

Industrial Policies and the Changing Patterns of Investment in the Chinese Economy

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Abstract:

Investment has always played an important role in the economic development strategies of the People's Republic of China. A major reform of the investment system in 2004 shifted the state's focus from direct investment control to industrial policies designed to promote investment in specific economic sectors. But in reality, the industrial policies' preferences have had little effect. The data suggest that investment patterns in China are largely divorced from the industrial policies, and, if anything, predate them. The significant shifts in investment across sectors and ownership forms that have taken place since the early 2000s appear driven far more by profitability considerations and private entrepreneurship than by government policies. The finding negates foreign concerns that the Chinese state *via* industrial policies such as "Made in China 2025" is creating national state-owned technological leaders.

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Hardly a day passed in the first half of 2018 without reports voicing concern about industrial policies pursued by the People’s Republic of China (PRC). Thus, the 2015 policy of “Made in China 2025” is viewed by President Trump as being harmful to U.S. companies,¹ and the U.S. trade representative’s office announced that U.S. tariffs will target China’s industrial policy, especially those industries included in Beijing’s “Made in China 2025” plan.² Outside the political arena, the PRC’s industrial policies have been viewed as either making the PRC an unstoppable juggernaut or as the ultimate source of wasteful investment that has caused domestic credit to soar and productivity growth to plummet.³

Underlying such views is the assumption that the PRC’s industrial policy has a decisive effect on resource allocation. The findings of this article, in contrast, suggest that this basic assumption is not valid.

Industrial policies are about incentives for specific types of investment. Establishing such investment priorities previously played a crucial role in the economic development of the PRC. In the second half of the 1950s, investment in 156 industrial projects established with the help of the Soviet Union laid the foundation for the PRC’s modern economy; in the Third Front Construction of the second half of the 1960s and the 1970s, industrial investment was directed geographically according to military considerations; by the late 1980s, investment policy assumed macroeconomic policy functions; and in the aftermath of the 2008 global financial crisis, an investment push helped maintain economic growth.⁴

¹ <https://www.whitehouse.gov/briefings-statements/president-donald-j-trump-confronting-chinas-unfair-trade-policies/> (accessed 11 July 2018).

² Gabriel Wildau, “US Tariffs Target China Industrial Policy, not Trade Deficit,” *Financial Times*, 23 March 2018.

³ The debate also occurs within the PRC; see, for example, an article in the *South China Morning Post* of 21 September 2016 (<http://www.scmp.com/news/china/economy/article/2021088/leading-economists-debate-value-state-intervention-chinas>, accessed 28 December 2017). For an academic treatment of recent industrial policies in the PRC, see, for example, Tristan Kenderdine, “China’s Industrial Policy, Strategic Emerging Industries and Space Law,” *Asia & The Pacific Policy Studies* 4, no. 2 (2017): 325-42. The academic literature on investment in the PRC covers foreign investment in the PRC (such as its effects on exports), financing constraints, and investment efficiency (typically as part of production function estimations); slightly closer to the topic here, one recent article finds that certain categories of listed firms restrict investment in the face of economic policy uncertainty (Yizhong Wang, Carl R. Chen, and Ying Sophie Huang, “Economic Policy Uncertainty and Corporate Investment: Evidence from China,” *Pacific-Basin Finance Journal* 26 (January 2014): 227-43). The effectiveness of industrial policy for advancing economic growth (such as due to a shift to newer and more modern sectors with external economies), has been questioned by, for example, Howard Pack, “Industrial Policy: Growth Elixir or Poison?,” *The World Bank Research Observer* 15, no. 1 (February 2000): 47-67.

⁴ These topics have been widely explored in the literature. For example, for the investment spurt after the global financial crisis, frequently viewed as “overinvestment” leading to excess capacity, high levels of debt, and poor asset quality, see, Chong-en Bai, Chang-Tai Hsieh, and Zheng Michael Song, “The Long Shadow of a Fiscal Expansion,” *Brookings Papers on Economic Activity*, BPEA Conference Draft (15–16 September 2016), at https://www.brookings.edu/wp-content/uploads/2016/09/3_baihsiehsong.pdf (accessed 23 September 2016); the authors suspect that local governments’ access to financial resources translated into investment that potentially worsened the overall efficiency of capital allocation.

A fundamental change in investment decision-making took place in 2004. Investment planning morphed into an investment approval procedure, transferring to the investing unit the investment initiative and extensive decision-making authority.⁵ As a partial offset, the central government began to issue a number of industrial policy measures in an attempt to direct investment and productive activities. Thus, apart from serving as a blunt driver of economic growth via a high investment rate during the 2008-09 global financial crisis, targeting investment increasingly is supposed to feature as a significant tool in long-term economic development strategies.

This article describes key industrial policies since 2004, followed by an examination of the changes in investment patterns that have occurred over time—by sector, level of central-local subordination, and ownership. A brief regression analysis will test if an approximate measure of the government’s industrial policies can explain the specific patterns of investment growth in the sectors of mining, manufacturing, and utilities.

Industrial Policy

Industrial policy as an instrument of economic development first emerged in the PRC’s Seventh Five-Year Plan (1986–1990),⁶ and then became more explicit in the 2000s. The following sections focus on the six sets of industrial policy that were laid out over the past decade, revealing the government’s targeted priorities as to which types of endeavors should be strategically favored and invested in. In order to avoid the tediousness of lengthy descriptions, some details have been moved into footnotes, and others into appendices.

⁵ For a description of the investment procedures in effect through the mid-1990s, focusing on the gradual decentralization of investment approval authority within the planning bureaucracy (while the central government retained strong control during austerity periods), see Yasheng Huang, “Central-local Relations in China During the Reform Era: The Economic and Institutional Dimensions,” *World Development* 24, no. 4 (April 1996): 655-672, and *Inflation and Investment Controls in China: The Political Economy of Central-local Relations During the Reform Era* (New York: Cambridge University Press, 1996). On increasing encouragement of private investment in the 2000s, see Nicholas R. Lardy, *Markets Over Mao: The Rise of Private Business in China* (Washington, DC: Peterson Institute for International Economics, 2014), 91 f.

⁶ For an overview of the development of industrial policy in the PRC see Sebastian Heilmann and Lea Shih, “The Rise of Industrial Policy in China, 1978–2012,” *Harvard-Yenching Institute Working Paper Series*, 2013, and Dic Lo and Mei Wu, “The State and Industrial Policy in Chinese Economic Development,” Chapter 11 in *Transforming Economies: Making Industrial Policy Work for Growth, Jobs and Development*, eds. Jose M. Salazar-Xirinachs, Irmghard Nuebler, and Richard Kozul-Wright (Geneva: International Labour Office, 2014), 307–326.

1. 2004–2009

A key step in reforming the investment system was a 2004 State Council regulation that stipulated the adoption of a new investment system, with non-state investment in principle no longer subject to government approval.⁷ An appendix to the regulation provided a long list of restricted types of investment projects by sector that continue to require government authorization. Direct government investment was to be limited to sectors where the market cannot achieve an “effective allocation of resources.”

Relaxation of investment control went hand in hand with a wide range of industrial policies that have an impact on investment.⁸ These included:

- (i) broad policies addressing more than one sector: priority investment catalogs for high-tech industries (2004, 2007, 2011) and foreign investors (2005, 2007), adjustment of the industrial structure (2005 and 2011), acceleration of service sector development (2007), lists of technologies and products for import (2007, 2009, 2011), and industrial technology promotion (2009);
- (ii) policies targeting individual industries: the automobile industry (2004), machine-building industry (2006), nine traditional sectors for revitalization (2009),⁹ information technology industry (2009), logistics industry (2009), and culture (2009);
- (iii) sector-specific ministry Five-Year Plans.

Much of the PRC’s industrial policy is not narrowly focused on one sector but expansive in its coverage. For example, the 2005 guidance catalog for adjustment of the industrial structure lists approximately 500 “encouraged” types of investment projects such as “Construction of a National Agricultural Products Base” and “Development of Inter-Regional Power Grid Engineering Technology,” 200 “restricted” types of projects, and 400 types of projects to be “eliminated.” The catalog was revised in 2011.¹⁰ A number of implementation

⁷ State Council, “Decision on Reform of the Investment System,” *Guofa* 20 / 2004, in English at http://en.ndrc.gov.cn/policyrelease/200602/t20060207_58851.html (accessed 8 February 2017).

⁸ Sebastian Heilmann and Leah Shih, *Rise of Industrial Policy*, provide a list of industrial policies, here augmented, categorized, and limited to the years through 2009.

⁹ These include, with concrete plans for 2009–2011, the automobile industry, biology and medicine industry, equipment manufacturing, and new energy (see <http://www.china-briefing.com/news/2009/11/24/revitalization-programs-set-for-five-industries.html>, accessed 10 February, 2017), later integrated into the Twelfth Five-Year Plan, 2011–2015.

¹⁰ National Development and Reform Commission (with State Council approval), “Chanye jiegou tiaozheng zhidao mulu” (Guidance catalog for adjustment of the industrial structure), 2005 (2 December 2005) and 2011 (27 March 2013), with the 2005 version at http://www.sdpc.gov.cn/fzgggz/fzgh/zcfg/200512/t20051222_65963.html, and the 2011 version at <http://www.gov.cn/gzdt/att/att/site1/20110426/001e3741a2cc0f20bacd01.pdf> (both accessed 8 February 2017). See Greenberg Traurig, “NDRC Publishes a New Guidance Catalog for Industrial Structure Adjustment,” 1 September 2011, at <http://www.lexology.com/library/detail.aspx?g=3a4e14ed-f589-49ad-8761-3840c84dd507>

instructions accompanied the catalogs, with later instructions reclassifying some projects in the catalogs.

2. Strategic Emerging Industries (2010)

In 2010, the State Council identified seven “strategic emerging industries” (*zhanluexing xinxing chanye* 战略性新兴产业) which were to be supported in the following years, with a target share in GDP for 2015 of 8 percent, and for 2020 of 15 percent.¹¹ The seven industries are:

- Energy-saving and environmental protection technologies
- next generation information technology
- biotechnology
- high-end equipment manufacturing
- new energy
- new materials
- new energy vehicles.¹²

The document elaborated on each of these industries and then proceeded to list ways to support their development. Non-state (*minjian* 民间) investment was explicitly encouraged.

These industries cannot be readily identified in the sector classification system because each of them cuts across the PRC’s sector classification system as published by the National Bureau of Statistics (NBS). For example, the “new energy” industry touches more than one sector in the sector classification system, and the sector classification system does not distinguish between “old” and “new” within any one sector. (It is thus also not possible to ascertain if the 2015 GDP target share of 8 percent was reached.)

The catalog of strategic emerging industries was revised in 2013 and then again in 2016. In 2016, “digital innovation” was newly added as an eighth favored industry, and the eight industries were broken down into 174 “key directions” with 4000 products and services.¹³

(accessed 8 February 2017), for details on the differences between the 2005 and 2011 catalogs. Projects not covered by the catalog are permitted.

¹¹ State Council, “Guanyu jiaokuai peiyu he fazhan zhanluexing xinxing chanye de jue ding” (Decision on accelerating cultivation and development of strategic emerging industries), 10 October 2010, at http://www.gov.cn/zwgc/2010-10/18/content_1724848.htm (accessed 9 February 2017).

¹² For an English language summary of the State Council document see The US-China Business Council, “China’s Strategic Emerging Industries: Policy, Implementation, Challenges, & Recommendations,” March 2013, at <https://www.uschina.org/sites/default/files/sci-report.pdf> (accessed 9 February 2017).

¹³ National Development and Reform Commission, “Zhanluexing xinxing chanye zhongdian chanpin he fuwu zhidao mulu 2016” (Guiding catalog for key products and services in the strategic emerging industries, 2016),

3. Twelfth Five-Year Plan (2011-2015)

One of the 60 sections of the Twelfth Five-Year Plan (2011–2015) covers the strategic emerging industries without, however, going into any further detail than the 2010 State Council document does.¹⁴ Another section of the plan covers nine traditional industries, with what seems a wish-list for development (here itemized in parentheses):

- equipment manufacturing (a switch to numerical controls, information technology, and green technology; service-orientation; development of strategic emerging industries),
- shipping industry (including liquefied gas carriers, ocean fishing vessels, luxury tourist boats),
- automotive industry (including new products, new forms of production, breakthroughs in battery technology and motors),
- iron and steel (with a focus on steel for high-speed railways, high-grade silicon steel, magnetic silicon steel, and high-strength steel for machine-building),
- non-ferrous metals (especially for aerospace and information technology industries),
- building materials (with a focus on photovoltaic glass, ultra-thin substrate glass, special glass fiber, and special ceramics and other new materials),
- petrochemical industry (construction of a large-scale integrated refinery base; coal electrification; carbon dioxide utilization; petroleum to reach the level IV standard),
- light industry (new batteries; new plastics for agriculture; energy-saving light sources; intelligent home appliances; self-reliance in equipment for key sectors), and
- textiles (high-tech fibers; next-generation industrial fiber applications and use; self-reliance in high-end textile machinery; recycling of textile waste products).

While the list comprises clearly defined sectors, the details suggest that it is not the sector itself that is favored, but specific projects within a sector. A particular sector thus comprises favored and less-favored types of projects, and investment within a large sector can, in the aggregate, rise or fall as some projects get prioritized for investment while non-prioritized projects may no longer be undertaken.

25 January 2017, at http://www.ndrc.gov.cn/gzdt/201702/t20170204_837246.html (accessed 18 December 2017).

¹⁴ See section 10 of the Twelfth Five-Year Plan, 16 March 2011, at http://www.gov.cn/2011lh/content_1825838.htm (accessed 9 February 2017). Some of the subsequent sections cover aspects of the seven strategic emerging industries, though the term “strategic emerging industries” does not appear.

A key topic of the Twelfth Five-Year Plan was “structural change,” targeting a breakthrough for the strategic emerging industries and an increase in their share of the tertiary sector (i.e., services) in GDP by four percentage points.¹⁵ The Plan also involved adjusting and “optimizing” the investment structure, emphasized the important role of investment for domestic demand, and encouraged non-state investment.¹⁶

4. Supply-side Structural Reform (2015)

The “supply-side structural reform” agenda was first introduced by the Finance and Economics Leading Small Group of the Party Central Committee in November 2015.¹⁷ It comprises five elements, with the first three directly impacting on investment: eliminating excess capacity, especially in steel and coal production;¹⁸ reducing stocks, mostly in real estate in second- and third-tier cities; de-leveraging across the economy; lowering costs, including those due to taxes, regulations, and social security contributions; and a broad catch-all call for “strengthening weak points.”¹⁹

The agenda does not involve draconian closure orders but represents a nod to publicly owned firms to merge and become more efficient, and encouragement for local officials to implement environmental and other regulations and to eliminate the least desirable production capacities. A call to reduce excess capacity may simply have been a response to falling profitability and increasing losses at a time when prices for coal and steel were plummeting.

¹⁵ Structural change further encompassed an increase in household consumption, consolidation of the agricultural foundation, “optimization” of the industrial structure, an increase in the urbanization rate by four percentage points, and a strengthening of the coordination between urban and rural development.

¹⁶ The plan promoted maintaining a “rational” increase in investment, changing the investment system, clearly defining the scope for government investment, standardizing the investment behavior of SOEs, encouraging an increase in non-state investment, effectively curbing “blind” expansion and duplication of investment, accelerating the beneficial interactions between consumption and investment, and creating final demand by organically combining increases in investment, employment, and people’s livelihood.

¹⁷ Articles by an “authoritative personage” in *Renmin ribao* (People’s Daily) on 4 January 2016 and on 9 May 2016 widely promoted the supply-side structural reform agenda.

¹⁸ Some details on capacity reduction are provided in Appendix 1.

¹⁹ For details, see Barry Naughton, “Supply-side Structural Reform: Policy-makers Look for a Way Out,” *China Leadership Monitor* 49 (1 March 2016), at <http://www.hoover.org/profiles/barry-naughton> (accessed 16 November 2016), and “Two Trains Running: Supply-side Reform, SOE Reform and the Authoritative Personage,” *China Leadership Monitor* 50 (19 July 2016), at <http://www.hoover.org/profiles/barry-naughton> (accessed 16 November 2016).

5. “Made in China 2025” (2015)

On May 8, 2015 the State Council issued a circular titled “Made in China 2025”—the PRC version of Germany’s 2012 “Industry 4.0”—which encouraged a fourth industrial revolution.²⁰ Breakthroughs are to occur in ten priority industries: information technology, numerical control tools and robotics, aerospace equipment, ocean engineering equipment and high-tech ships, railway equipment, energy saving and new energy vehicles, power equipment, new materials, medicines and medical devices, and agricultural machinery.²¹ These ten priority industries dovetail with the 2010 seven strategic emerging industries, slightly rephrased, and the original “high-end equipment manufacturing” is now reflected in several more narrowly defined categories.²² A central leading group was set up and supporting documents were gradually released.²³ Implementation of “Made in China 2025” follows traditional PRC policy patterns with pilot cities (Ningbo being the first), annual targets and tasks, and assignment of responsibility for implementation.²⁴

The impact on investment in individual sectors of the economy is unclear. Beyond identifying ten priority industries, “Made in China 2025” does not favor certain sectors over others. Even in the case of the priority industries, investment need not increase for the industry in total, but could shift between projects within a sector. An overall objective to become the leading manufacturing nation of the world in little more than thirty years suggests broad growth in manufacturing, with adjustments to how manufacturing is conducted within each sector, rather than a drastic redirection of investment flows between sectors.

6. Thirteenth Five-Year Plan (2016–2020)

The industry section of the Thirteenth Five-Year Plan—titled “Promote the Optimization and Upgrading of the Industrial Structure”—in three paragraphs lists comprehensive and

²⁰ State Council, “Zhongguo zhizao 2025” (Made in China 2025), State Council Regulation no. 28 / 2015, issued on 8 May 2015, at http://www.gov.cn/zhengce/content/2015-05/19/content_9784.htm (accessed 13 December 2016). The four revolutions are: water- and steam-powered mechanical manufacturing, mass production based on electric power, automation of manufacturing based on information technology, and cyber-physical systems (smart factories with embedded information technology systems).

²¹ For additional details on “Made in China 2025,” see Appendix 1.

²² Explicit reference is made to “strategic emerging industries” once, as part of an introductory passage on strengthening the manufacturing capacity of the PRC.

²³ For an English-language State Council webpage that promotes “Made in China 2025” events, decisions, and achievements, see <http://english.gov.cn/2016special/madeinchina2025/> (accessed 12 July 2018).

²⁴ Targets and tasks, and the assignment of responsibility, are historically not very promising measures. For example, on the (largely unsuccessful) use of such measures during the contractionary investment policies of 1988/89, see Carsten A. Holz, “Contractionary Investment Policies in China 1988/89: Accounting for the Implementation Difficulties and Successes,” *The China Quarterly* 160 (December 1999): 881-918.

industry-specific desirables.²⁵ The section elaborates in more detail on six sub-sectors and covers similar ground as the original seven strategic emerging industries (2010) and “Made in China 2025:”²⁶

- acceleration of the development of high-tech industries (manufacturing related to digital information; bio-medicine, bio-agriculture, bio-energy, bio-manufacturing; aerospace industry; new materials industry);
- revitalization of equipment manufacturing (a high technical standard of equipment; innovation capability of the automobile industry; independent design and construction capability of the shipbuilding industry);
- optimal development of the energy industry (strengthening coal resource exploration, reorganizing coal enterprises and closing certain coal enterprises; developing large and efficient thermal power stations, hydropower and nuclear power; strengthening the power grid; promoting oil and natural gas exploration and production; developing renewable energy);
- adjustment of the raw materials industry (resolving excess capacity in the metallurgical industry; adjustment of the chemical industry with a focus on quality improvement, less environmental pollution, and independent developmental capacity; improving building materials while saving energy and protecting the environment);
- an increase in the level of light industry (build Chinese-owned high-quality textile brands; develop new light industry products; promote energy and raw material reduction; use information technology, biotechnology, environmental protection, and other new technologies to transform light industry); and
- promotion of information technology (IT) (use IT to upgrade manufacturing, leading to yet further IT development; create a national information database; speed up development of broadband and mobile communications networks and create a triple-network of telecommunications, radio and television, and broadband; strengthen information security).

²⁵ Section 3 of the Thirteenth Five-Year Plan, at <http://ghs.ndrc.gov.cn/zttp/ghjd/quanwen/> (accessed 18 November 2016). Separate sections promote the development of the service industry, regional balancing, and energy saving and environmental protection.

²⁶ The term “strategic emerging industries” does not appear in the plan. Tristan Kenderdine, “China’s Industrial Policy,” shows the policy consistency from “Strategic Emerging Industries” to “Made in China 2025” and the 13th Five-Year Plan.

Beyond these specifically listed industries, the coverage of the plan is far-reaching, covering virtually every aspect of industry. Except for some raw materials industries singled out for a reduction in excess capacity, the plan is not so much about promoting particular sectors than about various forms of upgrading within each sector.

