



## Consultant's Report

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# Knowledge Work on Excess Capacity in the People's Republic of China

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For Asian Development Bank

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## **ABBREVIATIONS**

NBS	National Bureau of Statistics
PBOC	People's Bank of China
PRC	People's Republic of China

## **CURRENCY EQUIVALENTS**

(as of 30 June 2015)

Currency unit	–	yuan (CNY)
CNY1.00	=	\$0.1636
\$1.00	=	CNY6.1136

## I. Introduction

Since the 1990s, manufacturing in the People's Republic of China (PRC) encountered several rounds of excess production capacity. To address this issue, the government has taken a series of measures over time in the areas of administrative management, industrial development policies, environmental regulations, and monetary policies. During 2007-2013, managing excess capacity was flagged as one of the key government tasks at each of the annual central economic work conferences. At the conference in December 2013, the government clarified that capacity utilization in the steel, cement, aluminum, plate glass, and shipbuilding industries were all below 75%, and decided to bring capacity utilization back to normal. Four options for this were proposed: (i) boosting domestic demand to absorb excess capacity, (ii) boosting external demand through a "go global" strategy, (iii) using mergers and acquisitions to reduce excess capacity through consolidation, and (iv) strengthening and better enforcing environmental and energy efficiency standards to eliminate some capacity.

Although there is no consensus on the definition of excess capacity<sup>1</sup> and how to measure it<sup>2</sup>, historical data for the US (1967-2013), 17 Eurozone countries (1991-2013), Japan (1978-2013), Korea (1988-1998), Brazil (2005-2012) and Taipei,China (1981-2007) suggests that the normal capacity utilization rate is between 79% and 83%. A level of capacity utilization above 90% then implies capacity shortage while below 75% implies significant excess capacity<sup>3</sup>.

## II. Level of Excess Capacity in the PRC

Quarterly data from the People's Bank of China (PBOC) and the National Bureau of Statistics (NBS) shows that the PRC's manufacturing sector suffered from low capacity utilization (below 79%) during the second quarter (Q2) of 1992 and the first quarter (Q1) of 2002, and between Q4 2008 and Q4 2009, with average capacity utilization rate at 69.6% and 75.8%, respectively (Figure 1). Capacity utilization between Q1 2013 and Q1 2014 (Figure 1) stood at 80% on average for manufacturing in total, close to the minimum of the range that can be seen as normal.

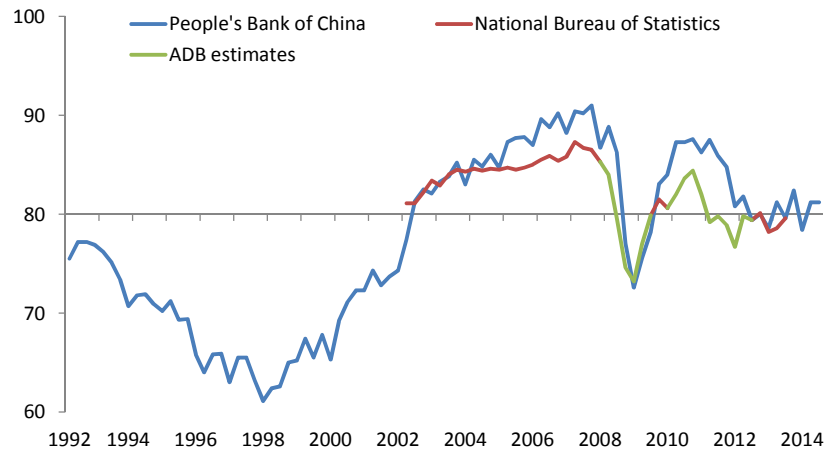
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<sup>1</sup> Chamberlin (1933) and Cassels (1937) regard "excess capacity" as the gap between capacity output (the lowest point on the total average cost curve) and actual output. Klein (1960) defines full capacity as the attainable level of output that can be reached under normal input conditions—without lengthening accepted working weeks, and allowing for usual vacations and for normal maintenance.

