <http://blog.heritage.org/2012/07/13/how-the-party-says-chinas-economy-is-doing/>; Thomas G. Rawski, “What Is Happening to China’s GDP Statistics,” *China Economic Review* 12 (2001): 347-50.

^{iv} Spending on housing in China is commonly measured in two ways: (1) Through surveys of residents to assess daily spending habits and the relative weight of basic needs; (2) Through housing spending as share of final consumption in GDP. These methods discount the actual market cost of housing, and provide only a very narrow definition of housing spending. The result is an underestimate of household spending. Xu Xianchun et al, “Jumin Zhufang Zuping Hesuan Ji Dui Xiaofulu de Yingxiang [On Residents House Rents and Its Impact on the Consumption Rate],” *Kaida Daobao* [China Opening Journal] 2 (April 2012): 12-15.

Table 3:
Impact of Housing Spending on Consumption Rate: Beijing, Shanghai, Guangzhou, Shenzhen, 2010

	Beijing	Shanghai	Guangzhou	Shenzhen	National
Official household consumption rate (%)	32.9	42.4	33.8	41.5	33.8
Spending on Residential Housing (RMB bn)	298.7	215.2	107.0	169.4	2,690.1
Adjusted household consumption rate (%)	43.5	47.9	38.7	49.4	38.9
Adjusted household consumption as share of GDP	17.8	11.3	9.2	15.3	6.5

Source: Adapted from Xu Xianchun et al, “Jumin Zhufang Zuping Hesuan Ji Dui Xiaofulu de Yingxiang (On Residents House Rents and Its Impact on the Consumption Rate)”, *Kaida Daobao* (China Opening Journal) 2 (April 2012): 12-15.

2. Fixed Asset Investment

The questions surrounding fixed asset investment are similar to those of household consumption. One allegation is that, due to the supply-side bias of China’s GDP measures, investment may be counted when funds are disbursed, rather than when an investment actually results in the use of working capital. If disbursement of funds is recorded as GDP growth, can the government not easily control the pace of growth by the pace at which it releases funds?¹⁹ In its defense, the NBS has pointed to regulations decreeing that investments only be tabulated when working capital is employed.²⁰ Enforcement of the regulations is hard to verify, because little public data is made available on how investments are utilized.

Infrastructure projects, a core component of fixed asset investment, provide a poignant example of how investment statistics can become unreliable. According to Chinese law, developers are required to build on land they buy within two years. They may therefore tell the government that a project is “under construction,” and make only minor investments, so as to avoid having the land confiscated.²¹ Rising land sales in recent years are therefore likely to have caused a gross overstatement of investment.²² Many analysts are forced to look at pre-sales of properties to get any accurate estimate of what properties are actually coming on the market. Only three-quarters of properties in China are pre-sold, though, so that this corrective mechanism is far from perfect.²³

Prices and Inflation

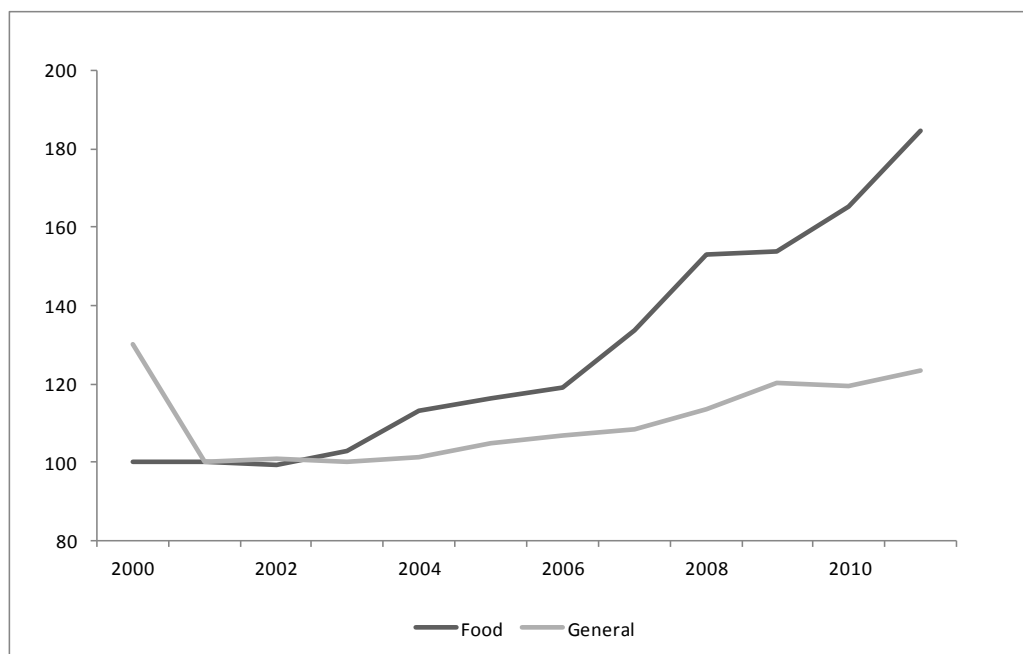
Inflation is a vital component of national output measurement, because it determines the difference between nominal and real GDP. Yet even here, there are several reasons to question reliability. First, the NBS does not detail how it calculates inflation. China uses a combination of deflators to translate nominal GDP to real GDP. Several indices (or combinations thereof) can be used to arrive at the deflator (e.g. the consumer price index, producer price index, retail price index, etc.). But the NBS does not publish how it arrives at the deflator each year. By contrast, other countries are very transparent about how they compile this data, since it is such a vital signal for investors to gauge inflation. The NBS does not even publish a deflator for its GDP reports.²⁴ World Bank senior economist Louis Kuijs has also criticized the government’s refusal to release details on how much weighting it gives to different product categories when calculating inflation.²⁵ One of the reasons this matters is that there is an unusually large gap between China’s food inflation and general inflation; in other words, low official inflation can mask the price hikes felt by consumers (**Figure 1**).

A second issue pertains to price indices. Inflation is calculated based on price indices, such as the consumer price index (CPI). To attain CPI, the NBS monitors the prices of products at markets across the country. It puts an unusually large number of products in its CPI basket — according to one account, 262 products compared to 211 in the United States.²⁶ And yet, the price index is not comprehensive enough; many services, such as IT, accounting, and advertising, are not included in the index.

One indication that China's consumer price indices are dubious is the fact they do not always correlate well with the implicit GDP deflator, which is based on the producer price index. In the first half of 2012, the GDP deflator was 3.2 percent, versus CPI of 3.3 percent. While this matched nicely, in 2010, the GDP deflator was twice as high as the CPI.²⁷

A final issue is that state subsidies distort market prices. In the service sector, such distortions have the effect of understating GDP. Welfare services directly provided by SOEs and collectively owned enterprises to employees and their families, as well as subsidized housing, lead to an *underestimation* of value added in services, which is often derived from the income generated by the housing or welfare provider. In turn, in the industrial sector, producer subsidies can lower the market prices of certain goods, and that reduces their official value-added.²⁸

Figure 1:
China's Average Consumer and Food price indices (2000 = 100)



Source: FAOStat

Inflation measures also tend to privilege state-regulated over market-oriented prices. For instance, CPI for services is based primarily on the prices of state-provided health, transport and education, while neglecting the more volatile price trends in private services. Prices may therefore appear more stable than they really are. Data collected by the National

Development and Reform Commission (NDRC) – China’s premier industrial planning agency – shows that inflation for medical care and education has been running at 5-10 percent in 2001 to 2012, well above the 1-2 percent figure reported in the NBS’s CPI.²⁹

Due to the legacy of a planned economy, industrial enterprises may also misreport prices. Long-term real GDP growth should be measured at constant prices, so that the statistics reveal real value created, not just changes in prices. But China’s enterprises still suffer from the so-called “comparable price” approach used in the Soviet era. Under this approach, enterprises report their output based on constant prices derived from a “price manual” published every few years. The problem is that in a market economy, new products are constantly introduced into the market. When this happens in years when the price manual is not published, there may not be any reference products in the price manual. This creates leeway for enterprises to exaggerate their real output by categorizing more products as new products and then specifying their current market prices to be close to their “constant prices”. If the elapsed time since the creation of constant prices includes periods of inflation, the “constant prices” assigned to the new products can become unrealistically high.³⁰

Such reporting deficiencies may be exacerbated by local governments. In the 1990s, studies showed that some provincial and local statistical agencies compiled enterprise output figures based on current prices, deflated the aggregated figures, and submitted the deflated totals to higher-level statistical offices. Although national-level officials suspected that the deflators applied by provinces understated inflation, they did not always adjust them adequately.³¹ To some extent, this behavior may persist today.

Measurement across Units

Another major concern regarding China’s data measurement is the lack of standardization across units. First of all, in different industries, statistics methods were established at discrete points in time, such that they are now inconsistently measured.³² To calculate the value-added of industry, government statisticians mix production and income approaches **(Table 4)**.³³ There can also be data mismatches within sectors. In the transport sector, cargo data is more accurate than the financial data of transport companies. In the financial industry, data at traditional banks is more complete than at new types of financial service providers. At the macro-level, statistics are still compiled differently for the urban and rural sectors, even for basic items like household income.³⁴

Table 4:
Value-added Measures of GDP – Data Availability by Sector

Data quality	Calculation method	Number of sectors	Share of GDP
<i>Annual (94 sectors surveyed)</i>			
Full data available; extrapolation low	Direct calculation of output and value added	51	60%
Partial data; extrapolation medium	Subset calculated and used to impute the rest, using proportion of value added for that sector in last census year (census every five years)	32	35%
Minimal data; extrapolation high	Output and value added estimated based on value in last census year and growth rate of a reference indicator	11	5%
<i>Quarterly (17 sectors surveyed)</i>			
Minimal data; extrapolation high	Estimate based on indicators that should move in line with value added growth during same period in prior year	14	
Minimal data; extrapolation high	Estimate based on output growth and its ratio to value added during same period in prior year	3	

Source: Adapted from Tom Orlik, *Understanding China's Economic Indicators* (Upper Saddle River, NJ: FT Press Science, 2012).

