

Tackling Corporate Debt— Reducing Overcapacity, Removing Zombies, and Reforming State-Owned Enterprises

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Abstract: *High and rising corporate debt has become a key vulnerability in China. Using the firm-level industrial survey data, this paper is the first study to document the empirical linkages among overcapacity firms, nonviable “zombie” companies, and state-owned enterprises (SOEs). We find that, as a group, these companies account for an outsized share of debt and face weakening fundamentals, putting them at the forefront of tackling corporate debt vulnerabilities. As the government is rolling out reforms to resolve the vulnerabilities, the empirical results provide strong evidence on the necessary policy to tackle. A more holistic and coordinated strategy that identifies and triages weak firms, recognizes and allocates losses, and fosters operational restructuring of viable firms will be crucial. This in turn requires decisive SOE reform to harden budget constraints and facilitate market entry.*

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The views expressed in this paper are those of the author(s) and do not necessarily represent those of the IMF or IMF policy.

I. Introduction

Faced with high and rising corporate debt, the government has put forward a broad agenda to address the risks of excessive leverage. The strategy aims to restructure debt, reduce overcapacity, and eliminate nonviable “zombie” firms.¹ At the same time, the government is pursuing gradual deleveraging and reforming its SOEs to reduce misallocation of credit flows.

This paper uses the firm-level industrial firm survey in China from 1998-2013, supplemented by aggregate data from 1998-2016. Applying firm characteristics, we are able to document the dynamics of the group (nonviable zombie firms, overcapacity companies, and SOEs) and their performance over time and across regions.

These components are closely connected. As a group, SOEs, zombies, and overcapacity firms account for an outsized share of total corporate debt and its increase in recent years. Implicit guarantees and the government’s desire to support growth encourage these firms to take on excessive investment, which raises already-high leverage while weakening their fundamentals, such as profitability and debt-service capacity. As a result, overcapacity and zombies are more common in industries with protected markets that SOEs dominate. This underperformance suggests a need to exit or operationally restructure. Substantial overlap puts these companies at the forefront of policies to tackle corporate debt (text table).

Scorecard of Corporate Debt Vulnerabilities			
Indicators	State-owned enterprises	Overcapacity firms	Zombie firms
Different dimensions of corporate debt vulnerabilities:			
1 High corporate debt (as of the aggregate)	Dark red	Red	Green
2 Large contribution to the rise of corporate debt	Dark red	Yellow	Yellow
3 Weak corporate fundamentals	Dark red	Dark red	Dark red
4 Heavy regional concentration	Yellow	Dark red	Red
1/ The degree of vulnerabilities ranks from dark red, red, yellow, green. Dark red indicates the most severe vulnerabilities.			

The paper also provides significant empirical results that shed light on policies to successfully tackle the corporate debt vulnerabilities. In addition to stylized facts on these group of companies, empirical results also indicate key determinants of nonviable zombie firms. We also compare the current situation relative to the reforms in the early 2000s that saw a major restructuring of corporate debt, particularly in SOEs.

¹ Nonviable zombie firms are those whose liquidation value is greater than their value as a going concern, taking into account potential restructuring. Kane (1989) first describes the term to refer to an insolvent bank that was kept alive during the Saving & Loan Association Crisis in the United States in the 1980s. In Japan, nonviable zombies refer to corporations that received persistent lending even with weak repayment capacity, which was one of the main culprits contributing to the “lost decades” (Hoshi and Kashyap, (2004), Ahearne and Shinade, (2005), and Jaskowski 2015).

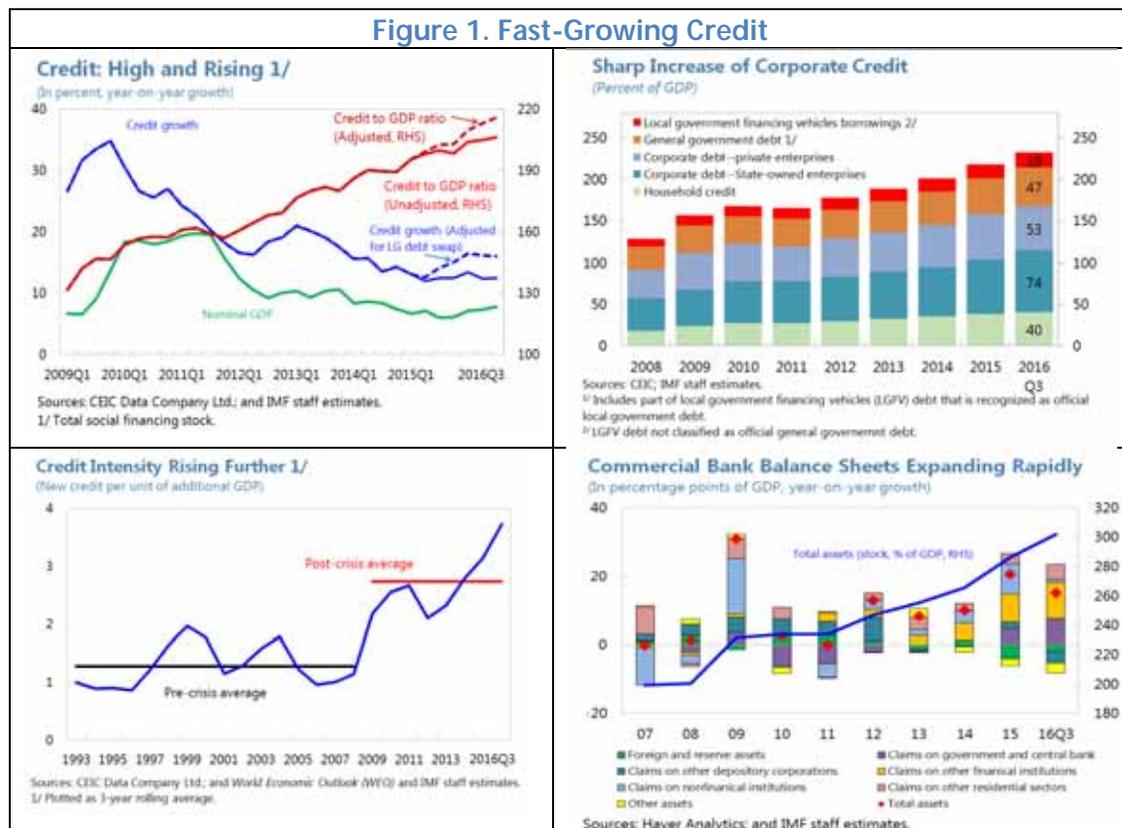
In this note, section II provides background on zombies, overcapacity firms, and SOEs. Section III discusses recent government measures in tackling debt vulnerabilities, followed by the empirical methodology and results in Section IV. Section IV outlines policy implications and the last section concludes.

II. Background and Analytics

A. Corporate Debt Vulnerabilities

High and rising debt vulnerabilities. Credit growth has accelerated (12.6 percent year-on-year in Q3 or 16 percent if adjusted for local government debt-swaps) and continues to grow much faster than nominal GDP (Figure 1). As a result, nonfinancial credit reached 167 percent of GDP as of end September and the deviation of credit growth from its trend rose to the historical and international high of 30 percent of GDP according to the Bank for International Settlements. SOEs have continued to leverage up, and accounted for 57 percent of corporate debt (or 74 percent of GDP) as of Q3. Total bank assets expanded by 16 percent y/y in September, while nonbank financial claims continued to grow.

The credit intensity of growth—a measure of credit efficiency—has continued to worsen. Industrial profits improved against a backdrop of rising producer prices and improving domestic demand, but the improvement among SOEs was modest.



B. Zombies

The government defines “zombies” as firms that incur three years of losses, cannot meet environmental and technological standards, do not align with national industrial policies, and rely heavily on government or bank support to survive.² This note uses two working definitions. The first classifies zombies as those incurring three cumulative years of losses (State Council definition). The second follows Fukuda and Nakamura (2011) to include firms that have estimated interest rates below market prime lending rates—a proxy for support from creditors or the government.³

➤ *Share and contribution.* Zombies account for a modest (3-8 percent) share of industrial firms and employment, and a slightly higher share (4-10 percent) of corporate debt (or 7-16 percent of industrial liabilities).⁴ These firms contributed to 3-7 percent of the overall rise of total corporate debt during 2008-15 (Table 1 and text table).

➤ *Corporate fundamentals.* Zombies play an important role in corporate debt vulnerabilities, not just because of their significant contribution to debt, but also due to their persistent weak performance. They have higher leverage, lower returns, slower growth, and lower productivity than non-zombie firms. About one-fifth of zombie firms remain as zombies (no exit or improvement) after 3 years. Their performance continues to deteriorate—even higher leverage and a further drop in returns and asset growth—and they survive without signs of recovery (text figure).

➤ *Regional concentration and connection with overcapacity and SOEs.* SOEs account for an outsized share of zombie firms (about half if weighted by debt or 30 percent by employment). Similar high exposures of zombies’ debt and employment are in overcapacity sectors and in North and Northeast regions (text table).

Table. Overlaps of Zombie firms, Overcapacity Sector, and SOEs

	Firm share	Debt share	Employee share
Zombie firms	in percent of industrial firms		
State Council definition	3.3	7.1	4.5
of which:	in percent of zombie firms		
SOEs	15	50	31
Overcapacity sector	13	15	10
North and Northeast regions	18	44	22
Modified Fukuda and Nakamura definition	in percent of industrial firms		
	6.5	16.2	8.1
of which:	in percent of zombie firms		
SOEs	11	55	30
Overcapacity sector	9	34	10
North and Northeast regions	15	40	20

Sources: NBS Industrial survey and staff estimates.

² In practice, local governments use both financial and production benchmarks to identify zombies. Financial benchmarks include three years of losses, liability to asset ratios exceeding 85 percent, negative operating cash flow, and debt in arrears for more than 1 year. Production benchmarks include capacity utilization rates less than 50 percent, suspended production for 6 months, and unpaid taxes or electricity bills (see [link](#)).

³ The State Council definition tends to underestimate the number of zombies by excluding those that survive on implicit support without incurring losses. The second definition may have overstate zombies because some dynamic firms may have initial years without profits and less reliance on debt finance.

⁴ There is a distinction between industrial liabilities (reported by the National Bureau of Statistics) and total corporate debt based on indicators on Total Social Financing published by the central bank. First, industrial liabilities do not cover nonindustrial (mainly services) sector and they include cross-company claims (for example, inter-company loans and account payables) that are netted out in the total credit data. Assumptions were made on the debt share of services and industrial sector and intercompany claims to get the estimates of corporate debt share and growth for zombie and overcapacity firms.

Table 1. Debt Vulnerabilities of Zombie Companies, Overcapacity Firms, and SOEs

As of end-2015 and in percent unless otherwise stated	Debt level		Contribution to overall corporate debt (2008-15)		Corporate performance				Regional concentration ^{1/}
	Corporate Debt		Increase (in percent of GDP)	Contribution	2003-2008		2015		2015
	Share of total	in percent of GDP			Leverage ratio ^{2/}	Returns on assets	Leverage ratio ^{2/}	Returns on assets	Share of provincial total
Total	100	119	45	100					
Private enterprises	45	53	19	42	144	7.1	101	5.9	...
State-owned enterprises	55	66	26	58	125	3.2	192	2.6	37
Overcapacity sector^{3/}	14	16	3	8	156	6.1	189	3.7	43
<i>of which:</i>									
<i>Coal</i>	3	3	2	5	146	6.9	205	0.8	17
<i>Steel</i>	5	6	0	1	162	6.0	180	3.1	18
Zombie firms^{4/}									
1) State Council definition	4	4	2	3	247	-5.3	346	-5.9	44
2) Modified Fukuda and Nakamura definition	9	10	3	7	242	-1.7	284	-1.6	40

Sources: PBC, CEIC, NBS, IMF staff estimates.