7. Matching Industrial Policies into the Sector Classification System

The industrial policies represent a combination of broad exhortations and specific objectives. But even when specific objectives are given, including on types of projects, in many instances the objectives cut across sectors or shift the balance of different projects within a sector. In other instances, it is possible to venture a guess as to which sector in the official sector classification system may be affected. Yet the implications of a particular policy for investment may be ambiguous if the only matching sector in the sector classification system also includes projects not favored by policies.

Table 1 represents an attempt to map the six sets of policies into the sector classification system. For the various pre-2010 policies, a year is given in the table. For the subsequent five sets of policies, “x” denotes that this particular sector is covered (positively) by the policy and “(-)” that the policy constrains development in this sector. The policy abbreviations are listed below the table.

Illustrating the difficulty of matching industrial policies with sectors, the sector classification system includes a fourth-digit sector “biotechnology extension services” within the first-digit service sector “science” as the only potential counterpart to a policy promoting biotechnology. While there is a second-digit service sector “ecological protection and environmental management,” none of its sub-sectors is an immediate counterpart for a policy targeting “environmental protection technology.” There are no sector counterparts for policies on “new energy,” “new materials,” or “new energy vehicles” (none of the automobile manufacturing sub-sectors refers to new energy vehicles, or electric vehicles). An increase in the level of light industry stipulated in the Thirteenth Five-Year Plan cannot be confined just to the textile and apparel industry, yet that is the only sector in the official sector classification system that can be matched with the description in the plan.²⁷ Notwithstanding such difficulties, Table 1 presents an attempt to match policies and sectors to the greatest extent possible.

²⁷ Aerospace equipment, one of the ten priority industries of “Made in China 2025,” can be matched directly with the third-digit sector “aviation and aerospace equipment manufacturing” (with a further, four fourth-digit sectors). But in the investment statistics, checked for 2012-2015 values, this third-digit sector is missing.

Table 1: Industrial Policy Summary

Sector classification system (GB2011) Digit Name	Policy	A	B	C	D	F	E
Primary sector							
2	Fisheries			x			
Secondary sector							
2	Mining and washing of coal	Coal; Energy development				(-)	(-)
3	Oil and natural gas exploration	Energy development					x
2	Mining and processing of ferrous metal ores	Steel; Raw material industry adjust.				(-)	(-)
2	Textile manufacturing	Textiles (high-tech, next generation)		x			
2	Textile and apparel	Light industry					x
3	Refined petroleum products manuf.	Petrochemical industry			x		
2	Chemical Raw Materials and Products	Raw material industry adjustment					(-)
2	Medicine manufacturing	Medicine; Medicine. medical devices	2009			x	
3, 4	Glass fiber and ceramic products manufacturing (3); with sub-sectors (4)	Building materials (focus on glass, ceramics)			x		
2, 3	Smelting and pressing of ferrous metals	Iron and steel; Steel; Raw material adj.			x	(-)	(-)
2, 3, 4	Smelting and pressing of non-ferrous metals	Non-ferrous metals			x		
2, 3, 4	General purpose machinery (2); Special purpose machinery (2); Electrical machinery and apparatus (2); each with numerous sub-sectors (3, 4)	Machine building; High-end equipment manuf.; Equipment manuf. (twice); Numerical control tools & robotics	2006	x	x	x	x
4	Agricultural and sideline food processing equipment manufacturing	Agricultural machinery				x	
3	Special equipment manufacturing: Agriculture, forestry, animal husbandry, fishing special machinery manufacturing	Agricultural machinery				x	
4	Special instrument manufacturing: Agriculture, etc. special instrument manufacturing	Agricultural machinery				x	
4	Other motor-driven equipment manufacturing	Motor breakthrough				x	
3, 4	Motor manufacturing	Motor breakthrough				x	
3	Automobile manufacturing	Automobiles	2004, 2009			x	
3	Automobile manufacturing	New energy vehicles (twice); Energy saving and new energy vehicles		x	x	x	
3	Railway transportation equipment manuf.	Railway equipment				x	
2	Rail, shipbuilding, aerospace and other transportation equipment manufacturing— with missing aerospace sub-sector	High-tech industries					x
3	Railway transportation equipment manuf.	Railway equipment				x	
3	Shipbuilding and related equipment manuf.	Ocean engineering equipment				x	
4	Electric light source manufacturing	Light industry			x		
3	Household electric appliance manufacturing	Light industry			x		
3, 4	Battery manufacturing (3); sub-sectors Lithium-Ion, Nickel-Hydrogen, and “Other” (4)	Battery technology			x		
4	Thermal / hydroelectric / nuclear power gener.	Energy development					x
3	Electricity production	Power equipment				x	
3	Electricity supply	Energy development					x
2	Gas production and supply	Energy development					x
Tertiary sector							
1, 2	Transportation (1); sub-sectors include loading/unloading and warehousing (2)	Logistics	2009				
4	Ocean freight and passenger transportation	Logistics				x	
2	Environmental management	Environmental protection technologies		x	x		
1	Information technology (services)	Information techn.; Next-generation inf. techn. (twice); High-tech industry	2009	x	x	x	x
2	Air transport services	High-tech industries; Aerospace equip.				x	x
2	Water transport (services)	Ocean engineering equipment				x	
1	Real estate	Real estate					(-)
1	Science	Same as information techn. (services)	2009	x	x	x	x
4	Biotechnology extension services	Biotechnology (twice); Light industry		x	x		x
1	Culture, sports, and entertainment	Culture	2009				

Notes: The order of sectors follows the official sector classification system GB2011. Numbers in parentheses after sector labels denote the digit-level of the sector. Policies of two separate periods in one field are separated by a semi-colon. The symbol “x” means that the policy favors investment in this sector and “(-)” that the policy constrains investment in this sector.

A: pre-2010 industrial policies. B: Strategic Emerging Industries (2010). C: Twelfth Five-Year Plan (2011–15). D: Supply-side Structural Reform Program (2015). E: “Made in China 2025” (2015). F: Thirteenth Five-Year Plan (2016–20).

Source: see discussion of industrial policies in text.

Data

Detailed investment data are available for a measure labeled “Fixed Asset Investment” (FAI, *guding zichan touzi* 固定资产投资). FAI is the sum of all of the fixed asset spending by firms. FAI data were first compiled in the early years of the PRC as a key performance indicator for central planners concerned with establishing the foundations for rapid economic growth, and as a monitoring mechanism for government investment expenditures.

FAI data are compiled by the Department of Investment and Construction Statistics of the National Bureau of Statistics (NBS) and are published in the investment section of the *Statistical Yearbook* series.²⁸ More detailed information is provided in a separate *Investment Statistical Yearbook* series published for 1950–1995 (one issue) and then as annual issues for 1997 through 1999 and again starting in 2003 (with the exception of 2014).²⁹ The NBS database includes data on FAI for the years since 1980 or 1981 (depending on the series), as does the CEIC database.³⁰

Through 2002, FAI statistics were primarily ownership-focused, with ample detail on state-owned units (SOUs) and urban collective-owned units (COUs), and over time increasing coverage of other ownership forms. The focus here is on the years since 2003, when a primary urban-rural distinction was introduced to the FAI statistics, with detailed breakdowns available for urban FAI. In 2003, urban investment accounted for 82 percent of total investment, and in 2010 for 87 percent.³¹

In 2011, the urban-rural distinction evolved into a distinction between “investment, except by rural households” (for which detailed data are available) and “investment by rural households,” accounting for 97 percent and 3 percent of total investment respectively. The new minimum urban investment size to be included in the statistics is CNY5 million, ten times higher than the size criterion previously applied through 2010 to “urban investment,” of CNY500,000. The two changes imply that the officially published, retrospectively revised 2010 FAI value is 9.51 percent smaller than the earlier published 2010 FAI value (as the sum of urban and rural investment, with the CNY500,000 urban size criterion).

²⁸ *Zhongguo tongji nianjian* ((China) Statistical Yearbook) (Beijing: Zhongguo tongji chubanshe, various years).

²⁹ *Zhongguo guding zichan touzi tongji nianjian* ((China) Investment (in Fixed Assets) Statistical Yearbook) (Beijing: Zhongguo tongji chubanshe, various years).

³⁰ NBS database: Database at NBS website <http://www.stats.gov.cn> (posted values may change over time due to official revisions). CEIC: China Premium Database, at <https://www.ceicdata.com/en/products/china-economic-database>. Appendix 2 provides further details on data.

³¹ *Investment Statistical Yearbook 2004*, 3, 73, 415; *Investment Statistical Yearbook 2011*, 13, 55, 415.

A third change occurred in 2012 in the sector classification system (*guobiao* 国标, in the following abbreviated “GB”), from the earlier GB2002 to the latest GB2011.³² At the first- and second-digit sector level, GB2002 and GB2011 are similar, though not fully identical.³³

The three statistical breaks suggest analyzing FAI data in two separate, consistent time periods: 2003–2009/2010, and from 2012 onwards. The FAI data are in nominal terms. Neither nominal nor real (inflation-adjusted) FAI data are the obviously preferred choice. Changing patterns of investment are simply assessed differently depending on whether one uses nominal or real data. Since an investment in fixed asset price index is available only for the aggregate of all sectors, the measurement proceeds in nominal terms.³⁴

To avoid cumbersome phrasing in the following, the term “urban” investment is frequently used to denote urban investment through 2010 as well as “investment, except by rural households” since 2011. The analysis at times focuses on the years since 2012, by which time the industrial policies can be expected to show up in the investment data. Key variables of interest are investment by sector, by central-local subordination, and by ownership.

Sector Distribution of Investment

A sector breakdown of the aggregate FAI value is available. The following sections examine the development of the sector distribution of investment over time, including consideration of the extent to which investment outcomes match industrial policies.

1. Primary, Secondary, and Tertiary Sectors

Between 2003 and 2016, the share in FAI of the secondary sector—industry (mining, manufacturing, and utilities) and construction—rose from 38 percent in 2003 to 45 percent in

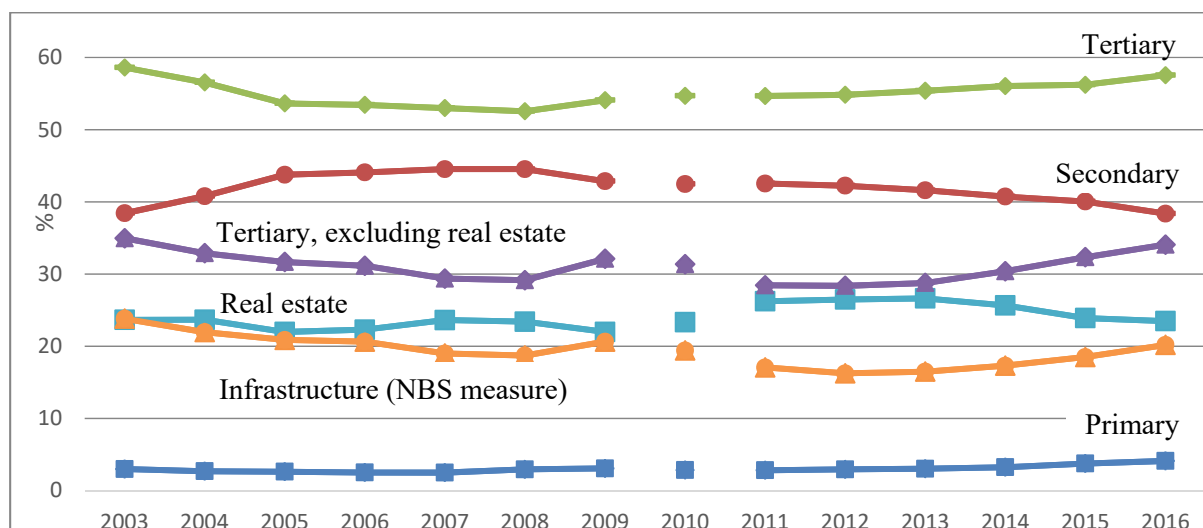
³² Confusingly, the NBS does not apply the sector classification system consistently. Thus, while investment data since 2012 are compiled according to GB2011, the NBS at times reports these data fitted into GB2002, leading to missing data where a sector match is not possible (and to differences between the aggregate value and the summed sector value).

³³ For details on the transition in the classification system, statistical breaks, and coverage changes over time see Carsten A. Holz, “Chinese Statistics: Classification Systems and Data Sources,” *Eurasian Geography and Economics* 54, no. 5/6 (2013): 532-71.

³⁴ The aggregate investment in fixed assets price index has remained nearly unchanged since 2012, and experienced, at most, upper single-digit price increases in 2003–2011. This suggests price stability across sectors and types of investment expenditures, or otherwise reflects a rather unlikely consistent evening out of different price changes across sectors in every single year. The investment in fixed assets price index in 2003–2015 (previous year = 100) was 102.2, 105.6, 101.6, 101.5, 103.9, 108.9, 97.6, 103.6, 106.6, 101.1, 100.3, 100.5, 98.2 (NBS database).

2008 before entering a long-term decline through 2016 to again 38 percent (Figure 1). The primary and tertiary sectors (agriculture and services) exhibit the reverse pattern, with declining shares through 2007/2008, and then increasing shares.

Figure 1: Sector Investment (FAI) Shares 2003–2016 (%)



Notes:

Real estate is a tertiary sector sub-sector. Infrastructure is the sum of several tertiary sector sub-sectors.

The size criterion for urban investment increased from CNY500,000 to CNY5 million in 2010, the coverage of investment subject to the size criterion changed in 2011 from urban to “investment, except by rural households,” and the sector classification system changed in 2012 (which should not affect any of the shares).

The share of infrastructure in investment is based on data on urban investment (and “investment, except by rural households”), following NBS practice (Appendix 3). Infrastructure investment is the sum of investment in most sub-sectors of transportation (rail, road, water, air, pipeline), information technology, and public facilities.

Source: NBS database, *Statistical Yearbook 2017*.

The tertiary sector—transport, trade, real estate development, and a host of other services ranging from business services to public administration—has always accounted for the bulk of investment (59 percent in 2003, 58 percent in 2016). A distinct increase in the tertiary sector share of investment occurred in 2009; tertiary sector investment growth exceeded FAI growth of 30 percent, the highest FAI growth rate in the period 2004–2016. This is in line with a 2007 policy to accelerate service-sector development and a *later* Twelfth Five-Year Plan policy favoring an increase in the tertiary sector share in GDP. A slow rise in the tertiary sector share in subsequent years conforms with the objectives listed in the Twelfth Five-Year Plan (2011-2015) of raising the share of the tertiary sector in GDP by four percent percentage points.

The share of real estate investment in FAI and in tertiary sector investment jumped in 2010 and 2011—possibly due to the statistical breaks—before starting to decline in 2014 and

ending the period with the same share as in 2003 (24 percent).³⁵ Real estate investment, thus, while not the subject of industrial policies, appears to have driven the increasing share of the tertiary sector in investment in the immediate aftermath of the 2008 global financial crisis.

An annual “urban” infrastructure investment measure constructed following NBS definitions—covering investment in certain aspects of transport, information technology, and public facilities—shows a decline between 2003 and 2012 (with an uptick in 2009) and then a gradual increase starting in 2013 (although the 2016 share of 20 percent in FAI is well below the 2003 share of 24 percent, prior to the statistical breaks).³⁶ Of the various components of infrastructure, only the information technology component (not transport and public facilities) is potentially affected by industrial policies.

2. First-digit Sectors

In 2015, more than half of FAI was concentrated in two out of the exhaustive 19 first-digit sectors: manufacturing (32 percent) and real estate (24 percent). These were followed by public facilities (10 percent) and transport (9 percent); i.e., one-quarter of the first-digit sectors accounted for three-quarters of FAI (Figure 2).³⁷ Information technology (IT) accounted for only 1 percent of economy-wide investment.

In the period 2012–2015, investment in mining was stagnant (dots in Figure 2), predating the 2015 supply-side structural reform agenda.³⁸ Manufacturing investment does not show any aggregate impact from the various industrial policies favoring individual manufacturing sectors promulgated in the Twelfth Five-Year Plan.

Investment in 2015 grew fastest in IT, business services, health, trade, and science (the latter, at 1.5 percent, was triple its 2010 share in FAI).³⁹ Growth in IT and science conforms with the 2010 strategic emerging industries policy. In 2016, the fastest-growing sector was business services, again followed by various tertiary sector sub-sectors, though IT does not stand out despite the 2015 “Made in China 2025” policy favoring IT. The rapid growth of

³⁵ Following the 2010 and 2011 statistical breaks, real estate accounted for almost one-half of tertiary sector investment before its share declined gradually, to 43 percent of tertiary sector investment and 24 percent of FAI in 2016, while the share of all other tertiary sectors in investment increased, to 34 percent of FAI in 2016.

³⁶ Official NBS infrastructure investment data are available only since May 2014, and only on a cumulative monthly basis. See Appendix 3 for the construction of the annual measure reported here.

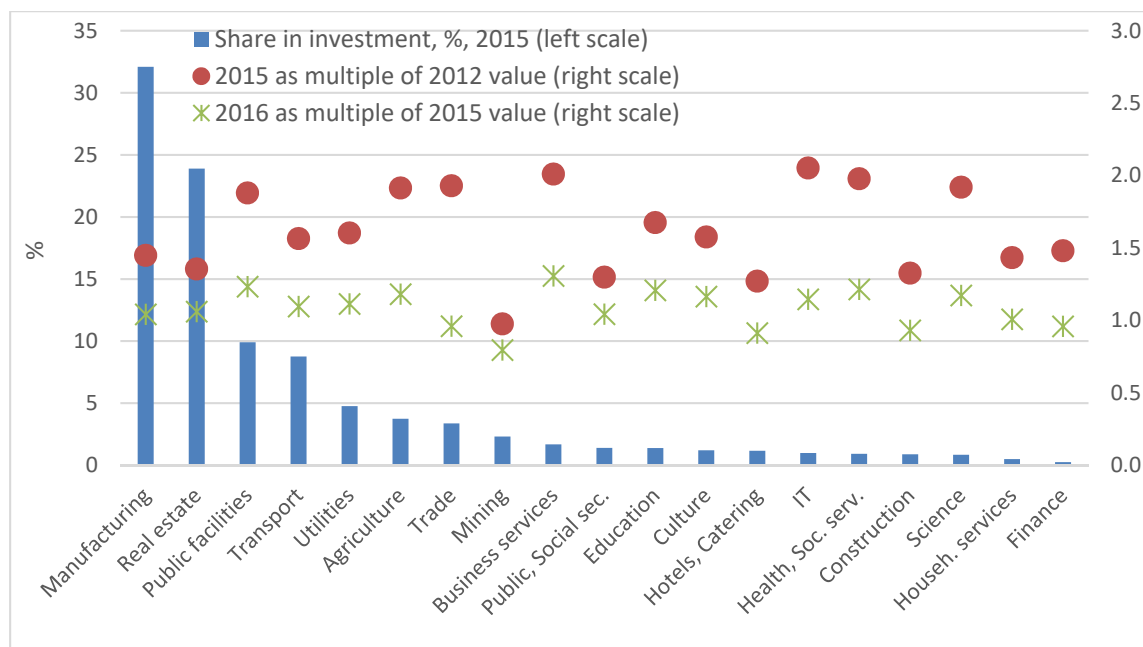
³⁷ The corresponding percentages in 2010 were very similar at 35 percent, 26 percent, 8 percent, and 9 percent.

³⁸ Mining’s 2015 share in FAI at 2 percent was half its share of 4 percent in 2010, and in 2016 it had the lowest growth rate of any sector (X-symbols in Figure 2).

³⁹ In contrast, between 2003 and 2010, among these five sectors, the growth rate of IT had been far below the average FAI growth rate, and only business services and trade somewhat exceeded the average.

investment in agriculture, trade, business services, health and social services occurred in sectors that were not the favored subjects of industrial policies.

Figure 2: Sector Investment Shares and Growth Rates, 2012–2015–2016



Notes:

IT: Information technology. (For unabbreviated sector labels, see note to Figure 4, below.)

Except for real estate investment and rural individual-owned investment, the minimum size of investment projects to be included in the statistics is CNY5 million.

The sector classification system, to judge by the sector labels, is GB2011. (The source includes data starting 2003 which are identical to the NBS database data available for 2003–2014 with sector labels for the NBS database data that reveal the use of GB2002; i.e., the source used here for 2012 and 2015 values, *Statistical Yearbook 2016*, probably mis-labels the sectors of its 2003–2011 data, while the NBS database probably mis-labels the sectors of its 2012–2014 data.)

Source: NBS website; *Statistical Yearbook 2016* and *2017*, Table 10-6.

3. Second-digit Sectors

Table 2 reports each second-digit sector’s share in “urban” investment in 2008, 2010, 2012, and 2015 (with first-digit sectors in bold) and period growth rates of investment expressed as multiples of the earlier year values.