In a 2004 analysis, economist Carsten Holz suggested varying degrees of reliability in each sector of the economy (**Table 5**).

The NBS's reliance on provincial-level data to obtain nationwide aggregate data introduces further inaccuracies. Local level data may not only be falsified and of low measurement quality; different provinces also tend to differ in terms of the speed at which they adopt new concepts.³⁵ Local governments may undertake their own reforms; one case is Sichuan province, where the provincial authorities introduced a digital platform in 2007 to unify statistical reporting of companies across sectors. It is unclear how and whether Sichuan's experiment is being implemented elsewhere.³⁶

China's survey system is also highly fragmented. The NBS, local government agencies, and State Council ministries conduct their own surveys, which may or may not be coordinated.³⁷ Companies with operations in several provinces are frequently double-counted, leading to exaggeration of output.³⁸ The Statistics Law, revised in 2009, was partly designed to avoid overlap of national and provincial survey teams.³⁹ It remains to be seen how effective the new law will be.

Strangely, centralization can be as counterproductive for China's statistical work as decentralization. Although statistical work is fragmented within the government, the government itself, through NBS, has centralized control over the nation's statistics. There is very little parallel collection of statistics by independent agencies. In many advanced economies, non-government actors serve as crucial checks and balances.⁴⁰

Table 5:
Reliability of GDP data by sector

	Highly reliable	Somewhat reliable	Unreliable
<i>Primary sector</i>	-	-	100.0%
<i>Secondary sector</i>			
Industry	66.5%	-	33.5%
Construction	56.7%	43.3%	-
<i>Tertiary sector</i>	-	-	-
Transport	60.0%	-	40.0%
Wholesale/retail trade	48.6%	-	51.4%
Banking and insurance	80.0%	20.0%	-
Real estate	-	-	100.0%
Government	-	100.0%	-
All other services	-	50.0%	50.0%

Source: Adapted from Carsten A. Holz, "China's Statistical System in Transition: Challenges, Data Problems, and Institutional Innovations," *Review of Income and Wealth* 50:3 (September 2004): 404.

The Timing and Revision of Data

A final problem regarding China's statistical data is its hurried release to the public. One oddity is that China is always one of the first countries to report GDP figures, usually only two weeks after the end of each quarter. Most developed economies, which collect smaller volumes of data more efficiently, take between four and six weeks.⁴¹ China's seemingly premature publication of GDP data is a key reason to question reliability. On the other end of the spectrum, an IMF report has noted that many specific datasets, such as balance of payments, are released infrequently or with significant time lags.⁴²

In addition to timing, there is a lack of clarity regarding the revisions of published GDP figures. In order for data to be timely, economists frequently publish it in the absence of full information, and later revise it. But in China's case, revisions are frequent, large, and not always clearly explained. One gap that regularly appears is between annual and year-to-date figures. Beijing reports figures at the end of each month, but at year's end, the annual total contains an implicit and substantial revision of the monthly figures. Examples of this are urban fixed asset investment, which tends to be revised downward at year's end, and outbound investment, which tends to be revised upward.⁴³

A more serious matter, referenced in the discussion of the census above, is the revision of long-run GDP growth. It originated in 1997, when the NBS partnered with Japan's Hitotsubashi University to revise China's historical growth estimates for the period 1952-1997, based on the SNA calculation methods. At the time, several academic economists presented evidence that the Hitotsubashi study overstated growth over those decades

because it miscalculated price levels and productivity growth. Contrary to the Hitotsubashi study, economist Angus Maddison got an average annual real GDP growth of 2.39 percent for 1978-1995, well below the official rate of 7.49 percent.⁴⁴

The controversy that began in 1997 grew more serious in the early 2000s, after a law in 2003 allowed the NBS to undertake revisions of long-run GDP data based on census findings.⁴⁵ Two years later, the first national economic census added 16.8 percent to total GDP. The NBS then used this new figure to revise growth at current prices and real GDP for 1993-2004, with the revised annual growth averaging 1.5 percent higher than the original.⁴⁶ A common criticism was that the inflation rate and the base years used for the revision were inaccurate. Since official updating was done only with current price information, it is not clear how the NBS adjusted price deflators for this period. In the end, the outcome in real terms involved an increase in annual average real GDP growth from 9.4 to 9.9 per cent for 1992-2003; by contrast, economists Angus Maddison and Harry Wu recalculated a growth rate of just 8.7 percent.⁴⁷

Overview of Statistics Reforms

Challenges of Statistical Work in the Reform Era

China's statistical work faces a dual challenge: a difficult institutional legacy and a complex transition economy.

Before 1949, China did not have a unified system of national accounts. After assuming power, the Chinese Communist Party (CCP) introduced the Soviet Material Product System (MPS) in 1952, adopting statistical methods prevalent throughout the Soviet Union. Political movements like the Great Leap Forward (1958-1961) dealt setbacks to statistical work. Nonetheless, leading experts agree that China's statistics were useful enough for the purposes of a planned economy.^v

But once China embarked on reform in 1978, the Soviet MPS left several negative legacies for statistical work under a market economy:

- Statistics were designed to measure physical inputs and outputs in a command economy. Demand-side indicators for investment and consumption were not properly measured.⁴⁸
- The economy outside the formal state sector was either discounted or inaccurately measured. In particular, the MPS created a category of "non-material services" that conflated several types of services, including retail sales, real estate, transport, and welfare benefits. It also failed to account for transactions among rural households, and for defense industry production.⁴⁹

^v The standard narrative is that China's statistical performance rapidly improved in 1949-57 but was devastated by the Great Leap Forward, because it was politicized and "plans became dreams." After the Great Leap, however, China's statistics work steadily improved. People's communes and their subdivisions were under continual pressure to produce reliable statistics. There was also a steady increase in rural statistics personnel, helped by expanding literacy and training of accountants. Thomas G. Rawski, "On the Reliability of Chinese Economic Data," *Journal of Development Studies* 12:4 (1976): 438-441.

- Data gathering was highly decentralized. The central government relied on local statistical bureaus to relay data up the administrative hierarchy. At the central level, different ministries collected and published their own data. Data gathering also relied on “direct reporting” of output by every state-owned enterprise and rural collective; surveys and censuses, the more sophisticated forms of data gathering, were hardly used.⁵⁰ More generally, output was measured very differently in the backward rural sector and industry-heavy urban sector.
- In an autarkic, authoritarian state, officials were more preoccupied with pleasing their superiors than informing the general public.⁵¹

To compound the Soviet legacy, China’s statisticians in the reform era confronted an economy in flux:

- Data gathering capacity was weakened by the proliferation of non-state firms, small businesses, and urban labor migrants, as well as by the restructuring of the state sector. While the increase in new enterprises overwhelmed the direct reporting system, the increasing economic activity outside the formal sector was not sufficiently monitored.^{vi}
- The new market economy required more diverse and sophisticated indicators to track supply and demand. As manufacturing in China became less vertically integrated and more firms procured their components from others, it also became more difficult to discern the value added at each stage of production. That increased the likelihood of upward bias, as the same product was liable to be counted multiple times.⁵²
- The added emphasis on economic growth reduced the incentive for firms to devote resources to statistical reporting. In parallel, it provided distorted incentives for officials and managers to manipulate statistics for personal gain.⁵³

History of Key Reforms

The Chinese government has implemented a series of reforms since the 1980s (**Table 6**). In terms of data gathering, the NBS moved from an “all-comprehensive reporting system marred with guesstimates for an increasing share of industry to a two-class data compilation system [...]”.⁵⁴ On the one hand, it reformed the direct reporting system by introducing a minimum threshold in 1998 to ensure that only firms with large annual revenue would participate.⁵⁵ For the rest of the economy, the NBS increasingly relied on surveys and censuses. Prior to the 1990s, China made limited experiments with these methods, but in the 1996 revision of China’s Statistics Law, surveys and censuses were codified for the first time as the primary method of data gathering in China.

Teams were installed across the country to conduct several types of surveys:

- Weekly price data collection at local markets;
- Annual household surveys in urban and rural areas; and
- Surveys of non-state industrial enterprises too small to qualify for direct reporting.⁵⁶

Further, economic censuses complemented surveys by gathering comprehensive data at larger intervals. Beginning in 1985, China conducted national censuses of industry (1985,

^{vi} The share of directly reporting industrial enterprises drops from 100 percent to 5.65 percent in 1986 and 2.07 percent in 1998, and also fell in terms of industrial output value share (90 percent 1979 to 60 percent 1999).

1995), services (1993), and agriculture (1996). In 2004 and 2009, the NBS ran its first national economic censuses of industry and services, covering 19 national economic sectors, including the previously opaque construction sector.⁵⁷ According to law, national economic censuses are to be undertaken twice a decade, and the next censuses are scheduled for 2014 and 2019.^{vii}

The government also began to do a better job of measuring and presenting the data it gathered. In 1995, Beijing fully adopted the international System of National Accounting (SNA), which is designed to measure indicators of relevance to a market economy.⁵⁸ Two years later, the NBS placed statistics on more solid legal footing by codifying methods to calculate and present GDP to the public.⁵⁹ It also developed better techniques to impute statistics based on limited sample data. The most recent reform in this regard was a seasonally adjusted measure of quarterly GDP growth, introduced in 2011.⁶⁰

In parallel, the government became more open. The publication of the first statistics yearbook in 1982 signaled the beginning of a relaxation of secrecy, and was followed by a “deluge of yearbooks, census materials, surveys, and [...] internet publications”.⁶¹ Input-output tables were first published for the whole economy in 1987, and now appear every five years, allowing scholars to better devise their own alternative estimates of GDP growth.^{viii} Moreover, the government worked with Japan’s Hitotsubashi University in 1997 to revise GDP estimates for the period 1952-95, based on the SNA method.⁶²

^{vii} The purpose of undertaking economic censuses is to collect information on the secondary and tertiary industries in terms of their development scale, structure and economic performance; establish and maintain the business register and database systems; and lay a solid foundation for research and formulation of the national economic and social development planning and for improving decision-making and management. It plays an important role in reforming the statistical system; improving the national economic accounting system and statistical monitoring, warning and forecasting systems. United Nations Statistics Division. “Economic Census: Challenges and Good Practices: A Technical Report.” (October 2010): 14.