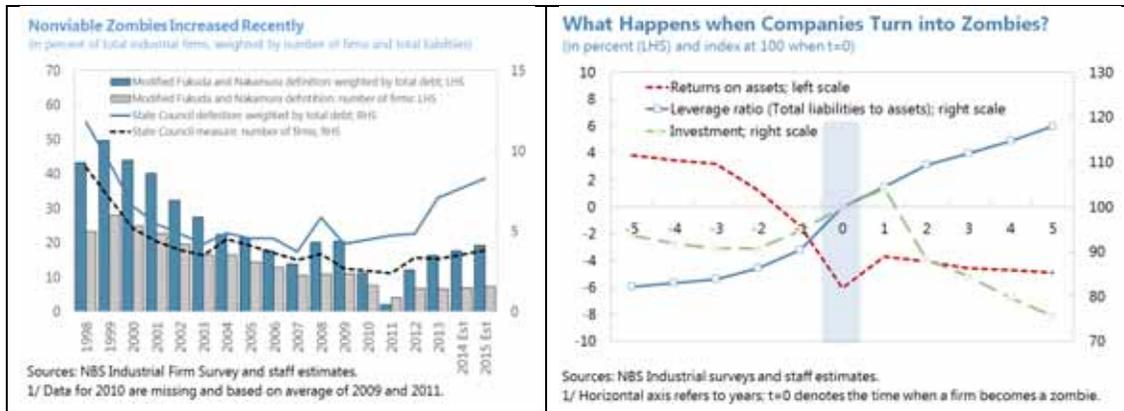
1/ Regional concentration is measured by the average share of industrial liabilities relative to the provincial total among the North and Northeast regions (Heilongjiang, Jilin, Liaoning, Shanxi, Shaanxi, and Hebei provinces, and Inner Mongolia autonomous region). For example, coal firms account for an average of 17 percent of industrial liabilities in the selected provinces (highest in Shanxi at 51 percent) and steel firms account for an average of 18 percent (highest in Hebei province at 37 percent). Overall, overcapacity firms account for 21-65 percent of industrial liabilities in North and Northeast regions.

2/ Leverage ratio is measured by total liabilities to total owners' equity (in percent).

3/ Overcapacity sector includes coal, steel, plated glass, cement, aluminum, nonferrous metals.

4/ The debt share of zombie firm is based on industrial liabilities in National Bureau of Statistics industrial survey from 1998-2013, which is then scaled to total corporate debt based on the aggregate ratio. Data after 2013 are estimated based on overall increase in credit and aggregate corporate performance.

Note: Numbers for overcapacity and zombies are preliminary estimates subject to revision.



C. Overcapacity Firms

The overcapacity sector usually refers to industries that suffer from persistently low capacity utilization rates of less than 70 percent. This note includes coal, steel, cement, plated glass, and aluminum industries as overcapacity sectors.⁵ The government has focused on capacity cuts in coal and steel sectors because of their larger regional concentration and greater presence of SOEs. China has contributed to about 80 percent of the rise in global crude steel capacity since 2010, and accounted for near half of global crude steel capacity and exported 14 percent of its output in 2015 (Figure 2 and European Union Chamber of Commerce 2016).

Table. Overcapacity Firms Play a Declining Role but Face Debt Overhang

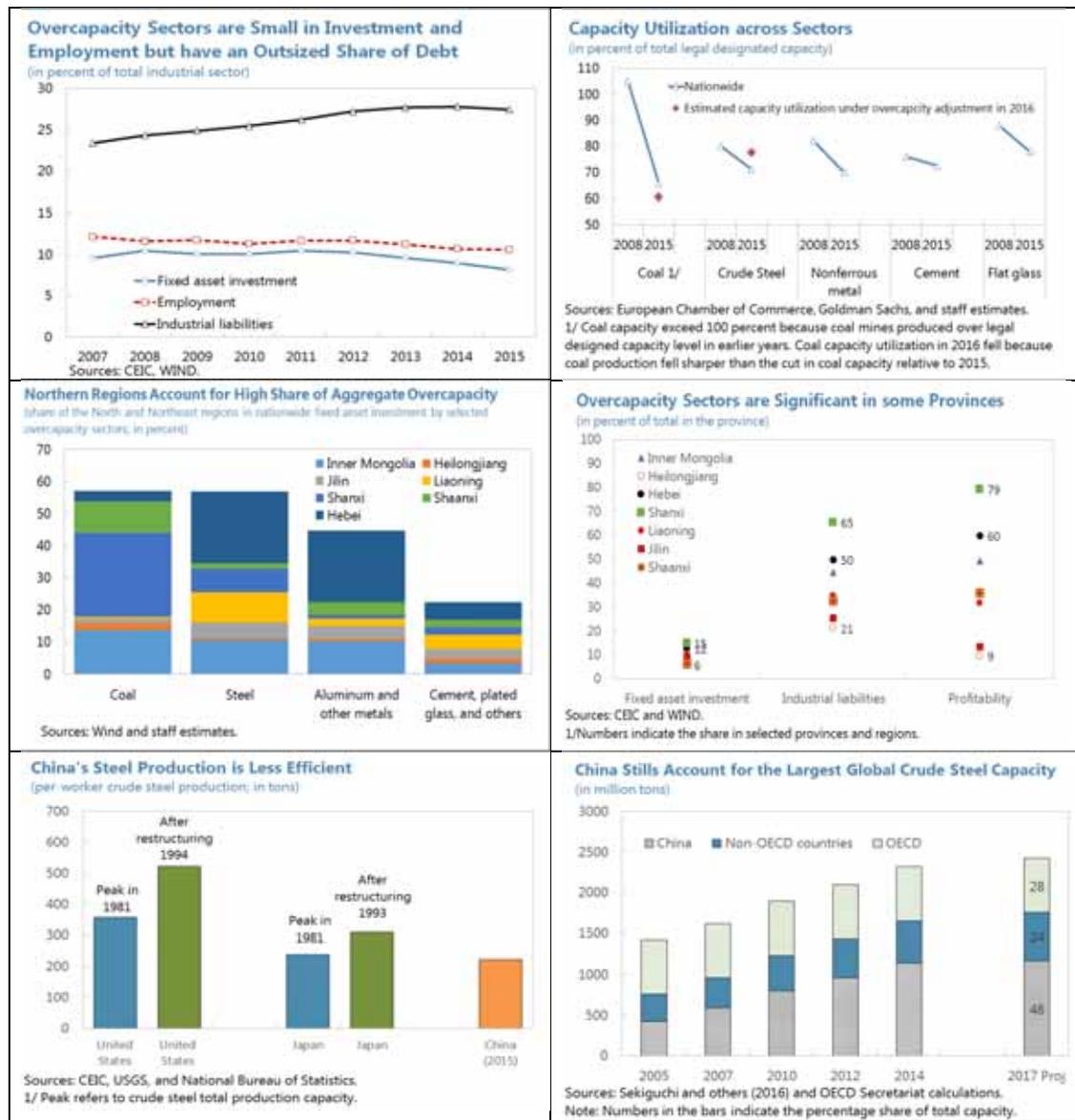
(in percent)	2008-2011			2015		
	Coal	Steel	Overcapacity sectors	Coal	Steel	Overcapacity sectors
Fixed asset investment (share of total)	2	4	10	1	3	8
(share of North and Northeast region)	58	62	48	57	57	41
Share of total industrial sector						
Employment	6	4	12	5	4	11
Total liabilities	5	12	25	7	11	27
Tax payment	7	8	22	4	6	17
Profitability	8	8	25	1	5	15
Leverage ratio	146	161	156	205	180	189

Sources: NBS, CEIC, and IMF staff estimates.
1/ North and Northeast region consist of seven provinces: Heilongjiang, Liaoning, Jilin, Inner Mongolia, Shanxi, Shaanxi, and Hebei.

- **Share and contribution.** Although overcapacity firms have contributed moderately to the rise in corporate debt during 2008–15, they are estimated to account for 10–15 percent of total corporate debt (about 27 percent of industrial corporate liabilities) (Table 1 and Figure 2). Their debt share has remained high despite declining employment and fixed asset investment, suggesting rising vulnerabilities of debt overhang (text table).

Figure 2. Overcapacity Sector Debt Overhang and Regional Concentration

⁵ Paper, solar power, chemicals, ship building, and auto-manufacturing are sometimes included in other studies such as European Chamber of Commerce (2016) and Maliszewski and others (2016). Data for these industries are grouped into the broader manufacturing sector.



- *Corporate performance.* Profitability has significantly weakened, with more than one-third of firms incurring losses in recent years. The leverage ratio has risen to 189 percent, and more notably in coal and aluminum sectors. Productivity in China's steel sector, measured by per-worker production, has been weaker than that in Japan and the United States at their peak of excess capacity in the early 1980s.
- *Regional concentration.* Overcapacity sectors have heavy regional exposure, which makes any adjustment difficult. For example, seven provinces in the North and Northeast regions account for over half of the output and investment for coal and steel industries (text chart).⁶

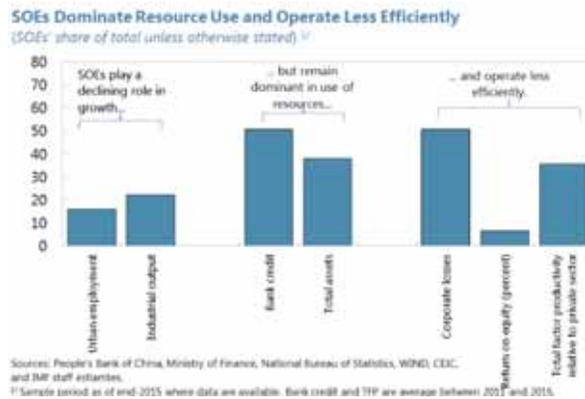
⁶ The North and Northeast regions refer to seven provinces, namely Heilongjiang, Jilin, Liaoning, Hebei, Shanxi, Shaanxi, and Inner Mongolia autonomous region.

Overcapacity sectors account for as much as two-thirds of industrial liabilities and as much as 70 percent of fiscal revenue in some provinces.

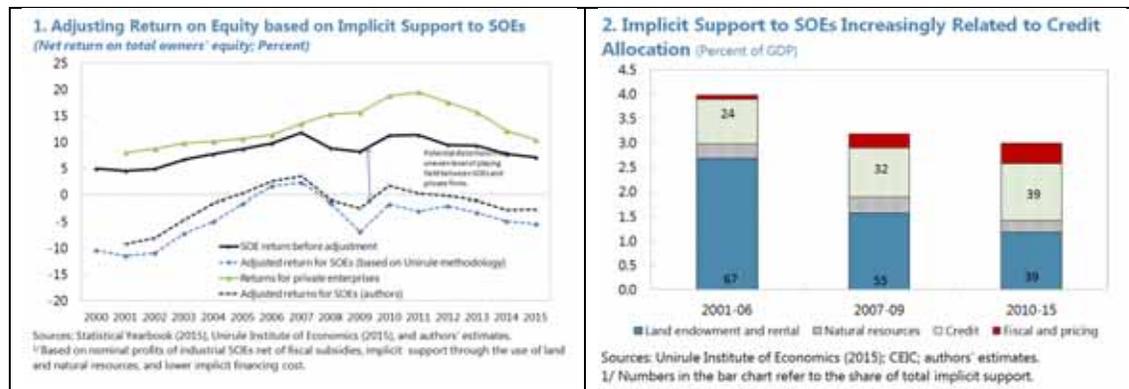
D. SOEs

SOEs often carry noncommercial functions such as pursuing national development strategies, undertaking investment to support growth, and performing social functions. About 102 central state-owned conglomerates (each has layers of subsidiaries) operate, which add up to some 150,000 nonfinancial SOEs nationwide. They tend to enjoy significant implicit support (3 percent of GDP) and benefit from protected markets.

➤ *Share and contribution.* While SOEs account for declining shares of output and employment, they have an outsized share of corporate debt (57 percent in 2015) and contributed to almost 60 percent of the rise in total corporate debt during 2008–2015 (Table 1 and text figure).



➤ *Corporate performance.* SOEs underperform private firms on average, with lower returns and larger losses (IMF 2016). Returns on assets have deteriorated to 2–3 percent since 2008 and interest expenses account for one-quarter of net profits on average, both worse than private firms. Many SOEs also suffered sizeable losses in 2015, mostly in resource-intensive industries with low capacity utilization. In addition, SOEs enjoy significant implicit support on factor inputs, such as land endowment, credit, and protected markets, which is estimated at about 3 percent of GDP per year and increasingly related to preferential access to credit (Lam and Schipke 2016). Adjusting for this implicit support shows that SOE return on equity would have fallen from an average of 8 percent to –1.3 percent during 2011–15 (text charts). The implicit support has contributed to resource misallocation and an uneven playing field.