Economy-wide urban investment in 2008 was 3.2 times the 2003 value. All sectors that experienced significantly faster than economy-wide average growth—measured as a multiple of 5 or more (see notes below Table 2 for cut-off values for different periods)—are marked in italics in the table.⁴⁰ In the 2003–2008 period, investment growth was particularly high in the

⁴⁰ The data cover 91 second-digit sectors. In addition, two first-digit sectors do not come with a second-digit sector breakdown (real estate and education) and are included in the analysis of second-digit sectors. Investment data on a 20th first-digit sector “international organizations” are highly incomplete and therefore omitted.

mining and manufacturing sectors. Investment in animal husbandry and fishery also grew fast, as it did in a selection of tertiary sector second-digit sectors, such as railway transport, storage, hotels and catering, securities activities, leasing, “other services,” and social welfare.

Table 2: Second-Digit Sector Investment Growth

	2008	2008	2010	2010		2012	2015	2015	2016
	/	%	/	%		%	/	%	/
<i>GB 2002</i>	2003	%	2008	%	<i>GB 2011</i>		2012	%	2015
National Total	3.2	100	1.6	100	National Total	100	1.5	100	1.08
Agriculture, Forestry, Animal Husbandry and Fishery	4.2	1.5	1.7	1.6	Agriculture, Forestry, Animal Husbandry and Fishery	2.4	2.2	3.5	1.19
Farming	3.3	0.3	2.1	0.4	Farming	0.9	2.5	1.4	1.30
Forestry	2.6	0.3	1.9	0.3	Forestry	0.3	1.9	0.4	1.11
Animal Husbandry	6.9	0.4	1.6	0.4	Animal Husbandry	0.6	2.2	0.9	1.10
Fishery	5.0	0.1	2.0	0.1	Fishery	0.1	1.7	0.2	1.22
Services in Support of Agriculture	4.9	0.4	1.6	0.4	Service in Support of Agriculture	0.5	1.9	0.6	1.12
Mining	4.4	4.6	1.4	4.0	Mining	3.6	1.0	2.4	0.80
Mining and Washing of Coal	5.5	1.6	1.6	1.6	Mining and Washing of Coal	1.5	0.7	0.7	0.76
Extraction of Petroleum and Natural Gas	2.8	1.8	1.1	1.2	Extraction of Petroleum and Natural Gas	0.8	1.1	0.6	0.68
Mining and Processing of Ferrous Metal Ores	13.6	0.5	1.6	0.4	Mining and Processing of Ferrous Metal Ores	0.4	0.9	0.2	0.72
Mining and Processing of Non-Ferrous Metal Ores	9.2	0.4	1.6	0.4	Mining and Processing of Non-Ferrous Metal Ores	0.4	1.1	0.3	0.90
Mining and Processing of Nonmetal Ores	9.2	0.3	2.3	0.4	Mining and Processing of Non-metal Ores	0.4	1.3	0.4	1.02
Mining of Other Ores	6.8	0.0	3.6	0.0	Support Activities for Mining	0.1	1.4	0.1	0.81
Manufacturing	4.3	31.2	1.6	30.6	Manufacturing	34.1	1.4	32.7	1.04
Processing of Food from Agricultural Products	5.1	1.4	1.8	1.5	Processing of Food from Agricultural Products	1.9	1.6	2.0	1.10
Manufacture of Foods	3.9	0.8	1.7	0.8	Manufacture of Foods	0.8	1.7	0.9	1.14
Manufacture of Beverages	4.1	0.6	1.5	0.6	Manufacture of Liquor, Beverages and Refined Tea	0.7	1.6	0.7	1.00
Manufacture of Tobacco	1.7	0.1	1.4	0.1	Manufacture of Tobacco	0.1	1.1	0.0	0.79
Manufacture of Textiles	2.5	1.0	1.8	1.1	Manufacture of Textile	1.1	1.5	1.1	1.11
Manufacture of Textile Apparel, Footwear and Caps	4.5	0.6	1.8	0.7	Manufacture of Textile, Wearing Apparel and Accessories	0.7	1.8	0.8	1.06
Manufacture of Leather, Fur, Feather and Related Prod.	4.5	0.3	1.6	0.3	Manufacture of Leather, Fur, Feather and Related Products and Footwear	0.4	1.6	0.4	1.07
Processing of Timber, Manuf. of Wood, Bamboo, Rattan, Palm and Straw Products	6.9	0.5	1.7	0.6	Processing of Timber, Manuf. of Wood, Bamboo, Rattan, Palm and Straw Products	0.7	1.7	0.7	1.05
Manufacture of Furniture	6.9	0.3	1.8	0.4	Manufacture of Furniture	0.4	1.9	0.5	1.06
Manufacture of Paper and Paper Products	3.3	0.7	1.4	0.6	Manufacture of Paper and Paper Products	0.6	1.3	0.5	1.10
Printing, Reproduction of Recording Media	3.6	0.3	1.6	0.3	Printing and Reproduction of Recording Media	0.3	1.8	0.3	1.00
Manufacture of Articles For Culture, Education and Sport Activities	4.5	0.1	1.7	0.1	Manufacture of Articles for Culture, Education, Arts and Crafts, Sport, Entertainment Activities	0.3	2.0	0.4	1.13
Processing of Petroleum, Coking, Processing of Nuclear Fuel	5.7	1.2	1.1	0.8	Processing of Petroleum, Coking and Processing of Nuclear Fuel	0.7	1.0	0.5	1.06
Manufacture of Raw Chemical Materials and Products	4.3	3.2	1.5	2.9	Manufacture of Raw Chemical Materials and Chemical Products	3.1	1.3	2.7	0.98
Manufacture of Medicines	2.1	0.7	1.7	0.7	Manufacture of Medicines	1.0	1.6	1.1	1.08
Manufacture of Chemical Fibers	2.4	0.2	1.7	0.2	Manufacture of Chemical Fibers	0.2	1.3	0.2	1.00
Manufacture of Rubber	3.5	0.3	1.7	0.4	Manufacture of Rubber and Plastics Products	1.2	1.5	1.2	1.07
Manufacture of Plastics	4.2	0.7	1.8	0.8	Manufacture of Non-metallic Mineral Products	3.3	1.4	3.0	1.01
Manufacture of Non-metallic Mineral Products	5.3	2.8	1.9	3.3					

Smelting and Pressing of Ferrous Metals	2.3	2.2	1.0	1.4	Smelting and Pressing of Ferrous Metals	1.4	0.8	0.8	0.98
Smelting and Pressing of Non-ferrous Metals	4.1	1.3	1.5	1.2	Smelting and Pressing of Non-ferrous Metals	1.2	1.2	1.0	0.94
Manufacture of Metal Products	7.8	1.5	1.9	1.7	Manufacture of Metal Products	1.6	1.6	1.7	1.07
Manufacture of General Purpose Machinery	8.9	2.2	1.8	2.4	Manufacture of General Purpose Machinery	2.3	1.6	2.4	0.98
Manufacture of Special Purpose Machinery	6.7	1.5	1.9	1.7	Manufacture of Special Purpose Machinery	2.3	1.5	2.2	0.97
Manufacture of Transport Equipment	5.3	2.5	1.7	2.7	Manufacture of Automobiles	2.2	1.4	2.1	1.05
Manufacture of Electrical Machinery and Equipment	7.4	1.6	2.3	2.2	Manufacture of Railway, Ship, Aerospace and Other Transport Equipment	0.6	1.4	0.6	0.91
Manufacture of Communication Equipment, Computers and Other Electronic Equipment	3.2	1.7	1.6	1.6	Manufacture of Electrical Machinery and Apparatus	2.3	1.4	2.1	1.13
Manufacture of Measurement Instruments and Machinery for Cultural Activity and Office Work	4.2	0.3	1.8	0.3	Manufacture of Computers, Communication and Other Electronic Equipment	1.6	1.5	1.6	1.16
Manufacture of Artwork and Other Manufacturing	3.3	0.5	1.8	0.5	Manufacture of Measurement Instruments and Machinery	0.4	1.3	0.3	1.06
Recycling and Disposal of Waste	22.5	0.1	2.6	0.1	Other Manufacture	0.4	1.5	0.4	1.01
Production and Supply of Electricity, Gas and Water	2.8	7.1	1.4	6.0	Utilization of Waste Resources	0.2	1.8	0.2	1.05
Production and Supply of Electric Power and Heat Power	2.7	6.1	1.3	4.7	Repair Service of Metal Products, Machinery and Equipment	0.1	1.1	0.1	0.89
Production and Supply of Gas	2.8	0.3	2.3	0.4	Production and Supply of Electricity, Heat, Gas and Water	4.6	1.6	4.8	1.11
Production and Supply of Water	3.0	0.7	1.7	0.7	Production and Supply of Electric Power and Heat Power	3.5	1.6	3.7	1.12
Construction	2.3	0.8	1.9	0.9	Production and Supply of Gas	0.4	1.5	0.4	0.92
Construction of Buildings and Civil Engineering	2.1	0.7	1.8	0.8	Production and Supply of Water	0.6	1.9	0.7	1.21
Building Installation	2.7	0.0	1.6	0.0	Construction	1.0	1.3	0.9	0.93
Building Decoration	3.4	0.0	1.8	0.0	Construction of Buildings	0.4	1.1	0.3	0.84
Other Construction	5.3	0.1	2.4	0.1	Civil Engineering	0.5	1.4	0.5	0.96
Transport, Storage and Post	2.8	10.6	1.8	11.4	Building Installation	0.0	1.8	0.0	1.06
Railway Transport	5.8	2.7	1.8	3.1	Building Decoration and Other Construction	0.1	1.8	0.1	1.04
Road Transport	2.1	5.0	1.7	5.0	Wholesale and Retail Trades	2.7	1.9	3.4	0.96
Urban Public Transport	2.9	0.9	1.6	0.8	Wholesale Trade	1.2	2.2	1.7	0.98
Water Transport	3.3	0.8	1.6	0.8	Retail Trade	1.5	1.7	1.7	0.94
Air Transport	2.7	0.4	1.4	0.3	Transport, Storage and Post	8.5	1.6	8.9	1.10
Transport Via Pipelines	1.0	0.1	0.7	0.0	Railway Transport	1.7	1.3	1.4	1.00
Loading, Unloading and Other Transport Services	2.5	0.1	2.9	0.1	Road Transport	4.8	1.6	5.2	1.15
Storage	7.6	0.6	2.1	0.7	Water Transport	0.6	1.2	0.4	0.92
Post	0.7	0.0	1.7	0.0	Air Transport	0.3	1.6	0.3	1.21
Information Transmission, Computer Services and Software	1.3	1.4	1.1	1.0	Transport Via Pipelines	0.1	1.5	0.1	0.88
Telecommunications and Other Information Transmission Services	1.2	1.3	1.0	0.8	Loading, Unloading and Forwarding Agency	0.2	1.8	0.2	0.85
Computer Services	4.9	0.0	2.4	0.1	Storage	0.9	2.1	1.2	1.05
Software	4.5	0.1	1.8	0.1	Post	0.0	3.5	0.0	0.92
Wholesale and Retail Trades	4.0	2.1	1.6	2.1	Hotels and Catering Services	1.4	1.3	1.2	0.91
Wholesale Trade	4.8	1.0	1.5	1.0	Hotels	1.0	1.3	0.8	0.89
Retail Trade	3.5	1.1	1.7	1.2	Catering Services	0.4	1.3	0.3	0.99
Hotels and Catering Services	5.4	1.2	1.7	1.2	Information Transmission, Software and Information Technology	0.7	2.0	1.0	1.15
Hotels	5.3	0.8	1.8	0.9	Telecommunication, Radio and Television and Satellite Transmission Service	0.4	1.5	0.4	1.08
Catering Services	5.5	0.4	1.6	0.4	Internet and Related Service	0.1	3.4	0.1	1.17
Financial Intermediation	2.9	0.2	1.9	0.2	Software and Information Technology	0.2	2.7	0.4	1.20
Bank	2.5	0.1	1.7	0.1	Financial Intermediation	0.3	1.5	0.2	0.96
Security Activities	19.3	0.0	1.7	0.0	Monetary and Financial Service	0.2	1.2	0.1	0.84
Insurance	1.9	0.0	2.9	0.0	Capital Market Service	0.0	2.5	0.1	1.24

Other Financial Activities	5.2	0.0	3.7	0.0	Insurance	0.0	1.1	0.0	0.90
Real Estate	3.2	24.1	1.6	23.6	Other Financial Activities	0.0	2.2	0.0	0.90
Leasing and Business Services	4.1	0.8	2.0	1.0	Real Estate	25.4	1.4	23.0	1.07
Leasing	16.6	0.0	3.4	0.1	Leasing and Business Services	1.3	2.0	1.7	1.31
Business Services	3.9	0.8	1.9	1.0	Leasing	0.1	4.3	0.2	1.79
Scientific Research, Technical Service and Geologic Prospecting	2.5	0.5	1.8	0.5	Business Services	1.2	1.9	1.5	1.25
Research and Experimental Development	2.1	0.2	1.6	0.2	Scientific Research and Technical Services	0.7	1.9	0.9	1.17
Professional Technical Services	2.5	0.1	1.8	0.2	Research and Experimental Development	0.2	1.6	0.3	0.96
Services of Science and Technology Exchanges and Promotion	4.0	0.1	2.1	0.1	Professional Technical Services	0.3	1.9	0.3	1.14
Geologic Prospecting	3.3	0.1	1.7	0.1	Science and Technology Popularization and Application Services	0.2	2.4	0.3	1.39
Management of Water Conservancy, Environment and Public Facilities	2.9	8.3	1.8	9.2	Management of Water Conservancy, Environment and Public Facilities	8.1	1.9	10.1	1.23
Management of Water Conservancy	2.0	1.0	2.1	1.2	Management of Water Conservancy	1.2	1.7	1.3	1.20
Environmental Management	2.8	0.5	2.1	0.6	Ecological Protection and Environmental Management	0.3	2.1	0.4	1.40
Management of Public Facilities	3.1	6.8	1.7	7.0	Management of Public Facilities	6.6	1.9	8.4	1.23
Services to Households and Other Services	4.8	0.2	2.4	0.3	Service to Households, Repair and Other Services	0.5	1.6	0.5	1.02
Services to Households	3.9	0.1	1.8	0.1	Service to Households	0.2	1.7	0.3	1.01
Other Services	8.0	0.1	3.6	0.2	Repair of Motor Vehicle, Electronics and Household Products	0.1	1.8	0.1	0.89
Education	1.6	1.6	1.6	1.5	Other Services	0.1	1.1	0.1	1.21
Health, Social Security and Social Welfare	3.0	0.7	1.8	0.8	Education	1.3	1.7	1.4	1.21
Health	2.8	0.6	1.7	0.6	Health and Social Service	0.7	2.0	0.9	1.21
Social Security	3.2	0.0	4.4	0.0	Health	0.6	1.8	0.7	1.17
Social Welfare	5.9	0.1	1.7	0.1	Social Services	0.1	2.9	0.2	1.36
Culture, Sports and Entertainment	3.0	1.0	1.8	1.1	Culture, Sports and Entertainment	1.2	1.6	1.2	1.16
Journalism and Publishing Activities	2.8	0.0	0.8	0.0	Journalism and Publishing Activities	0.0	1.9	0.0	0.77
Broadcasting, Movies, Television and Audiovisual Activities	1.9	0.1	1.6	0.1	Radio, Television, Motion Picture and Videotape Program Production Services	0.1	2.0	0.1	1.26
Cultural and Art Activities	3.7	0.3	2.0	0.4	Cultural and Art Activities	0.5	1.6	0.6	1.11
Sports Activities	2.5	0.2	1.9	0.2	Sports Activities	0.2	1.2	0.2	1.38
Entertainment	3.4	0.3	1.9	0.4	Entertainment	0.3	1.7	0.4	1.15
Public Management and Social Organization	1.8	2.2	1.5	2.0	Public Management, Social Security and Social Organization	1.7	1.3	1.4	1.04
Organs of Communist Party of China	0.9	0.0	1.2	0.0	Organs of Communist Party of China	0.0	0.8	0.0	1.25
Government Agencies	1.5	1.6	1.6	1.6	Government Agencies	1.2	1.2	0.9	1.10
People's Political Consultative Conference and Democratic Parties	1.2	0.0	0.9	0.0	People's Political Consultative Conference and Democratic Parties	0.0	0.9	0.0	0.24
Non-Governmental Organizations, Social Organizations and Religion Organizations	2.9	0.1	1.9	0.1	Social Security	0.1	1.3	0.1	0.92
Grass Roots Self-governing Organizations International Organizations	5.5	0.5	1.1	0.3	Non-Governmental Organizations, Social Organizations and Membership Organizations	0.2	1.1	0.1	0.74
					Grass Roots Self-Governing Organizations	0.2	1.9	0.3	1.00
Coefficient of variation	0.76		0.32				0.33		0.18

Note: Red color / italics: column 2008/2003: if value is equal to or larger than 5.0; 2010/2008 and 2015/2012: if value is equal to or larger than 2.0, 2016/2015: if value is equal to or larger than 1.20. Coefficient of variation is for second-digit sectors only, including the two first-digit sectors for which no second-digit sectors are available.

Source: NBS database, *Statistical Yearbook 2017*.

In the period 2008–2010, very few mining and manufacturing sectors had investment growth faster than the economy-wide average. Since then, many more tertiary sector second-digit sectors grew faster. Comparing the list of pre-2010 industrial policies (Table 1) to the 2010 vs. 2008 sector investment growth rates (Table 2) reveals a relatively good match of industrial policy promotion and high investment growth rates for the following sectors (with policies listed in parentheses):

- “manufacture of electrical machinery and equipment” (machine building policy, 2006),
- “loading, unloading and other transport services” (logistics, 2009),
- “computer services” (information technology, 2009),
- “services of science and technology exchanges and promotion” (information technology, 2009), and
- “cultural and art activities” (culture, 2009).

Other relatively fast-growing sectors such as leasing and business services, services to households and other services, and some of the financial services, however, grew fast *in the absence* of favorable industrial policies. The observed concentration of fast-growing sectors in the tertiary sector *predates* the Twelfth Five-Year Plan (2011-2015) with its objective of raising the share of the tertiary sector in GDP by four percentage points.

In the period 2012–2015, none of the mining and manufacturing sectors made it into the group of fast-growing sectors, except for “articles for culture, education, arts and crafts, sport and entertainment activities.” That is despite a Twelfth Five-Year Plan (2011-2015) that still supported traditional industries, and despite the fact that the supply-side structural reform agenda on eliminating excess capacity, especially in steel and coal, was only passed later, in 2015. Farming and animal husbandry grew fast, as did various tertiary sector second-digit sectors such as internet and related services, software and IT, capital market services, other financial services, leasing, science and technology popularization and application services, social services, and radio / television / film. Among these sectors, only investment in IT and science are borne out by a favorable industrial policy (the 2010 Strategic Emerging Industries policy).

In 2015-2016, mining experienced a 20 percent drop in investment, and manufacturing investment rose by only 4 percent (vs. an aggregate 8 percent increase). Fast-growing sectors—those with a 20 percent increase or higher—can be found in agriculture and in leasing and business services, water conservancy, environment, and public facilities, education, social services, and some culture, sports, and entertainment sectors. Of the three

scientific research and technical services sectors, investment in research and development shrank by 4 percent, and only investment in “science and technology popularization and application services” grew fast. Industrial policy was not in keeping with this selection of fast-growing sectors.

The coefficient of variation in investment growth rates decreased over the four periods from 0.76 in 2003-2008 to 0.32, 0.33, and then 0.18 in 2015-2016. This means ever less variation in investment growth across second-digit sectors, suggesting a trend towards broad-based, economy-wide investment growth rather than any form of specialization (whereas industrial policies targeting certain sectors favor specialization).

