Appendices to accompany

Understanding PRC Investment Statistics

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Appendices

Appendix 1. Ownership-focused Fixed Asset Investment Definition through 2002

Changing definition

FAI in 1990 included the following items:

- investment by state-owned units (SOUs) in one of four forms: capital construction, technological updating and transformation, real estate investment (a category not listed separately in the previous year, with data provided retrospectively for the years from 1986 onwards in the *Statistical Yearbook* starting with the 1991 issue), and "other investment" (which may have been folded into technological updating and transformation in the years through 1980, or 1985, or 1993, on which more below);
- investment by urban and rural collective-owned units (COUs); and
- investment by individuals: investment in housing construction by individuals in municipalities, county-level cities, township-level cities and in mining areas; investment in housing construction by individuals in villages; investment in productive fixed assets (with a lifespan of at least two years and a value of at least CNY 50 per item) by individuals in villages.[1]

An identical definition was used five years earlier, with a minimum value for investment in productive fixed assets by individuals in villages of CNY 30.[2]

In 1993, a new ownership category of "all kinds of economic types" was introduced to cover the joint economy, the shareholding economy, joint equity ventures, joint contractual ventures, and wholly foreign-owned enterprises (and regarding the latter three, similarly for Hong Kong, Macau, and Taiwan-invested enterprises), and "other economic types of units."[3]

In 1996, an explicit minimum value of CNY 50,000 was given for those types of capital construction and technological updating and transformation investment that had not been included in the investment plan.[4] In 1997, the minimum value was raised to CNY 500,000.[5]

In 2000, a manual on how to use the *Statistical Yearbook*, by-passing the ownership-based classification, provided the following coverage of FAI:[6]

(i) capital construction (*jiben jianshe*) of value CNY 500,000 and above;
(ii) technological updating and transformation (*gengxin gaizao*) of value CNY 500,000 and above;
(iii) investment by urban collective-owned units of value CNY 500,000 and above (this category excludes township and village enterprises);
(iv) other investment by state-owned units, including investment with a value of CNY 500,000 and above that does not constitute capital construction or technological updating and transformation;
(v) investment of CNY 500,000 and above by joint enterprises, limited liability companies, stock companies, Hong Kong, Macao, and Taiwan-invested enterprises,

[1] See *Statistical Yearbook 1991*, p. 201; *1990*, p. 222.
[2] See *Statistical Yearbook 1986*, p.488.
[3] See *Statistical Yearbook 1994*, p. 183. A minimum value limit for investment in productive fixed assets by individual in villages to be included was not mentioned.
[4] See *Statistical Yearbook 1997*, p. 2003.
[5] For the new 1998 value limits see *Statistical Yearbook 1998*, pp. 239.
[6] For the definition and explanations, see Liu et al. (2000), pp. 74f.

foreign-funded enterprises, urban private enterprises (*siying qiye*) and urban sole proprietorships (*getihu*, also translated as "individual-owned economy");

(vi) all investment by real estate units (presumably investment in real estate through real estate companies);

(vii) private investment in housing in urban and industrial mining areas;

(viii) rural collective-owned and individual-owned investment (in housing as well as in productive assets).

Between 1990 and 2000, thus, the coverage of FAI changed repeatedly due to the changing value limits on what is to be included in FAI. While the published definitions keep changing over time, only the 1996-1997 statistical break (with an increase in the minimum value for investment to be included in the statistics) is explicitly noted with some of the data. A second set of 1996 data, following the new definition, shows that in the aggregate the statistical break is small, with a reduction in 1996 FAI of 0.26 percent due to the introduction of a higher value limit for investment to be included in FAI.[7] If earlier changes to the definition of FAI had an (unreported) impact of similar size, the typical annual increases in FAI would swamp the size of any re-definition. Nevertheless, even if the numerical impact is minimal, there remains the suspicion that the coverage of the investment statistics is subject to repeated changes over the years with none except the 1996/1997 change in coverage being explicitly noted with the data.

FAI does not capture all investment

FAI falls short of measuring total economy-wide investment for a variety of reasons:

(1) The value limit for various investment categories of CNY 500,000 (since 1997, previously CNY 50,000) excludes an unknown amount of investment from FAI.

(2) The total comes with a breakdown by ownership category (state, collective, individual, and since 1993 "others"). The 1996 value of the revised category "individual," which presumably covers both private and individual-owned enterprises, is identical to that using the earlier, lower cut-off point. This appears not credible in that much investment by the (urban) private and individual-owned economy (item v) is likely to be of small scale (below CNY 500,000). The revision in the cut-off point should have led to a significant reduction in the value of investment by the *urban* private and individual-owned economy. The fact that it did not would suggest either that only the largest urban individual-owned investment projects were covered in the investment statistics in 1997, or that investment by urban private enterprises and urban sole proprietorships even after 1996 is not subject to the CNY 500,000 requirement (contrary to the explicit phrasing in the source).[8]

(3) An explanatory note to the investment statistics states that prior to 1999, *urban* private and individual-owned investment are not included in the statistics.[9] Urban private and

[7] See *Statistical Yearbook 1998*, p. 186.

[8] A more recent publication, the *Statistical Abstract 2006*, explicitly states that real estate development, rural collective-owned investment, individual-owned (*geren*) investment (without specifying rural or urban), and "other investment" did not experience the shift from the 50,000 to the CNY 500,000 minimum investment requirement. This contrasts with the inclusion of the urban individual-owned economy in (v) in the list. (The precise meaning of the term *geren* used in the Statistical Abstract is unclear as to whether it encompasses only the individual-owned economy (*getihu*) or also private enterprises (*siying qiye*).)