III. Recent Developments and Policy Measures

A. Deleveraging and Restructuring Debt

Government deleveraging strategy. Addressing corporate debt vulnerabilities is a key reform of the Five-Year Plan (2016–20). The overarching strategy envisages a market and legal framework—rather than government direction and bailout—on debt restructuring and aims to guard against systemic or regional risks. A multi-pronged approach (for example, merger and consolidation, bankruptcy proceedings, debt-equity swaps, and corporate asset sales) will be pursued gradually on a firm-by-firm basis. The aim is that through this process, creditors can better distinguish risks and thereby harden budget constraints.

Recent measures and developments. Recent guidelines on deleveraging emphasize the use of market-based principles and legal frameworks.⁷ The guidelines allow for a wide range of restructuring tools (including debt-equity swaps, creditor committees, out-of-court workouts). The National Development and Reform Commission (NDRC) was tasked to lead a joint ministerial group to facilitate deleveraging. For SOEs, progress on deleveraging will become an assessment criterion for their management (Annex Table 1). Specific guidelines were also announced for:

- *Debt-equity swaps.* These are seen as one of many restructuring options for only viable firms. Banks can only conduct the swap through “implementation” institutions (for example, financial asset management companies, state investment corporations, or their own specially-created subsidiaries). The transfer price will refer to prices in secondary markets or other market benchmarks.
- *Creditor committees.* Banks are encouraged to establish committees to coordinate the restructuring of claims with multiple creditors. Committee decisions will be binding for remaining creditors, provided a majority is reached.⁸

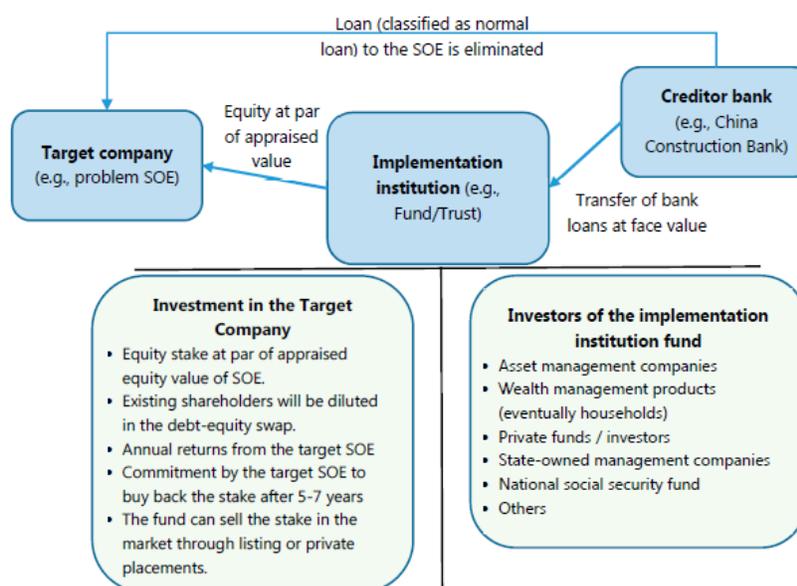
Incremental steps are under way on debt restructuring (Annex Table 1).

- Several troubled central SOEs have announced financial restructuring plans, mostly involving mergers and consolidation, with little emphasis on operational restructuring. Proposals for debt-equity swaps were announced for some SOEs (total face value RMB 120 billion) (Annex Table 2).
- Banks have incrementally raised their capital and accelerated write-offs and bad debt disposals (about 2–10 percent of bank loans) (Bedford 2016). The range has varied among regions, with limited effort by local banks in lower income provinces.

⁷ State Council (2016) “Opinions on Proactive and Prudent Corporate Deleveraging” *GuoFa* Document No.54.

⁸ China Banking Regulatory Commission (CBRC) (2016) “Notice on Implementing Creditor Committees in the Banking Sector”, September 2016. Majority is defined by a simple majority in the number of creditors and two-thirds super-majority in terms of claim amount.

- Corporate bond defaults have risen but remained very low. Among these 20-some cases, about half eventually received refinancing support, the majority were in the overcapacity sector, and about one-third were SOEs (Annex Table 3).⁹ The resolution so far appears lengthy and ex-ante less predictable, leading to fairly low recovery rates (20 percent for SOEs excluding those received refinancing support).
- The announced debt-equity swaps involve transfers of non-impaired loans at face value to implementation institutions, which then sell the equity (converted at par to the appraised net asset value of the underlying firms) to a wide range of investors, including wealth management products, private equity funds, state-owned capital management companies. These swaps do not seem to facilitate operational restructuring (for example, a change of management or spinoffs of noncore business) and usually come with a commitment by the problem firms to repurchase the stake after 5-7 years. In effect, the swaps resemble more a typical debt restructuring than a genuine conversion to equity at the market value.



Assessment

The deleveraging guidelines signal important first steps toward a comprehensive framework to resolve the corporate debt overhang. Emphasis on (1) market-based principles and insolvency framework, (2) firm viability, (3) concerted efforts from stakeholders to ensure fair and equitable treatment, (4) solid corporate governance, and (5) joint inter-ministerial group all represent clear commitment to resolving the corporate debt overhang.

While this represents progress, the guidelines and their implementation are less than desired. The guidelines lack important details on operational restructuring of weak firms and loss recognition and allocation. As SOEs are in the frontline of debt vulnerabilities, deleveraging efforts also require decisive SOE reforms to harden their budget constraints (see section III.D). The few SOE

⁹ China Railway Material Group was put into the custody of Chengtong Group, the state asset holding platform.

restructuring cases so far are pointing to increasing risk of a superficial financial restructuring to meet a deleveraging “target” without operational restructuring and tackling underlying problems, effectively “kicking the can down the road.”

B. Removing Zombies

Government strategy. The government mostly focuses on nonviable SOEs when referring to the zombie companies. Faced with weak and deteriorating performance in some SOEs, the government strategy is to let go of those zombies through a menu of options, including asset transfer, consolidation, and liquidation.¹⁰

Recent measures and developments. The government has identified over 2,000 central SOE subsidiaries (with total assets about 4 percent of GDP) and over 7,000 local SOEs as zombies (5 percent of total SOEs) (Annex Table 4). Besides the total number, little was announced or known about their size and financial performance. Reportedly, amendments are made to the regulation of nonperforming loans to expedite the recognition and liquidation of zombies. Coastal provinces (that are fast growing and have less overcapacity challenges) have taken advantage of the government initiatives, while the north and northeast provinces have moved more slowly.

Assessment. Allowing zombies to exit is appropriate but efforts to date seem to have relied more on forced takeover by zombie parents or other administrative restructuring rather the exits or liquidation. Lack of information on selected zombies makes it difficult to assess the progress and the impact on the economy. Although their debt level is estimated to be overall manageable and recovering producer prices will reduce the formation of new zombies, resolving them may still prove difficult due to lower recovery in each case and their weak performance is more entrenched.

C. Reducing Overcapacity

Government strategy and target. The government intends to phase out low-technology and high-polluting capacity through a combination of market forces, legal, and administrative measures. The coal and steel sectors have set a target to cut capacity by 10–15 percent of 2015 output level and to reduce employment by 1.8 million workers over 3–5 years. A restructuring fund of RMB 100 billion was set up to mitigate social cost. No official targets or projections have been set for other overcapacity industries.

¹⁰ The government defines zombies with broad criteria, which in practice boils down to several financial and production benchmarks (see footnote 3).

Recent measures. The government has taken legal action by imposing fines and penalizing violating firms. On the coal sector, it imposed a uniform cut of working days (from 360 to 276 days or about 23 percent cut) for the operation of coal mines.¹¹ The NDRC also set up a mechanism that linked coal production with price movements and encouraged coal miners and buyers to arrange long-term contracts (e.g., at prices 12 percent lower than the current spot price) to mitigate excessive price volatility (Annex Table 5). The current restructuring fund was largely disbursed to local levels to mitigate the social cost of layoffs. The banking regulator also tightened overcapacity refinancing.

Table. Overcapacity Adjustment Progress and Targets

	Overcapacity sectors	
	Steel	Coal
Actual outturn in 2015 (in millions of tonnage)		
Total output	804	3,747
Total capacity	1,131	5,700
Medium-term capacity cut target over 3-5 years		
in millions of tons	-100 to -150	-500
in percent relative to 2015 total output	-12.4 to -18.6	-13.3
in percent relative to 2015 capacity	-8.8 to -13.3	-8.8
Annual capacity cut target for 2016		
in millions of tons	-45	-250
in percent relative to 2015 total output	-5.6	-6.7
in percent relative to 2015 capacity	-4.0	-4.4
Completion relative to medium-term target	30 to 45	50
Memorandum items:		
Potential displaced workers (in millions of workers)	1.3	0.5

Sources: State Council GuoFa 2016 No.6 and No.7, NDRC, media reports, and staff estimates.

Recent developments. After a slow start, the government has intensified efforts to cut capacity and the 2016 annual target was reportedly met in November (text table). The decline of capacity and employment (0.8 million workers year-to-date) was in line with medium-term targets (Liao and others 2016), but output development was mixed: coal production was down by 12 percent but crude steel production increased by 4 percent year-over-year. Profitability improved and selected commodities prices surged significantly in the past few months, which reduced market pressures for firms to reduce capacity (Figure 3).

Despite tightening measures on refinancing, it remains common, however, for local governments and other SOEs to refinance overcapacity firms entering payment difficulties. Banks also seem generally not to classify problem debt as nonperforming loans. For example, seven large troubled coal SOEs in Shanxi province have rescheduled their debt (which was not classified as nonperforming) by extending maturity and lowering interest rates when local government officials promised repayment.

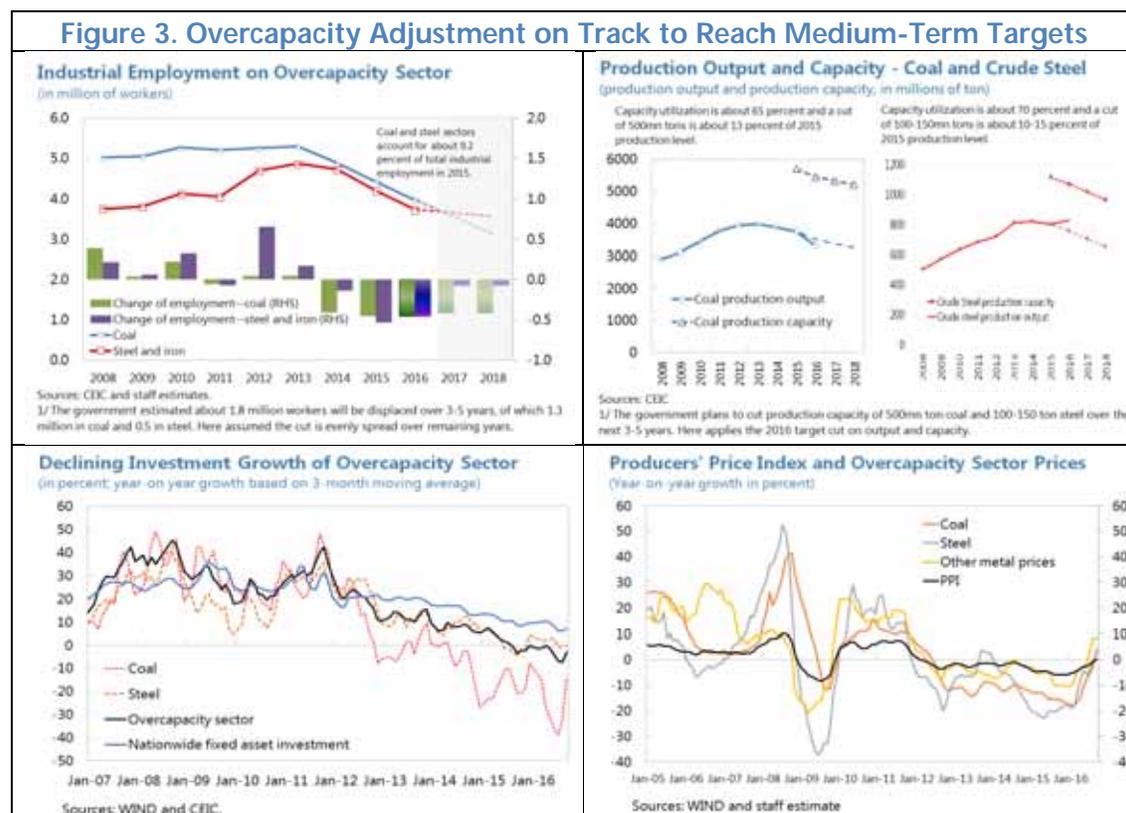
Assessment. The medium-term overcapacity reduction target is appropriately frontloaded but not very ambitious (an increase of capacity utilization rate by about 5 percentage points from the current level of 60-70 percent, and including only two of the over-capacity sectors). While capacity data are subject to wide interpretation, only a small fraction of the cut was related to closure of active plans. For example, in coal, only 5 percent of the capacity cut was related to active plants, while 46 percent of the cut was on retired coal mines that had already suspended production and the remaining half of the cut was related to nonproducing coal mines.¹² Under the current cut target, the crude steel capacity would likely continue to rise by 1.6-2.4 percent by 2017 from the 2014 level due to current and planned capacity investment (Sekiguchi and others 2016).