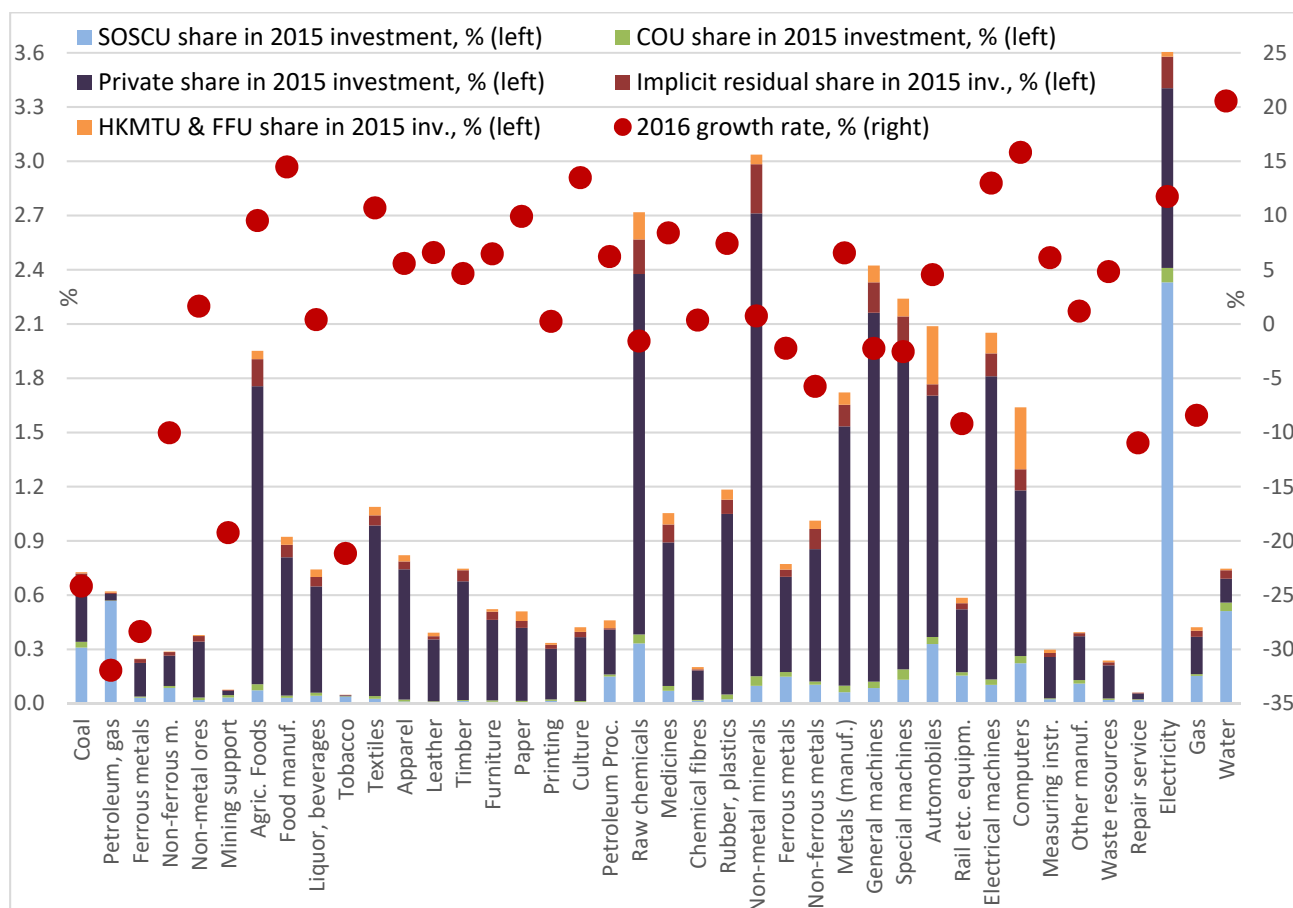
Figure 3 graphically extracts the second-digit industry sectors and their 2015 shares in investment (including an ownership breakdown that is discussed below) and the 2016 growth rates (represented by dots). In mining, except for non-metal ores, all the other five mining sectors experienced significant investment declines in 2016, including a 32 percent fall in investment in oil and natural gas extraction, a sector favored by the Thirteenth Five-Year Plan for 2016-2020. This continues a trend that well predated the 2015 supply-side structural reform program. In manufacturing, a broad range of light industry sectors experienced on the order of ten percentage points of investment growth (these were not industrial policy sectors), while investment in heavy industry stagnated. Investment growth was high for computers, communication and other electronic equipment (16 percent) and electrical machinery and apparatuses (13 percent), in line with the high-end manufacturing promoted as a strategic emerging industry (2010), but investment in general purpose machinery and in special purpose machinery fell 2 percent and 3 percent. Investment grew fast in food manufacturing (15 percent) and in the manufacture of cultural goods (14 percent), which are not favored industrial policy sectors. Investment in the automobile industry—where the 2010 Strategic Emerging Industry policy promoted the development of electric vehicles—only rose 4 percent.

The analysis can be extended to the third- and fourth-digit sector level, with more than 1,000 sectors, but this yields few new insights and is therefore relegated to an appendix.⁴¹ Changes in investment patterns across many of the sectors predate the respective industrial policies, and in some sectors concur. An additional finding is that the 30 fastest-growing sectors together account for an ever smaller share of “urban” investment over time, by 2015 equal to only one-thirtieth of what one would expect that share to be, given the average sector

⁴¹ See Appendix 4.

share. This suggests that fast-growing investment in a particular sector primarily serves to develop a previously underdeveloped sector, implying a catch-up process or the completion of an industrial structure more than any kind of specialization favored by industrial policies.

Figure 3. Industry Investment Patterns (incl. by ownership) 2015 with 2016 growth rates (%)



Notes:

The sum of all bars across sectors equals 39.9% of total (economy-wide) “urban” investment (i.e., of economy-wide investment [except by rural households], in all sectors of the economy, and not just in industry).

In each bar, the ownership distribution begins from the bottom up. Thus, SOSCUs occupy the lowest segment of the bar, with private units the next segment up. (The shares of HKMTUs, FFUs, COUs, and of the residual tend to be relatively small and may not be easy to decipher in the chart.)

Data coverage: Investment, except by rural households, for industry (mining, manufacturing, and utilities).

Source: NBS database, *Statistical Yearbook 2016, 2017*.

Central vs. Local Investment

“Central” investment denotes investment by enterprises, administrative facilities (*shiye danwei* 事业单位), and administrative organs (*xingzheng danwei* 行政单位)—in short, by “units”—directly subordinate to the Chinese Communist Party Central Committee, the National People’s Congress, and the State Council’s ministries, commissions, offices, and

companies.⁴² All other investment is “local:” all projects by enterprises, administrative facilities, and administrative organs that are directly led and administered by provincial, municipal, and county governments and their relevant departments,⁴³ as well as private and foreign investment that is not subordinate to any of the above administrative tiers.

The central share in FAI declined from 13.3 percent in 2003 to a mere 4.7 percent in 2015, less than one-twentieth of FAI.⁴⁴ This extremely low share of central investment means that the central government’s direct impact on investment via units subordinate to the central government is small and near-negligible.

A more detailed breakdown of local investment is available for 2015: the center accounted for 5 percent of investment, the provinces for 4 percent, the municipalities for 8 percent, the counties for 17 percent, and “others” for 65 percent (Figure 4). The various tiers focused their investment on public goods sectors where one would expect a relatively high share of state involvement, ranging from transport to education, health, and public management. The center has a relatively high investment share in mining, utilities, and transport; the provinces in transport; the municipalities in transport and across all tertiary sectors; and the counties in construction, transport, “water conservancy, environment, and public facilities,” education, health, and public management. The center’s 21 percent share in mining may largely be a historical remnant, with land a key state resource, while the center’s 21 percent share in utilities reflects ownership of the nationwide electricity grid and gas supply. The provision of public goods can plausibly explain the observed investment patterns, while the various industrial policies seem to have no explanatory power.

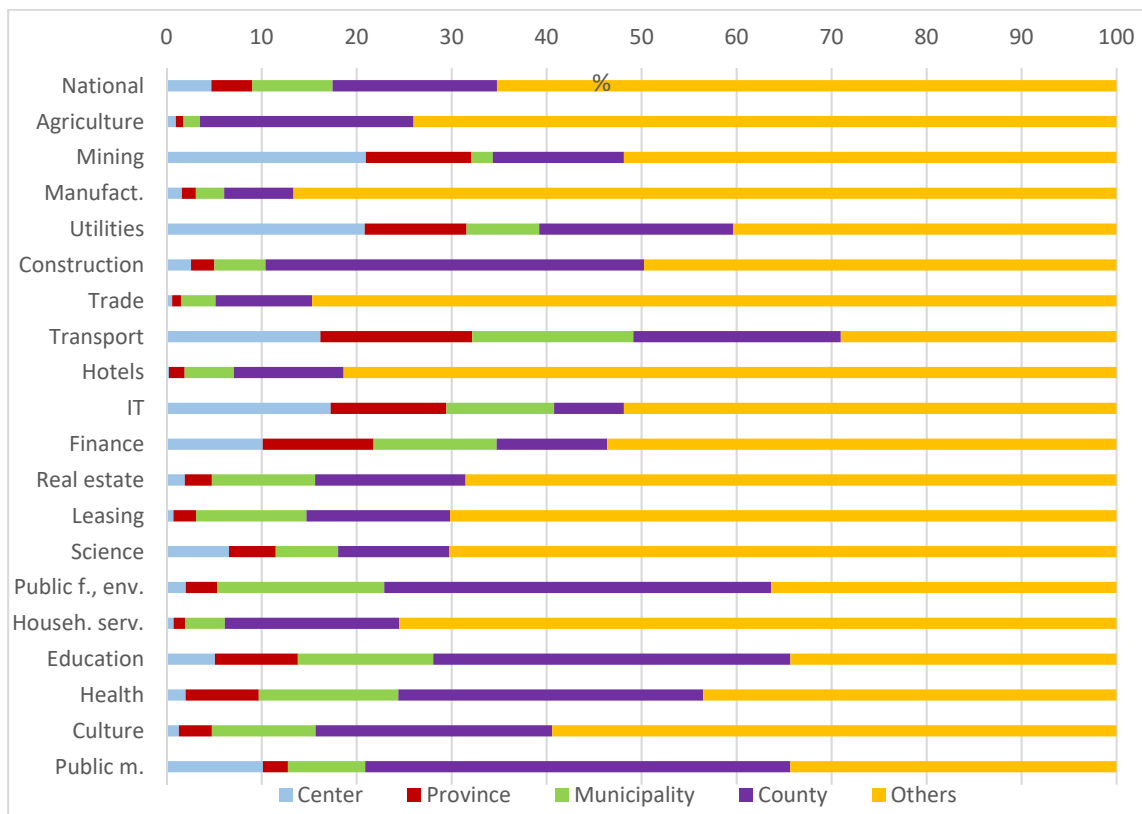
“Other” investment—i.e., investment by non-government/non-Party units and thus principally the private sector—is the dominant form of investment in more than half of all first-digit sectors, in particular in manufacturing (where it accounts for 87 percent of investment) and real estate (69 percent). These two sectors are also the largest sectors by investment volume (together they account for 56 percent of FAI). “Other” investment further accounts for approximately three-quarters of investment in agriculture, trade, leasing, science, and household services. The share of “other” investment is lowest in transport (29 percent), education (34 percent), and public management (34 percent), i.e., in key public goods sectors.

⁴² For the definition see the NBS database http://www.stats.gov.cn/tjsj/zbjs/201310/t20131029_449538.html (accessed 31 January 2017). It also gives examples of such units, including the NBS local survey teams (directly subordinate to the NBS), the Industrial and Commercial Bank of China, China Telecom, and PetroChina.

⁴³ The source does not mention Party organs or people’s congresses in its definition of “local,” but presumably these are included.

⁴⁴ NBS database.

Figure 4: Central vs. Local Shares in “Urban” Investment, 2015 (%)

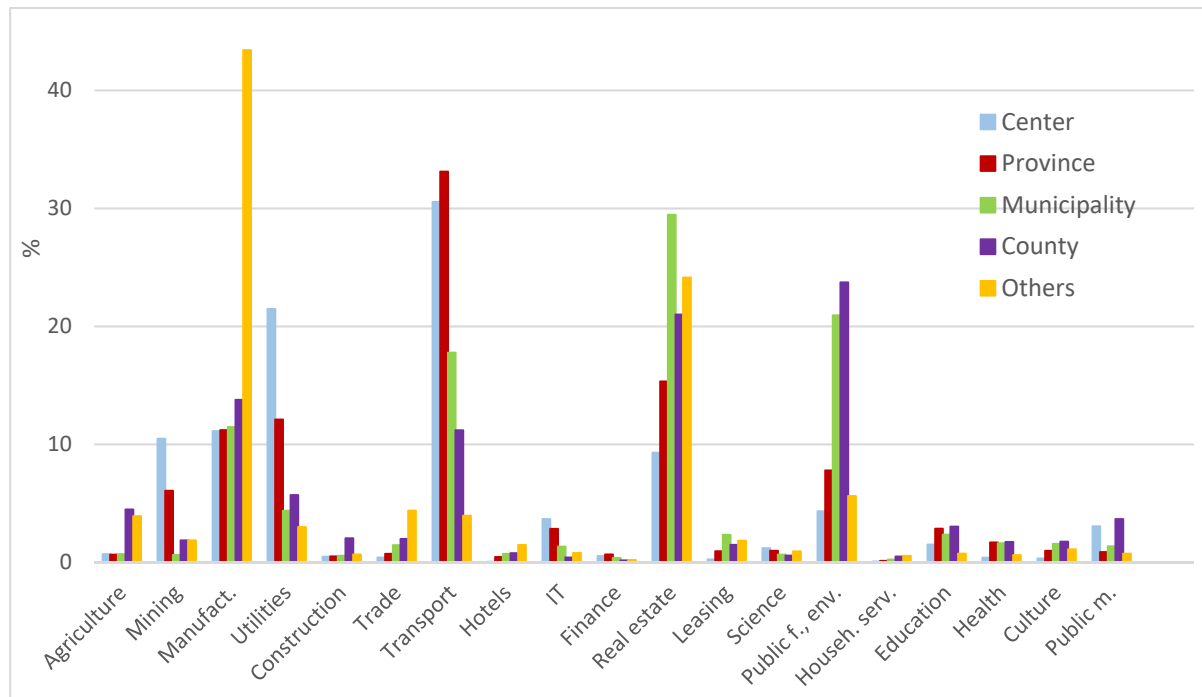


Note: The unabbreviated sector labels are: Agriculture, Forestry, Animal Husbandry and Fishery; Mining; Manufacturing; Production and Supply of Electricity, Heat, Gas and Water; Construction; Wholesale and Retail Trade; Transport, Storage and Post; Hotels and Catering Services; Information Transmission, Software and Information Technology; Financial Intermediation; Real Estate; Leasing and Business Services; Scientific Research and Technical Services; Management of Water Conservancy, Environment and Public Facilities; Service to Households, Repair and Other Services; Education; Health and Social Services; Culture, Sports and Entertainment; Public Management, Social Security and Social Organizations. Source:

Investment Statistical Yearbook 2016.

Figure 5 shows the distribution of each tier’s investment across sectors, where each tier’s bars across sectors add up to 100 percent. Central units concentrate their investment in utilities (21 percent) and transport (31 percent). Provincial units also concentrate their investment in transport (34 percent), and in real estate (24 percent). Municipal- and county-level units concentrate their investment in “water conservancy, environment, and public facilities” and real estate, with further percentages in the teens in transport and manufacturing. Two-thirds of “other” investment is in manufacturing (43 percent) and real estate (24 percent). Again, investment by units subordinate to governments targeted sectors where one would expect government to invest; provincial, municipal, and county tier units dabbling in real estate serves as a means of improving local government finances.

Figure 5: Distribution of “Urban” Investment across Sectors by Investing Tier, 2015



Notes:

For unabbreviated sector labels, see note to Figure 4.

For each tier, the percentages across sectors add to 100%.

Source: *Investment Statistical Yearbook 2016*.

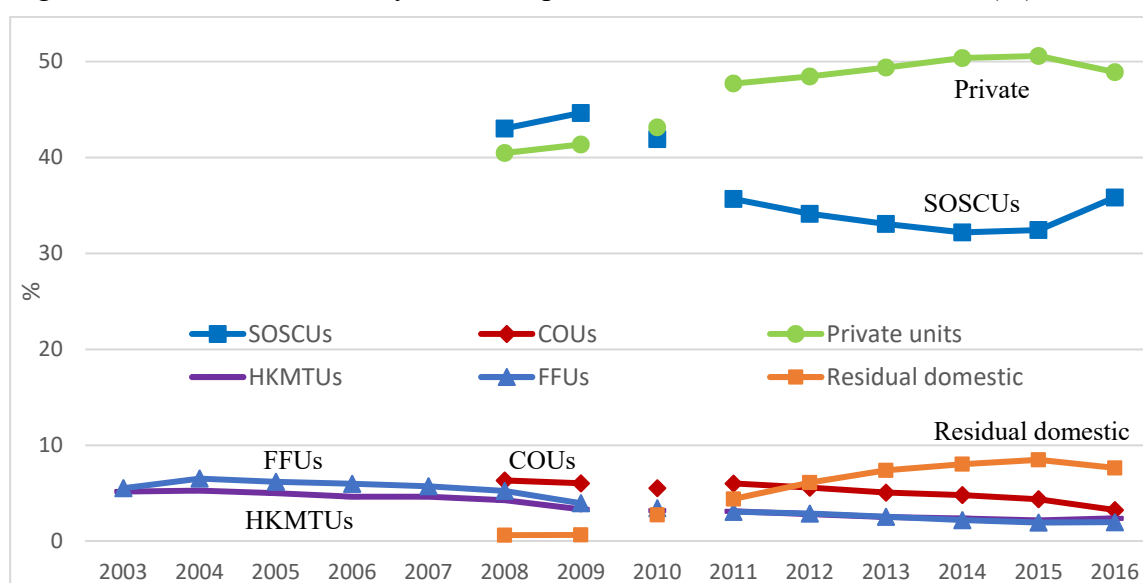
Across sectors, central investment is highly correlated with provincial investment (Pearson correlation coefficient of 0.93), and correlated to a continuously decreasing degree with municipal, county, and then “other” investment (other: 0.27). The same pattern holds for the correlation between provincial investment and municipal/county/”other” investment, and finally municipal investment (vs. county, “other”). This gradation in correlations suggests the existence of tier-specific (rather than industrial policy specific) investment preferences, with some flexibility in investment assignments between adjacent tiers.

Even if the center wanted to implement industrial policies via local government investment, implementation would face three problems: (i), the transmission and enforcement of downward directives may not be flawless (lower-level governments may have no interest in implementing central policies); (ii), the provincial units’ share in investment is limited (4.3 percent of “urban” investment in 2015); and (iii), although the investment shares of the municipal- and county-level units are slightly higher (8.5 percent and 17.3 percent), these tiers are furthest removed from the center and therefore least likely to respond to unfavorable central policies. Also, among the four tiers of the state, the municipal and county tiers have a stronger presence in sectors such as education, health, and public management, which are least subject to industrial policies.

Ownership Distribution of Investment

A breakdown of investment by ownership is available for “urban” investment, where a first distinction is between domestic investment vs. investment by “Hong Kong, Macau, and Taipei, China” units (HKMTUs) and by foreign-funded units (FFUs). (Investment can be undertaken by any “unit” (*danwei* 单位), not just enterprises.) Domestic investment accounted for 89 percent of “urban” investment in 2003 and continuously increased to 96 percent in 2016. The investment shares of HKMTUs and FFUs, shown in Figure 6, correspondingly decreased, from 5 percent and 6 percent in 2003 to 2 percent each in 2016 (and are indistinguishable in the figure from 2011 onwards).

Figure 6: Investment Shares by Ownership, “Urban Investment” 2003-2016 (%)



Notes:

“Residual” is the implicit residual obtained as domestic investment less investment by SOSCUs, COUs, and private units.

In 2010, the size criterion for inclusion in urban investment increased from CNY500,000 to CNY5 million (the NBS retrospectively revised the 2010 data), and in 2011 coverage switched from urban investment to “investment, except by rural households.”

The HKMTU and FFU shares are indistinguishable after 2010.

Source: NBS database, *Statistical Yearbook 2017*.

A breakdown of the domestic investment—available since 2008—shows investment by private units on a steady upward trend and exceeding investment by state-owned and state-controlled units (SOSCUs) starting in 2010.⁴⁵ By 2015, private units accounted for more than

⁴⁵ “State-owned and state-controlled units” refers to the following units (enterprises and non-enterprises): traditional (unincorporated) state-owned units, joint state-state units, 100 percent state-owned limited liability companies, and all other units (typically limited liability and stock companies) in which the state has an absolute or de facto controlling stake.

half of investment (51 percent), SOSCUs, after a phase of decline, for 32 percent, and collective-owned units (COUs) for 4 percent. An undefined implicit residual increased over time from 1 percent in 2008 to 8 percent in 2015. (The implicit residual presumably reflects an inability of the National Bureau of Statistics to properly classify some units.)

Since 2008, thus, a shift in investment shares has occurred away from SOSCU, COU and foreign investment, and towards domestic private units. The transition from a 3 percentage point lead of SOSCUs over private units in 2008 to an 18 percentage point lead of private units over SOSCUs by 2015 has been particularly dramatic, though some of the shift is likely due to statistical breaks.⁴⁶

The 2016 values show a reversal of the earlier trend away from SOSCU investment towards private investment, in that the SOSCU share in “urban” investment increased from 32 percent in 2015 to 36 percent in 2016, and the private share declined from 51 percent to 49 percent. This could be the outcome of a real-world trend or of a statistical break (or both). Private investment in 2016 grew 4.5 percent over 2015 while SOSCU investment grew 19.5 percent, compared to an aggregate “urban” investment growth rate of 8.1 percent. The aggregate growth rate seems plausible and the private investment growth rate possible, but the SOSCU investment growth rate appears high. The increase in the SOSCU share went hand in hand with a decline by one percentage point each in the COU share (4.4 percent to 3.3 percent) and in the share of (implicit) residual investment (8.5 percent to 7.6 percent), the first reduction in the share of residual investment since the beginning of these statistics, suggesting reclassifications.⁴⁷

⁴⁶ The SOSCU share drops significantly between 2009 and 2011, the period of statistical breaks. It is unclear, how much of this drop is due to (i) a higher minimum size requirement for inclusion in these investment statistics, probably affecting private units, with likely smaller investment, more *negatively* than SOSCUs, (ii) the switch in the coverage of these investment statistics from urban investment to “investment, except by rural households,” newly including likely private investment by non-farm-household rural enterprises and rural administrative facilities and organs, *favouring* the private unit share, and (iii) the relative growth of investment by private units vis-à-vis investment by SOSCUs in the absence of statistical breaks.