^{viii} Input-output tables (IO tables) are the key way for economists to determine the value-added at different stages of the production process (e.g. from the production of rubber to the sale of a car tire). In advanced economies, IO tables are used in tandem with supply and use tables, which provide a detailed analysis of the structure of the costs of production and income generated in the production process, the flow of goods and services produced within the national economy, and the flows of goods and services with the rest of the world.

**Table 6:
Timeline of Statistical Reform in China**

Year	Event
1983	National Statistics Law introduced to reduce manipulation of statistics
1984	Consumer price offices introduced at provincial and municipal level to sample data for price indexes
1985	National Bureau of Statistics begins to compile tertiary sector and aggregate production GDP stats
1990	First volume published with national and provincial GDP going back to 1978
1991	First tertiary sector census (lasts from 1991 to 1995)
1993	Official switch to UN System of National Accounts
1995	First secondary (industrial) sector census reveals problems of rural industrial data for first time. Results in a downward revision of up to 25 percent for the gross output value of collective-owned and private enterprises in 1991-1994, and as well as major revisions in production accounts
	Begins reporting according to the UN System of National Accounts (SNA) and discontinues the Soviet Net Material Product (NMP) system
1996	1st Revision of 1983 National Statistics Law drastically reduces the role of the traditional industrial enterprise reporting system in favor of censuses and sample surveys
1997	NBS publishes national accounts for every province for the time period 1952-1995, with expenditure accounts in nominal and real growth terms
	Local government data manipulation comes to a head: (1) February 1998: State Council threatens disciplinary measures if local officials falsify statistics; (2) March 1998: NBS dispatches investigative teams to provinces
	Two laws are issued to codify the calculation of annual and seasonal GDP
1998	Reform of ownership classification results in a new category for state-owned enterprises (SOEs), which provides a very broad definition for the state-owned sector
	Direct reporting system reformed for first time in order to include only larger industrial enterprises
1999	NBS increases monitoring of provincial-level statistical work, especially in order to monitor major
2004	First national economic census - GDP revised by 16 percent
2007	Direct reporting system again adjusted to include less firms
2009	Second national economic census - GDP revised by 4 percent
	2nd Revision of National Statistics Law increases punishments for manipulation of statistics
2011	Seasonally adjusted quarter-by-quarter growth metric introduced for the first time (as of 1Q11)
	Direct reporting system adjusted again to include less firms

Source: Various. Adapted from Carsten A. Holz, "China's Statistical System in Transition: Challenges, Data Problems, and Institutional Innovations," *Review of Income and Wealth* 50:3 (September 2004): 387-95; Tom Orlik, *Understanding China's Economic Indicators*, 1-62.

Section II: Political Interference

The possibility of political manipulation has been raised not only by outside observers, but also by the Chinese government itself. The key question, however, is how *systemic* and *persistent* it is across units and over time. The sections below aim to provide an analytical framework for discussing manipulation.

Instances of Coordinated Falsification

One theory suggests that China's data becomes less dependable when the economy is in poor shape and officials are afraid to report negative performance. Such instances of mass manipulation are popularly referred to in China as "winds of falsification (*jiabao fukua feng*)". Historical instances of such manipulation are:

- In the Great Leap Forward (1959-62), China suffered extreme declines in agricultural output. Local officials nevertheless overstated production, thus contributing to the worst famine epidemic in the nation's history.^{ix}
- In the late 1980s, China suffered from high levels of inflation and urban unemployment in the lead-up to the Tiananmen Square massacre in June 1989. Some scholars argue that the economy actually contracted in 1989, counter to official growth figures of over 10 percent.⁶³
- During the Asian Financial Crisis in 1998, China recorded 7.8 percent annual GDP growth, down just 1 percent from 1997. This was not only anomalous in the regional context, but also contradicted the sharper decline in more specific economic activity, such as energy consumption and airline travel.⁶⁴ Notably, when the NBS revised historical GDP growth rates in 2005, the real GDP growth figure for 1998 was spared any revision.⁶⁵

Since 2009, the global financial crisis and subsequent recession in the global economy may have provided new incentives to manipulate statistics. Under such circumstances, local officials may be even more eager to meet the central government's growth targets, even if their local economies are not performing well. The incentive to manipulate data in 2012 was arguably magnified by the leadership transition – many officials were due for promotion and so were keen to present a strong economic track record. Predictably, numerous economists questioned China's high growth rates throughout 2009, at the height of the crisis, harkening back to similar criticism during the Asian Financial Crisis in 1998.⁶⁶

Further, in July 2012, China's National Bureau of Statistics (NBS) announced 7.6 percent year-on-year growth in China's GDP for the second quarter of the year. Although the figure confirmed a sixth straight quarter of declining growth, it was down just 0.5 percent from the previous quarter. Based on weak industrial output, some analysts suggested growth 0.3 percent lower than the official figure.⁶⁷

Manipulation along the Reporting Hierarchy

Local Governments

It is useful to be aware of historical moments when China's statistics are more susceptible to coordinated manipulation. The downside of this approach, however, is that it does little to uncover the underlying mechanisms that cause manipulation on a regular basis. To

^{ix} One study suggests that cadres and officials from different levels, under pressure from upper-level leaders and competing counterparts, over-reported grain output for fear of punishment, contributing to the serious grain shortage and death of millions of people. Yongshun CAI. "Between State and Peasant: Local Cadres and Statistical Reporting in Rural China." *The China Quarterly* 163 (September 2000): 783-805.

understand these, it is useful to break down manipulation among different units in the chain of statistical work.

It is commonly argued that manipulation occurs most frequently at the local level. Several pieces of evidence back this claim. Over the past decade, the economic growth figures reported by local governments have regularly exceeded those of the central government. There is also anecdotal evidence of malfeasance by individual officials; notably, a deputy governor of Anhui Province tried on corruption charges in 2005 revealed that he had ordered a local planning commission to deliberately overstate GDP growth.⁶⁸ In addition, recent policy actions by the central government imply that manipulation does occur. In the 2009 revision of the 1983 Statistics Law, the NBS introduced new punishments for manipulation. During the unveiling of the law, officials spoke extensively about local government malfeasance.⁶⁹

In institutional terms, a particular set of incentives and constraints also encourages statistical manipulation at the local level. In the primary and tertiary sectors, the NBS is heavily reliant on local statistical bureaus. Officials at different levels thus have ample opportunity to manipulate data.⁷⁰ Second, there is a lack of checks and balances. The 1983 Statistics Law, promulgated by the NBS, stipulates that local statistical agencies are subject to local governments in administrative affairs. As a result, local governments today still provide the financial support for the statistical agencies, which gives them significant power over personnel appointments. This intertwined relationship may compromise the independence of the agency.⁷¹

Historically, the enforcement of the Statistics Law has been lackluster. In 1994 and 1997, a series of nation-wide inspections uncovered more than 60,000 violations of the Statistics Law. In spite of the huge number of violations, very few officials were punished by their superiors.⁷² The recent 2009 revision, referred to above, sets out harsher and more detailed punishments. During investigations into manipulation, officials can be subjected to a documented interrogation and even face prosecution.⁷³ But given the poor historical precedents of enforcement, institutional path dependence suggests that local officials will not take enforcement of these laws very seriously.

On the incentive side, economic data may be manipulated to please officials at higher levels of government. In the absence of a democratic electorate, the tenure and promotion of officials is contingent upon superiors.⁷⁴ The imperative to satisfy higher-level officials through economic performance likely took hold in the 1990s. In the 1980s, there was still debate about the merits of capitalism, so local governments were reluctant to overstate economic achievements. Chinese officials also had painful memories of the Great Leap Forward disaster, and so took special care to report data accurately.^x After the Tiananmen Incident, however, increased economic growth became more important to evaluating an official's performance than ideological correctness or honest reporting.⁷⁵ Especially in localities with lackluster economic conditions, officials could disguise poor economic

^x In 1962, following the Great Leap Forward, the government issued a circular on strengthening statistical work, which led to marked improvements. The Cultural Revolution was politically disruptive, but did witness some modernization of statistics. Dwight H. Perkins, *Market Control and Planning in Communist China*, Cambridge, MA: Harvard University Press, 1966. Quoted in Carsten A. Holz, "China's Statistical System in Transition: Challenges, Data Problems, and Institutional Innovations," *Review of Income and Wealth* 50:3 (September 2004): 382.

performance by manipulating statistics.⁷⁶ A popular Chinese idiom, “officials falsify economic statistics because economic statistics determine their achievement (*guanchu shuzi, shuzi chuguan*), even suggests that this is a custom dating back to pre-modern China’s mandarin bureaucracy.”⁷⁷

Meeting the growth targets set out by the government can play an important role in an official’s promotion. One set of targets is officially enshrined in the Five-Year Plans formulated by the central government. According to Rawski, another type of target is implicit – Chinese officials view attainment of “magic 8 percent” GDP growth as a “great political responsibility”.⁷⁸

Although local governments constitute the primary source of manipulation, some factors mitigate this problem. For one, provinces with poorer governance and less stable economic conditions are probably more liable to manipulate data. Since such provinces tend to be poorer, they may also be of less import to the national economy. In the provinces where the data matters most, like Shanghai and Guangdong, the likelihood of honest reporting, at least in principle, is greater.