Despite the decline in investment and employment share, outstanding debt of overcapacity firms has not fallen, suggesting the full recognition of their problem loans still has a long way to go (for

¹¹ The threshold was eased from 276 to 330 days in November for technologically-advanced coal firms as the government wanted to expand supply to maintain coal price stability.

¹² China Coal Technology and Engineering Group (2016).

example, the seven largest coal firms in Shanxi that rolled-over their debt). More importantly, even if medium-term targets are met, considerable overlap of the sector with SOEs raises doubts if operational efficiency would improve significantly without substantial SOE reform (see below). The government has also relied on administrative measures, such as forced mergers, working day reductions, and window guidance on price setting, rather than market-based methods (such as liquidation and operational restructuring), which is more likely to provide lasting results, especially if prices of overcapacity sectors were to increase further.

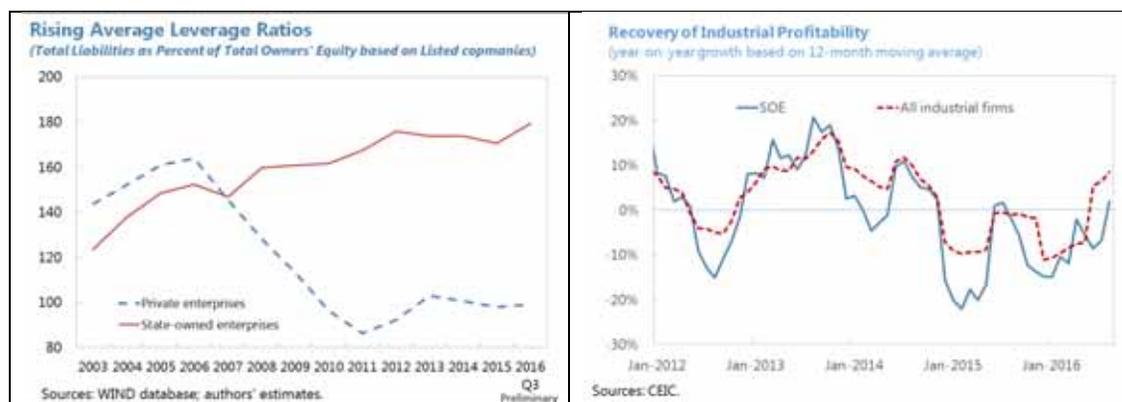


D. Reforming SOEs

Government strategy. SOE reforms were highlighted as key priorities in the Five-Year Plan (2016–20). The strategy is to “integrate naturally” modern corporate governance and strong leadership of the Communist Party to nonfinancial SOEs so that they can serve national development goals more efficiently. The current proposals aim to raise SOE efficiency and improve the supervision of state assets, while institutionalizing Communist Party leadership (IMF 2016 and Leutert 2016).

Recent measures and developments. Profitability of SOEs improved but at a smaller rate than private counterparts. They continued to build up leverage to 180 percent through September (text charts). Pilot plans have been under way to reform SOEs. First, a State-owned Enterprise Structural Adjustment Fund of RMB 350 billion (½ percent of GDP), financed by ten central SOEs, was established to facilitate restructuring. Second, deleveraging will be part of the

assessment criteria for SOE management. Third, all SOEs, including subsidiaries, are required to cut losses and be individually incorporated by 2017, and SOEs will no longer provide part of social functions (such as provision of utilities and property-management) to workers. Finally, the government has introduced a pilot in the Northeast region by identifying 40-60 local SOEs for debt restructuring and ownership reforms by 2018.



Assessment.

SOE reforms remain ambiguous about the role of the market and the state, leading to the conflicting objectives of greater market discipline and stronger political influence. The reforms also leave much room for interpretation in creating a more “arms-length relationship” between the government as an owner and corporate management (Naughton 2016 and Leutert 2016). Recent remarks by the leadership suggest reforms are titling toward greater political influence, which could risk misaligning incentives.

SOE reform implementation has lagged other reforms and has not unleashed new growth potential. For example, less than half of provinces have completed the first step of classifying SOEs into respective categories and reforms.¹³ Despite guidelines to divest SOE social functions from SOEs, implementation has proven difficult—also acknowledged by the government—reflecting vested interests, potential regional impact, and the lack of consensus. For example, central SOEs still bear the cost of social functions (RMB 100 billion or 0.2 percent of GDP per year) for over 7,000 entities. Progress is slower in regions where SOEs play an outsized role and have complex, multi-layer subsidiary structures.

While the SOE restructuring fund has the potential to jump-start restructuring, nontransparent operation could risk channeling support to ailing industries and thereby delay needed restructuring. The few proposals on restructuring several weak central SOEs focus on financial restructuring with less concrete steps to restore long-term viability.

¹³ In the sample of 13 city or provincial SASACs, about 56 percent of SOEs were classified as commercial competitive, 36 percent as commercial strategic, and 8 percent as social function SOEs. However, there is no detailed information about these SOEs by sector, size, and debt or ownership profiles.

IV. Empirical Analysis—Data, Methodology, and Results

This paper uses the firm-level industrial survey data during 1998-2013 and provincial- and aggregate level data from 1998 to 2016 in China to analyze the corporate debt vulnerabilities. We provide the current conditions of nonviable zombie companies relative to the past and identify the determinants of those zombies. This will inform the debate on how to let go of those zombies and resolve the corporate debt overhang.

A. Data

Data consist of firm-level data from the annual industrial surveys compiled by the National Bureau of Statistics. The data sample covers the annual period between 1998 and 2013 for about 1 million of companies in each year that have annual sales of RMB 5 million or above (1998-2008) and of RMB 20 million or above (2009-13). It is the most comprehensive dataset for industrial firms in China.

For consistency purpose, we use the firm-level observations with annual sales of 20 million or above and eliminated data outliers using the methodology in Feenstra, Li, and Yu (2014) and Cai and Liu (2009). Observations are deleted if: (1) key financial variables are missing or negative (e.g., total assets, sales revenue, gross value of industrial output, employment, and net fixed assets); (2) they do not meet the General Accepted Accounting Principles (GAAP), i.e., the value of variables in a firm's balance sheet such as liquid assets, total fixed assets, and the net value of fixed assets exceeds the total asset value; (3) employment is 10 people or more (financial reports of small firms are generally not reliable); (4) the firm identification code is missing or non-unique; and (5) the date of firm inception must be valid.

The aggregate data for the economy is obtained from National Bureau of Statistics, People's Bank of China, Ministry of Finance through the commercial data vendor CEIC.

B. Identification of “zombie” firms

This paper uses several criteria to classify nonviable “zombie” companies. The State Council broadly identifies nonviable ‘zombie’ companies that incur persistent losses of over three years and have little chance of recovery as a going concern basis. In practice, local governments use both financial and production benchmarks to identify zombies. For example, financial benchmarks include three years of losses, liability to asset ratios exceeding 85 percent, negative operating cash flow, and debt in arrears for more than 1 year. Production benchmarks include capacity utilization rates less than 50 percent, suspended production for 6 months, and unpaid taxes or electricity bills. In this paper, the State Council definition uses three-year of cumulative losses as the criterion.

Other definitions include those used in the literature, such as (1) Caballero, Hoshi, and Kashyap (2008) that defined zombie firms as receiving subsidized credit (actual interest cost less than market prime interest rates); (2) Fukuda and Nakamura (2011) that used both the persistent losses and credit subsidy ~~and persistent losses~~ or ever-green loans as criteria; and (3) Nie, Jiang, Zhang, and Fang (2016) that extended the Fukuda and Nakamura definition to two successive years.

The State Council definition tends to underestimate the number of zombies by excluding those that survive on implicit support without incurring losses. The definition in Fukuda and Nakamura (2011) might have overstate zombies because some dynamic firms may have initial years without profits and less reliance on debt finance. The FN definition better capture the significant feature of zombies: absorbing credit resources. This paper uses the baseline zombie index following FN definition except we take 25 percent off firms' short-term minimum interest payment (assuming half of them were 6-month debt), considering part of firms' short-term debt due less than a year. The State Council definition, FN definition, and FN-Nie definition go through the robustness check.

Zombie Definition	Sources	Criteria
State Council	China's State Council	· Firms with three years of successive losses
CHK	Caballero, Hoshi, and Kashyap (2008)	· Firms that have lower interest cost (interest payment divided by total debt) relative to the market interest rates (e.g., prime rate or benchmark rate)
FN	Fukuda and Nakamura (2011)	· Firms that have lower interest cost relative to the market interest rates, or the debt-to-asset ratio higher than 50 percent and increased over the year, and the earnings before interest and tax (EBIT) smaller than interest payment at market interest rate.
FN-Nie	Nie, Jiang, Zhang, and Fang (2016)	· Firms that fit the Fukuda and Nakamura definition for two successive years.
Modified FN	Baseline Index of this paper	· Firms that fit the Fukuda and Nakamura definition considering part of short-term debt due less than a year

C. Literature

Sustaining the nonviable zombie firms brought great cost to the economy. It will crowd out other private firms, contribute to a decline in productivity, and hinder competition.¹⁴ These companies are insolvent but continue to have access to resources, possibly from policy distortions such as implicit support by the government and banks. Some of the protection may be for incumbent workers. Institutional arrangements, such as the lifetime employment system in Japan, make firms in distress more likely to survive and employment protected (Hoshi 2007). Banks might

¹⁴ Ahearne and Shinada (2005) found that market share in low productivity growth industries increased during the 1990s and financial support from Japanese banks may have played a role in sustaining this perverse reallocation of market share. Kwon, Narita and Narita (2009) conducted a counterfactual exercise and showed that zombie lending would result in the loss of 37% of the actual decline in aggregate productivity growth due to inefficient labor reallocation in Japan's 1990s. Caballero, Hoshi and Kashyap (2008) employed a "creative destruction" model and analyzed the indirect costs of "zombies" through suppressing the normal competitive process in Japan. Tan, Huang and Woo (2016) used Chinese firm-level data in 2004-2007 period and found that government investment boosted the performance of zombie firms and crowded out the growth of private firms.

also have incentives to ‘ever-green’ loans, for example, weak borrowing firms in Japan between 1993 and 1999 were more likely to receive additional credit from banks (Peek and Rosengren 2005). Troubled banks allocate credit to impaired borrowers to avoid the recognition of loan losses in their balance sheet.

D. Empirical analysis and results

1. Determinants of zombie formation

Assessing the determinants of the zombie formation, we use a “probit” model with the following specification:

$$\Pr(zombie_{it} = 1) = \beta X_{it-1} + DInd + Dyear + Dreg + \varepsilon_{it}$$

where i denotes firms, t denotes time horizon at annual frequency, $zombie_{i,t}$ is the zombie index under various definitions, $X_{i,t-1}$ includes all explanatory variables in lagged terms to avoid endogeneity problem. Dummy variables such as industry (in 2-digit codes), year, and province / region are added.