⁴⁷ The decline in the COU share hints at a reclassification of some COUs (possibly earlier created as off-springs of SOUs) as SOSCUs. Nicholas R. Lardy and Zixuan Huang, “China Private Investment Softens, But Not as Much as Official Data Suggest,” China Economic Watch, Peterson Institute for International Economics, 19 August 2016, at <https://piie.com/blogs/china-economic-watch/china-private-investment-softens-not-much-official-data-suggest> (accessed 30 January 2017), suggest that the receding share of the private sector is due to a reclassification starting in 2016 of some stock companies as state rather than privately controlled, following the PRC government’s intervention in the stock market in the summer of 2016 (which may have tipped the balance of the dominant or controlling ownership form towards the state in some companies). Louis Kuijs, “Credit and Investment – Problems and Misunderstandings,” Research Briefing, China. Oxford Economics (22 August 2016), suggests that as part of the restructuring of local government financing vehicles, some investments were reclassified from “private” to “state controlled;” he also considers the possibility that the data for private FAI growth experienced a correction but overall FAI growth did not. For further details, see Appendix 5.

Between 2010 and 2016, “urban” investment accounted for 97-98 percent of FAI, and the missing rural household investment should by definition be private investment. Thus, the share of private investment in FAI is likely 2-3 percentage points higher than in the case of “urban” investment, i.e., approximately 52 percent in 2016.⁴⁸

Combining ownership with second-digit sector data for the years 2008–2015 for “urban” investment allows the following two conclusions based on Pearson correlation coefficients:⁴⁹

- No particular ownership form allocates an over-proportional share of its annual investment to fast-growing sectors in any one year.
- If investment in any one sector in one of the two periods of 2008–2010 or 2012–2015 grows fast, investment by all individual ownership forms in that sector during that period also grows fast (particularly strongly for SOSCUs at the first-digit sector level), except for FFUs, which exhibit only a weak correlation at the first-digit sector level and none at the second-digit sector level, and except for HKMTUs in 2012–2015 with only a weak correlation at both first- and second-digit sector level.

This suggests a certain degree of domestic herd behavior in that all ownership forms increase their investment in the same sectors of fast-growing investment.

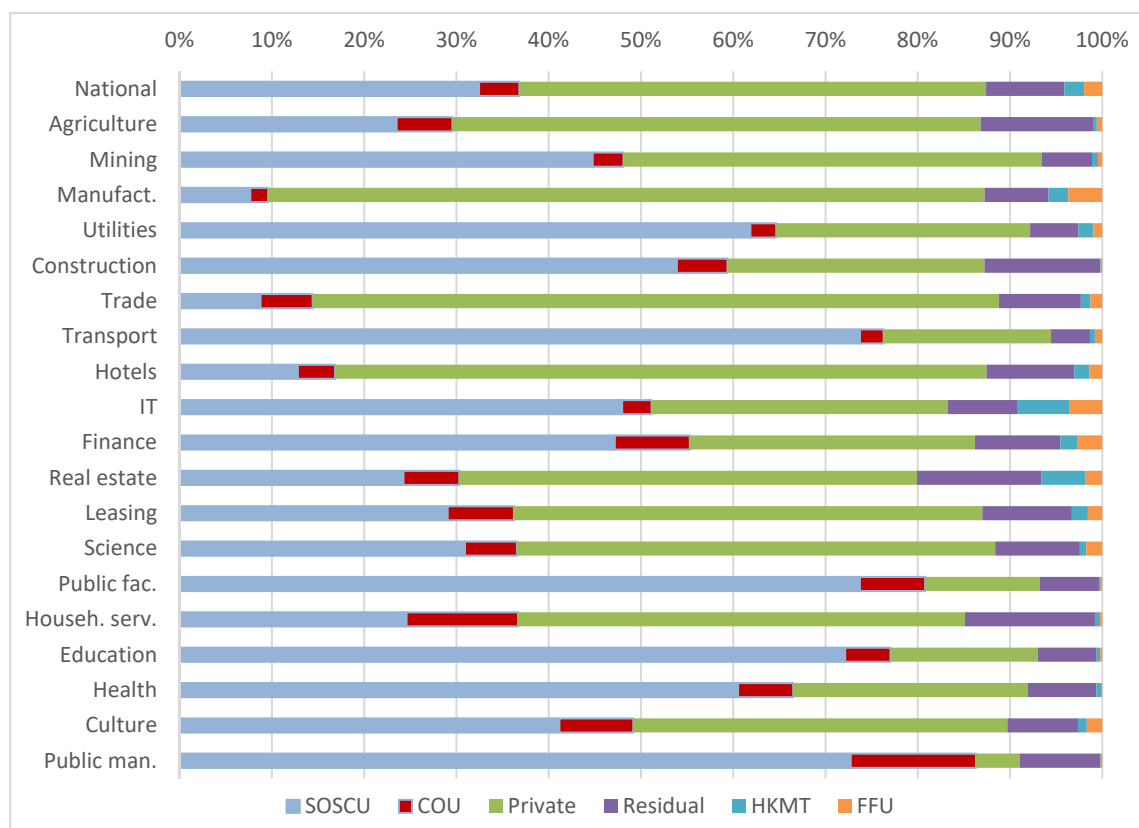
The fact that ownership-specific patterns across sectors are hard to find suggests closer examination of individual sectors, which in the following is done for 2015. Figure 7 shows the ownership shares within each first-digit sector for “urban” investment. The extent of private investment in manufacturing and in real estate—the two largest sectors, together accounting for more than half of investment—is immediately apparent. Private investment, further, is strong in agriculture, trade, hotels and catering, real estate, leasing, science, and household services, and contributes a fair share to investment in mining and culture. Altogether, private investment is dominant across half of all sectors, with a lower presence in typical public goods sectors.⁵⁰

⁴⁸ This additional private component was even higher prior to the 2010/11 statistical breaks, probably on the order of 10 percentage points. In the years 2003-2009, urban investment accounted for 82-86 percent of FAI, with the difference being rural investment. Since state-owned enterprises by definition are urban, the 14-18 percent of FAI (i.e., rural investment) for which no ownership breakdown was available was likely private and COU investment. The 2009 private share in urban investment (excluding all rural investment) of 41 percent rose to 48 percent of “all investment, excluding by rural households” (but newly including all rural non-household investment) in 2011, after the statistical breaks, while the COU share stayed at 6.0 percent.

⁴⁹ For details, see Appendix 6.

⁵⁰ The figure for 2012 looks very similar and a time series comparison is therefore omitted. In 17 out of the 19 first-digit sectors, private investment’s share in sector investment increased between 2012 and 2015 (it fell by 1 percent in real estate, and by 7 percent in public management). It increased in 76 out of 93 second-digit sectors (where none of the decreases are of significant size).

Figure 7: Investment (Except by Rural Households) by Sector and Ownership, 2015 (%)



Notes:

For unabbreviated sector labels, see note to Figure 4.

“Residual” is the implicit residual obtained as domestic investment less investment by SOSUCUs, COUs, and private units.

Source: NBS database.

In manufacturing, SOSUCUs in 2015 accounted for only 7 percent of investment, while private units accounted for 78 percent. However, investment by SOSUCUs, as a share of a sector’s investment, is strong in utilities, construction, transport, information technology, finance, public facilities, education, health, culture, and public management.⁵¹ Investment by COUs is spread across all sectors, accounting for 4 percent of economy-wide investment in 2015. Small shares of investment by FFUs and HKMTUs are present across two-thirds of all sectors: more so in manufacturing and real estate and only minimally in construction, transportation, public facilities, household services, education, health care, and public management.

Figure 3 (above) provides a snapshot of the industry sectors in 2015. SOSUCUs are the dominant investors in the extraction of petroleum and natural gas, in the tobacco sector, in

⁵¹ SOSUCUs accounted for 24 percent of investment in agriculture in 2015, reflecting large investment shares (based on second- to fourth-digit sector data) of the state in staples, sugar, tobacco, forestry, and agricultural services (including irrigation, and fire prevention in forests).

electricity production, and in water supply. Otherwise, sector for sector, private units provide the lion's share of investment. COUs play a negligible role across all sectors (barely visible in the figure), while HKMTUs and FFUs (together) play a minor role in half a dozen sectors and have a minimal presence across other sectors.⁵²

This pattern persists across sectors: private units tend to play a dominant role except in traditional state monopoly sectors, of which some second-digit sectors can be found in almost every first-digit sector. For example, in the first-digit mining sector, SOSUCUs account for more than 90 percent of investment in the (second-digit sector) extraction of petroleum and natural gas. In the first-digit manufacturing sector, SOSUCUs account for 80 percent of the manufacture of tobacco. In the first-digit information technology sector, SOSUCUs account for 80 percent of telecommunication, radio and television and satellite transmission services. In the first-digit sector "water conservancy, environment, and public facilities," SOSUCUs account for 60–85 percent of investment across all second-digit sectors.

The distribution of private investment across sectors and its dominance in the non-public goods sectors implies that implementation of industrial policy, to a very large degree, has to rely on the private economy. Lea Shih, in monograph on the PRC's industrial policy programs from 1978 through 2013, concluded that industrial policy in the PRC was introduced to replace imperative planning and therefore *exclusively* targeted state-owned enterprises.⁵³ The industrial policies of the last decade appear to be more inclusive and are—at least in language—not limited to state-owned enterprises. But forcing or incentivizing private enterprises to do the state's (policy) bidding is likely difficult, while the scope of state enterprises in the favored industrial policy sectors is severely limited, suggesting that the reach of industrial policies may in the end not extend far beyond a very small portion of state enterprises.

Industrial Policies and Investment Growth

If the channels for industrial policy through state enterprises is limited and if some investment patterns change in a direction favored by industrial policy *before* specific industrial policies have actually been issued, one wonders to what extent factors other than

⁵² Yet more dis-aggregated data show FFU investment to be highly concentrated in a very few sectors. But even in highest-concentration FFU sectors, such as automobile manufacturing, computer manufacturing, or "other financial activities," FFUs do not account for more than 15 percent of investment.

⁵³ Lea Shih, *Chinas Industriepolitik von 1978-2013: Programme, Prozesse und Beschränkungen* (China's industrial policy 1978-2013: program, processes, and limitations) (Wiesbaden: Springer VS, 2014).

industrial policy affect investment. A prime competing explanatory variable is profitability. Perhaps investment in the PRC simply follows market forces. Industrial policy, ex-post, then puts its imprimatur on market-driven developments.

Investment and profitability data can be matched for mining, manufacturing, and utilities (“industry”). What is available for industry is (limited) balance sheet and profit-and-loss account data for the above-norm industrial enterprises, a set of enterprises that accounts for approximately 90 percent of industrial value-added and half of industrial employment.⁵⁴ If profitability of above-norm industrial enterprises in a particular sector is representative of the profitability of all industrial enterprises in that sector, and if investment in industrial sectors is exclusively conducted by industrial enterprises, then the two datasets can be combined. As of early 2018, fourth-digit sector industry data are available for 2012-2016, and fourth-digit sector investment data for 2003-2012, 2014, and 2015.

The question is to what extent investment growth between 2012 and 2015 can be explained by profitability vs. industrial policy. Several control variables are included: (i) Sales growth and price changes represent market demand, with changes in market demand potentially triggering changes in investment. (Price changes for an enterprise’s products may also reflect changes in input prices; input prices by sector are not available). (ii) Different ownership forms, measured by their share in investment, may exhibit different investment behavior. (iii) Investment per employee controls for capital intensity. It is measured in CNY million per employee, while all other variables are measured in percentages.

Due to data limitations, sales growth data are for 2013⁵⁵ and price change data for 2012⁵⁶. For consistency, the ownership data should be for 2013, too, but because fourth-digit sector investment data are not available for 2013, those of 2014 are used. (Ownership shares are quite stable between adjacent years and the choice of year thus should have little effect.) Data on investment per employee can only be constructed for 2014 because the 2012 industry data do not report employment values, and no 2013 investment values are available.

Table 3 reports the Ordinary Least Squares regression results without industrial policy variables. Profitability is measured by return on equity (total profit divided by equity, RoE)

⁵⁴ Above-norm industrial enterprises are industrial enterprises with annual revenues from principal business above (since 2011) CNY20 million. The data source is *Zhongguo gongye tongji nianjian* ((China) Industry Statistical Yearbook) (Beijing: Zhongguo tongji chubanshe, various years).

⁵⁵ With investment growth measured for the period 2012–2015 (in the absence of fourth-digit sector 2013 investment data), a preferred sales growth measure might cover the period 2012 vs. 2011, but 2011’s fourth-digit sector industry data are not available (and data for earlier years follow the different, earlier sector classification system).

⁵⁶ The second-digit sector price data according to the sector classification system GB2011 start in 2012.

or, alternatively, return on assets (RoA). The first two regressions of investment growth on RoE and RoA for the 194 third-digit sectors which have data show that profitability matters. Given the lack of a clear criterion for choosing one measure of profitability over another and the vast divergence between equity and “paid-in equity” in some sectors (raising questions about the precise meaning of return on equity), the subsequent regressions focus on RoA. The third and fourth regressions repeat the second regression for all fourth-digit sectors, and then for all fourth-digit sectors (490 observations) plus those third-digit sectors for which no fourth-digit sector data are available (567 observations). Profitability, invariably, is a highly significant explanatory variable for investment growth.

Table 3: Explaining Investment Growth 2012–2015 (I)

	Dependent variable: growth rate of investment 2012-2015 in %								
	3 rd -digit sectors	4 th -digit sectors	4 th -digit sectors, plus 3 rd -digit sectors if a 3 rd -digit sector has no 4 th -digit sectors				3 rd -digit sectors		
RoE 2013	***0.94 (0.36)								
RoA 2013	***2.61 (0.72)	***2.96 (0.86)	***2.86 (0.77)	***2.63 (0.77)	***2.27 (0.79)	***2.30 (0.80)	***2.75 (0.76)	***1.85 (0.66)	
Sales growth 2013				***0.81 (0.24)	***0.81 (0.24)	***0.76 (0.24)	***0.74 (0.24)	***1.45 (0.24)	
Price index 2013					*3.98 (2.16)				
SOSCU 2014 share in investment						-0.47 (0.29)			
Investment per employee 2014							***9.69 (2.74)	***11.1 (2.10)	
Intercept	***28.7 (8.38)	***22.9 (7.83)	***31.7 (10.3)	***31.2 (9.12)	**21.1 (9.59)	***28.9 (10.5)	***29.6 (10.9)	*16.4 (9.61)	5.22 (7.59)
Obs.	194	194	490	567	564	564	564	563	193
R ²	0.034	0.064	0.024	0.024	0.043	0.048	0.042	0.063	0.24

RoE: return on equity. RoA: return on assets.

Sales growth refers to main business income (*zhuying yewu shouru* 主营业务收入).

Price index: the second-digit sector level ex-factory price index.

Except for investment per employee, which is in CNY million per employee, all explanatory variables are expressed in %.

Investment data cover “investment, except by rural households.” Industry data cover the above-norm industrial enterprises.

Values in parentheses are standard errors.

Significance levels: * 10%, ** 5%, *** 1%.

Sources: *Investment Statistical Yearbook 2013, 2015, 2016; Industrial Statistical Yearbook 2013, 2014, 2015.*

Continuing with the fourth-digit sector plus relevant third-digit sector data (maximum 567 observations), adding sales growth in the fifth regression shows that market demand is an important explanatory factor for investment growth. Price changes have a less significant impact (the sixth regression, and similar results if sales growth is excluded). Perhaps price changes are too ambiguous a measure since, besides reflecting demand, they may also capture input price changes. Ownership shares in investment do not seem to matter for investment growth (seventh regression); a high share of SOSCU investment in a particular

sector lowers investment growth, but that effect is only significant at the 11 percent significance level.⁵⁷ The SOSCU share in investment has a significant negative impact on investment growth (at a 1.5 percent significance level) if RoA is omitted from the regression; i.e., SOSCU characteristics are already captured by their profitability.

Dropping the ownership variables and adding investment per employee (eighth regression) suggests that investment per employee has a highly significant impact on investment growth. I.e., investment in the PRC in 2012–2015 favored concentration in sectors with high capital intensity, which could reflect a shift across the economy from labor-intensive to capital-intensive sectors. Focusing solely on third-digit sectors (ninth regression), the same results obtain.⁵⁸

The explanatory power of the regressions (as measured by the R^2) is low throughout. Variation in the explanatory variables typically explains 2-4 percent of the variation in investment growth. Only when the analysis is limited to third-digit sectors, in the ninth regression, does the explanatory power rise to 24 percent. The fact that the fit increases drastically when the number of observations is reduced to third-digit sectors suggests that sector-specific characteristics play an important role for investment growth.⁵⁹ Some of these characteristics could be industrial policies.

Table 4 continues from the last regression in Table 3 and includes industrial policy dummy variables. A first set of six regressions using third-digit sector data incorporates each of the six industrial policy measures in turn; a second set of three regressions uses fourth-digit sector plus relevant third-digit sector data. The earlier identified significance of profitability, sales growth, and capital intensity continues to consistently hold across all regressions.

Only the Twelfth Five-Year Plan (2011-2015) and the supply-side structural reform program of 2015 show an effect on investment growth. The effect of the Twelfth Five-Year Plan is barely significant at the 10 percent significance level and is negative, even though all elements of the plan point towards the promotion of investment (i.e., the data suggest that investment promotion leads to reduced investment growth). The supply-side structural reform

⁵⁷ Among the other ownership forms (FFUs, HKMTUs, and the domestic residual of non-SOSCU), only the FFU investment share has a slightly significant (positive) effect on investment growth (not reported in the table).

⁵⁸ An earlier version of this article used investment growth 2012-2014 (rather than 2012-2015) as the dependent variable and did not explicitly include industrial policy variables. The results reported here without industrial policy variables are very similar to the earlier results (and typically come with a higher significance level).

⁵⁹ All regressions were also run with a dummy variable that assumes unity if the SOSCU share exceeds 75 percent of the sector's investment in 2014, as a proxy for state monopoly or quasi-monopoly sectors. The coefficient of this variable was highly insignificant across all regressions.

program of 2015 has the expected negative effect on investment growth and is significant, but the effect is on investment growth of 2012-2015, *preceding* the reform program.

Table 4: Explaining Investment Growth 2012-2015 (II)

	Dependent variable: growth rate of investment 2012-2015 in %								
	3 rd -digit sectors				4 th -digit sectors, plus 3 rd -digit sectors if a 3 rd -digit sector has no 4 th -digit sectors				
RoA 2013	***1.79 (0.66)	***1.78 (0.67)	**1.52 (0.68)	**1.62 (0.63)	***1.85 (0.66)	***1.85 (0.66)	***2.71 (0.78)	***2.66 (0.76)	***2.70 (0.76)
Sales growth 2013	***1.44 (0.24)	***1.45 (0.24)	***1.41 (0.23)	***1.32 (0.23)	***1.45 (0.24)	***1.46 (0.24)	***0.74 (0.24)	***0.71 (0.24)	***0.76 (0.24)
Investment per employee 2014	***11.0 (2.10)	***11.0 (2.10)	***10.7 (2.09)	***10.5 (2.02)	***11.1 (2.11)	***11.1 (2.10)	***9.71 (2.74)	***9.60 (2.73)	***9.56 (2.73)
Dummy Policy A	-7.52 (7.81)								
Dummy Policy B		-6.16 (6.80)							
Dummy Policy C			*-12.7 (6.43)				-2.15 (8.95)		
Dummy Policy D				***-50.8 (11.9)				**-61.1 (30.4)	
Dummy Policy E					0.64 (11.0)				**31.1 (15.7)
Dummy Policy F						4.70 (11.1)			
Intercept	7.24 (7.87)	7.40 (7.96)	13.0 (8.52)	*12.5 (7.46)	5.19 (7.62)	4.76 (7.668)	17.7 (10.9)	**19.0 (9.67)	14.3 (9.7)
Obs.	193	193	193	193	193	193	563	563	563
R ²	0.254	0.254	0.266	0.317	0.235	0.251	0.057	0.067	0.070

A: pre-2010 industrial policies. B: Strategic Emerging Industries (2010). C: Twelfth Five-Year Plan (2011–15). D: Supply-side Structural Reform Program (2015). E: “Made in China 2025” (2015). F: Thirteenth Five-Year Plan (2016–20). For further notes and sources see previous table.

Continuing with fourth-digit sector plus relevant third-digit sector data, the supply-side structural reform program continues to matter after the fact. The “Made in China 2025” policy of 2015 now has a positive effect on investment growth, also after the fact. The other policies, not all reported in the table, have no effect. In particular, the Strategic Emerging Industry policy of 2010 has no effect. A continuing caveat is that coding of industrial policies into the sector classification system, as noted earlier, is exceedingly difficult.

To summarize the findings: profitability, market demand, and capital intensity exert a clear, strong, and positive influence on investment growth in 2012–2015. Ownership hardly matters. Industrial policies, in the rare instance when they matter, *do so after the fact*.