<sup>2</sup> There are two kinds of indicators to observe excess capacity: One is capacity utilization, or the ratio of actual output to capacity (Klein and Long, 1973; Berndt and Morrison, 1981), and the other is the firm's operating performance as reflected in prices, profitability and indebtedness (Lu Feng, 2010; Shen Kunrong et al, 2012).

<sup>3</sup> According to the PRC's National Bureau of Statistics (NBS), the normal capacity utilization rate in most developed and developing countries is between 79% and 83%, with above 90% means capacity shortage while below 79% implies excess capacity (Jiang Yuan, 2006).

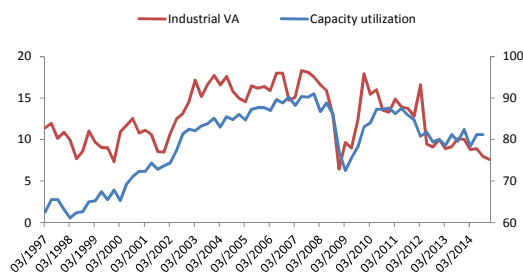
**Figure 1: Capacity Utilization**



Sources: People's Bank of China, National Bureau of Statistics, ADB staff estimates.

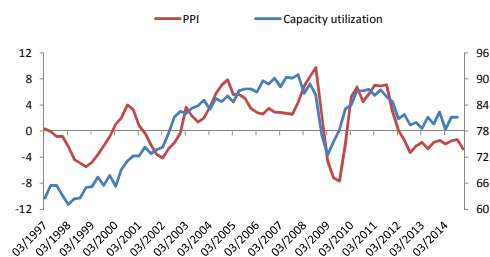
As there are gaps in NBS reporting about capacity utilization and the PBOC publishes its data with a time lag, we estimate capacity utilization with the growth rates of industrial value-added (VA) and the producer price index (PPI) as independent variables; this approach is based on experience in the US and 17 Eurozone countries. Industrial value-added growth, PPI, and capacity utilization are obviously closely correlated (Figure 2 and Figure 3).

**Figure 2: Industrial VA and capacity utilization**



Sources: People's Bank of China, National Bureau of Statistics.

**Figure 3: PPI and capacity utilization**



Sources: People's Bank of China, National Bureau of Statistics.

A regression analysis (Table 1) shows that the relation between capacity utilization, the growth of industrial value added, and producer price index in the PRC is robust. Using the equation below, we estimate that capacity utilization in Q4 2014 stood at 78.4%, or somewhat below the normal range.

$$\text{Capacity utilization} = 76.0113 + 0.4739 \cdot \text{Growth of industrial value added} + 0.6023 \cdot \text{Producer price index} + 0.3623 \cdot \text{MA}(1)$$