Table 2. Baseline Results on the Determinants of Nonviable Zombie Firms
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	(1)	(2)	(3)	(4)	(5)	(6)	(7)
L.market_pca						0.003*** (0.000)	0.004*** (0.000)
L.government dominance			0.020*** (0.004)				
L.SOB dominance				0.024*** (0.005)			
L.market discipline					-0.034*** (0.006)		
L.subsidy		0.215*** (0.019)					0.215*** (0.019)
North & Northeast regions	0.028*** (0.001)						
overcapacity industries	0.035*** (0.002)						
soe	0.072*** (0.001)	0.060*** (0.001)	0.058*** (0.001)	0.058*** (0.001)	0.058*** (0.001)	0.058*** (0.001)	0.060*** (0.001)
L.leverage	0.255*** (0.001)	0.263*** (0.001)	0.261*** (0.001)	0.261*** (0.001)	0.261*** (0.001)	0.261*** (0.001)	0.263*** (0.001)
L.return on asset	-0.870*** (0.002)	-0.953*** (0.003)	-0.838*** (0.002)	-0.838*** (0.002)	-0.837*** (0.002)	-0.837*** (0.002)	-0.953*** (0.003)
L.size	0.004*** (0.000)	0.003*** (0.000)	0.003*** (0.000)	0.003*** (0.000)	0.003*** (0.000)	0.003*** (0.000)	0.003*** (0.000)
L.age	0.001*** (0.000)						
L.industrial sales growth	-0.050*** (0.004)	-0.051*** (0.004)	-0.066*** (0.004)	-0.066*** (0.004)	-0.066*** (0.004)	-0.067*** (0.004)	-0.051*** (0.004)
Year FE	YES						
Industry FE	YES						
Province FE	NO	YES	YES	YES	YES	YES	YES
Observations	1,857,863	1,534,908	1,857,814	1,857,819	1,857,814	1,857,814	1,534,859
Pseudo R-squared	0.234	0.249	0.243	0.243	0.243	0.243	0.249

*Note: Variable market_pca is the principal component of three correlated indexes: government dominance index, SOB dominance index and market discipline index. For all the regressions, there's one period lead between the dependent variable and continuous independent variables. Standard errors are reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.*

Empirical results suggest that zombie companies tend to underperform—higher leverage and lower profitability. These companies are larger in size and less pro-cyclical relative to non-zombie firms. A reduction of aggregate demand (proxied by average growth of sales in the industrial sector) would contribute to a rise of zombie companies. They are also more common among SOEs, are concentrated in overcapacity industries and in the North and Northeast regions. The coefficients are all statistical significant at the 1 percent level, and the magnitudes are also important in economic terms. These findings remain valid regardless of the different definitions of zombie companies (see Table [3] for results of other zombie definitions). These results confirm with our priors and the stylized facts in Section II that they are the key on corporate debt vulnerabilities and overlap with overcapacity and SOEs.

Table 3. Determinants of Nonviable Zombie Firms Based on Alternative Definitions

VARIABLES	(1) State Council	(2) Definition	(3) FN Definition	(4) FN Definition	(5) FN-Nie Definition	(6) FN-Nie Definition
L.market_pca	0.001* (0.000)	0.001 (0.000)	0.003*** (0.001)	0.004*** (0.001)	0.001*** (0.000)	0.001*** (0.000)
L.subsidy		0.128*** (0.014)		0.253*** (0.022)		0.106*** (0.014)
soe	0.026*** (0.001)	0.026*** (0.001)	0.069*** (0.001)	0.072*** (0.001)	0.044*** (0.001)	0.044*** (0.001)
L.leverage	0.046*** (0.001)	0.047*** (0.001)	0.326*** (0.001)	0.326*** (0.001)	0.155*** (0.001)	0.158*** (0.001)
L.return on asset			-1.033*** (0.003)	-1.179*** (0.003)	-0.619*** (0.002)	-0.635*** (0.002)
L.size	0.003*** (0.000)	0.003*** (0.000)	0.005*** (0.000)	0.005*** (0.000)	0.004*** (0.000)	0.004*** (0.000)
L.age	0.000*** (0.000)	0.000*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
L.industrial sales growth	-0.059*** (0.004)	-0.058*** (0.004)	-0.088*** (0.005)	-0.070*** (0.005)	-0.039*** (0.003)	-0.039*** (0.003)
Observations	1,006,523	988,420	1,857,814	1,534,859	1,314,103	1,297,379
Pseudo R-squared	0.0625	0.0624	0.251	0.258	0.260	0.259

*Note: Variable market_pca is the principal component of three correlated indexes: government dominance index, SOB dominance index and market discipline index. For columns (1) (2), there're three periods lead between the dependent variable and continuous independent variables, for columns (3) (4), there's one period lead, and for columns (5) (6), there're two periods lead. Standard errors are reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.*

More importantly, the likelihood of being zombie companies are also closely related to the behaviors of banks and local governments, as well as the legal framework. Zombie survives on support despite persistent losses.

- **Local governments.** In particular, the government support (estimated using an index of government direct intervention level across provinces by Fan et. al. (2011) is a decisive factor on the zombie formation. The variable uses the average share of the working hours that firm managers spend with government officials in a particular province. The estimated coefficient is positive and statistically significant at the 1 percent level. In addition, the regression also has specification using the government subsidies to the firm to measure the level of government support. Higher explicit subsidy tends to raise the possibility of turning into a zombie company, ceteris paribus.
- **Local banks.** Banks may extend or roll over credit for zombie companies because of soft budget constraints and close connections with local governments or local economy. Provinces that have a higher deposit share by the major state-owned banks tend to contribute to a higher

likelihood of zombie formation. The coefficient is positive as expected and is statistically significant.

- **Barriers of entry and exit.** Better bankruptcy mechanism can facilitate firms' entries and exits. Provinces with greater marketization level of firms' exit framework and stronger legal framework, measured by the share of lawyers and accountants in the overall population, tend to reduce the likelihood of firms becoming zombies. In other words, weak firms might have directly exited before turning into zombie companies.

2. Transition from zombies to viable companies

Next question of interests is to identify the transition of turning nonviable zombies into viable companies or of facilitating their exits. This is critical in guiding the government policies in light of the reform priorities to deleverage. This is closely tied to policy implications on how to restructure or liquidate those nonviable zombie firms. Here we investigate: (1) under what situations zombies might be more difficult to recover and (2) what action the nonviable firms take would help the transition out of the 'zombie' state.

Although nonviable zombies, in principle, should have exited the markets, our definitions of zombies allow for possibilities that some zombies can recover to viable companies. Our data show that more than half of zombies would stay as zombies in the following year but about one-fifth has turned to non-zombies in our definitions in the following year.

2.1 Duration of staying as 'zombies'

The paper uses the duration and survival analysis in statistics to help assess the transition in the data sample. A firm classified as zombie this year can transit into one of the three states: staying as zombie, recovering into a viable company, or exiting the sample (e.g., liquidation). In the data sample, there is a chance that a zombie might experience multiple transitions, which we regard as independent observations. To avoid bias in the estimation, a left-censored treatment on observations is added to exclude those firms that are classified as zombies in the first year of the dataset.

The survival and hazard functions assume n independent observations denoted $(t_j, C_j), j = 1, 2, \dots, n$, where t_j is the "survival" time (zombie duration) and C_j is the event indicator variable C of observation j . C_j takes on a value of 1 if "failure event" (zombies recover into non-zombies) occurred and 0 otherwise. Assume there are $m \leq n$ recorded times of zombie recovery. Denote the rank-ordered zombie duration times as $t_1 < t_2 < \dots < t_m$. Let n_j denote the number of subjects at t_j and let d_j denote the number of observed zombie recovery. The Kaplan-Meier estimator at time t is given by

$$\hat{S}(t) = \prod_{j|t_j \leq t} \left(\frac{n_j - d_j}{n_j} \right)$$

The Kaplan-Meier estimator is a nonparametric estimate of the survivor function, which shows the probability of not turning into a non-zombie in time period t , and it is robust to data censoring.

- **Hypotheses.** Several hypotheses can help identify conditions that help sustain zombie survivals. For example, firms with higher public policy burden tend to be more entrenched in staying as zombies. Specifically,
 - a. Zombies that are SOEs are more difficult to recover because of soft budget constraints and implicit support.
 - b. Zombies that receive explicit subsidy, higher debt burden, and/or redundant workers are less likely to recover to viable firms.
 - c. Zombie firms in overcapacity industries and/or regions are more entrenched as zombie firms.

Regression. We illustrate the Kaplan-Meier estimates on the duration of the zombie firms based on firm characteristics (Figure 4). At the same time, we also examine the the Cox-proportional hazard model with a multivariate regression analysis. Unlike the classical linear regression, the Cox regression does not directly model the survival time (the duration of zombie status) but rather the natural logarithm of the hazard rate function. Specifically, the model is:

$$h_j(t) = h_0(t) \exp(x_j \beta)$$

The hazard function $h_j(t)$ is the probability of the expected event when a zombie firm turning into a non-zombie firm, conditional on the observation j that has been a zombie for t years. $h_0(t)$ denote the underlying baseline hazard function and need not be specified for the parameter estimation, x_j includes all the independent explanatory variables. Taking logarithm will arrive at a linear regression model:

$$\ln h_j(t) = \ln h_0(t) + x_j \beta$$

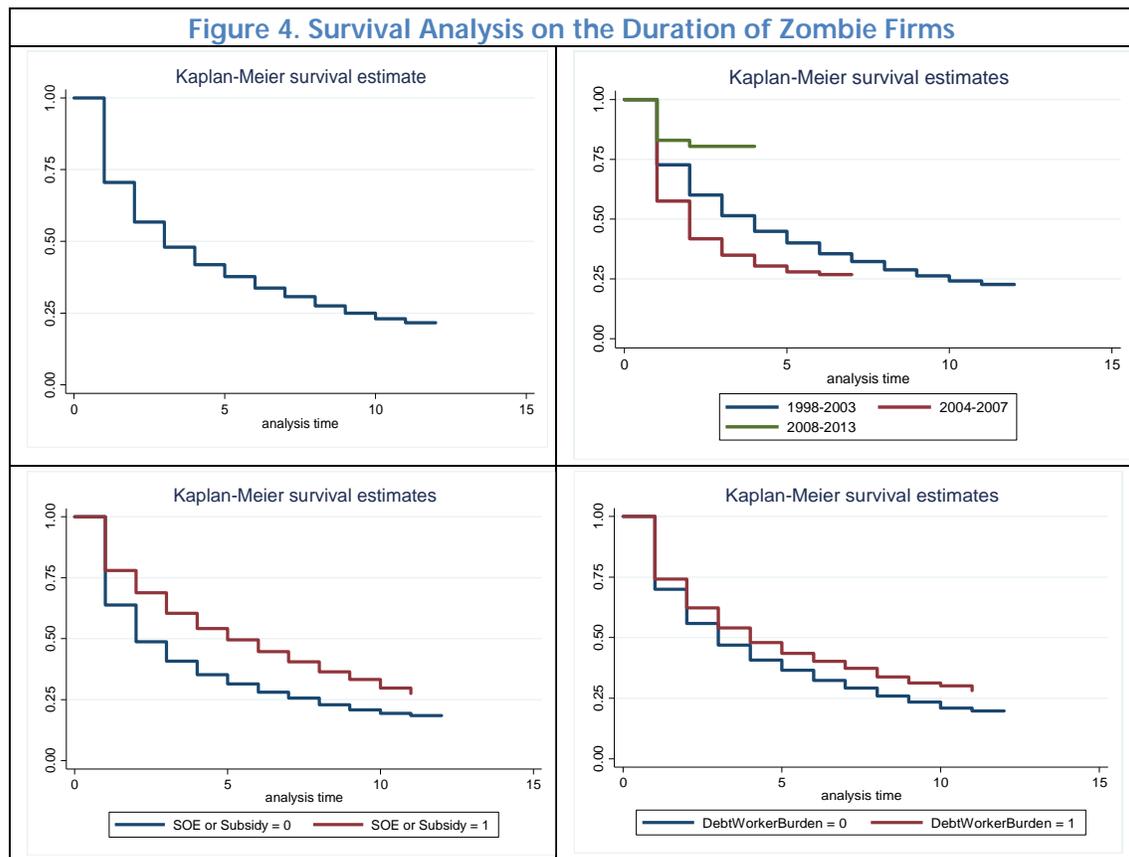
The regression results confirm that zombie firms with higher political connection or policy burden have a lower possibility of recovering into viable firms.

Empirical results. Empirical results tend to support these hypotheses (Figure 4 and Tables 4 and 5). The estimated survival functions—based on mean value of zombie firms during the period—is downward-sloping that shows that about 30 percent of zombie firms stay as zombies after 5 years of becoming one. A steeper downward slope indicates a faster transition to non-zombie state, while a flatter curve shows firms are more entrenched as zombies.