Conclusions

Private investment has come to account for just over half of all investment in the PRC. Across specifically manufacturing second-digit sectors, state-owned and state-controlled units by 2015 accounted for only 7 percent of investment, while private units accounted for 78 percent. Only in a few, small sectors do state units still play a dominant role, not astonishingly in typical public goods sectors (such as utilities, transport, public facilities, education, health, and public management).

Much of the investment under central and local governments appears to follow tier-specific public goods investment assignments and thus is not a target of industrial policies such as the 2010 Strategic Emerging Industries policy or the 2015 “Made in China 2025” initiative. Industrial policy implementation then has to rely on the private economy, which one can expect to be motivated more by profitability than by government exhortations.

Regression analysis covering mining, manufacturing, and utilities suggests that industrial policies indeed have little or no effect on the observed investment outcomes. When they do, the investment patterns *precede* industrial policy (though industrial policies could first be circulated internally and informally before being formally announced). The analysis confirms that investment in the PRC is driven primarily by profitability considerations.

Breakthroughs such as those envisaged by “Made in China 2025” may be *more likely* to occur if the government offers profitability-enhancing measures, but the original policy document “Made in China 2025” does not list any, and with competing interests and a large number of policies, supporting measures could well end up supporting everything and (thereby) nothing, or be limited to a very narrow selection of sectors and/or enterprises.

Across the economy, the sectors in which investment grows fastest tend to be exceedingly small sectors, and the pattern of investment thus favors the development of a broad economic structure more than specialization (whereas industrial policy would suggest specialization). To the extent that there has been a shift of investment into the tertiary sector, the services that benefited most, such as business services, are not on the list of industrial policies. The overall objective of “Made in China 2025”—for the PRC to become the leading manufacturing nation of the world—is not borne out by the observed below-average growth of investment in manufacturing in recent years. In the end, the observed investment outcome appears the result of an amalgam of market forces, sector-specific characteristics, and *perhaps* industrial policies, in this order of importance.

Foreign-funded investment is significant only in a very few sectors (automobile manufacturing, computer manufacturing, “other financial activities”) and does not exceed 15 percent of investment in any second-digit sector. This suggests that the PRC today has a strong core of domestic investment that does not depend on state-led investment projects or on foreigners, and operates largely independently of industrial policies. In other words, what drives economic growth and economic restructuring in the PRC’s economy today is not the state, nor foreigners, but a solid manufacturing base in domestic private hands and a strong private presence in the tertiary sector.

If industrial policy does not have a decisive effect on resource allocation and resource allocation is largely market-driven,⁶⁰ then the underlying assumption of arguments such as that the PRC is an unstoppable economic juggernaut thanks to industrial policies, or, on the other hand, that Chinese investment is wasteful due to government industrial policies that cause plummeting productivity growth, is false. Instead, government (and Party) control over the structure of the economy is exceedingly weak.⁶¹

The findings invalidate U.S. President Trump’s case for tariffs on imports from the PRC since the rationale given, namely PRC industrial policies such as “Made in China 2025,” are unlikely to have any significant effect on actual investment in the PRC. President Trump chooses to penalize well-performing enterprises that are not in U.S. ownership, i.e., to enact a pre-emptive strike against a coming economic superpower, under cover of unfair PRC industrial policy practices. To be sure, evidence exists of PRC industrial policy measures that potentially discriminate against foreign enterprises and subsidize certain sectors⁶²—similar to industrial policy measures that are implemented in other countries, such as the U.S.—but the findings of this article show that, overall, PRC industrial policies likely have little real-world impact.

⁶⁰ Nicholas Lardy, *Markets over Mao*, 91f., comes to similar conclusions in a different context.

⁶¹ Perhaps not astonishingly, the Party is asserting control by other means, such as via the newly to-be-established Party committees in private enterprises.

⁶² Jost Wuebekke, Mirjam Meissner, Max J. Zenglein, Jaqueline Ives, and Bjoern Conrad, “Made in China 2025: The Making of a High-tech Superpower and Consequences for Industrial Countries,” MERICS Papers on China no. 2, December 2016, at <https://www.merics.org/en/papers-on-china/made-china-2025> (accessed 13 July 2018).

Appendix 1: Further Policy Details

A. Policies for Capacity Reduction (Supply-side Structural Reform)

The State Council on 4 February 2016 issued “suggestions” on how to reduce excess steel production.⁶³ Following “the elimination of backward steel production capacity in recent years,” starting 2016 crude steel production capacity is to be reduced by 100–150 million tons over a period of five years (SC, 4 February 2016); this compares to output of 804 million tons in 2015.⁶⁴ The guideline stresses the importance of environmental, efficiency, quality and technology criteria in eliminating excess capacity, and favors mergers and restructuring over bankruptcies. Localities are to organize the reduction in excess capacity with a supporting role for the center. The role of the market and the importance of legal procedures is stressed. The overall objective is one of sector upgrading.

Further measures to eliminate capacity were only planned for coal. Xu Zhaoshi, head of the National Development and Reform Commission, on 27 June 2016 announced a reduction in coal production capacity for 2016 of 280 million tons (and a reduction in steel production capacity of 45 million tons) with corresponding layoffs of 700,000 (and 180,000) workers.⁶⁵ By 2020, the reduction in coal production capacity is to have reached 500 million tons, with an additional reduction in coal production (though not necessarily capacity) of 500 million tons; this compares to output of raw coal (*yuanmei*) of 3.7 billion tons in 2015. Xu Zhaoshi also reiterates the State Council’s 100–150 million ton target for reduction in steel production capacity. The intention is to achieve near-half of the reduction in production capacity in 2016. These measures match the development of coal and steel output over time, which both declined in 2015. But by 2016 steel production was flat, while a further decline in coal output in the first half of 2016 was followed by coal shortages in the second half of 2016.⁶⁶

The case of coal illustrates that what is to be regarded as excess capacity is hard to determine. In fact, examining the (limited) available annual data in the *Statistical Yearbook* series and in the CEIC China Premium database on production capacity (of above-norm

⁶³ State Council, “Guowuyuan guanyu gangtie hangye huajie guosheng channeng shixian tuokun fazhan de yijian” (Suggestions regarding the resolution of excess capacity in the steel industry and its development out of the difficulties), Guofa no. 6 (2016), at http://www.gov.cn/zhengce/content/2016-02/04/content_5039353.htm (accessed 16 November 2016).

⁶⁴ According to an official State Council website (http://english.gov.cn/policies/policy_watch/2016/08/05/content_281475409540166.htm, accessed 14 December 2016), more than 90 million tons of crude steel production capacity have already been cut “in recent years.”

⁶⁵ “Xu Zhaoshi: jinnian meitan quchanneng 2.8 yi dun gangtie 4500 wan dun” (Xu Zhaoshi: production capacity of coal this year is to be reduced by 280 million tons, and that of steel by 4.5 million tons), 27 June 2016, at http://finance.ifeng.com/a/20160627/14529998_0.shtml (accessed 16 November 2016). The head of the PRC’s Ministry of Human Resources and Social Security had previously (in February 2016) suggested a total of 1.3 million layoffs in the coal industry and 0.5 million in the steel industry (presumably by 2020). The (central) government budget will provide CNY100 billion to help along the reduction in capacity, mostly to be spent on the new placement of staff and workers. This follows layoffs in recent years on the order of 1–2 million workers in the coal and steel industry after firm decisions to close or restructure, largely in the absence of government pressures. Thomas Gatley and Rosealea Yao, “The Turning Point for Excess Capacity,” *Gavekal Dragonomics*, 18 January 2016, at <http://research.gavekal.com/article/turning-point-excess-capacity> (accessed 16 November 2016), write that the coal and steel sectors have shed about 1.4 million workers since 2014.

⁶⁶ Rosalea Yao, “The Mixed Progress on Excess Capacity,” *Gavekal Dragonomics*, 20 July 2016, at <http://research.gavekal.com/article/mixed-progress-excess-capacity> (accessed 16 November 2016), provides an overview through late 2016.

industrial enterprises) vs. actual output (of all industry) of crude oil, coal, coke, cement, crude steel, and rolled steel from 2005 to 2015, no major drop in capacity utilization is apparent, in part due to incomplete data, except perhaps for crude steel. Crude steel experiences a drop from capacity utilization of around 85% in the second half of the 2000s to approximately 73% in the first half of the 2010s. Coal capacity data are missing for the years since 2009. Capacity utilization in cement appears steady at around 70%.

Excess capacity in the PRC, furthermore, may not necessarily imply a need for capacity reduction in the PRC. For example, in the case of aluminum, a non-ferrous metal, Michael Komesaroff finds that “China’s aluminum smelters are operating with the world’s most efficient technology.”⁶⁷ Thus, even though in 2014 the PRC’s aluminum smelters were operating at just 68% of capacity, the shake-out hoped for by foreign firms, operating with less efficient technology, did not happen. I.e., reducing excess capacity is not a supreme PRC objective when the existing capacity operates at the technological frontier and cyclical downswings can be expected to eventually have run their course. Overinvestment in the PRC then is only a temporary phenomenon; the shake-out may well happen elsewhere.

B. “Made in China 2025”

The State Council document of 8 May 2015 also lists nine strategic tasks followed by eight supporting measures. The nine strategic tasks focus on improving manufacturing innovation capacity with the integration of information technology and industrialization, the development of high-quality brands, and green manufacturing. The eight supporting measures range from reforming the institutional mechanisms and a fair competitive market environment to financial and fiscal support policies, and personnel training.

In detail, the nine strategic tasks are:

- (1) Increase the national manufacturing innovation capacity,
- (2) promote the deep integration of information technology and industrialization,
- (3) strengthen the industrial base capacity,
- (4) strengthen the development of quality brands,
- (5) fully implement green manufacturing,
- (6) promote breakthrough developments in key areas (with a list of ten priority industries),
- (7) promote the structural adjustment of the manufacturing industry,
- (8) actively develop service-oriented manufacturing and producer services, and
- (9) raise the level of manufacturing internationalization.

The eight supporting measures are:

- (1) Deepen the reform of the institutional mechanisms,
- (2) create a fair competitive market environment,
- (3) improve financial support policies,
- (4) increase fiscal and taxation policy support,
- (5) establish a healthy multi-level personnel training system,
- (6) perfect micro, small and medium-sized enterprise policies,
- (7) further open up manufacturing to the outside world, and
- (8) create a healthy organizational implementation mechanism.

“Made in China 2025” is to be achieved in three stages. By 2020, the first step of the first stage, the PRC is to have completed basic industrialization, with consolidation of the PRC as

⁶⁷ Michael Komesaroff, “Aluminum: Coping With Excess Capacity,” *Gavekal Dragonomics*, 10 March 2015, at <http://research.gavekal.com/article/aluminum-coping-excess-capacity> (accessed 16 November 2016).

a big manufacturing nation including much increased use of information technology in manufacturing. By 2025, the second step of the first stage, the quality of manufacturing is to have much increased with significant improvements in innovation capacity and labor productivity. By 2035, the PRC's manufacturing sector is to have advanced into the middle field of the world's manufacturing nations. By 2049, 100 years after the founding of the PRC, the PRC's manufacturing sector is to be in the forefront of the world's manufacturing nations. The document also provides a dozen specific targets; for example, internal R&D expenses of above-norm manufacturing industry are to reach 1.68% of main business revenue by 2025 (after 0.88% in 2013, 0.95% in 2015, and 1.26% in 2020).

Using the formula "1+X" (where 1 refers to "Made in China 2025"), 11 supporting implementation plans are expected, of which five have been formulated: the manufacturing innovation center project, the project to build a more solid foundation for industrial development, the green manufacturing project, the smart manufacturing project and the high-end equipment innovation project.⁶⁸

⁶⁸ See <http://economists-pick-research.hktdc.com/business-news/article/Business-Alert-China/China-Releases-Implementation-Guidelines-for-Five-Made-in-China-2025-Projects/bacn/en/1/1X2ZLGG8/1X0A768A.htm> (accessed 14 December 2016). According to this source, the other six supporting documents include development planning guidelines for manufacturing talents, information industry, new materials industry and pharmaceutical industry, and action guides for developing service-oriented manufacturing and promoting the upgrading of quality and brands in equipment manufacturing.

Appendix 2: Data

1. Investment

a. Data availability

The *Statistical Yearbook* series provides second-digit sector investment values for urban areas for the years 2004–2010, and for “investment, except by rural households” for the years since 2011; a change in size criterion for inclusion in investment of CNY50,000 to CNY500,000 concurs with the change in coverage. The sector classification system changed from GB2002 to GB2011 a year later, in 2012. Data are available on: total investment, investment by composition and by type of construction (on which more below), sources of funding, ownership, central vs. local investment, and cumulative investment by project.

The NBS database provides similar second-digit sector data for the years since 2003 under the label “investment, except by rural households” and within the GB2002 classification system (i.e., ignores the change in coverage, size criterion, and classification system). The available breakdowns of sector investment are the same as in the *Statistical Yearbook* series.⁶⁹

The *Investment Statistical Yearbook* series provides similar second-digit sector data as the *Statistical Yearbook* series does, for the years since 2003 but not for 2013 (with no *Investment Statistical Yearbook 2014* having been published). The break between “urban investment” and “investment, except by rural households” occurs in 2011, as does the change in size criterion. The switch from GB2002 to GB2011 occurs one year later, with the 2012 data. The *Investment Statistical Yearbook* series also includes fourth-digit sector investment data for all years since 2003 (except for 2013), including a large number of further breakdowns.

These breakdowns are the following:

- By composition: construction and installation (*jianzhu anzhuang gongcheng*), purchase of equipment (*shebei gongqiju gouzhi*), and other expenses (*qita feiyong*).
- By type: new construction (*xinjian*, accounting for approximately two-thirds of the total), expansion (*kuojian*), reconstruction and technical transformation (*gaijian he jishu gaizao*), and four residual categories (with data sometimes not provided), together accounting for approximately five percent of the total: singular construction of living facilities (*danchun jianzao shenghuo sheshi*), relocation (*qianjian*), resumed construction (*huijian*), singular purchase (*danchun gouzhi*).
- By source of funds: state budgetary funds (*guojia yusuannei zijin*), domestic loans (*guonei daikuan*), bonds (*zhaiquan*), foreign funds (*liyong waizi*) with sub-category foreign direct investment (*waishang zhijie touzi*), self-raised funds (*zichou zijin*) with sub-category own funds of enterprises and administrative facilities (*qishiye danwei ziyou zijin*), and “other funds” (*qita zijin*).
- By ownership: state-owned and state-controlled investment (*guoyou ji guoyou konggu touzi*); domestic investment (*neizi touzi*, sometimes with a further breakdown), foreign investment (*waishang touzi*), and investment by Hong Kong, China, Macau, China, and

⁶⁹ CEIC proceeds as the NBS database does, with annual second-digit sector investment data since 2003; the only breakdown available is by composition. CEIC also offers monthly second-digit sector investment data since 2004 (under a label “investment” that is not limited by such terms as “urban” or “investment, except by rural households”); the NBS database also offers limited monthly data.

Taipei, China businesses (*gang'aotai shang touzi*).

- By administrative level of the project: central (*zhongyang*) and local (*difang*), and the latter with an exhaustive four sub-categories: provincial (*shengshu*), municipal (*dishishu*), county (*xianshu*) and “others” (*qita*).
- Volume of ongoing construction: total/aggregate value of construction (*jianshe zong guimo*), cumulative completed investment since the beginning of construction (*zi kaishi jianshe leiji wancheng touzi*), total value of construction in progress (*zaijian zong guimo*), net value of construction in progress (*zaijian jing guimo*).

Apart from annual data, limited (cumulative) monthly data are also available. The NBS database and the CEIC database also report such monthly FAI data, which are also available in the NBS magazine *China Monthly Statistics*.

b. Data discussion

In contrast to the national income accounts measure of gross fixed capital formation, FAI does not net out sales of old fixed assets and does not distinguish between produced and non-produced fixed assets.⁷⁰ While gross fixed capital formation is the more desirable measure, only one annual aggregate, economy-wide data point is available, without sector or ownership breakdown. In contrast, the NBS publishes a multitude of annual (as well as monthly) FAI data; these data are used here.

The NBS derives the national FAI values as summed provincial values. The FAI values of Liaoning province were acknowledged in 2016 to have been exaggerated. At least the time trend of FAI data, thus, needs to be viewed with caution. This paper works with proportions: the shares of different sectors or different ownership forms in economy-wide FAI. As long as any form of data inaccuracy affects each sector (or ownership form) equally, the analysis is valid. Similarly, while FAI is not an ideal proxy for gross fixed capital formation, as long as sales of existing assets and land account for the same proportions across sectors (or ownership forms), any findings based on FAI data extend to the more meaningful measure of gross fixed capital formation.

Figure 8 illustrates the 2011 transition in the detailed investment statistics from “urban” investment to “investment, except by rural households.” Up through 2010, total investment comprises urban investment and rural investment. Rural investment comes with a breakdown into rural households and rural non-households, with the latter capturing everything rural that is not a rural farm household. (The terminology in official sources varies over time, with alternative terms being rural farm-household vs. rural non-farm-household.) Since 2011, only the rural household category is retained as a separate category. Rural non-households, previously accounting for three-quarters of rural investment, are now merged with the previously “urban” category into the newly formed category “investment, except by rural households.”

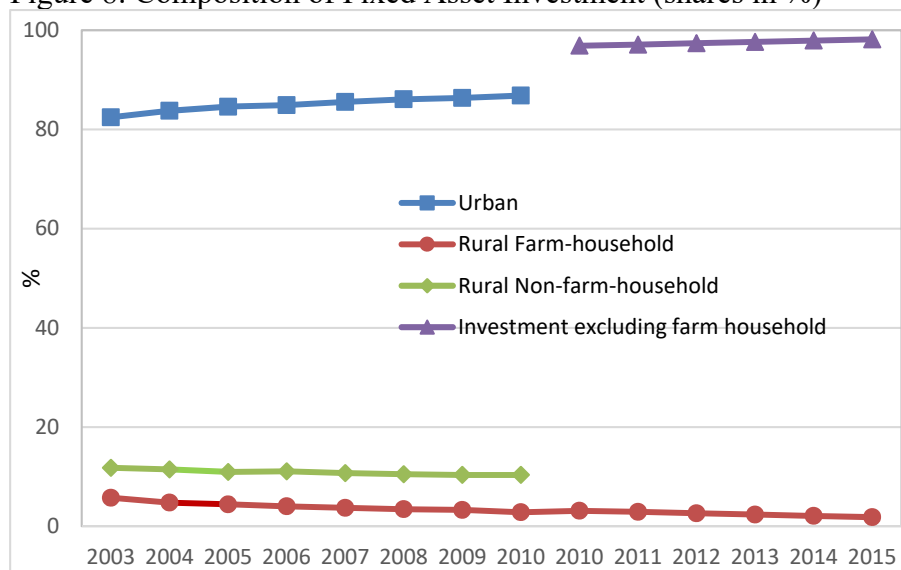
The distinction between “urban” investment and “investment, except by rural households” matters in that detailed sector investment data are only available for the urban investment coverage in 2003–2010, and for “investment, except by rural households” since 2011. I.e., use of the detailed sector investment data imply a statistical break in 2011. The two series “urban” and “investment, except by rural households” can also be found reported

⁷⁰ For details on the relationship between gross fixed capital formation and FAI, and questions about the quality of FAI data, see Carsten A. Holz, “Understanding China’s Investment Statistics,” Mimeo (February 2017).

together in NBS data sources (for example, *Statistical Yearbook 2015*, p. 307) or in the CEIC database under the label “urban,” which ignores the 2010–2011 statistical break altogether.

The NBS in its time series data also ignores the sector reclassification. The *Statistical Yearbook 2012*, pp. 164ff. reports economy-wide first-digit sector investment data for 2003–2011 following GB2002, while the *Statistical Yearbook 2013*, pp. 159ff., reports economy-wide first-digit sector investment data for 2003–2012 following GB2011; the values through 2011 in two first-digit sectors whose coverage changed slightly between GB2002 and GB2011 were not revised in the more recent *Statistical Yearbook 2013* edition, which follows GB2011.

Figure 8: Composition of Fixed Asset Investment (shares in %)



Sources: *Statistical Yearbook 2011*, p. 144; *Statistical Yearbook 2016*, Table 10-2.

2. Profitability: Data availability

In order to relate investment to profitability, profit and equity data are needed. Such data are available only for a subset of enterprises in industry (mining, manufacturing, utilities). The subset is the set of above-norm industrial enterprises, i.e., since 2011 industrial enterprises with annual sales revenue in excess of CNY20 million, from 2007 to 2010 industrial enterprises with annual sales revenue in excess of CNY5 million, and before 2007 (1998–2006) all SOEs plus all non-SOE industrial enterprises with annual sales revenue in excess of CNY5 million. Above-norm industrial enterprises typically account for 90 percent of industrial value-added, and profitability indicators of the above-norm industrial enterprises in a particular sector may thus be indicative of the (unknown) profitability of all industrial enterprises in that sector.⁷¹

These data are available in the *Industry Statistical Yearbook* series at the second-digit sector level for industry for 2003–2011 (except for 2004, with no yearbook published in 2005), and at the fourth-digit sector level for industry for 2012–2016 (and presumably continuing with upcoming editions of the yearbook).⁷²

⁷¹ For details on the coverage of the above-norm industrial enterprises, see Carsten A. Holz, “Chinese Statistics: Classification Systems and Data Sources,” *Eurasian Geography and Economics* 54, no. 5/6 (2013): 532-71.