**Table 1: Regression results**

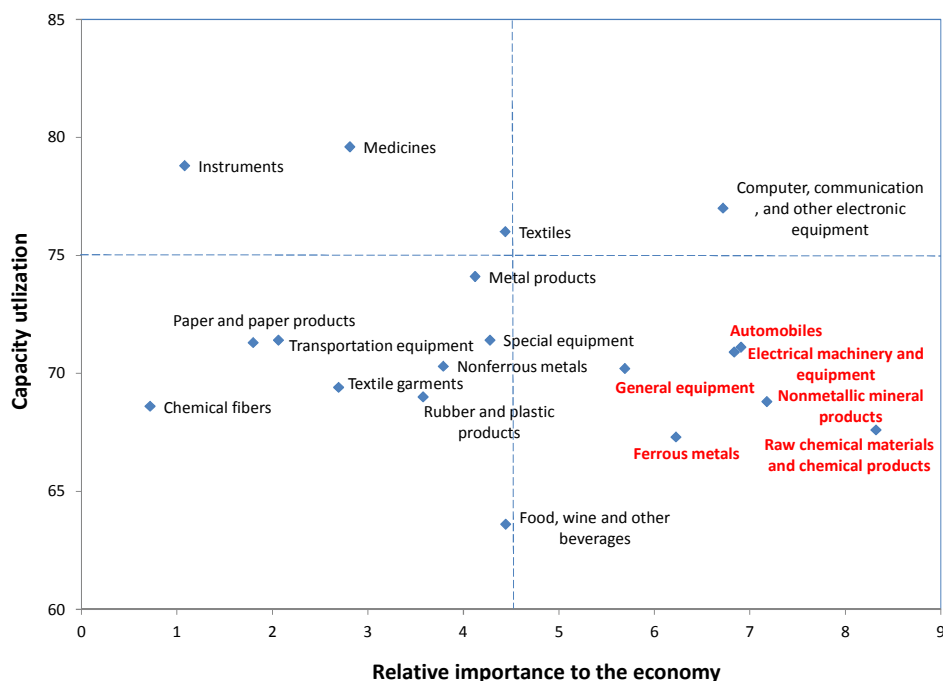
Dependent Variable: CAPACITY\_UTILIZATION  
 Method: Least Squares  
 Date: 04/20/15 Time: 13:51  
 Sample (adjusted): 12/01/2001 9/01/2014  
 Included observations: 52 after adjustments  
 Convergence achieved after 21 iterations  
 MA Backcast: 9/01/2001

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	76.01129	1.828743	41.56478	0.0000
PPI	0.602288	0.116951	5.149922	0.0000
INDUSTRIAL_VA	0.473903	0.137525	3.445941	0.0012
MA(1)	0.362297	0.136061	2.662750	0.0105
R-squared	0.763190	Mean dependent var		83.63731
Adjusted R-squared	0.748389	S.D. dependent var		4.604761
S.E. of regression	2.309787	Akaike info criterion		4.585991
Sum squared resid	256.0856	Schwarz criterion		4.736087
Log likelihood	-115.2358	Hannan-Quinn criter.		4.643534
F-statistic	51.56461	Durbin-Watson stat		1.624611
Prob(F-statistic)	0.000000			
Inverted MA Roots	-.36			

The analysis of disaggregated data, however, indicates that different sectors of manufacturing experienced excess capacity problems to different extents. According to data from the Chinese Entrepreneurs' Survey conducted by the Development and Research Center under the State Council, 19 out of total 29 sectors of manufacturing encountered significant excess capacity in 2012-2013.

To find the sectors that face not only pronounced excess capacity but are also large enough to have a substantial impact on the economy, we calculated the simple average of the share of the number of enterprises, asset, revenue from principal business, and profit of the individual sectors to reflect their economic importance and used the Chinese Entrepreneurs' Survey results to assess excess capacity (Figure 4). It appears that ferrous metals, raw chemical materials and chemical products, non-metallic mineral products, general equipment, electrical machinery and equipment, and automobiles (in red) were the most problematic sectors in 2013.

**Figure 4: Sectors with excess capacity and economic importance**



Sources: Development and Research Center of the State Council, National Bureau of Statistics.

Given data constraints, we then calculated the capacity utilization rates of five subsectors under the above mentioned sectors, for which we have both output and capacity data, and found that four of them were characterized by pronounced excess capacity in 2012-2013: crude steel, cement, chemical fertilizers, and motor vehicles (Table 2).

**Table 2: Capacity utilization of 4 subsectors**

	Crude steel <sup>(i)</sup>	Cement	Chemical Fertilizers	Motor Vehicles
2001	88.6	90.3	-	62.6
2002	92.3	-	-	123.5
2003	84.3	75.5	58.6	-
2004	80.2	73.7	-	58.7
2005	87.6	76.8	70.3	55.4
2006	89.1	75.9	69.0	65.9
2007	80.2	74.2	70.8	69.3
2008	79.5	68.8	-	-
2009	80.4	-	-	-
2010	79.8	-	-	-
2011	81.3	71.6	69.9	77.4
2012 <sup>(ii)</sup>	76.2 (68.7)	70.8 (73.7)	67.4	74.4
2013 <sup>(ii)</sup>	74.3 (72.1)	(75.8)	-	-