Further, new performance metrics may begin to militate against the need to achieve economic growth at all costs. For example, it is not necessarily in the best interest of local officials to overstate growth, because energy use per unit of GDP is now an important metric to gauge the environmental record of officials. Overstated growth can actually cause the central government to discourage spending in order to reduce energy use.⁷⁹

A new wave of studies by political scientists also suggests that Chinese officials may be promoted based on metrics other than economic growth. Victor Shih et al. (2012), using a new biographical database of Central Committee members, a previously overlooked feature of Chinese Communist Party (CCP) reporting, and a novel method that can estimate individual-level correlates of partially observed ranks, find no evidence that strong growth performance was rewarded with higher party ranks at any of the CCP congresses since the 1980s. Rather, factional ties with various top leaders, educational qualifications, and provincial revenue collection were more relevant. Similarly, Guang Gao (2009) has argued that strategic fiscal spending by local governments in visible and quantifiable large-scale development projects is more important than economic growth per se.⁸⁰ In addition to macroeconomic data, the government’s fiscal records merit close analysis as well.

Local Reporting Units

Another source of manipulation stems from firms that misreport their data to the government. Some economists suggest that such manipulation is worse in the non-state sector. Non-state enterprises lack the traditional accounting systems of SOEs, leaving unskilled statisticians to report company statistics.⁸¹ Further, while the state sector is under relatively tight official supervision, no comparable controls exist for the non-state sector.⁸² Some firms actually fear that their income data will be divulged to others as a commercial secret. The NBS has recently taken steps to ensure that names of survey respondents are not revealed to the public after statistics are gathered.⁸³

Among small non-state enterprises, there is a distorted incentive to underreport income in order to evade taxes.⁸⁴ In some cases, such evasion may be a rational calculation when the

finer levied for false reporting are set at absolute rather than relative rates. In such cases, the fine may be far less than what would be paid in additional taxes.⁸⁵ It is worth noting that private businesses in China often bear the brunt of China's fiscal policies. Until recently, foreign-invested entities paid a lower statutory corporate income tax than domestic companies, while state-owned enterprises were compensated in the form of subsidies and easier access to credit. In addition, enterprises paid a business tax to the local government and a value-added tax to the central government, essentially an overlapping tax structure. In 2012, the government began to pilot a tax reform in Guangdong province to ease the tax burden; time will tell whether this reform will lower the tax burden on private enterprises nationwide, and so mitigate the incentive for manipulation.⁸⁶

Others suggest that, on the contrary, SOEs are more likely to cheat. Since the 1990s, SOEs have begun to devote fewer resources to accurate statistical work, since SOE managers are primarily judged based on sales and profitability.⁸⁷ Local governments may also exert indirect pressure on SOEs, such as utility companies, to report false figures that suit official goals. One top corporate executive with access to electricity grid data told the *New York Times* in 2012 that in Shandong and Jiangsu provinces, centers of heavy industry in east-central China, electricity consumption dropped more than 10 percent over a year earlier, but the reporting units reported flat or only slightly rising electricity consumption.⁸⁸ Andy Xie, an analyst at HSBC, agreed: "Many businessmen have told me that their governments ask them to misreport data, including electricity consumption, to hide the depth of the slump." SOE managers are wont to jeopardize their careers by reporting negative performance, since personnel appointments are commonly made by the government agency that acts as the SOE's majority shareholder.⁸⁹

The Central Government

A more sensitive question is how much manipulation takes place at the central level. Beijing has certainly acknowledged that manipulation of economic statistics takes place within the government. In a controversial diplomatic cable released by *Wikileaks* in 2011, China's incoming premier Li Keqiang told U.S. officials that China's GDP numbers were "man-made" and therefore only indicative.⁹⁰ During an inspection of the NBS in October 2008, Li publicly stated that "China's foundation for statistics is still very weak".⁹¹ The need for adjustment of the Chinese official estimates was further acknowledged by two NBS officials in 2006: "The sheer size of China, together with the limited resources currently devoted to national accounts and the continuation of MPS-oriented statistical procedures, inevitably means that the official GDP estimates are subject to margins of error that are somewhat bigger than for other developing countries and substantially larger compared with most other OECD countries."⁹²

But as with corruption and other hot-button issues, it seems more palatable for Beijing to place the blame on local officials. Former premier Zhu Rongji (1997-2002) once complained of "embellishment and falsification" of local GDP figures.⁹³ Ma Jiantang, the head of the NBS, admitted in January 2010 that local officials frequently inflate GDP growth - though he maintained that the central government figures were lower and more accurate.⁹⁴ In fact, starting in 1998, the NBS began to reject provincial data on GDP growth that it dismissed as "cooked local figures", and began using methods to bypass local and provincial governments.⁹⁵

Some outside observers agree that the central government shares little blame. Princeton economist Chow is among those who argue that, since data is used for government decision-making and is subject to review by all members of the National People's Congress, there is little incentive for the central government to fabricate data. It would hurt the credibility of statisticians within the government, and also lead to confusion among officials using different figures.⁹⁶ Indeed, the government could not have managed its economy so well over the past three decades without quality data, and China's economic policy generally reflects the published figures.⁹⁷ For these reasons, the common allegation that the government keeps "two sets of books" for administration and publicity does not hold either, since it would require the collusion of thousands of officials.⁹⁸

However, the central government, through the NBS, can manipulate statistics in more subtle ways. First, when it "squeezes the water content" out of inflated local statistics, the NBS does not reveal the size of the revisions to the public. The NBS may also "smooth" over GDP data to disguise volatility. Studies by Goldman Sachs and others suggest that "smoothing" effectively underreports growth in boom years and overstates growth in downturns.⁹⁹

As noted above, the NBS is especially secretive about its inflation measures.¹⁰⁰ Some critics thus argue that the NBS concocts "satisfactory" deflators to suit the government's "rule of thumb" real growth targets. It is hard to find systemic evidence to back this claim. But revisions to past GDP data are indicative. In 1995, the NBS used the results of China's first service-sector census to adjust GDP growth figures for the preceding years. Revisions in levels of GDP — for both expenditure and value-added measures — would require substantial revisions in real growth rates as well. However, no such adjustments were made, implying that as revisions were made in levels, exactly compensating revisions were also made in deflators. In the real world, this coincidence is highly unlikely.¹⁰¹

Further, in 2005, when the NBS used the results of the first national economic census to revise GDP growth rates for 1992-2004, it left the real GDP growth figure for 1998 unchanged. That was the year when, according to many economists, China's growth was grossly overstated, because the rest of the region was suffering from the Asian Financial Crisis. The NBS was arguably unwilling to concede to international pressure to revise the 1998 figure downwards, but also did not wish to incite further controversy by raising the figure. It thus ensured that, after adjusting the nominal growth rate upward, the real growth rate would remain unchanged.¹⁰²

A more subtle criticism is that the NBS, when faced with a lack of accurate data, is more likely to report false figures than not to publish at all. Carsten Holz has noted that the NBS repeatedly dropped hints of under-reported national tertiary sector value added prior to the national economic census in 2004, but knowingly reported false GDP data for several years.¹⁰³

In sum, although the evidence for local government manipulation is stronger subtle and at times reinforcing manipulation can occur at the central level. At the very least, there is a lack of transparency.

Section III: Testing Reliability

Alternative Indicators

Using Alternative Indicators to Test Statistical Reliability

Alternative indicators are a common method to judge the reliability of official figures. They span a large range, from energy consumption to transport volumes and producer surveys (**Table 7**). The common advantage of alternative indicators is that they measure very specific activities in the economy, stem from dependable sources, and/or use numbers that are unrelated to prices and currencies. Electricity production and consumption, for example, is frequently referred to as the “gold standard” for measuring economic activity, because it closely tracks industrial output and is measured in kilowatts. China’s five largest electricity generation companies together produce about half of the country’s electricity, which makes the data easier to aggregate and harder to manipulate.¹⁰⁴

Alternative indicators are a popular measuring tool among financial analysts, who are often cited in the media. Among scholars, Rawski set a precedent by using drops in airline travel and electricity consumption to question China’s GDP growth figures during the Asian Financial Crisis in 1998.¹⁰⁵ Even senior officials in the Chinese government have acknowledged the usefulness of alternative indicators. In 2007, China’s future premier Li Keqiang indicated electricity consumption, rail cargo volumes, and bank lending as his preferred measures of economic activity, in place of official GDP.¹⁰⁶ The NBS has made tentative efforts to compare China’s national output figures with alternative indicators.^{xi}

A decade ago, several studies were done on alternative indicators, but the results were somewhat inconclusive. In an influential study, Wang Xiaolu and Meng Lian (2001) calculated the physical output of 168 industrial commodities in 1991-1999. They found that output was much lower than official GDP growth would suggest.¹⁰⁷ Yet other scholars found contrary results. Lawrence R. Klein and Suleyman Ozmucur (2003) used a comprehensive set of 15 indicators, ranging from transport volumes to wages,^{xii} to infer that official GDP growth was indeed reliable for the period 1980-2000.¹⁰⁸ Their findings were supported by Princeton economist Chow, a leading expert on the subject.¹⁰⁹

While this report cannot match the breadth of these earlier studies, it compares real GDP growth with a number of popular alternative indicators (**See Figures 1 to 6 in Appendix**). Each figure juxtaposes the year-on-year quarterly growth of an indicator (e.g. from the first quarter of 2008 to the first quarter of 2009) with China’s official real GDP.

^{xi} According to an NBS staff economist, the agency has recently begun to compare GDP, industry value-added, fixed asset investment, retail sales, and disposable household income to other indicators, including fiscal and tax revenue, electricity generation and consumption, inventory turnover, and the scale of savings and loans. Xianchun XU, “Dangqian Woguo Tongji Gaige yu Jianshe de Ruogan Jucuo (Several Measures Regarding China’s Statistics Reform and Infrastructure,” *Gaige Jianyan* 10 (2011).