When separating into sub-samples over time, those firms that recently became zombies during 2008-13 have had higher likelihood of staying as zombies, that is more entrenched, than their counterparts in the early 2000s. Moreover, zombie firms that are state-owned, receive explicit subsidy, or have higher debt burden (top 10-percentile in the debt share in their industries or provinces) are more entrenched, conditional on other factors. For example, firms that are SOEs

show a 33-41 percent lower probability of recovering to a non-zombie relatively to a non-SOE zombie. In addition, the marginal effect of subsidy is even higher, with the recovering rate 47 percent lower for firms with explicit subsidies. All the coefficients are statistically significant at 1% level. Using dummy variables to identify the firms that have high debt or worker share (top 10th-percentile) in its industry or provinces, the regression coefficients are negative and statistically significant, suggesting debt and employee burden help keeping companies surviving as zombies (Tables 4 and 5).

The Kaplan-Meier estimates by overcapacity industries and regions also suggest that zombies are more entrenched in these areas and have less recovering rate to viable firms. In particular, firms that became zombies after the global financial crisis in 2008 were particularly more entrenched in overcapacity industries (coal, steel, cement, electrolytic aluminum, plate glass, ship building), much stronger than those zombie firms in the same industries before 2008. The regression shows that zombie firms in North and Northeast regions has 5 percentage points lower probability of recovering to non-zombie firms. The effect of six overcapacity industries is also negative, but only significant for years after 2008 (Tables 4 and 5).



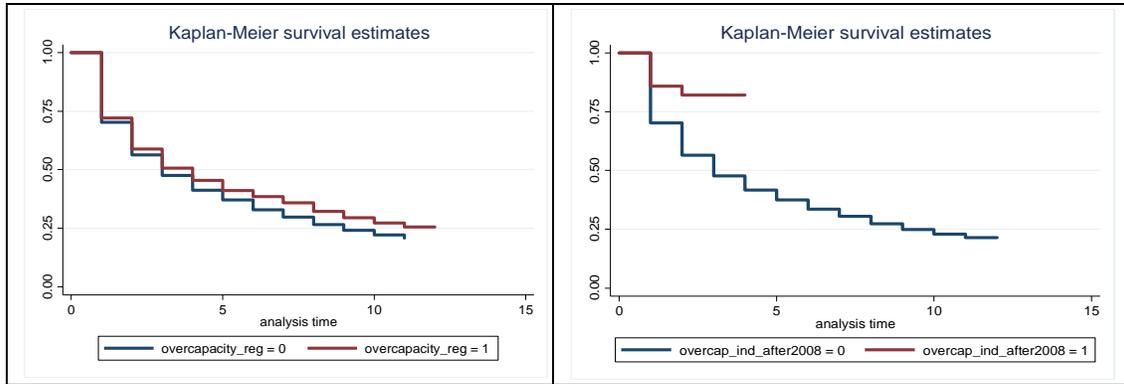


Table 4. Baseline Results on the Duration Analysis of Nonviable Zombie Firms

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SOE	-0.339*** (0.018)	-0.363*** (0.018)	-0.337*** (0.018)	-0.361*** (0.018)	-0.338*** (0.018)	-0.362*** (0.018)	-0.387*** (0.018)	-0.411*** (0.018)
subsidy	-0.469*** (0.013)	-0.469*** (0.013)	-0.469*** (0.013)	-0.469*** (0.013)	-0.469*** (0.013)	-0.469*** (0.013)		
top_10pct_debt	-0.146*** (0.018)		-0.142*** (0.018)		-0.147*** (0.018)		-0.177*** (0.018)	
top_10pct_worker		-0.045** (0.019)		-0.039** (0.019)		-0.045** (0.019)		-0.076*** (0.019)
North & Northeast regions			-0.046*** (0.016)	-0.053*** (0.016)				
overcapacity_ind					-0.034 (0.021)	-0.030 (0.021)	-0.036 (0.022)	-0.032 (0.022)
After2008							-0.829*** (0.016)	-0.826*** (0.016)
overcapacity_ind*After2008							-0.134* (0.069)	-0.139** (0.069)
Observations	92,427	92,427	92,427	92,427	92,427	92,427	92,427	92,427

*Note: Basic information for survival analysis includes a firm's duration as a zombie and an event variable indicating whether the firm recovered as a non-zombie. All the independent variables were calculated based on the mean of the values during the period that the firm surviving as a zombie. For example, SOE equals to 1 if the firm were state-owned enterprises during the whole period that it stays as a zombie. top_10pct_debt and top_10pct_worker are dummies denoting if the firm ranks top 10% by debt or worker share in its industry and province, respectively. Standard errors are reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.*

Table 5. Duration Analysis across Alternative Definitions of Zombie Firms

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	State Council	Definition	FN Definition		FN-Nie Definition	
SOE	-0.160*** (0.030)	-0.206*** (0.030)	-0.323*** (0.019)	-0.372*** (0.019)	-0.441*** (0.014)	-0.496*** (0.014)
subsidy	-0.327*** (0.027)		-0.458*** (0.013)		-0.361*** (0.013)	
top_10pct_debt	-0.030 (0.032)	-0.053* (0.032)	-0.147*** (0.019)	-0.181*** (0.019)	-0.170*** (0.014)	-0.201*** (0.014)
North&Northeast regions	-0.028 (0.029)		-0.047*** (0.016)		-0.070*** (0.013)	
overcapacity_ind		0.147*** (0.037)		-0.016 (0.023)		0.043** (0.017)
After2008		-0.777*** (0.038)		-0.812*** (0.016)		-0.955*** (0.020)
overcapacity_ind* After2008		-0.312** (0.136)		-0.144** (0.069)		-0.084 (0.081)
Observations	26,366	26,366	95,772	95,772	122,856	122,856

2.2 Effects of restructuring on zombie firm performance

The transition from zombies to viable companies may involve restructuring undertaken at the zombie firms. This section identifies the effects of various restructuring options on the likelihood of the recovery to viable companies, conditional on a firm has turned into a zombie. The analysis can help guide the government measures in debt restructuring. The probit regression specification is listed:

$$\Pr(zombie_{it} = 0 | zombie_{it-1} = 1) = \beta X_{it-1} + DInd + Dyear + \varepsilon_{it}$$

Firms in the sample in period t are those classified as zombies last period ($t-1$) based on our criteria. The dependent variable is set to one if firms in period t move to the non-zombie category, and is assigned zero if otherwise. All explanatory variables are in one-period lag, while the specification also controls for industry and year fixed effects. The explanatory variables include common restructuring options for weak firms:

- *Deleveraging*. A dummy variable of ‘deleveraging’ is introduced when there is a reduction of debt-asset ratio of more than 5 percentage points over a year.
- *Ownership change*. Two dummy variables are used to measure the ownership change of the zombie firm from state- or collectively-owned to privately-owned (*SOE to private*) and when the zombie firm get incorporated (*Corporatization*) as a limited company over a year. Both variables are expected to have positive effects on raising the likelihood of transitioning to a non-zombie company.

- *Layoff of workers.* Cutting redundant workforce is often an operational restructuring to improve firm performance. We use the explanatory variable of change in wage-to-asset ratio to test for the effects.
- *Asset sale or injection.* Restructuring also often involves the sale of noncore assets or injection of assets by parent companies. As data on firms' asset injection or sale are limited, the analysis uses the growth of fixed asset as a proxy. Dummy variables of “*asset injection*” and “*asset sale*” are introduced when the fixed asset growth is higher or lower than 10 percentage points, respectively.

Empirical results. The results suggest that deleveraging and substantial ownership change in zombie firms can improve the likelihood of transitioning into viable firms (Tables 6 and 7).

Table 6. Baseline Results on the Effects of Restructuring on Zombie Recovery

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
d.leverage	-0.447***							
	(0.006)							
deleveraging=1		0.185***						0.206***
		(0.002)						(0.003)
SOEtoPrivate			0.051***	0.077***				0.048***
			(0.010)	(0.013)				(0.010)
Corporatization			0.027***	0.033***				0.031***
			(0.006)	(0.008)				(0.006)
SOEtoPrivateAfter2004				-0.055***				
				(0.018)				
CorporatizationAfter2004				-0.011				
				(0.011)				
d.(wage/sales)					-0.036**			-0.032*
					(0.017)			(0.018)
capital growth						0.021***		
						(0.001)		
injection=1							0.080***	0.045***
							(0.002)	(0.003)
sell=1							0.051***	0.037***
							(0.002)	(0.002)
Observations	249,023	358,163	358,163	358,163	249,023	358,163	358,163	249,023
Pseudo R-squared	0.0439	0.0458	0.0341	0.0341	0.0284	0.0353	0.0371	0.0512

Note: Deleveraging equals 1 if the decrease of a firm's leverage is larger than 5 percentage points.

SOEtoPrivate and Corporatization is measured based on firm registration type, denoting a firm turns from SOE into private enterprise or turns into corporation. injection and sell equals 1 if a firm's capital growth is larger than 10% or lower than -10%, respectively. For all the regressions, there's one period lead between the dependent variable and continuous independent variables. Standard errors are reported in parentheses.

, ** and * indicate statistical significance at the 10%, 5% and 1% level, respectively.*

- **Deleveraging.** Debt restructuring to reduce the debt burden and leverage would help improve repayment capacity and therefore raise the likelihood of turning into viable firms. In the process, creditors may also take on ownership stake and have common incentives to raise the firm performance for upside gains.
- **Ownership change.** As in the last round of SOE reforms in the late 1990s and the early 2000s, many insolvent SOEs were privatized or corporatized under the reform of “Grasping the Large and Letting Go of the Small” reform. The operational restructuring change in the ownership tend to improve the likelihood of transitioning into viable nonzombie firms, as evidenced by a strong statistical significant coefficient despite a smaller marginal effects after 2004.
- **Reduction in labor costs.** The marginal effect of reducing labor cost also seem to be significant in some specifications, although the results are less robust across specification. That may be due to the zombie phenomenon is more driven by debt burden rather than labor redundancy in the sample.
- **Asset injection and sale.** Both dummy variables of asset “injection” and “sale” have statistically significant positive effects in most definitions of zombies, suggesting a substantial unloading of noncore assets or asset injection from parents tend to help zombie firms to transit into viable firms again.

Table 7. Estimated Marginal Effect of Restructuring Measures

	Modified FN Definition (Baseline)	State Council Definition	FN Definition	FN-Nie Definition
Deleveraging	0.206	0.108	0.21	0.207
SOEtoPrivate	0.048	0.025 ^a	0.046	0.046
Corporatization	0.031	0.036	0.019	0.017
d.(wage/sales)	-0.032 ^b	-0.528	-0.042	-0.147
Asset injection	0.045	0.042	0.041	0.04
Asset sell	0.037	-0.042	0.036	0.03

Note: Estimated marginal effect of restructuring measures specified as column (8) of last regression table using different zombie definitions. All the results are significant at 1% level, except: a) not significant; b) significant at 10% level.

IV. Policy Implications

Corporate debt vulnerabilities cut across zombie companies, overcapacity firms, and SOEs, and these companies overlap in many ways in sectors and regional exposure. Adjustment is complicated by rising prices, piecemeal exits of zombies, and slow progress in SOE reforms. Tackling the risks therefore requires a holistic, coordinated approach with time-bound actions.

The focus should be a government-led process that allows market forces to operate, whereby weak firms (especially SOEs) are identified, banks suspend ever-greening problem claims and recognize losses proactively, and nonviable firms liquidated (Maliszewski and others 2016). Complementary actions should follow to ensure the process does not just end with financial restructuring, but also address the underlying problems of weak performance through operational restructuring.

1. Deleveraging and Restructuring Corporate Debt

Building on recent efforts in the deleveraging guidelines, steadfast implementation through a series of prioritized, coordinated, and time-bound actions is critical. Key elements include:

- **Assessing firm viability.** Banks should initiate a targeted asset quality review to assess firm viability and triage the distressed debt into the viable (to be restructured) and nonviable (to be liquidated). The process should be transparent with independent assessments. Supportive policies will also include reinforcing accounting and audit rules to provide timely and accurate financial information on the companies, raising the standards of independent appraisers for asset valuation, and developing efficient credit and property registers.
- **Recognizing and allocating losses.** Regulators should review regulatory policies such as loan classification, bank capital, collateral valuation, and prudential reporting to foster banks' proactive NPL resolution. Once losses are recognized, techniques such as debt-equity swaps, sales to AMCs, or NPL securitization can be useful to work out impaired assets. Losses on impaired assets should then be assigned to banks, corporates, and investors and, if necessary, the government can put in public capital as a backstop.
- **Operational restructuring** plans should follow quickly on a few high-profile pilot cases of weak SOEs. Creditors and new equity holders need to have reasonable assurance that the restructured firms will be viable on a going-concern basis. This will require corporate governance reforms (possibly a change of management), withdrawal of implicit support, and tighter budget constraints, which ensure the distressed firms returning back to viability with the objective of maximizing creditor values.
- **Refining the restructuring mechanism**
 - *Creditor committees.* The directives should be seen as one component of a strategy based on informal or hybrid restructuring, driven by creditors. They should also align with international best practices (for example, the INSOL principles for multi-creditor workouts), which allow for a sufficient standstill period, information sharing between debtors and creditors, and restraints on debtors from weakening the firm value.
 - *Debt-equity swaps.* The swaps should be preceded by an asset quality review of troubled firms and supported by operational restructuring. Bank loans should be transferred at economic / market value (rather than face value). The transfer should be separated from the price of converting debt to equity because each will require independent assessment. Tax incentives can be provided for transactions rather than to eligible firms. The “implementation” entities should have incentives and operational independence to exercise diverse exit options, provide safeguards to investors, and prevent collusion.