*Note: (i) Data on crude steel are from the China Iron and Steel Association, (ii) data in brackets are from the Ministry of Industry and Information Technology, and (iii) “-” means data unavailable.*

*Source: National Bureau of Statistics, China Iron and Steel Association, Ministry of Industry and Information Technology.*

In summary, excess capacity in PRC’s manufacturing as a whole was not as serious in 2012-2014 as it was in 1992-2002 and 2008-2009, but a number of economically important sectors and subsectors did suffer from pronounced excess capacity.

### **III. Reasons for Excess Capacity in PRC’s Manufacturing**

Although excess capacity usually occurs when an economy faces deteriorating domestic and/or external demand in line with changes over the business cycle, its persistence in many of the PRC’s manufacturing sectors for longer periods cannot be fully explained by demand side factors. In fact, the most important reason for excess capacity in PRC’s manufacturing seems to be on the supply side, especially the continuously rapid growth in fixed asset investment. During 2002-2013, average annual growth of investment reached 19.7% in real terms, almost doubling real GDP growth (10.1%). As continuously increased investment expanded capacity in manufacturing and crowds out consumption, the relation between supply and demand deteriorated, resulting in overinvestment and eventually excess capacity. Several factors associated with government and market failure likely contributed to overinvestment and excess capacity in the PRC’s manufacturing.

First, decentralized investment decisions under incomplete information can help to explain excess capacity. The investment behavior of firms who share a consensus about the next promising industry can be described as “wave phenomenon”. Such consensus will trigger a wave of investment and eventually result in excess capacity. As the PRC maintained a rapid economic growth for a quite a long time (e.g. average annual GDP growth of 9.9% in 1979-2008), strong infrastructure development demand attracted huge investment in steel, cement, and other construction materials. For instance, the investment in steel and iron grew by 45.9% year on year in 2002 and 89.2% in 2003. Domestic demand for steel and iron was increased by around 15%-20% per year in 2007-2008. As the number of investment projects was huge, target sectors were concentrated, and the sources of investment were decentralized, coordination among investors was very difficult, resulting in overinvestment and excess capacity in sectors such as steel, cement, plate glass, and aluminum.

Second, under the current education and technology management system, enterprises in manufacturing have low incentives to upgrade their technology and products. During the high growth period before the global financial crisis, many producers grew overoptimistic about ever-increasing market demand. They did not invest sufficiently to move up in the value chain by increasing quality or developing new products. Instead, enterprises focused on expanding capacity at the low-end of the value chain.

Third, the implementation of the huge stimulus package aimed at offsetting the impact of the global financial crisis in 2008-2009 encouraged local governments and enterprises to excessively increase production capacities. Although the government’s massive CNY4 trillion stimulus aimed to boost investment in infrastructure and social housing, it was also