^{xii} The analysis covers energy, transport, communications, labor, agriculture, trade, public sector, wage, and inflation,

**Table 7:
Examples of Alternative Indicators**

Category	Alternative Indicator	Unit of measurement	Source
Transport	Air travel	Persons millions	Civil Aviation Administration of China
	Rail cargo	Ton-kilometers millions	Ministry of Railways
	Highway transport volumes	Persons millions	Ministry of Transport
Retail	Auto sales	Units	China Association of Automobile Manufacturers
Survey of business views on current operating conditions and immediate outlook	CFLP Purchasing managers index	Index (>50 expansion, <50 contraction)	China Federation of Logistics and Purchasing (CFLP)
	HSBS/Markit Purchasing managers index	Index (>50 expansion, <50 contraction)	HSBC and Markit Economics
	China business survey	Index (>50 expansion, <50 contraction)	Market News International
Energy output and consumption	Electricity output and consumption	KwH millions	National Bureau of Statistics, China Electricity Council
	Coal stockpiles	Tons millions	National Bureau of Statistics, Ministry of Commerce
	Oil and petrochemicals	Tons millions	National Bureau of Statistics
Construction activity	Area under construction	Square meters	National Bureau of Statistics
	Total floor space sold	Square meters	
Intermediate inputs	Brick and concrete piling production	Tons millions	National Bureau of Statistics
	Cement output	Tons millions	National Bureau of Statistics
	Iron ore, steel, and coke consumption	Tons millions	China Iron and Steel Association
Credit policy and activity	Reserve ratio requirement	Percentage	The People's Bank of China
	Benchmark deposit and lending rates	Percentage	The People's Bank of China
	Bank lending in proportion to benchmark interest rate	Percentage	The People's Bank of China
	Bank lending growth	Percentage	The People's Bank of China
	Money supply (M1 / M2)	Renminbi billions	The People's Bank of China

The figures provide some evidence that official real GDP growth for 2012 is unreliable. Several indicators - electricity production, crude oil production, rail turnover, automotive sales, and gross industrial output – witness sharp drops beginning in 2010 that were not reflected in real GDP growth, which remained remarkably stable. It is noteworthy that the

degree of decline in many indicators in early 2009, at the height of the financial crisis, was much steeper than real GDP growth would indicate.

To be sure, each indicator's long-term correlation with real GDP growth varies significantly; in the case of automobile sales and output in the iron and steel industry, volatility makes it especially difficult to distinguish any "abnormal" patterns during an economic downturn. Nonetheless, the indicators provide strong grounds to suspect at least an excessive "smoothness" of GDP growth, and perhaps even overstated growth after 2009.

A Note of Caution about Alternative Indicators

Alternative indicators are a useful way to test reliability. But there are also potential disadvantages that analysts must take into account. These include:

- *The quality of data sources varies.* As Table 7 illustrates, the sources for alternative indicators run the gamut from manufacturers associations (e.g. automobiles, iron and steel) to government regulators (e.g. civil aviation), federations, the central bank, and ministries. In some cases, the official source is the National Bureau of Statistics, but the data is based on reports by companies and individuals (e.g. construction activity).
- *As the economy's structure changes, alternative indicators can become less indicative.* For instance, as light industry and services assume a larger share of GDP, the use of heavy industry inputs like coal and steel begins to say less about the overall economy. Electricity consumption in the services and logistics sectors outpaced total power consumption in the first half of 2012. A rising share of residential electricity use could also impact consumption cycles – during a hot summer, homes consume more power, leading to a rise in demand that has little to do with the health of the economy.¹¹⁰
- *The performance of alternative indicators is influenced by factors other than economic growth.* Productivity gains can explain drops in consumption. Therefore, decreases in power consumption can be attributed to gains in energy efficiency.¹¹¹ Supply and demand dynamics also play a role. Hence, coal stockpile variation is influenced not just by shipments to power stations (demand) but also by incoming deliveries from suppliers (supply).¹¹²
- *Different indicators indicate the health of the economy at different points in time.* It is sometimes hard to determine whether an indicator reflects economic trends in the present ("coincident"), or rather in the future ("leading") or past ("lagging"). The common wisdom is that business surveys (e.g. purchasing manager's indexes) are predictive; energy, transport, and industrial activity are coincident; and fiscal and monetary policies are "lagging" (i.e. reacting to the state of the economy). However, in China's case, monetary policies can in fact play a major role in boosting growth, to the extent that they become "leading" indicators. Further, coincident indicators may say more about medium-term than short-term growth. Thus, electricity consumption fell in the first half of 2009, even as the economy grew at an annualized rate of over 7 percent; yet the long-run power consumption growth rate for 2010-2011 was consistent with GDP growth.¹¹³ Moreover, certain indicators are seasonal. Hotel occupancy rates are one example – in 2010-2012, they increased and declined in a predictable yearly cycle. Without seasonal adjustment, such indicators can be misleading.

- *The volatility of growth varies by indicator.* Car sales, for instance, may grow or decline very sharply in the course of a given year. The growth of money supply, on the other hand, is more stable. Comparing either of these to GDP growth has very different implications.

Inconsistencies in China's National Output Data

Another way to assess the reliability of China's economic statistics is to consider them at "face value". Inconsistencies within the data can imply a lack of accuracy, even if it is hard to identify where exactly the source of the error lies. The analysis below looks at discrepancies between different methods of calculating GDP, and between GDP reported at the national and provincial levels.

Production (value-added) vs. Expenditure GDP

Different measures of national output – the production measure based on the value-added of industry and the expenditure measure based on consumption and investment (**Figure 2**) - should add up to roughly the same number, in terms of growth and absolute value. Even in the United States, there is a slight discrepancy between these figures; yet the divergence should be around two percent at most. The difference between the two figures in China, in nominal terms, exceeds the accepted threshold (**Table 1 in Appendix**). Expenditure GDP is consistently larger in absolute terms, while production-side GDP has shown faster growth in most years.

Xu Xianchun, an economist at the NBS, claims that the gap has shrunk, reaching a level on par with the United States in 2007-2009 (**Table 2 in Appendix**). His figure is based on inflation-adjusted rather than nominal GDP. It remains open to question why the inflation-adjusted figures are so much more congruent than the nominal figures.

**Figure 2:
Methods of Calculating Gross Domestic Product**

Expenditure method. GDP is the sum of final purchases. This is known as demand-side estimation. It finds textbook expression in the accounting definition.

$$GDP = C(\text{consumption}) + I(\text{investment}) + G(\text{gov't purchases}) + X(\text{exports}) - M(i$$

Income method. GDP is the sum of income payments to the original factors of production:

$$GDP = W(\text{wages}) + IN(\text{interest}) + P(\text{profits}) + R\left(\frac{\text{rent}}{\text{royalty}}\right) + IT(\text{indirect tax}) - S(\text{subsidies})$$

Production method. GDP is the sum of value-added across all sectors of production. Value-added is written as:

$$GDP = GP(\text{gross production}) - IP(\text{intermediate production}) = VA(\text{value added})$$

Provincial vs. National GDP

National aggregate GDP should be equal to the sum of GDP of each province in China. However, there is a serious discrepancy between nominal GDP at the provincial and national level (**Tables 3.1 and 3.2 in Appendix**). Provincial GDP figures over the past decade have been significantly higher than those reported at the central level. This fact may corroborate the allegation that local governments like to overstate their economic growth. However, this conclusion is somewhat simplistic. Until 2001, national GDP was actually greater than the sum of provincial GDP. The central government since 2002 may therefore have adjusted provincial GDP figures downwards “automatically”, based on the assumption that these figures are always too high.

A closer look at Tables 3.1 and 3.2 also shows that the degree of divergence between provincial and national GDP figures varies by sector and type of GDP measurement. When an expenditure measure of GDP is used, the most significant overstatement of provincial GDP is for gross capital formation; in other words, local governments overstate how much investment is taking place in the economy. On the consumption side, the provincial GDP is also overstated, but much less so. In this case, the conundrum is that the gap between provincial and national consumption GDP increased every year in 2005-2010. This strange trend may be led back to the government’s efforts to realign provincial and national GDP in 2005, after reviewing the results of the first national economic census (See “Key reforms” section). It appears that this realignment began to fall apart in the ensuing years, as the local government began to overstate consumption more with each year.

A production measure of GDP – the preferred measurement used by the Chinese government – reveals other incongruities. In the years leading up to the 2004 national

economic census, provincial GDP was hugely overstated in retail and transport. But after 2005, the difference shrank dramatically. One theory, suggested by a journalist at the *Economist*, is that local governments are better able to gauge the true size of the tertiary sector (which includes services like retail and transport). That could be the reason why provincial tertiary sector GDP was so much greater before 2005.¹¹⁴ After the census, the NBS may have acknowledged that by raising central GDP figures for the tertiary sector to be more in line with the provincial numbers. Since then, retail and transport figures have been more closely aligned. Yet oddly, over that same period since 2005, the gap appears to have migrated to industrial output – provincial figures for industrial sector GDP began to exceed those of the central government.

The divergence between provincial and national GDP is a complex problem because it varies across units and over time. It is hard to argue that local governments are always to blame. At least some culpability also belongs to the central government.

Section IV: The Debate on China's Statistics

International Debate

Reliable economic statistics benefits not only businesses and policymakers, but also the public, which has the right to know the truth about the economy. The provision of this public good should be universal. To ensure that it is provided in China, a developing country and one-party state, close scrutiny and informed debate are essential.