- **Ensuring sufficient resources** for bankruptcy courts and professionals and overcoming remaining hurdles in the insolvency framework will be critical, particularly in light of extremely limited application of insolvency in the past (Maliszewski and others 2016). More out-of-court restructuring cases also require independent experts to provide valuation and restructuring / liquidation plans. Government should also design targeted social policies to mitigate substantial welfare cost of potential layoffs (see below and Kikeri 1999).
- **Clarifying the role of the public sector.** First, one explicit formal mandate for the joint-ministerial council should be given to help guide expectations, particularly for identification of “zombies” and SOE reform. Second, the government should lead the process in assessing SOE viability by eliminating ambiguity on the extent of subsidies or state support that restructured SOEs will enjoy in the future. Third, public creditors such as the tax authorities will need to acknowledge a loss in the debt restructuring (under strict conditions). Finally, civil servants or state bank employees should be indemnified from personal responsibility for decisions made in good faith regarding potential losses in the restructuring of viable firms.

2. Removing zombies

- Zombies should be publicly identified and subject to greater use of liquidation. This should be complemented by a clear timetable for resolving zombies.
- The government should suspend implicit support and allow banks to manage their claims on zombie SOEs in order to quickly recycle their assets to productive uses.

3. Reducing overcapacity

- The government should shift the reliance from administrative measures (such as imposing a uniform cut or price ceiling/floor)—which inevitably lead to distortions—to strict enforcement of the central government directives that geared toward a larger net reduction of capacity and implemented on a market basis to phase out the weakest capacity companies.
- Strict enforcement of regulatory (such as safety, health, and environmental) standards and greater use of (coal) resource and environmental taxes, together with stronger regulatory action to reduce credit provision, can provide incentives to phase out low-grade or loss-making capacity. Reducing energy subsidies and pricing reforms on resource inputs and electricity can also provide the necessary incentives to raise energy efficiency and reduce overcapacity. Higher output prices should be accepted as an outcome of the capacity cut.
- As the capacity target is met and near-term growth is robust, the government should aggressively tackle the deleveraging challenges in those firms. Hardening their budget constraints and operational restructuring are necessary to make these firms viable again.
- Capacity closures and debt restructuring will involve social welfare costs, such as layoffs (estimated at 2.8 million workers). The central government should stand ready to adjust

the budget of the current restructuring fund to provide sufficient target assistance for worker resettlement to complement existing local social security programs.

4. Reforming SOEs

Accelerating SOE reforms will be paramount in the efforts of tackling corporate debt and resolving over-indebted SOEs. Without decisive progress on SOE reforms, measures to tackle corporate debt could run a risk of a financial restructuring exercise without correcting for credit misallocation. Key elements of SOE reform include:

- **Operational restructuring.** Greater emphasis should be placed on operational restructuring of weak SOEs and recognizing (and stopping) losses. The state should not “window-dress” by merging them with sound SOEs nor encourage creditors to refinance, even if that means greater immediate loss recognition. The recently established SOE restructuring fund should solely be used for operational and financial restructuring of weak SOEs and liquidating nonviable zombies rather than extending unconditional support to them.
- **Hardening budget constraints.** Reducing credit access and implicit support to SOEs will not only address existing debt overhang but also improve the efficiency of new credit. This requires hardening budget constraints by gradually removing implicit guarantees and support and by enforcing the transfer of individual SOE profits to the fiscal budget to reach 30 percent by 2020.¹⁵ Financial regulatory reforms, particularly in the bond market, to allow greater tolerance of defaults will help remove gradually the implicit guarantees.
- **Facilitating market entry.** Successful restructuring requires the entry of new and more competitive firms. Reducing entry barriers and phasing out restrictions that give SOEs a privileged role will level the playing field and make markets more contestable. Opening protected markets in the state-dominated services sector, such as logistics, finance, and telecommunications, and breaking up administrative monopolies would foster competition and promote growth (OECD 2015).

¹⁵ The government committed to raise the transfer 30 percent of SOE profit (government-owned portion) to the fiscal budget by 2020.

V. References

- Ahearne, A. G. and N. Shinada (2005) "Zombie Firms and Economic Stagnation in Japan", *International Economics and Economic Policy*, 2(4), 363-381.
- BCA Research (2016) "The Myth of Chinese Overcapacity", BCA Research Special Report on China Investment Strategy, October 2016.
- Bedford, J. (2016) "China Banks: Have the Bailouts and Recapitalization Begun?", UBS Global Research, August 2016.
- Caballero, Ricardo J., Takeo Hoshi, and Anil K. Kashyap (2008) "Zombie Lending and Depressed Restructuring in Japan" *American Economic Review* 98(5): 1943-77.
- Cai H, Q. Liu (2009) "Competition and Corporate Tax Avoidance: Evidence from Chinese Industrial Firms", *The Economic Journal*, 119(537), 764-795.
- China Coal Technology and Engineering Group (2016) "Coal Capacity Adjustment in 2016", China Coal Technology and Engineering Group Report.
- European Union Chamber of Commerce (2016) "Overcapacity in China—An Implementation to the Party's Reform Agenda", Roland Berger.
- Feenstra, Robert, Zhiyuan Li, and Miaojie Yu (2014) Exports and Credit Constraints under Incomplete Information: Theory and Application to China. *Review of Economics and Statistics* 96(4): 729-744.
- Fukuda, S. and J. Nakamura (2011) "Why Did 'Zombie' Firms Recover in Japan?" *World Economy* vol. 34/7.
- Hoshi, T. (2006) "Economics of the Living Dead", *Japanese Economic Review*, 57(1), 30-49.
- Hoshi, Takeo, and Anil K. Kashyap (2004) "Japan's financial crisis and economic stagnation." *The Journal of Economic Perspectives* 18.1: 3-26.
- International Monetary Fund (2016) "The People's Republic of China: 2016 Article IV Consultation Staff Report", IMF Country Report No. 16/270.
- Jaskowski, Marcin (2015) "Should zombie lending always be prevented?" *International Review of Economics & Finance* 40: 191-203.
- Kane, E. J. (1989) *The S & L Insurance Mess: How Did It Happen?* The Urban Institute.
- Kikeri, S. (1999) "Labor Redundancies and Privatization: What Should Government Do?" World Bank Public Policies for the Private Sectors, World Bank Group, January 1999.
- Kwon, H., F. Narita and M. Narita (2009) "Resource Reallocation and Zombie Lending in Japan in the 1990s", *The Research Institute of Economy, Trade and Industry (REITI) Working Paper*, 09-E, 052.

Lam W.R. and A. Schipke (2016) “State-owned Enterprises Reforms”, in *Modernizing China: Investing in Soft Infrastructure*, IMF Publishing, forthcoming.

Liao, Tianshu., Jin, Weidong, He, Dayong, and Liu Yue (2016) “China’s Supply Side Reforms from International Perspectives—A Focus on Debt and Redundancy Resolution” Boston Consulting Group Report, March 2016.

Leutert, W. (2016) “Challenges Ahead in China’s Reform of State-owned Enterprises”, *Asia Policy* 21 (January): pp.83-99.

Maliszewski, W., S. Arslanalp, J. Caparusso, J. Garrido, S. Guo, J.S. Kang, W.R. Lam, T.D. Law, W. Liao, N. Rendak, P. Wingender, J. Yu, and L. Zhang (2016) “Resolving China’s Corporate Debt Problem”, IMF Working Paper No. 2016/203.

Naughton, B. (2016) “State Enterprise Reform: Missing in Action”, in *The State Sector’s New Clothes: Will SOEs save China’s Economy or Drag it Down*, *China Economic Quarterly* 20 (2), June 2016.

Nie H., T. Jiang, Y. Zhang and M. Fang (2016) “Report on China’s Zombie Enterprises: Current Situation, Reasons and Countermeasures”, *Macroeconomic Management*, 9. (In Chinese)

Organisation for Economic Cooperation and Development (OECD) (2015) “State-owned Enterprises in the Development Process. Paris, OECD Publishing.

Peek, Joe, and Eric S. Rosengren (2000) "Collateral damage: Effects of the Japanese bank crisis on real activity in the United States." *American Economic Review*: 30-45.

Sekiguchi, N., H. Otsuka, A. de Carvalho, and F. Silva (2016) “Capacity Developments in the World Steel Industry”, Organisation for Economic Co-operation and Development, Directorate for Science, Technology, and Innovation (Steel Committee), DSTI/SU/SC(2015)8/FINAL

Tan, Yuyan, Yiping Huang, and Wing Thye Woo (2016) "Zombie Firms and the Crowding-Out of Private Investment in China." *Asian Economic Papers* 15(3).

Unirule Institute of Economics (2015) “The Nature, Performance, and Reform of the State-owned Enterprises”, Unirule Institute of Economics, Beijing.

VI. Annex

Annex Table 1. Recent Measures on Deleveraging and Debt Restructuring

Date	Authorities	Measures
Sep-16	CBRC	CBRC encourages banks to establish creditor committees to facilitate restructuring on claims with multiple creditors.
Oct-16	State Council	<p>The State Council released the broad ambitious guidelines on deleveraging. Greater emphasis on market and legal framework, firm viability, joint-ministerial committee, concerted efforts from stakeholders, greater accountability for SOE management all indicate clear commitment on deleveraging.</p> <p>Details on debt-equity swap were announced:</p> <ul style="list-style-type: none"> ·The swap is one of several techniques to restructure debt of over-leveraged viable firms. Transfer prices are based on secondary equity markets and other market benchmarks. ·Banks cannot directly covert debt claims to equity and will need to conduct through implementation institutions (e.g., financial AMCs, insurance AMCs, and state investment corporations).
Oct-16	CBRC	CBRC relaxed thresholds on provincial asset management companies by allowing each province to set up 2 AMCs and the transfer of distressed debt to third-parties.
Oct-16	MoF and CBRC	<p>Amendments on rules of bulk transfer of NPLs to asset management companies.</p> <ul style="list-style-type: none"> ·Expedite the bankruptcy and clean-up of nonviable zombie firms ·Reduce the threshold on number of loans (from 10 to 3) required for transfer to AMCs.
Oct-16	NDRC	NDRC was tasked to lead the new joint-ministerial committee (involving 21 ministries and agencies) to facilitate deleveraging policies.
Nov-16	State Council	<p>The Northeast Revitalization Plan contains a broad contour for having the Northeast region as a pilot case for state-led restructuring and SOE reforms.</p> <ul style="list-style-type: none"> · Accelerate SOE reform plans for managing state assets and mixed-ownership reforms; allow asset transfer / sale to replenish local social security funds. · Priorities given to corporations in the region on debt-equity swaps, bad-debt disposals, and IPOs.

Sources: State Council, MOF, NDRC, CBRC, and media reports.