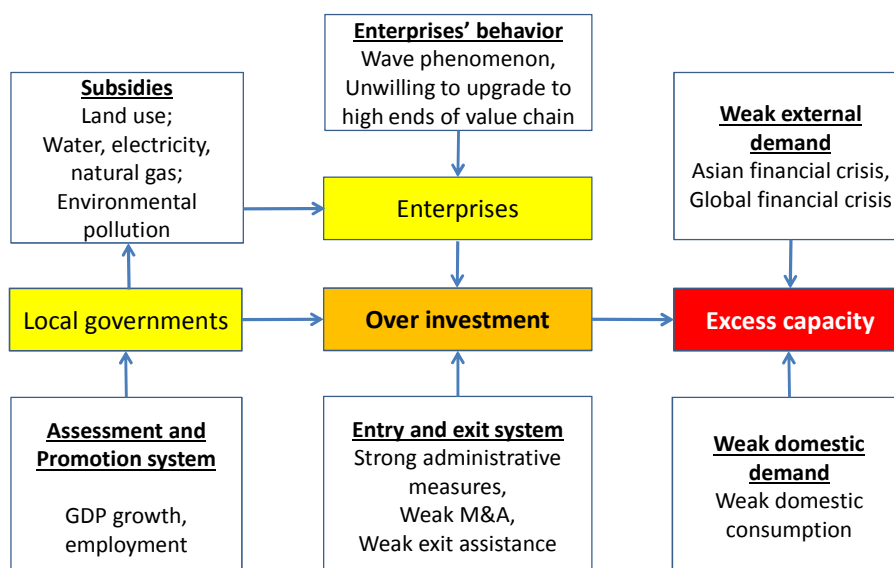


used to support so-called “strategic” industries including steel, automobile, and shipbuilding, contributing to excess capacity in these sectors. For instance, capacity in the steel sector increased by 52% in 2009 alone. Similarly, the newly added number of production lines in plate glass in 2009-2012 was 40% of the total number of production lines added in the past 30 years.

Fourth, under the traditional division of fiscal power between central and local governments and the promotion system for government officials, local governments have a strong motivation to promote economic growth through investment without considering social and environmental costs. That has led local governments to supply land at below-market prices, provide explicit or implicit guarantees for bank loans to selected enterprises and industries, or tolerate environmental damage caused by such enterprises and industries. This distorted enterprises’ investment behavior and eventually caused overinvestment and excess capacity. Other input factors were also provided at below market rates, which is why the inadequate marketization of productive factors (e.g. land, water, electricity, natural gas, environment, bank loans, etc.) is frequently seen as one of the most important reasons for the persistent excess capacity in PRC.

Fifth, the lack of a functional market entry and exit mechanism in the PRC is also influencing the elimination of excess capacity. To avoid unemployment and social instability, local governments are reluctant to implement the bankruptcy law and encourage enterprises’ closure, mergers and acquisitions. For instance, the number of employees in the steel and iron sector in Hebei province reached more than 600,000 in 2011. About 28% of them would have to be laid off if the out-of-date excess capacity was eliminated. How to deal with around 170,000 laid-off workers would be a great challenge to Hebei government. The reasons for excess capacity in PRC’s manufacturing could also be illustrated as Figure 5.

**Figure 5: Channels to excess capacity in PRC’s manufacturing**



Source: Asian Development Bank staff.

In general, government measures to address excess capacity in manufacturing have had some impact. However, the fact that excess capacity still persists, at least in some industries, indicates that more emphasis should be placed on how to eliminate undesired consequences of government intervention.

#### **IV. Policy Implications**

To reduce the remaining excess capacity in the PRC's manufacturing sector, it is recommended to accelerate reforms by making better use of the market-mechanism in line with the decisions of the Third Plenary Session of the 18th Communist Party of China Central Committee.

- Reform the current administrative management system. This includes rearranging fiscal relation between the central and local governments, and changing the promotion system of government officials. In line with the amended budget law, public expenditure should be more transparent and better monitored to avoid subsidy competition between local governments. The reforms on local government official promotion system, which focuses on GDP growth, should be speeded up to eliminate the strong motivation on the part of local governments to intervene in enterprises' investment.
- Reform markets for production factors. Relevant reforms include (i) land reforms to clarify land property rights and to ensure fair competition in land utilization; (ii) utilities pricing reform to make it more expensive for enterprises with excess capacity to use electricity, water and energy; and (iii) financial reform to improve the access of more competitive enterprises, including small and micro sized enterprises, to bank loans.
- Reform technology administration system. More support should be given for enterprises to upgrade their products and move up the value chain, by strengthening the protection of intellectual property rights, intensifying vocational education and training, and increasing public spending on research and development, among others.
- Establish a functional market entry and exit mechanism. Setting market entry standards should be based on indicators focusing more on social externalization such as environmental protection, energy efficiency, and quality control. To force enterprises with excess capacity to exit the market, the government should provide necessary social security and compensation, and (re-)training for laid-off employees.