⁷² The *Statistical Yearbook 2005* does not offer sufficiently detailed industry data to substitute for the missing (not published) *Industry Statistical Yearbook 2005* volume with 2004 data.

Industrial equity and profit data are further available by ownership category times sector: for 2003–2011 (except 2004), data are available by second-digit sector for, separately, SOSCEs, collective-owned enterprises (COEs), private enterprises, and “foreign-funded enterprises and Hong Kong, Macau, and Taipei,China enterprises”, and for 2012–2014 for the same ownership categories except COEs, by third-digit sector.

Second-digit industry equity and profit data are equally available on the NBS database for all years, including by second-digit sector times ownership category (SOSCEs, private enterprises, and “foreign-funded enterprises and Hong Kong, Macau, and Taipei,China enterprises”). The data are provided separately for 2003–2011 vs. the years since 2012, to account for the change in the sector classification system. CEIC carries the same data as the NBS database but as continuing time series, ignoring the change in sector classification. In contrast to the *Industry Statistical Yearbook* series, thus, the NBS and CEIC databases provide 2004 data but do not offer fourth-digit sector data when the yearbook does, for the years since 2012. The NBS and CEIC databases also do not provide sector COE data ever, whereas the yearbook series does for 2003–2011 (except 2004).

In addition, CEIC provides fourth-digit sector data on a monthly basis typically starting 2006, albeit with various breaks and omissions; the same series are not provided on an annual basis. Data cover profit but not equity; total equity can be derived as difference of assets and liabilities, but no measure of “actually paid-in equity” (as provided in the above listed sources) can be derived. The NBS database provides the same monthly data, at the second digit sector level only, with the same limitation on the derivation of equity, with no January data and frequent other omissions, since 2003. (January and February values in the CEIC database appear identical throughout, suggesting that in the CEIC database half of the published NBS February value is attributed to January, and the other half to February.)

Appendix 3: Establishing the NBS Definition of “Infrastructure”

The NBS measure of infrastructure comprises transportation (rail, road, water, air, pipeline), information technology, and public facilities (“water conservancy, environment, and public facilities,” the latter accounting for more than 80% of investment in this sector). It does not include other tertiary sectors such as health, science, or education, or the secondary sector sub-sector “utilities.”

The NBS practice is deduced from the available NBS cumulative monthly investment data in the CEIC database, with these infrastructure data available for May–November 2014, all months of 2015, and all months of 2016, and cumulative monthly data on all tertiary sector first-digit sectors and some second-digit sectors, as available. Cumulative monthly data are turned into monthly data; January and February values each are obtained as half the cumulative February value (with the source providing identical January and February values).

In the CEIC database, the NBS infrastructure values are listed as an aside to the NBS tertiary sector investment values. These infrastructure monthly (non-cumulative) investment values are regressed on all available second-digit tertiary sector investment values and, where second-digit sector investment values are not available, first-digit tertiary sector investment values. Sectors with a significance level higher than 10% are eliminated one by one, then a very few sectors with negative coefficients are eliminated, followed by further elimination one by one of sectors with a significance level higher than 10%, or negative coefficients.

The resulting set of sectors typically has a coefficient of one (except pipeline transportation, with a coefficient of two), the significance levels are 0.1% (except for pipelines, 2%), and investment in these such identified sectors adds up across all months for which investment data are available to 99–100% of infrastructure investment. The same set of sectors results with or without inclusion of a constant, and with or without inclusion of monthly dummy variables.

Appendix 4: Investment Patterns Across Fourth-digit Sectors

Detailed sector investment data covering 1181 sectors (first- through fourth-digit sectors) are available for urban investment in 2003–2010 (GB2002), and covering 1409 sectors for “investment, except by rural households” in 2012, 2014, and 2015 (GB2011). These numbers are too large for sector-by-sector analysis, and this section therefore focuses on the 30 fastest-growing fourth-digit sectors (with third-digit sectors included if they do not come with fourth-digit sectors).

In 2003–2010, the 30 fastest-growing sectors were found across the economy (Table 5). The list comprises a range of diverse sectors, from magnesium dressing to notary services. Industry accounted for half of the fastest-growing sectors, with 6 mining sectors, 8 manufacturing sectors, and 1 utility sector.

In 2012–2014, the balance shifted (Table 6): None of the mining or utilities sectors made it into the group of 30 fastest-growing sectors, and only 6 manufacturing sectors made it. More third- and fourth-digit sectors were in financial intermediation, leasing and business services, and culture, sports and entertainment, along with water conservancy, environment, and public facilities.

In 2014–2015 (Table 7), the number of industry sectors was reduced to 5 marginal manufacturing sectors (hemp-dyeing, enamel sanitary ware, fishery machinery, special instruments for agriculture, and instrument repair), the same number as in agriculture (of which three were cash crops: sugar, bananas and other subtropical fruits, and spice). IT with 2 sectors and science with 2 sectors newly entered the 30 fastest-growing sectors, and almost one-third were accounted for by three finance and six leasing and business service sectors.

The 2012–2014 and 2014–2015 data are evidence of a broad-based shift of investment growth out of mining and manufacturing and into the tertiary sector. Here, too, much of this shift out of mining and manufacturing predates government industrial policy; the Twelfth Five-Year Plan (2011–2015) still promoted various historic manufacturing sectors, and the government’s de-emphasis of coal, steel, and, more generally, mining, only surfaced in policies starting 2015, long after the downward shift in investment growth had occurred. The move to a high-tech, next generation textile industry as propagated in the Twelfth Five-Year Plan either did not yield investment growth, or has not happened (beyond the hemp-dyeing industry in the most recent year). Medicine manufacturing, glass fiber products, and the automobile and motor industry don’t appear among the fastest growing sectors. Railway equipment and shipbuilding make it into the 2012–14 list of fast-growing sectors, well ahead in time of corresponding industrial policies. On the other hand, IT and science appear among the 30 fastest-growing sectors in 2014–2015, in line with the Twelfth Five-Year Plan (2011–2015).

In 2010, the 30 fastest-growing sectors together accounted for only 1.7 percent of total urban investment, where one would expect 3 percent (30 out of just above 1,000 fourth-digit sectors and those third-digit sectors that do not come with fourth-digit sectors). In 2012, that share was only 0.34 percent, and in 2015 only 0.089 percent, one-thirtieth of what one would expect that share to be. I.e., the fastest-growing sectors are significantly smaller than the average sector, and increasingly so over time. This suggests that fast-growing investment in a particular sector primarily serves to develop a previously underdeveloped sector, implying a catch-up process or the completion of an industrial structure more than any kind of specialization that could be the outcome of industrial policies.

Table 5. Thirty Fastest-Growing Third- or Fourth-digit Sectors, 2010 vs. 2003

<i>First digit sector (sometimes with second-digit sector)</i>	% of invest-ment	Mul-tiple 2010 / 2003
Third- or fourth-digit sector		
<i>Agriculture, forestry, animal husb., fishery: Cereals and other crops</i> 谷物及其他作物的种植		
Tobacco cultivation 烟草的种植	0.009	126
Bamboo harvesting 竹材的采运	0.000	68
Inland fishery 内陆捕捞	0.001	156
<i>Mining: Non-ferrous metal industry</i> 有色金属矿采选业		
Antimony ore mining 锑矿采选	0.005	65
Aluminum mining and dressing 铝矿采选	0.020	81
Magnesium dressing 镁矿采选	0.005	67
Other commonly used non-ferrous metals 其他常用有色金属矿采选	0.033	87
Other precious metals mining and dressing 其他贵金属矿采选	0.011	3681
Radioactive metal ore mining 放射性金属矿采选	0.002	160
<i>Manufacturing: General equipment manufacturing</i> 通用设备制造业		
Guns and similar appliances 喷枪及类似器具制造	0.005	113
<i>Manufacturing: Special equipment manufacturing</i> 专用设备制造业		
Oil drilling equipment 石油钻采专用设备制造	0.113	66
Feed production equipment 饲料生产专用设备制造	0.008	61
Postal machinery and equipment 邮政专用机械及器材制造	0.000	90
Traffic safety and control equipment 交通安全及管制专用设备制造	0.007	69
<i>Manufacturing: Transportation equipment manufacturing</i> 交通运输设备制造业		
Aids to navigation equipment and other floating devices 航标器材及其他浮动装置的制造	0.008	253
<i>Manufacturing: Electrical machinery and equipment manufacturing</i> 电气机械及器材制造业 Generators and generator sets 发电机及发电机组制造	0.189	65
<i>Manufacturing: Waste resources and materials recycling and processing</i> 废弃资源和废旧材料回收加工业 Metal waste and scrap processing 金属废料和碎屑的加工处理	0.083	74
<i>Utilities: Electricity and heat, production and supply</i> 电力、热力的生产和供应业		
Other energy production 其他能源发电	1.015	66
<i>Transportation, storage and postal serv.</i> 交通运输、仓储和邮政业 Freight trains 货运火车站	0.006	68
<i>Trade – retail trade</i> 零售业		
Audiovisual products and electronic publications 音像制品及电子出版物零售	0.003	58
Photographic equipment 照相器材零售	0.001	588
Medical supplies and equipment 医疗用品及器材零售	0.006	57
Other electronic products 其他电子产品零售	0.005	80
Paint 涂料零售	0.002	138
<i>Financial intermediation</i> 金融业 Financial companies 财务公司	0.001	224
<i>Leasing and business services</i> 租赁和商务服务业		
Other machinery and equipment rental 其他机械与设备租赁	0.034	270
Notary services 公证服务	0.000	93
Other unlisted business services 其他未列明的商务服务	0.110	62
<i>Resident services and other services</i> 居民服务和其他服务业		
Office equipment maintenance 办公设备维修	0.002	209
<i>Cultural, sports and entertainment</i> 文化、体育和娱乐业 Audiovisual production 音像制作	0.018	71
<i>Sum shares</i>	1.706	

Notes:

Total number of first- through fourth-digit sectors: 1182.

For some second-digit sectors, only third-digit sector values are available, for others, also fourth-digit sector values.

Therefore, in the search for the fastest-growing sectors all levels of sector classification were retained.

About one dozen sectors saw no investment in 2003; these sectors are omitted from the search for the fastest-growing sectors.

Source: *Investment Statistical Yearbook*.

Table 6. Thirty Fastest-Growing Third- or Fourth-digit Sectors, 2014 vs. 2012

<i>First digit sector (sometimes with second-digit sector)</i>	% of invest-ment 2012	Mul-tiple 2014 / 2012
Third- or fourth-digit sector		
Agriculture, forestry, animal husbandry and fishery 农、林、牧、渔业 Sheep raising 羊的饲养	0.039	4.8
Agriculture, forestry, animal husbandry and fishery 农、林、牧、渔业 Corn cultivation 玉米种植	0.009	4.7
Manufacturing: Rubber and plastic products 橡胶和塑料制品业		
Waterproof construction materials 防水建筑材料制造	0.006	14.2
Manufacturing: Rail, shipbuilding, aerospace and other transportation equipment 铁路、船舶、航空航天和其他运输设备制造业 Recreational boats, and sport boats 娱乐船和运动船制造	0.005	7.6
Manufacturing: Smelting and pressing of ferrous metals 黑色金属冶炼和压延加工业		
Silver smelting 银冶炼	0.007	5.0
Manufacturing: Rail, shipbuilding, aerospace and other transportation equipment 铁路、船舶、航空航天和其他运输设备制造业 Narrow gauge locomotive and rolling stock 窄轨机车车辆制造	0.001	4.8
Manufacturing: Chemical fibers 化学纤维制造业 Vinylon fiber manuf. 维纶纤维制造	0.003	4.0
Manufacturing: Instruments 仪器仪表制造业 Agriculture, forestry, animal husbandry and fishery special instrument manufacturing 农林牧渔专用仪器仪表制造	0.001	4.0
Wholesale and retail trade 批发和零售业		
Internet retail 互联网零售	0.001	16.9
Newspaper, Wholesale 报刊批发	0.000	10.2
Auctions 拍卖	0.000	8.7
Photographic equipment retail 照相器材零售	0.000	5.1
Transportation, Storage and Post 交通运输、仓储和邮政业 Railway freight transport 铁路货物运输	0.190	4.3
Accommodation & catering services 住宿和餐饮业 Other beverages & cold drinks 其他饮料及冷饮服务	0.001	4.7
Financial intermediation 金融业		
Other insurance activities 其他保险活动	0.000	8.2
Securities brokerage services 证券经纪交易服务	0.002	6.3
Capital investment services 资本投资服务	0.015	4.4
Futures market management services 期货市场管理服务	0.001	4.3
Leasing and business services 租赁和商务服务业		
Other security services 其他安全保护服务	0.000	7.4
Other machinery and equipment rental 其他机械与设备租赁	0.029	4.9
Labor dispatch service 劳务派遣服务	0.001	4.9
Car rental 汽车租赁	0.003	4.4
Other Human Resources Services 其他人力资源服务	0.002	4.4
Human resources services 人力资源服务	0.007	4.2
Water conservancy, environment and public facilities management 水利、环境和公共设施管理业		
Radioactive waste treatment 放射性废物治理	0.000	6.4
Wildlife Protection 野生动物保护	0.004	5.0
Protection of wild plants 野生植物保护	0.002	4.6
Culture, sports and entertainment 文化、体育和娱乐业		
Film and television program distribution 电影和影视节目发行	0.002	5.4
Film and television program production 电影和影视节目制作	0.015	4.7
Public management: Mass organizations, social groups and other member org. 群众团体、社会团体和其他成员组织 Communist Youth League 共青团	0.000	12.4
Sum shares	0.346	

Notes:

Total number of first- through fourth-digit sectors: 1409.

For some second-digit sectors, only third-digit sector values are available, for others, also fourth-digit sector values.

Therefore, in the search for the fastest-growing sectors all levels of sector classification were retained.

About half a dozen sectors saw no investment in 2012; these sectors are omitted from the search for the fastest-growing sectors.

Source: *Investment Statistical Yearbook*.

Table 7. Thirty Fastest-Growing Third- or Fourth-digit Sectors, 2015 vs. 2014

<i>First digit sector (sometimes with second-digit sector)</i>	% of invest-ment 2014	Mul-tiple 2015 / 2014
<i>Third- or fourth-digit sector</i>		
Agriculture: Farming 农业		
Sugar plantation 糖料种植	0.0025	3.4
Banana and other subtropical fruit cultivation 香蕉等亚热带水果种植	0.0061	2.6
Spice crop cultivation 香料作物种植	0.0028	2.5
Agriculture: Animal husbandry 畜牧业 Camel breeding 骆驼饲养	0.0001	5.4
Agriculture: Services 农、林、牧、渔服务业 Forest fire prevention services 森林防火服务	0.0013	2.6
Manufacturing: Textiles 纺织业 Hemp dyeing 麻染整精加工	0.0012	3.9
Manufacturing: Metal products 金属制品业 Enamel sanitary ware 搪瓷卫生洁具制造	0.0042	2.4
Manufacturing: Special Purpose Machinery 专用设备制造业 Fishery machinery 渔业机械制造	0.0015	2.8
Manufacturing: Measuring instruments 仪器仪表制造业 Agriculture, forestry, animal husbandry and fisheries special instrument manufacturing 农林牧渔专用仪器仪表制造	0.0017	2.8
Manufacturing: Repair Service of Metal Products, Machinery and Equipment 金属制品、机械和设备修理业 Instrument repair 仪器仪表修理	0.0004	2.8
Trade: Wholesale trade 批发业 Nutrition and health products wholesale 营养和保健品批发	0.0020	2.3
Trade: Retail trade 零售业		
Mail order and television, telephone retail 邮购及电视、电话零售	0.0003	3.8
Internet retail 互联网零售	0.0143	2.9
Audio-visual products and electronic publications retail 音像制品及电子出版物零售	0.0003	3.4
Stationery retail 文具用品零售	0.0010	2.5
Information technology: Telecommunication, Radio and Television and Satellite Transmission Service 电信、广播电视和卫星传输服务 Other telecommunications services 其他电信服务	0.0216	2.3
Information technology: Internet and related services 互联网和相关服务 Other Internet services 其他互联网服务	0.0123	2.7
Finance: Monetary and financial services 货币金融服务 Financial leasing serv. 金融租赁服务	0.0037	2.7
Finance: Capital market services 资本市场服务 Fund management services 基金管理服务	0.0005	2.3
Finance: Insurance 保险业 Risk and loss assessment 风险和损失评估	0.0001	2.8
Leasing and business services: Leasing 租赁业		
Entertainment and sports equipment rental 娱乐及体育设备出租	0.0025	2.6
Other cultural and daily necessities 其他文化及日用品出租	0.0008	3.2
Cultural and daily necessities 文化及日用品出租	0.0033	2.8
Leasing and business services: Business services 商务服务业		
Notary services 公证服务	0.0000	56.3
Market surveys 市场调查	0.0003	4.1
Other legal services 其他法律服务	0.0005	3.9
Science: Professional technical services 专业技术服务业		
Ecological monitoring 生态监测	0.0015	2.5
Water, carbon dioxide and other mineral geological prospecting 水、二氧化碳等矿产地质勘查	0.0005	2.3
Health and social services: Social services 社会工作 Mental rehabilitation serv. 精神康复服务	0.0016	2.8
Culture: Journalism and publishing activities 新闻和出版业 Journal Publications 期刊出版	0.0004	2.4
Sum	0.0890	

Notes and sources: see previous table.

Appendix 5: Annual Vs. Cumulative Monthly Data

As of early 2017, for 2016 only cumulative monthly December values are available, not annual values. [Annual values for 2016 have in the meantime, by end-2017, become available, and are discussed in the text of the paper.] The NBS database provides cumulative monthly investment data by ownership form for first-digit sectors and for a typically incomplete set of second-digit sectors within some but not all first-digit sectors. It also provides cumulative monthly investment data by ownership form. This section examines cumulative monthly December data for 2015 and 2016.⁷³ The data, while not further labeled in the source, likely cover “investment, except by rural households” (see reference values in table).

Ownership

Table 8 provides detailed data on ownership shares in annual investment in comparison to ownership shares in cumulative monthly December values. Cumulative monthly December investment of the years 2011–2015 is equal to 97%–98% of annual FAI values and in the years 2006–2010 equal to 85%–87%, reflecting the likely “urban” coverage of the cumulative monthly data. Since 2011, the individual ownership shares in the two sets of data match reasonably well, except for sole proprietorships, which in 2015 accounted for 2.2% of FAI but for only 0.4% of cumulative monthly December investment; the rationale for the difference could be that investment by rural households (part of FAI) likely contains a good number of sole proprietorships.

A limited ownership breakdown is available following the registration classification used in the FAI statistics (the source refers to “enterprises” rather than “units”), with an SOSCU data point provided separately. SOSCUs accounted for 32% of investment in 2015 and experienced a 19% investment growth rate in 2016 (Figure 9). The ownership category with the fastest-growing investment is the category of limited liability companies at 36%; its sub-category solely state-owned limited liability companies exhibits a 155% growth rate. The officially labeled private enterprises accounted for 31% of investment in 2015 and their investment grew 12% in 2016. Investment by “Hong Kong, Macau, and Taipei, China” enterprises and foreign-funded enterprises grew 19% and 12%.

The pattern of investment growth across registration/ownership forms in 2016 suggests somewhat of a reversal of the earlier 2012–2015 pattern in that investment growth in state-owned and state-controlled enterprises (SOSCEs) exceeds that in (an incomplete measure of) private enterprises, although investment by private enterprises still grew faster than the economy-wide average. These findings warrant further examination. Thus, the share of SOUs in investment falls significantly from 25.3% to 21.8% in 2016, while the share of private units in investment increases from 31.1% in 2015 to 31.5% in 2016. However, the SOSCU share rises significantly from 32.4% to 35.7%, and a measure included in the monthly statistics (starting 2012) but not in the annual statistics through 2016, labeled “non-state” investment (*minjian*), falls from 64.2% of investment to 61.2% in 2016.

Examining the data reveals that “non-state” investment simply refers to domestic investment less SOSCU investment, in deviation from the (erroneous) “private” ownership

⁷³ Shorter-term analysis would appear inappropriate as already the quarterly year-on-year growth rates are very variable. For example, investment in repair services for metal products, machinery and equipment repair grew 41% year-on-year in the fourth quarter of 2016, but fell 11% in the full year 2016.

interpretation often found in the media and indicated by the Chinese term. The NBS likely adopted the term “non-state” from government policies such as the Twelfth Five-Year Plan, in order to distinguish between the state and everything else.