Annex Table 2. Recent Debt-Equity Swap Proposals

Date	company	Province	Enterprise type	Amount (RMB bn)	Loan classification	Liability-asset ratio (in percent)		Participating agencies	Investors	Returns & Exit Strategy	Government Guarantee
						Before DES	After DES				
Sep-16	Sino Steel	Beijing	Central SOE	27	Non-performing	>90	About 66	Key current creditors	Current debt holders	Loans transferred to convertible bonds for first three years, to be converted to equities afterward; plan to restructure and list the firm for exits.	n.a.
Oct-16	Yunnan Tin	Yunnan	Local SOE	10 (first round 5)	Normal	83	68	China Construction Bank Trust	Funding from insurance companies, CCB pension funds, Cinda's subsidiary and private banking clients.	An annual return of 5-15 percent expected under a repo arrangement by Yunnan Tin at year 5; plans to restructure and list the firm for exits.	No
Oct-16	Wuhan Steel	Hubei	Central SOE	24 (first round 12)	Normal	74	65	China Construction Bank Fund and CCB International	CCB wealth management funds and creditors of Wuhan steel	An annual return of 5 percent expected under a repo arrangement by Wuhan steel at year 7; plans to restructure and list the company in the main board or other exchanges.	No
Oct-16	Yituo Group	Heilongjiang	Central SOE	0.5	Normal	NA	NA	Huarong, CCB Henan branch, Oriental	n.a.	The parent will transfer 33 million tradable shares to AMCs (Huarong and Orient); investors can exit in the secondary markets.	No
Oct-16	China First Heavy	Heilongjiang	Central SOE	1.6	Normal	NA	NA	Parent Company of China First Heavy	State investment corporation	Issue shares to parent company for RMB 1.6 billion to repay debt. The shares can be sold in secondary markets after the lock-up period.	No
Nov-16	Guangdong Rising Asset Management	Guangdong	Local SOE	15	n.a.	n.a.	to lower 6	China Construction Bank Trust	n.a.	n.a.	n.a.
Nov-16	Guangdong Communications Investment	Guangdong	Local SOE	10	n.a.	68	About 53	China Construction Bank Trust	n.a.	n.a.	n.a.
Nov-16	Shandong Energy Group	Shandong	Local SOE	21	n.a.	74	About 68	China Construction Bank Trust	n.a.	n.a.	No, but with some involvement of local SASAC.
Nov-16	Chongqing Construction Investment Holdings	Chongqing	Local SOE	10	n.a.	88	n.a.	China Construction Bank Trust	n.a.	Investment in equities of the company and its key subsidiaries and collaborate on the PPP projects.	n.a.

Sources: Media reports and Deutsche Bank.

Annex Table 3. Recent Bond Defaults and Their Resolution

No.	default date	Issuer	SOE	Overcapacity sectors	Issuance amount (RMB billion)	Recovery rate (in percent)	Resolution			
							Refinancing	Seizing collateral	Bank-ruptcy	Debt equity
Public offering										
1	Mar-14	Shanghai Chaori Solar Energy		√	10.0	100	√			
2	Apr-15	Cloud Live Technology Group (XiangE debt)			4.8	100	√			
3	Apr-15	Tian Wei Group	√	√	45.0	0				√
4	May-15	Zhuhai Zhongfu Enterprise Ltd			5.9	100		√		
5	Sep-15	China National Er Zhong Group	√	√	18.0	100	√	√		
6	Oct-15	Yingli Group		√	24.0	27	√			
7	Oct-15	Sinosteel Co Ltd	√	√	20.0	0				
8	Nov-15	Sunnsy Group		√	46.0	...				
9	Nov-15	Sichuan Shengda Industrial Ltd		√	3.0	0		√		
10	Feb-16	Yabang Group			4.0	50	√			
11	Mar-16	Zibo Hongda Minierals Industrial Ltd		√	4.0	...				
12	Mar-16	Yurun Group			15.0	100	√			
13	Mar-16	Dongbei Special Steel Co. Ltd	√	√	57.7	0				√
14	Mar-16	China Coal Group Shanxi Huayu Energy	√	√	6.0	100		√		
15	Mar-16	Guoyu Group		√	6.0	...				
16	May-16	Inner Mongolia Nailun Group Inc.			8.0	...				
17	May-16	Evergreen Group		√	4.0	...				
18	Jun-16	Sichuan Coal Group	√	√	10.0	100	√			
Private placements										
19	Mar-16	Guangxi Nonferrous Metals	√	√	15.0	0				√
20	Mar-16	Hanergy Holding Group Ltd.		√	10.0	1	√			
21	Jan-16	Yunfeng Group		√	66.0	...				
<i>Memorandum items:</i>										
<i>Total</i>					382	24				
<i>of which: SOE</i>					172	20				
<i>private firms</i>					211	28				
Sources: WIND.										

Annex Table 4. Cleaning up Zombies at Provincial Levels

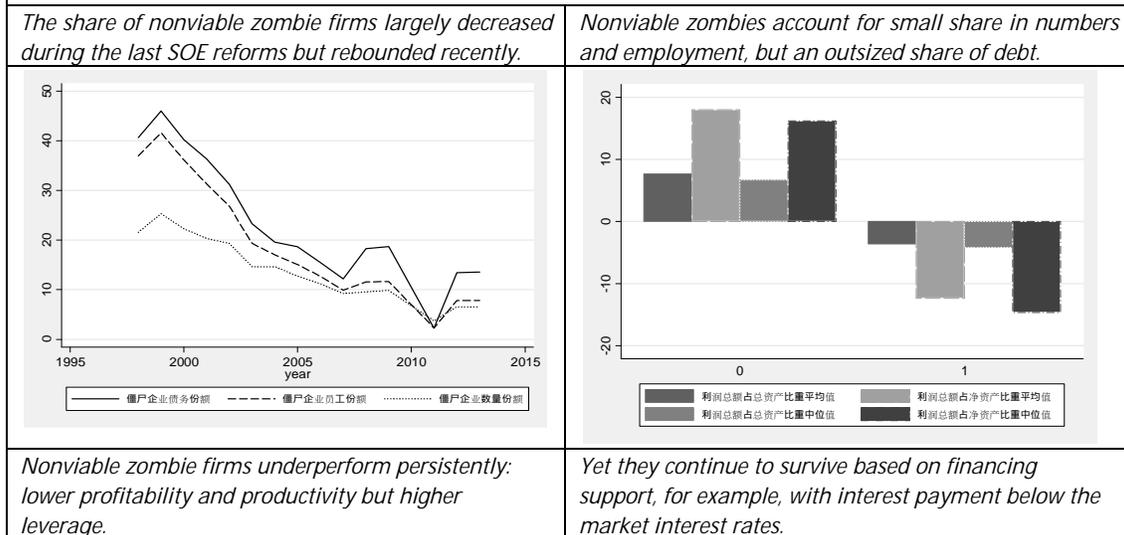
Province / Region	Provincial development	No. of identified 'zombies' (end 2015)	Type	Industry	Reform plan	Resolution methods				
						Mergers & acquisition	Capital consolidation	Others	Bank / liquidation	
Central government		345	Central SOEs	Overcapacity industries						
Chongqing	High income municipality	200	Provincial SOEs		Plan to resolve all zombies by 2016					
Gansu	Western region	110	Provincial and lower level SOEs	Overcapacity industries						
Guangdong	High income province	3,385 of which 768 provincial SOEs	Provincial and lower level SOEs	All	Plan to resolve all zombies by 2018	A total of 16,000 employees to be redeployed (including retirees); debt outstanding about RMB billion.				
Hubei	Overcapacity province	125	Provincial SOEs		Has resolved 58 SOEs; expect 35 in the H2 2016	3	4			
Inner Mongolia	Overcapacity province	90		Overcapacity industries						
Liaoning	Overcapacity province	830								
Qinghai	Western region	31	Provincial and lower level SOEs	Cement, steel, coal	Has resolved 18 SOEs	8	1	4		
Shandong	High income province	321	Provincial SOEs		Plan to resolve 125 zombies by 2016; has resolved 36.					
Tianjin	High income municipality	113			Plan to resolve all zombies by 2016					
Yunnan	Western region	135	Provincial SOEs	Iron, steel, and coal						
Zhejiang	High income province	450		Iron and steel; coal	Plan to resolve all zombies by 2016					
Source: Provincial and municipal governments.										

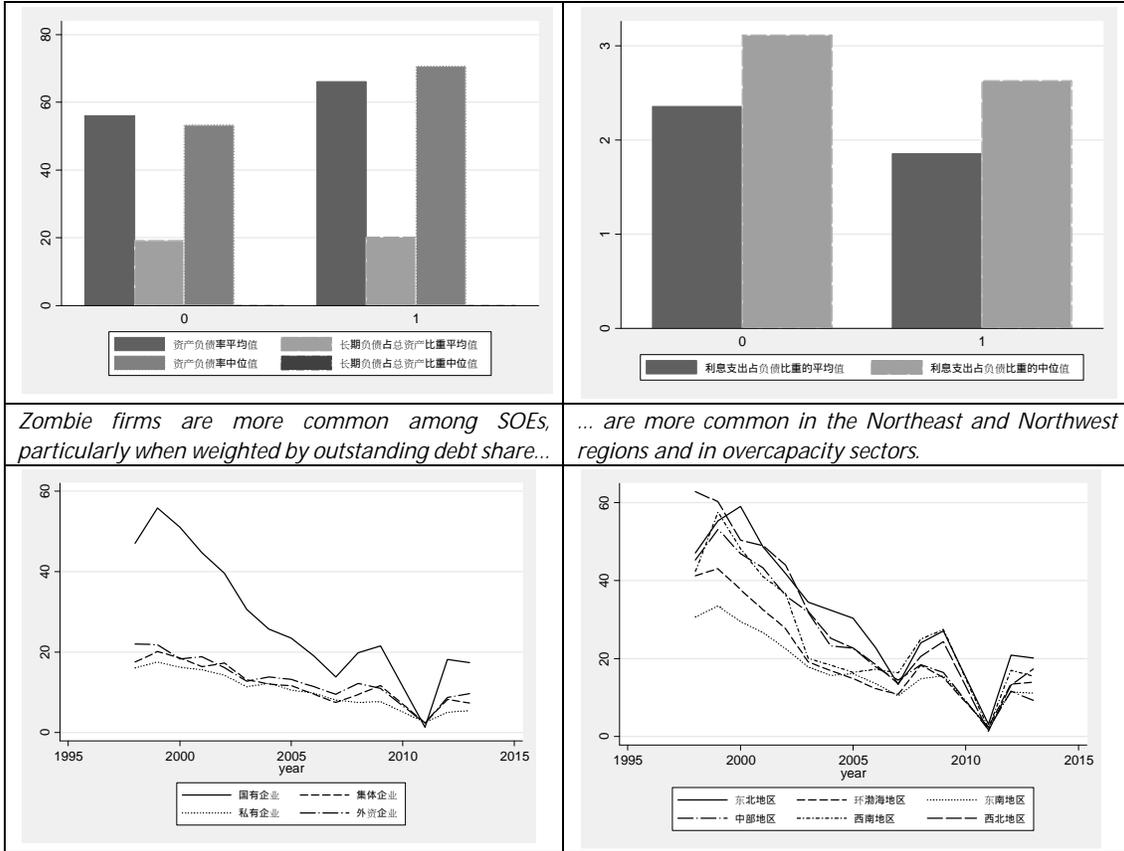
Annex Table 5. Recent Measures and Progress in Reducing Overcapacity

Date	Measures
Aug-16	<ul style="list-style-type: none"> -SASAC aimed to cut 10 percent of excess capacity of central SOEs in two years, and identified the exit of 345 central zombie SOEs in three years. -Ministry of Land and Resources tightened the land use requirements for overcapacity sectors. -CBRC issued guidelines to restructure coal and steel industry debt.
Sep-16	<ul style="list-style-type: none"> -NDRC relied on legal actions on overcapacity adjustment. -NDRC introduced measures to raise coal production to counter the price surge. -State Council established a SOE Structural Adjustment Fund of RMB 350 billion to facilitate overcapacity adjustment as part of the SOE reforms. -Several restructuring plans for selected SOEs were initiated, mainly focus on financial restructuring. <ul style="list-style-type: none"> -Consolidation for 4 SOEs in overcapacity sectors announced. -Debt-equity swap plans were initiated for some SOEs. -Seven Shanxi coal firms obtained refinancing support from banks and local government.
Oct-16	<ul style="list-style-type: none"> -New guidelines for firm deleveraging and debt-to-equity swaps is issued by the State Council. -Dongbei Special Steel formally entered into bankruptcy procedures. -About 80 percent of 2016 annual capacity adjustment target was met by end-September.
Nov-16	<ul style="list-style-type: none"> - NDRC eased the uniform cut limit of 276 days to 330 days for the coal sector for 2016-17.

Sources: Government documents and media reports.

Annex Figure 1. Stylized Facts of Nonviable Zombie Firms





Zombie firms are more common among SOEs, particularly when weighted by outstanding debt share...

... are more common in the Northeast and Northwest regions and in overcapacity sectors.