As China's economic footprint has grown, the country's official statistics have come under wider scrutiny. The most outspoken authority on the subject is Tom Orlik of the *Wall Street Journal*— his 2011 book, *Understanding China's Economic Indicators*, is the first to explain China's statistics to a broader public.¹¹⁵ Although the book offers important technical insights, it is more descriptive than analytical, and supports Orlik's claim that "China's economic statistics are actually very impressive, with relatively timely, accurate, and comprehensive data published on a range of key indicators."¹¹⁶

By contrast, the *New York Times*, *Foreign Policy*, *Economist*, and other publications have made less favorable assessments. They draw on the skepticism of financial analysts, such as Stephen Green of Standard Chartered Bank, who have distrusted China's official statistics for many years.¹¹⁷ In policy circles, economists at the International Monetary Fund (IMF) and World Bank have criticized the transparency of work at China's National Bureau of Statistics (NBS). Others, such as John H. Makin (American Enterprise Institute) and Derek Scissors (Heritage Foundation), dismiss the reliability of China's GDP data altogether.¹¹⁸

However, the quantity of debate has not been matched by quality. The last time that economists engaged in broad and in-depth analysis was in the late 1990s to early 2000s. At the time, China's statistical work was undergoing radical reform, in line with other promising market reforms ahead of WTO accession. China's long-run GDP growth figures, dating back to the 1950s, were being revised, inciting debates about decades of economic performance. Further, China's economy performed surprisingly well during the Asian Financial Crisis (1997-1998), which led many to charge that the government manipulated GDP figures (see "Political Interference" section). Scholars took a closer look at statistics in diverse industries, from cement production to grain output. Seasoned China economists,

such as and Thomas Rawski (University of Pittsburgh) and Gregory Chow (Princeton University), attacked and defended reliability.^{xiii}

Unfortunately, this informed debate has waned in recent years. Prior to the global financial crisis in 2009, China's rapid and stable economic growth prompted less scrutiny. With the exception of the 2004 national economic census, the pace of statistical reform was also more incremental. Now, as China confronts serious rebalancing in the years ahead, the quality of statistics is likely to become a point of contention once again.

Civil Society Pressure in China

In theory, civil society is an important force that can pressure governments to be more accountable. In China's authoritarian state, the strength and efficacy of civil society is constrained. Even so, it is important to consider whether any civil society movements are leading to improvements in China's economic statistics.

Economists at semi-autonomous universities and think tanks have criticized the government's statistical work since the 1990's: Huang Yiping (Beijing University) has alleged that the NBS is cognizant of the errors in its own statistics; Wang Xiaolu (National Economic Research Institute), mentioned earlier in this report, has exposed unreported household income among China's richest households; and Yue Ximing (Chinese Academy of Social Sciences Bureau of Economics) has published a litany of academic papers on faulty reporting in the service sector. Wang and others are also engaging with Western critics on these subjects.^{xiv}¹¹⁹ However, partly owing to constraints on free speech, China's scholars prefer to focus on technical rather than political aspects.

To be sure, the Chinese government is debating its statistical work with independent economists. Xu Xianchun, a staff economist at the NBS, has acted as a public ambassador of his institution over the past decade, publishing numerous academic articles in both Chinese and English. Xu has time and again questioned the reliability of China's official figures. However, his underlying claim is that the NBS's measurements *understate* rather than overstate GDP growth. That, of course, is a viewpoint that China's leadership is prepared to accept.¹²⁰

A more interesting phenomenon to observe is how the broader public exerts pressure on the government. Chinese newspapers have long criticized the manipulation of data by local officials.¹²¹ This is likely of less concern to the central government, since it has openly acknowledged that this occurs. What really catches Beijing's attention is when the public attacks statistics published at the national level. In February 2009, the NBS's release of its

^{xiii} The *Review of Income and Wealth*, a small economics journal, has published much of the relevant scholarship. For an overview, see Carsten A. Holz, "China's Statistical System in Transition: Challenges, Data Problems, and Institutional Innovations," *Review of Income and Wealth* 50:3 (September 2004): 382.

^{xiv} Examples of Chinese academics engaging with the West on the subject of economic data: (1) Wang Xiaolu has been interviewed by the *International Herald Tribune* on hidden household income; (2) Huang Yiping has given a speech supporting critical findings in an article in *Foreign Policy* magazine; and (3) Xu Xianchun issued a retort to an American Enterprise Institute report claiming that China's GDP figures are bogus.

2008 National Statistics Bulletin caused a public uproar, because it blatantly understated the appreciation in housing prices. In light of China's real estate bubble at the time, the false number was highly controversial. The NBS eventually relented, publishing data to show that average housing prices had actually risen by 24 percent.¹²²

In December 2009, a staff writer for *Xinlang Caijing*, a popular online finance publication, cited critiques of China's statistical work listed in an IMF staff report. The revelation prompted strong reactions from Chinese bloggers. The NBS responded with a statement that the IMF did not agree with the blogger's representation of its findings.¹²³

These instances illustrate that the public is exerting pressure on the central government, to the extent that the latter feels compelled to justify its methods and weigh in on major disputes.

Conclusion

China's national output figures are not as reliable as those of the United States and Europe. Although alternative indicators and internal consistency checks are imperfect methods, they serve to cast doubt on the quality of data. A closer analysis of China's statistical work sheds light on some of the underlying problems facing China's statistics. These problems stem in part from the lack of reform since the 1990s. With the exception of certain breakthroughs, such as seasonally adjusted growth, there has not been any deeper reform. The lack of reform of statistical work appears to follow a broader pattern during the decade-long administration of President Hu Jintao: a wide range of reforms, from corporate ownership to social welfare, were less ambitious than under the preceding government of President Jiang Zemin.

How committed the Chinese government is to improving statistics is unclear. If improved data indicates, say, a higher share of consumption in GDP, or faster GDP growth, that is conducive to the government's message. The NBS itself is pioneering many of these studies. On the other hand, accurate statistics can also shed light on sensitive problems, like vast income gaps. The government's attempts to conceal the poor quality of air in China's largest cities, and the subsequent loss of public confidence in the government's credibility, illustrate the pitfalls of official mendacity.

The reliability of China's statistics is also a crucial challenge for the world economy. China remains a very open economy heavy reliant on both exports and imports. It is also the primary destination of foreign direct investment worldwide. Countless firms, not to mention their shareholders and creditors, depend heavily on accurate statistics to make decisions.

To its credit, the United States has already taken several actions to improve China's statistics.

- In the 1980s, the estimation of China's economic growth rate received guidance from U.S. economist Irving Kravis through the LINK Project, under the auspices of the U.S. National Academy of Sciences, American Council of Learned Societies, and the Social Science Research Council.¹²⁴

- In 2003, the International Monetary Fund's Statistics Department (STA) launched a technical assistance and training program for government statisticians in China. In March 2009, an STA mission visited China to evaluate the progress of the program; elicit China's views on how to broaden and enhance the technical cooperation between STA and China; and to establish training priorities for 2009-2011.¹²⁵
- In 2009-2011, the U.S.-China Joint Commission on Commerce and Trade (JCCT) repeatedly announced the goal of establishing a "work plan [...] to extend the statistics dialogue and research already conducted under auspices of the JCCT". This goal, however, is confined to trade statistics, and moreover, aims "not to change the official statistics reported by either country, but to understand better the data and methodologies used in the collection and compilation of those official trade statistics".¹²⁶
- According to the NBS, the seasonal adjustment growth statistics that Beijing adopted in 2011 were implemented with technical assistance from the U.S. government.¹²⁷

In addition to assisting China to improve its statistics, the U.S. government should take steps to encourage data gathering by foreign and private entities in China, and lobby the Chinese government to enable this through new regulatory frameworks. The British bank HSBC has collected independent purchasing managers' indexes in China since 2007, in many ways complementing similar efforts by the Chinese government. This precedent should be followed elsewhere.

Also, U.S. policymakers and businesses need to be briefed on the risks they face in relying on Chinese statistics. Such briefings could help to cross-check claims made about Chinese statistics in the Western media, in order to shed light on the areas that really matter. The debate must move beyond a simple dichotomy between "reliable" and "unreliable" – the quality of China's data should be considered across units and over time. Where there is a problem, we need to better identify whether it was owing to technical failure or not. If it is indeed an issue of manipulation, we need to determine where along the hierarchy – at the individual, local, or central level – the manipulation is in fact occurring.

APPENDIX

Table 1:
Difference between Production and Expenditure Measurements of GDP –
Nominal GDP and GDP growth

	GDP value (RMB bn)			Annual growth rate		
	Expenditure GDP	Production GDP	Percentage Difference	Expenditure GDP	Production GDP	Percentage Difference
1996	7,416	7,118	4.0%			
1997	8,166	7,897	3.3%	10.1%	11.0%	-0.8%
1998	8,653	8,440	2.5%	6.0%	6.9%	-0.9%
1999	9,113	8,968	1.6%	5.3%	6.2%	-0.9%
2000	9,875	9,922	-0.5%	8.4%	10.6%	-2.3%
2001	10,903	10,966	-0.6%	10.4%	10.5%	-0.1%
2002	12,048	12,033	0.1%	10.5%	9.7%	0.8%
2003	13,663	13,582	0.6%	13.4%	12.9%	0.5%
2004	16,080	15,988	0.6%	17.7%	17.7%	0.0%
2005	18,744	18,494	1.3%	16.6%	15.7%	0.9%
2006	22,271	21,631	2.9%	18.8%	17.0%	1.9%
2007	26,656	26,581	0.3%	19.7%	22.9%	-3.2%
2008	31,598	31,405	0.6%	18.5%	18.1%	0.4%
2009	34,877	34,090	2.3%	10.4%	8.5%	1.8%
2010	40,282	40,151	0.3%	15.5%	17.8%	-2.3%

Source: National Bureau of Statistics, via CEIC data.