Table 8. Ownership Shares, Annual and Cumulative Monthly Values

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Share in annual FAI (%)													
Domestic			90.1	90.3	91.1	93.1	93.8	94.0	94.4	95.0	95.5	96.0	95.7
SOU			30.0	28.2	28.2	31.0	30.0	26.5	25.7	24.6	24.4	24.9	21.3
COU			3.3	3.4	3.6	3.8	3.6	3.3	3.2	3.0	3.0	2.7	1.5
Cooperative units			0.7	0.6	0.6	0.5	0.5	0.5	0.5	0.4	0.4	0.3	0.2
Joint units			0.5	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.1
LLC			23.9	24.4	24.3	23.9	25.3	27.7	27.4	27.2	26.7	26.0	33.2
Shareholding units			7.4	7.0	7.0	6.3	6.2	6.1	5.7	5.2	4.4	3.7	2.9
Private units			17.5	19.7	20.6	20.9	21.8	22.9	24.4	27.2	29.2	30.5	30.9
Sole proprietorships			4.7	4.4	4.2	4.0	3.4	3.4	3.1	2.8	2.5	2.2	2.0
Others			2.2	2.1	2.2	2.5	2.8	3.3	4.2	4.3	4.7	5.4	3.7
HKMTU			4.3	4.4	4.0	3.2	3.0	3.0	2.7	2.5	2.3	2.1	2.3
FFU			5.6	5.4	4.9	3.7	3.2	3.0	2.8	2.5	2.2	1.9	2.0
Share in cumulative monthly December investment (%)													
Domestic	86.9	87.8	88.9	89.1	89.9	92.2	92.9	93.3	93.8	94.5	95.0	95.5	95.3
SOU	39.1	36.1	34.3	31.6	31.3	34.0	32.4	27.3	26.2	25.9	25.0	25.3	21.8
COU	2.1	2.2	2.3	2.5	2.9	3.0	2.8	3.4	3.3	3.1	3.0	2.8	1.5
Cooperative units	1.0	0.9	0.7	0.7	0.7	0.5	0.6	0.5	0.5	0.5	0.4	0.3	0.2
Joint units	0.8	0.7	0.5	0.5	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.1
LLC	23.5	25.3	25.8	26.4	26.1	25.8	27.1	28.3	27.8	26.9	26.9	26.5	33.4
# solely state-owned	2.8	2.8	2.9	2.8	2.6	2.9	2.8	2.3	2.2	2.0	2.3	2.4	5.6
# others	20.8	22.4	23.0	23.6	23.5	22.9	24.3	26.0	25.6	24.9	24.7	24.1	27.7
Shareholding units	9.3	9.0	8.3	7.8	7.9	6.9	6.7	6.3	5.9	5.2	4.4	3.8	2.9
Private units	9.9	12.4	14.8	17.8	18.6	19.3	20.7	23.8	25.5	27.8	30.0	31.1	31.5
Sole proprietorships	1.2	1.1	0.5	0.5	0.6	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.4
Others	1.2	1.4	2.1	1.9	2.0	2.4	2.5	3.4	4.3	4.7	4.9	5.5	3.8
HKMTU	5.3	4.9	4.6	4.6	4.3	3.3	3.2	3.1	2.8	2.5	2.4	2.2	2.4
FFU	6.6	6.2	6.0	5.8	5.2	4.0	3.4	3.1	2.9	2.5	2.2	1.9	2.0
Reference values													
Urban inv. / FAI (%)	83.8	84.6	84.9	85.5	86.1	86.3	96.9	97.1	97.4	97.6	97.9	98.1	98.4
Cumulative monthly Dec. inv. / FAI (%)	83.2	84.6	85.0	85.5	85.7	86.4	95.9	96.9	97.4	97.8	98.0	98.1	98.4
Cumul. monthly Dec. inv. / urban inv. (%)	99.3	100.0	100.1	100.0	99.6	100.1	99.0	99.8	100.0	100.2	100.1	100.0	100.0
Percentage share in FAI or cumulative monthly December investment (%)													
SOSCU: annual					37.0	38.6	36.7	34.6	33.2	32.3	31.5	31.8	
SOSCU: cumulative monthly					43.3	44.6	42.3	35.6	33.9	33.0	32.2	32.4	35.7
Non-state units: annual, constructed					54.1	54.6	57.1	59.4	61.2	62.7	64.0	64.1	
Non-state units: cumulative monthly									61.4	62.9	64.1	64.2	61.2
Non-state units: cum. monthly, constr.			40.5	44.5	46.6	47.6	50.6	57.7	59.9	61.5	62.8	63.1	59.5

LLC: limited liability companies.

Notes:

Cooperative units are collective-owned units in formal “cooperative” organizational form.

Cumulative monthly data are the cumulative December values. Cumulative monthly December investment of the years

2011–2015 is equal to 97%–98% of annual FAI values; in the years 2006–2010, the percentages are 85%–87%. This suggests that the coverage of the cumulative monthly data is “urban” investment.

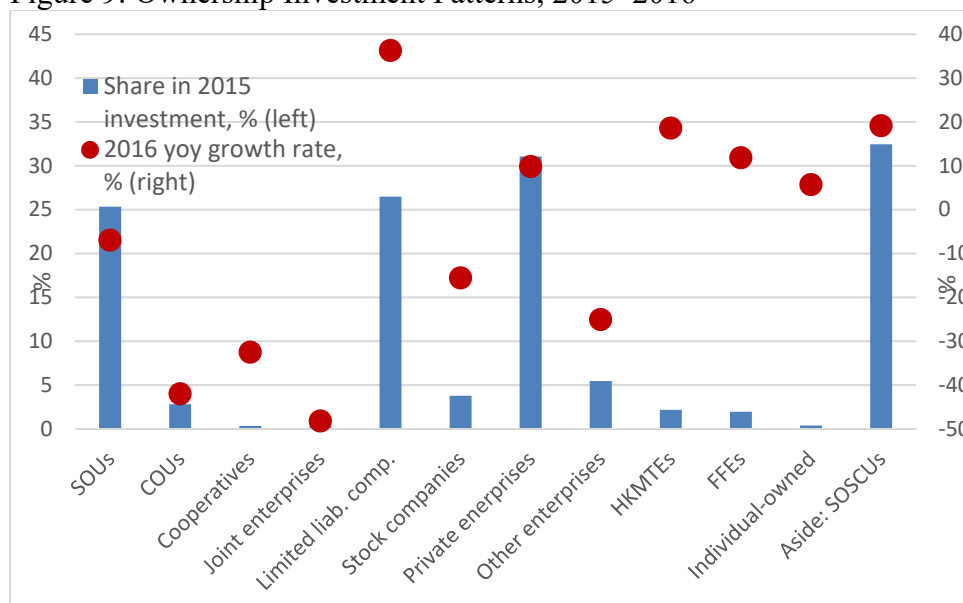
Constructed non-state values are obtained as value of domestic investment less value of SOSCU investment.

Source: NBS database, *Statistical Yearbook 2017*.

The fall in the non-state share in investment matches a halving of the investment share of COUs (–1.3 percentage points), a 0.9 percentage point reduction in the shareholding share, and a 1.7 percentage point reduction in the residual share “others,” with as counterpart a more than doubling of the investment share of solely state-owned limited liability companies (part of the SOSCU) from 2.4% to 5.6%. The size of these changes stretch credulity—also a decrease in the SOU share from 25.3% to 21.8% while the share of the larger SOSCU ownership category, of which the SOUs are a subset, rises from 32.4% to 35.7%—suggests

that some SOUs (or COUs, or other enterprises) are being reclassified as state-owned companies. As a consequence, the changes in the shares of the SOSCU and non-state categories in 2016 should not be directly compared to 2015 values.

Figure 9: Ownership Investment Patterns, 2015–2016



Note: 2016 data are cumulative monthly December values.

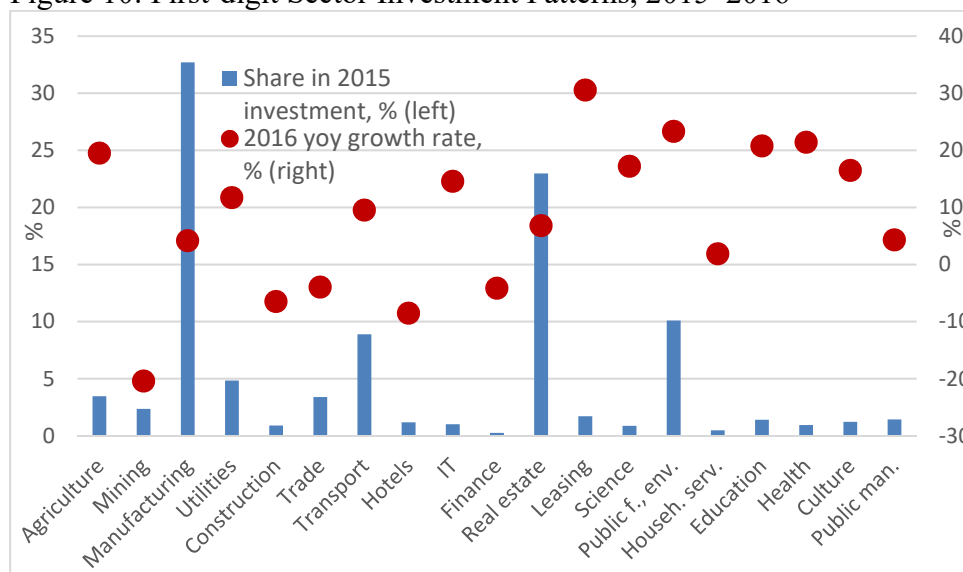
Source: NBS database.

Sectors

Figure 10 shows the first digit-sector distribution of cumulative monthly December 2015 investment, i.e., of annual 2015 investment as captured by the cumulative monthly data. Unchanged from 2012, manufacturing and real estate still account for more than half of all investment, followed by environment and transport. Added into the chart are the year-on-year first-digit sector growth rates of cumulative monthly December investment (i.e., investment in January through December 2016 compared to investment in January through December 2015). Growth rates are highest in tertiary sectors, at 31% for leasing and between 15% and 25% for information technology, science, public facilities, education, health and culture. This compares to a growth rate of economy-wide investment of 8%. The growth rate of investment in mining is –20%, in finance –4%, and in construction –7%. Investment growth in manufacturing is 4%. In agriculture, it is 19%.

In manufacturing, a broad range of light industry sectors, and also medicines, experiences on the order of ten percentage points investment growth, while investment in heavy industry stagnates (Figure 11). Investment growth is fastest for “computers, communication and other electronic equipment” (16%) and “electrical machinery and apparatus” (13%). In the first-digit transport sector (no chart provided), investment rises by 21% in air transport; in the first-digit sector “water conservancy, environment, and public facilities,” investment in environment grows by 40%.

Figure 10: First-digit Sector Investment Patterns, 2015–2016

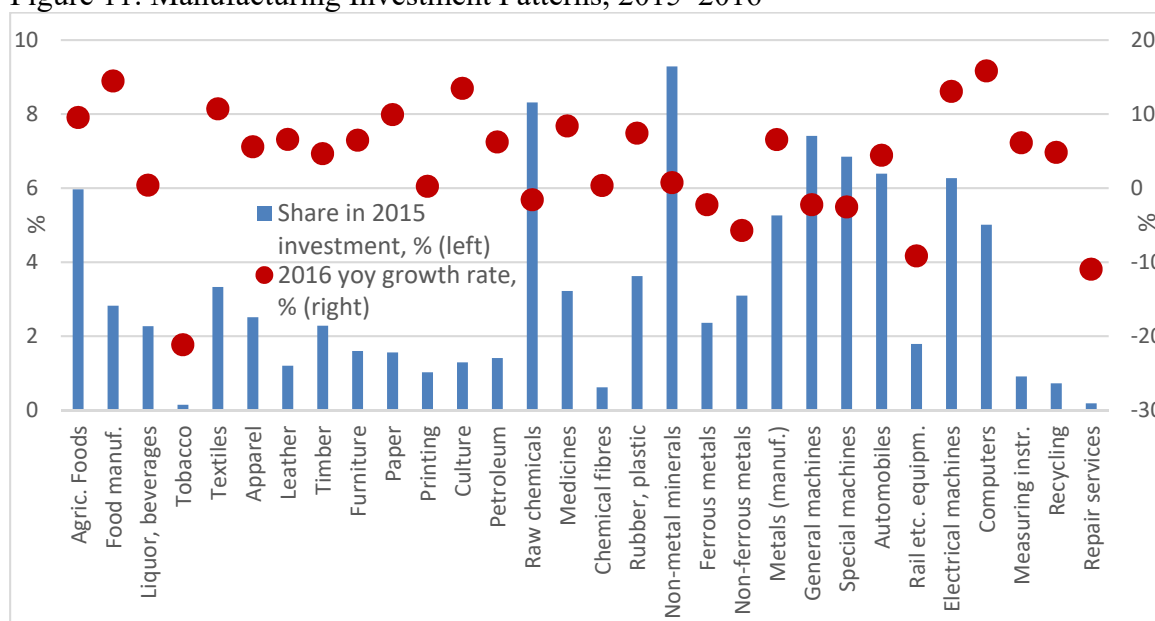


IT: information technology.

Note: 2016 data are cumulative monthly December values.

Source: NBS database.

Figure 11: Manufacturing Investment Patterns, 2015–2016



Notes:

2016 data are cumulative monthly December values.

The first-digit sector manufacturing also contains an implicit residual accounting for 1% of 2015 investment.

Source: NBS database.

The 2016 investment patterns offer a mixed picture regarding the implementation of the various industrial policies. Some sectors favored by industrial policies experienced solid investment growth, but several did not:

- investment in mining fell (but that includes a 32% fall in investment in oil and natural gas extraction, a sector favored by the Thirteenth Five-Year Plan);
- investment in light industries, including medicines, rose;
- investment in heavy industry stagnated;

- investment in the sector electrical machinery and apparatus in 2016 rose 13% but investment in general purpose machinery and in special purpose machinery fell 2% and 3%;
- investment in the automobile industry (where policy promotes the development of electric vehicles) only rose 4%;
- investment in the manufacture of computers, communication, and other electronic equipment rose 16%, and in the information technology service sector 15%;
- investment in agriculture grew 19%;
- investment in air transport services rose 21%, but investment in rail services stagnated, investment in the “manufacture of railway, ship, aerospace and other transport equipment” fell 9%, and investment in water transport services fell 8%;
- investment in the production and supply of electricity grew 12%, but investment in the production and supply of gas decreased 8%; investment in science grew 17%.

Four sectors experienced high investment growth in 2016 without representing sectors or products targeted by industrial policy: leasing (31%), education (21%), health (21%), and culture (16%). While growth in investment in leasing and culture may reflect market developments, investment growth in education and health likely derives from other government priorities that do not fit into policies such as “Made in China 2025.”

Appendix 6: Sector Investment Growth Rates and Ownership Characteristics

Table 9. Pearson Correlation Coefficients between 2008-2010 Sector Investment Growth Rates and Ownership Characteristics (Urban Investment)

	Domestic	SOSCUs	COUs	Private	HKMTUs	FFUs
<i>Share of a particular sector in this ownership category total</i>						
First-digit (19 sectors)						
2008	-0.21	-0.22	-0.24	-0.16	-0.21	-0.18
2009	-0.19	-0.17	-0.19	-0.15	-0.20	-0.18
2010	-0.18	-0.14	-0.17	-0.15	-0.18	-0.17
Second-digit (94 sectors)						
2008	-0.13	-0.19	-0.12	-0.07	-0.12	-0.12
2009	-0.13	-0.16	-0.11	-0.07	-0.10	-0.13
2010	-0.11	-0.14	-0.10	-0.07	-0.09	-0.12
<i>Share of this ownership category in economy-wide investment in a particular sector</i>						
First-digit (19 sectors)						
2008	0.52	-0.20	0.31	0.29	-0.53	-0.50
2009	0.51	-0.20	0.53	0.23	-0.50	-0.51
2010	0.50	-0.14	0.55	0.15	-0.45	-0.53
Second-digit (94 sectors)						
2008	0.17	-0.21	0.07	0.25	-0.25	-0.13
2009	0.15	-0.15	-0.01	0.19	-0.20	-0.11
2010	-0.03	-0.13	0.04	0.09	-0.12	-0.19
<i>Growth rate 2008-2010 of investment by this ownership category in a particular sector</i>						
First-digit	0.99	0.84	0.83	0.40	0.53	0.25
Second-digit	0.97	0.52	0.47	0.36	0.39	-0.06
<i>Share of this ownership category's investment that is in the tertiary sector in %</i>						
2008	56.1	63.0	60.0	45.6	52.2	34.9
2009	57.1	67.2	62.2	42.8	52.5	33.2
2010	56.9	68.9	63.1	43.3	53.8	34.4

Notes:

SOSCU, COU, and private units' data start in 2008 only.

Second-digit sectors include two first-digit sectors for which no second-digit sector data are available in the source: real estate, education.

SOSCU, COU, and private unit investment do not add up to domestic investment; the percentage shortfall of their aggregate value to the domestic value is small at 0.70, 0.71, and 2.94% in 2008-2010, but can differ significantly in individual sectors, with the biggest difference in the first-digit sector information technology, where the three ownership categories exceed the domestic total by 22.49%.

For 60 observations (and very similarly for 120, and thus also for 95), a correlation coefficient of 0.40 is significant at the 10% significance level, a correlation coefficient of 0.73 at the 5% significance level, and a correlation coefficient of 0.985 at the 1% significance level.

A finding omitted from the text is that in 2008, 2009, and 2010 (only), fast-growing first-digit sectors tend to be characterized by an over-proportional share of investment by COUs and, to a lesser degree, private units, and by an under-proportional share of HKMTUs and FFUs. (Perhaps investment by HKMTUs and FFUs is not over-represented in the fastest-growing sectors because the fastest-growing sectors tend to be tertiary sectors, where foreign access is likely more limited. But while that is true for FFUs, it is not true for HKMTUs. In the three years 2008–2010, 56-57% of domestic investment went to the tertiary sector, compared to 52-54% of HKMTU investment (and 33-35% of FFU investment.) At the second-digit sector level, the results are weaker, and disappear in 2010.

Source: NBS database.

Table 10. Pearson Correlation Coefficients between 2012–2015 Sector Growth Rates and Ownership Characteristics (Investment, except by Rural Households)

	Domestic	SOSCUs	COUs	Private	HKMTUs	FFUs
<i>Share of a particular sector in this ownership category total</i>						
First-digit (19 sectors)						
2012	-0.24	-0.14	-0.22	-0.23	-0.26	-0.20
2013	-0.22	-0.12	-0.19	-0.22	-0.26	-0.20
2014	-0.20	-0.09	-0.16	-0.20	-0.25	-0.19
2015	-0.18	-0.05	-0.12	-0.18	-0.24	-0.19
Second-digit (95 sectors)						
2012	-0.09	0.07	-0.03	-0.08	0.01	0.16
2013	-0.08	0.03	0.00	-0.05	-0.03	0.17
2014	-0.12	-0.02	0.01	-0.01	-0.01	0.22
2015	-0.09	-0.04	-0.03	0.03	0.07	0.10
<i>Share of this ownership category in economy-wide investment in a particular sector</i>						
First-digit (19 sectors)						
2012	-0.09	-0.07	-0.06	-0.11	-0.08	-0.13
2013	-0.08	-0.05	-0.05	-0.10	-0.07	-0.11
2014	-0.07	-0.04	-0.03	-0.09	-0.07	-0.11
2015	-0.05	-0.03	-0.02	-0.07	-0.06	-0.09
Second-digit (95 sectors)						
2012	0.00	-0.07	0.02	0.01	0.11	-0.10
2013	-0.07	-0.11	0.02	0.04	0.18	-0.06
2014	-0.06	-0.14	0.12	0.04	0.16	-0.05
2015	-0.24	-0.15	0.06	0.07	0.32	0.12
<i>Growth rate 2012-2015 of investment by this ownership category in a particular sector</i>						
First-digit	1.00	0.77	0.76	0.84	0.27	0.09
Second-digit	0.99	0.60	0.53	0.79	0.19	0.25
<i>Share of this ownership category's investment that is in the tertiary sector in %</i>						
2012	54.9	71.3	68.1	40.1	56.0	32.8
2013	55.2	72.3	70.2	40.9	60.6	34.1
2014	55.8	74.3	72.7	41.1	63.8	35.6
2015	56.1	75.8	74.7	40.7	62.5	34.4

Notes:

Second-digit sectors include two first-digit sectors for which no second-digit sector data are available in the source: real estate, education.

SOSCU, COU, and private unit investment do not add up to domestic investment; the implicit residual accounts for 6.1, 7.4, 8.0 and 8.5% of investment in 2012-2015, and can differ significantly in individual sectors, with the biggest percentage in leasing in 2013 of 40.2%, and the biggest negative percentage in internet and related services in 2012 of -9.2% (both are second-digit sectors).

For 60 observations (and very similarly for 120, and thus also for 95), a correlation coefficient of 0.40 is significant at the 10% significance level, a correlation coefficient of 0.73 at the 5% significance level, and a correlation coefficient of 0.985 at the 1% significance level.

Source: NBS database.