Table 2:
Difference between Production and Expenditure Measurements of Real GDP – National
Bureau of Statistics Version

	2001	2002	2003	2004	2005	2006	2007	2008
<i>United States</i>								
Expenditure approach (1)	1.1	1.8	2.5	3.6	3.1	2.7	2.1	0.4
GDP growth rate (%)								
Production approach (2)	0.8	1.6	2.5	3.6	2.9	2.8	2.0	1.1
GDP growth rate (%)								
Difference (1) - (2)	0.3	0.2	0.0	0.0	0.2	-0.1	0.1	-0.7
<i>China</i>								
Expenditure approach (1)	8.3	9.1	10.0	10.1	11.3	12.7	14.2	9.6
GDP growth rate (%)								
Production approach (2)	9.7	10.7	11.9	12.1	13.4	13.7	13.9	9.8
GDP growth rate (%)								
Difference (1) - (2)	-1.4	-1.6	-1.9	-2.0	-2.1	-1.0	0.3	-0.2

Source: Xu Xianchun, “Zhunque Lijie Zhongguo Jingji Tongji (An Accurate Understanding of China’s Economic Statistics),” JingjiYanjiu (Journal of Economic Research) 5 (2010): 26.

Table 3.1:

**Percentage Difference between Provincial and National Figures –
Nominal GDP – Expenditure Method**

	Total GDP	Gross Capital Formation	Final Consumption Expenditure Total	Government	Household
1996	-8.3%	2.6%	-14.2%	-21.7%	-12.7%
1997	-6.2%	9.7%	-13.0%	-19.5%	-10.9%
1998	-4.4%	16.2%	-13.5%	-17.9%	-12.6%
1999	-3.0%	14.8%	-13.4%	-15.4%	-14.0%
2000	-0.2%	19.0%	-12.7%	-13.6%	-13.9%
2001	-0.4%	15.2%	-11.6%	-7.6%	-13.8%
2002	0.2%	12.0%	-8.2%	-1.7%	-12.1%
2003	2.0%	10.8%	-4.8%	6.1%	-10.3%
2004	4.2%	13.5%	-2.5%	10.7%	-9.1%
2005	6.1%	22.2%	-0.5%	1.0%	-1.0%
2006	4.9%	21.5%	0.0%	2.2%	-0.8%
2007	4.9%	23.9%	0.4%	4.3%	-0.9%
2008	6.4%	23.3%	1.3%	5.8%	-0.2%
2009	5.0%	21.4%	1.5%	6.7%	-0.4%
2010	8.7%	25.8%	3.9%	7.7%	2.4%

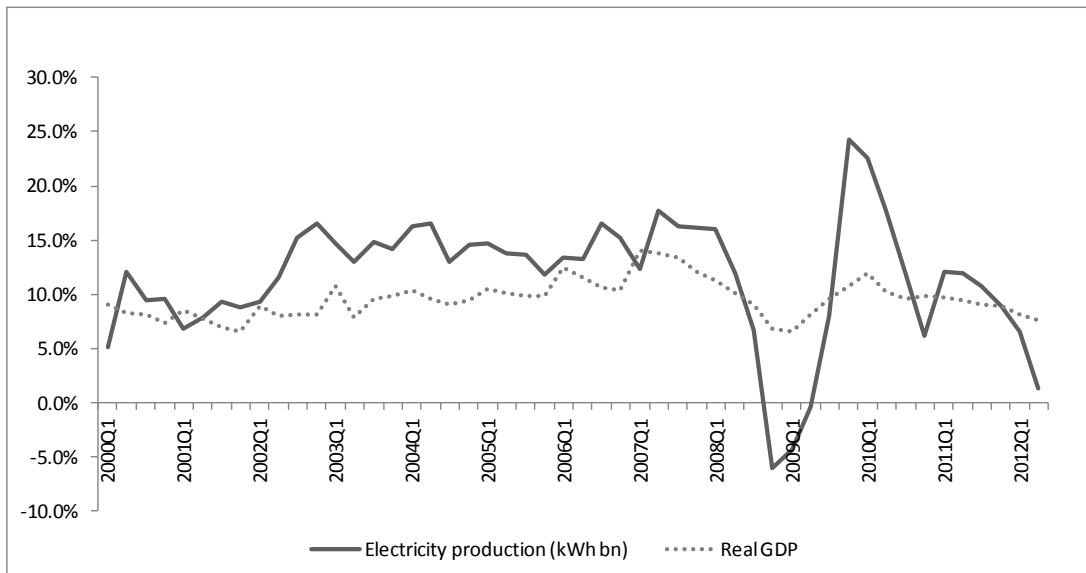
Source: National Bureau of Statistics, via CEIC data.

**Table 3.2:
Percentage Difference between Provincial and National Figures –
Nominal GDP – Production Method**

	Total GDP	Primary Industry	Secondary Industry			Tertiary Industry				
			Total	Industry	Construction	Total	Retail	Transport	Finance	Real estate
1996	-4.3%	-2.4%	-8.3%	-7.5%	-13.1%	0.4%	--	--	--	--
1997	-2.8%	0.1%	-6.8%	-6.9%	-6.1%	1.4%	--	--	12.0%	-31.5%
1998	-1.7%	-0.1%	-4.0%	-4.6%	0.1%	0.4%	--	--	10.5%	-30.1%
1999	-1.2%	-1.3%	-3.0%	-4.0%	4.0%	0.9%	--	--	9.9%	-25.8%
2000	-0.5%	-0.8%	-2.5%	-3.7%	6.5%	1.7%	25.9%	21.2%	8.8%	-20.5%
2001	-0.8%	-1.8%	-1.9%	-3.5%	9.7%	0.6%	25.8%	25.5%	0.2%	-17.3%
2002	0.4%	-2.1%	0.2%	-1.5%	12.8%	1.3%	27.4%	27.3%	1.6%	-15.3%
2003	2.7%	-1.4%	4.0%	2.3%	16.0%	2.5%	27.0%	33.2%	5.1%	-12.5%
2004	5.0%	-3.1%	8.4%	7.1%	17.9%	3.7%	29.3%	33.9%	7.3%	-10.9%
2005	7.7%	1.3%	11.2%	11.0%	12.8%	5.6%	33.7%	25.6%	--	-0.2%
2006	7.6%	0.4%	11.7%	12.3%	7.2%	4.8%	13.2%	8.9%	2.0%	-2.6%
2007	5.2%	-0.1%	10.4%	11.7%	0.7%	0.8%	4.3%	4.6%	-2.4%	-10.7%
2008	6.1%	-0.6%	12.2%	14.0%	0.1%	0.9%	0.9%	8.7%	-1.7%	-9.0%
2009	7.2%	0.0%	14.1%	16.5%	0.0%	1.4%	10.2%	10.3%	1.3%	-8.4%
2010	8.8%	0.0%	17.4%	20.3%	0.3%	1.6%	10.1%	12.6%	3.0%	-15.0%
2011	10.0%	-0.6%	19.9%	23.3%	-0.1%	1.7%	7.7%	12.4%	--	--

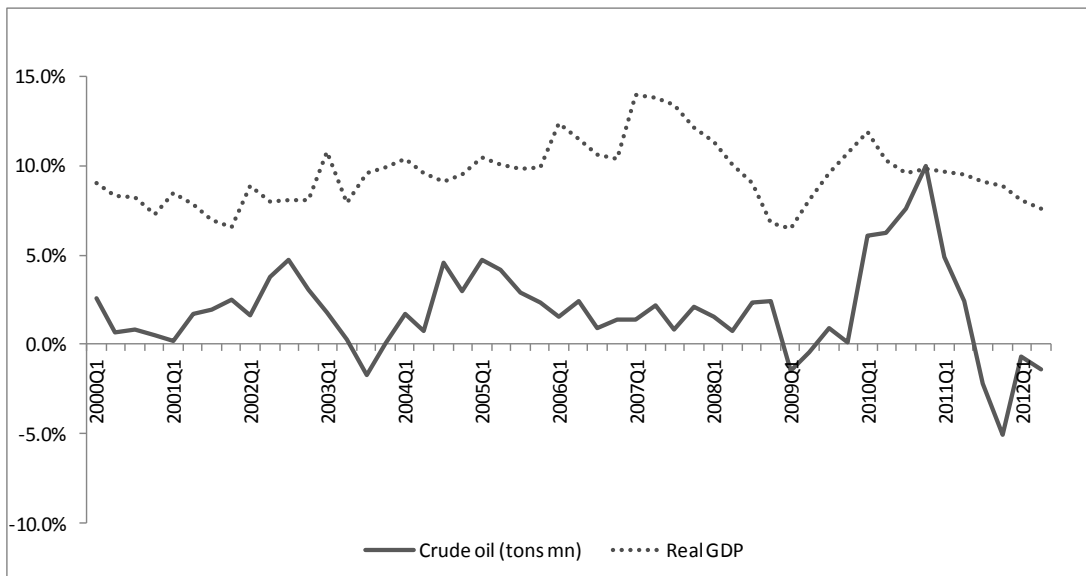
Source: National Bureau of Statistics, via CEIC data.

Figure 1:
Growth in Electricity Production and Real GDP [YQ]



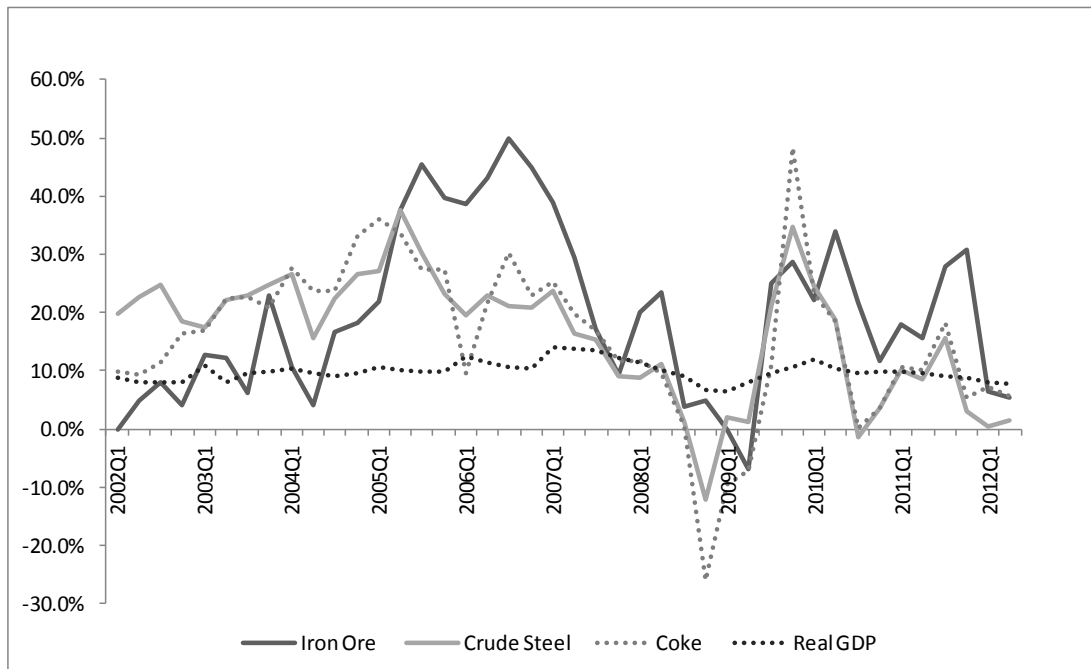
Source: National Bureau of Statistics, via CEIC data

Figure 2:
Growth in Crude Oil Production and Real GDP [YQ]



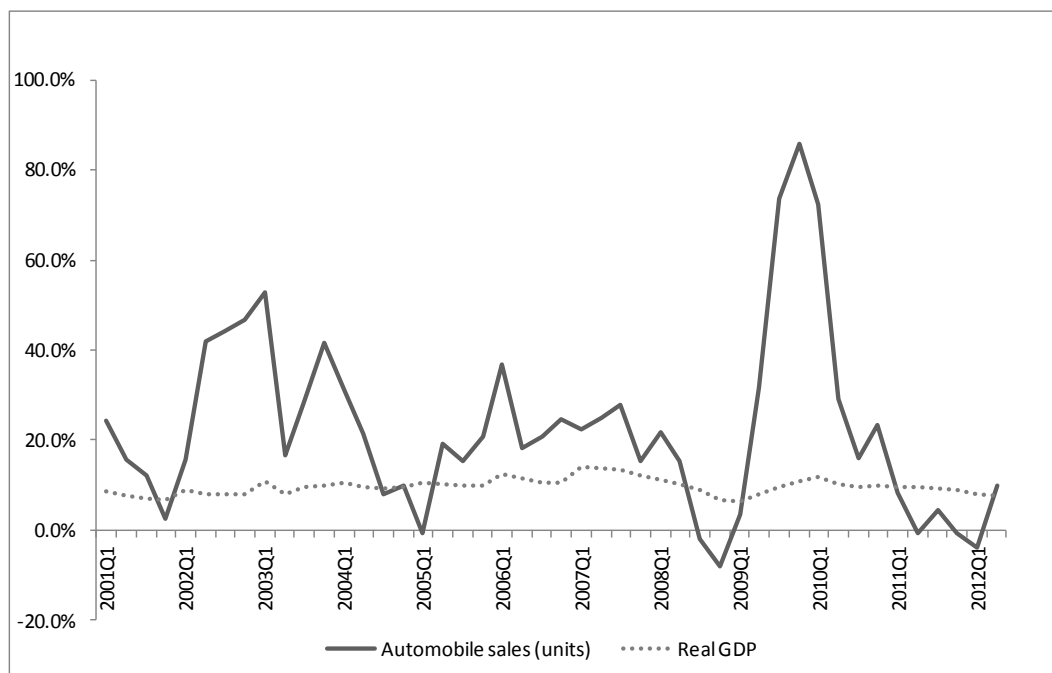
Source: National Bureau of Statistics, via CEIC data

Figure 3:
Growth in Iron Ore, Steel, and Coke Output and Real GDP [YQ]



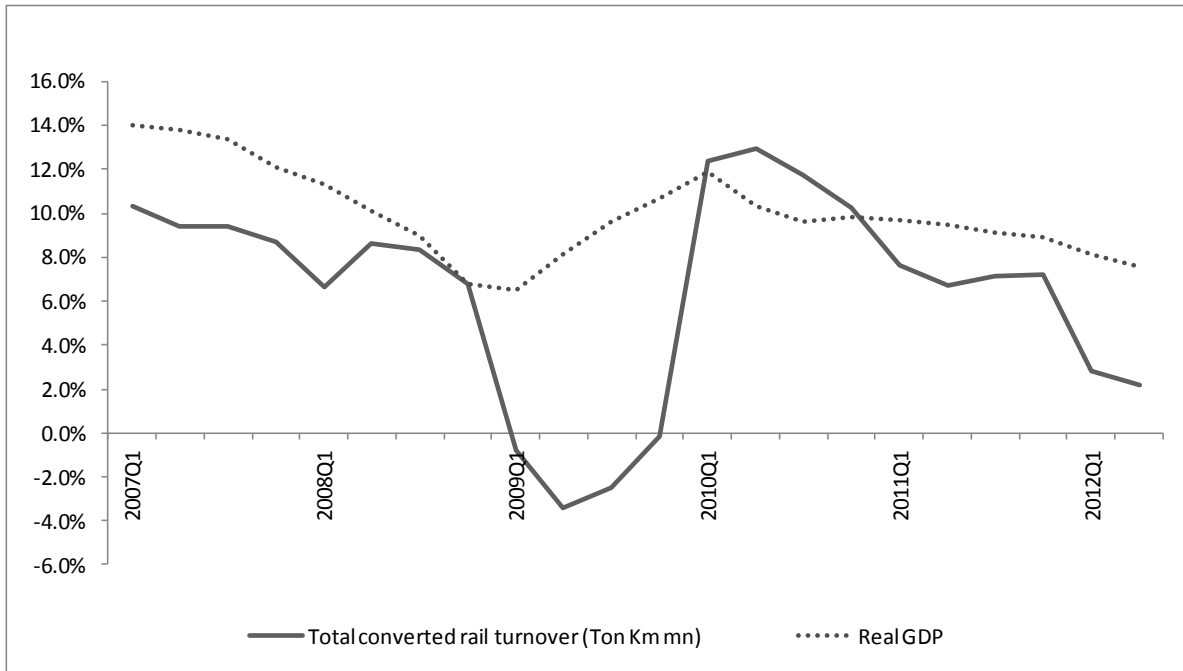
Source: China Iron and Steel Association, via CEIC data

Figure 4:
Growth in Automobile Sales and Real GDP [YQ]



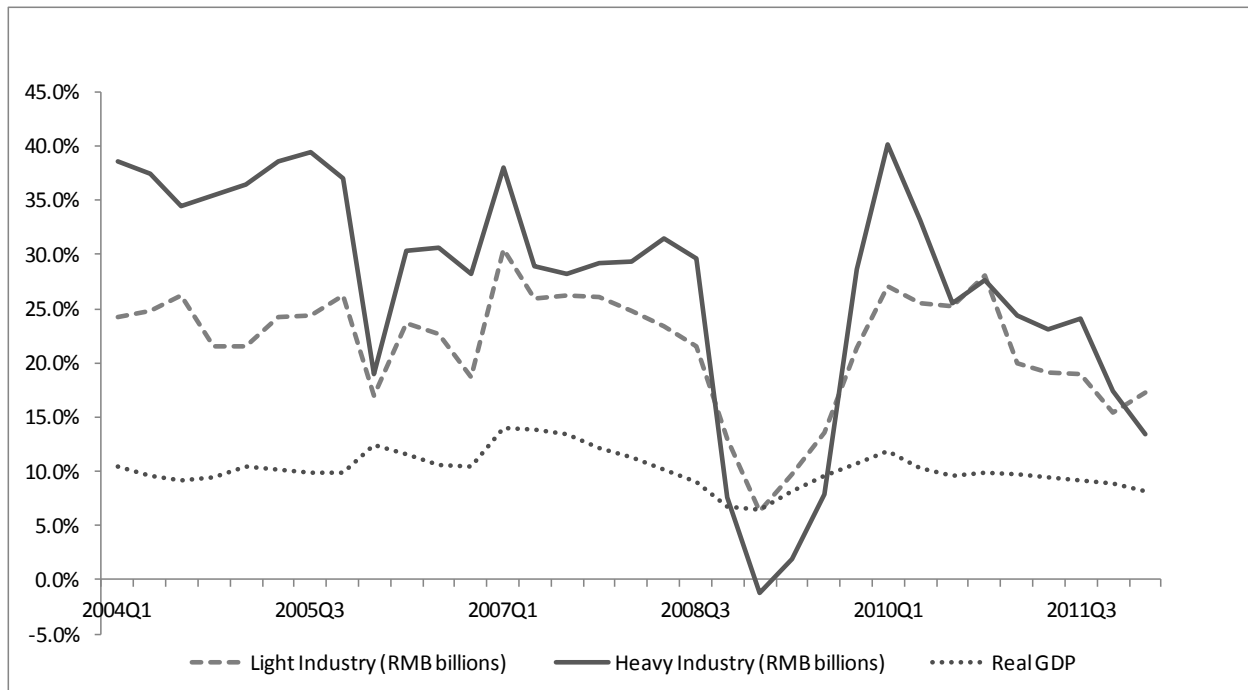
Source: China Association of Automobile Manufacturers, via CEIC data

Figure 5:
Growth in Converted Rail Turnover and Real GDP [YQ]



Source: China Ministry of Railways, via CEIC data

Figure 6:
Growth in Gross Industrial Output and Real GDP [YQ]



Source: Department of Industry & Transport Statistics

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- ¹¹ Ibid, 15.
- ¹² Albert Keidel, "China's GDP Expenditure Accounts," *China Economic Review* 12 (2001): 355.
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- ¹⁷ Keidel, "China's GDP Expenditure Accounts," 355-367.
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