[9] Liu et al. (2000), pp. 75.

individual-owned investment since 1999 are presumably captured in items (v) and (vii).

(4) Fourth, non-real-estate investment below CNY 500,000 (CNY 50,000 prior to 1997) by all types of enterprises and units except by state-owned units, rural collective-owned enterprises, and the rural individual-owned economy are not included ever. It is further questionable if non-real-estate investment below CNY 500,000 by state-owned units, rural collective-owned enterprises and the rural individual-owned economy are indeed included, as items vi-viii would imply. In the case of state-owned units, NBS (1997, p. 165) states explicitly that the "odd" (*lingxing*) investment of state-owned units with a value below CNY 50,000 (the relevant limit prior to 1997) is "currently not included in the investment in fixed asset statistics" (and therefore needs to be estimated in the compilation of GFCF in the calculation of expenditure approach GDP); it is reported to have been included at some earlier point.[10] In the case of the rural collective-owned economy, these small investments are also to be estimated (in the compilation of GFCF), which suggests that they are not part of the FAI statistics (p. 169).[11]

(5) "Investment in fixed assets" in the PRC does not include intangible assets (NBS, 28 June 2006); this may have changed in 2016.

The quality of the FAI data is questionable. Data on fixed asset investment by rural collective-owned enterprises and the rural individual-owned economy are collected by the rural survey teams of the National Bureau of Statistics (NBS) through surveys. All other investment in fixed asset statistics are collected by the NBS Investment in Fixed Assets Division through "complete" statistical reporting. Both procedures are open to errors and manipulation. The usual suspicions about incentives for local governments and their statistics offices to report accurate vs. politically adjusted figures apply.[12]

Capital construction, technological updating and transformation, and "others"

A corollary of the ownership-focused definition of FAI is the classification of first state-owned investment, and later on an aggregate larger than state-owned investment, into capital construction, technological updating and transformation, and "other investment" (with separate real estate investment values for the years starting 1986 first published in the *Statistical Yearbook 1991*). The two categories "capital construction" and "technological updating and transformation" are of particular interest because data are available on investment in these two categories for all years through 2003 (including the years prior to 1981).

"Capital construction" and "technological updating and transformation" are traditional planned economy terms. Their coverage extends only to projects with investment of value

[10] Another piece of evidence that not all such investment is included is a 1993 accounting regulation for industry, covering specific accounting issues. For example, it requires individual test equipment with a value below CNY 50,000 that was purchased for the purpose of developing new products or new technologies to be entered into the cost accounts. In other words, this equipment is not regarded as a fixed asset. (Finance Ministry, 1999, Vol. 1, p. 462)

[11] In the case of the urban individual-owned economy, because the collection of data is "difficult," only real estate investment is covered in the compilation of GFCF (p. 170); presumably, and as the definition of investment also suggests, non-real-estate investment of the urban individual-owned economy is not included in the official investment statistics.

[12] On who collects which statistics, see, for example, *Statistical Yearbook 2004*, p. 185.

CNY 500,000 or above (50,000 and above prior to 1997).[13] The category capital construction comprises:

(i) projects included in this year's central or local capital construction plan, and projects not included in this but in previous years' plan(s), as long as the projects are continued this year;
(ii) new construction with investment included in this year's capital construction plan as well as simultaneously in this year's technological updating and transformation plan; extension projects to increase production capacity as long as these projects meet the large or medium size criterion; also includes the relocation of complete factories; and
(iii) any other new construction, extension, or resumption of projects with investment of value CNY 500,000 or above (50,000 prior to 1997), by SOUs, that is not part of the capital construction plan or the technological updating and transformation plan, including the relocation of complete factories; this also includes the construction of business premises by government and administrative facilities (*xingzheng, shiye danwei*), and the construction of welfare facilities (*shenghuo fuli sheshi*) by government and administrative facilities.

Projects included in the capital construction plan or the technological updating and transformation plan likely by their very nature carry a value in excess of the minimum requirement.

Technological updating and transformation is defined along similar lines to comprise:

(i) projects included in this year's central or local technological updating and transformation plan, and projects not included in this but in last year's plan, in as far as the projects are continued this year;
(ii) technological updating and transformation of enterprises' and administrative facilities' original equipment with investment included in this year's technological updating and transformation plan as well as in this year's capital construction plan; extension projects of main workshops or factory branches to increase production capacity as long as these projects do *not* meet the large or medium size criterion; also includes the relocation of complete factories due to urban environmental protection and production safety needs; and
(iii) any other technological updating and transformation project with investment of value CNY 500,000 or above (50,000 prior to 1997), by SOUs or administrative facilities, that is not part of the capital construction plan or the technological updating and transformation plan, including relocation of complete factories due to urban environmental protection and production safety needs.

The data reveal that between 1953 and 1980, SOU investment equaled capital construction plus technological updating and transformation.[14] Between 1953 and 1985, SOU investment also equals capital construction plus a historical technological updating and transformation series that comes with the note "excludes other state-owned investment since 1994," i.e., implicitly includes other state-owned investment prior to 1994. Between 1986 and 1992, SOU investment de facto equals capital construction,

[13] For the definitions below, see Liu et al. (2000), pp. 76f., or *Statistical Yearbook 2004*, p. 266.
[14] Data on capital construction are available for the years since 1950, data on technological updating and transformation for the years since 1953, and SOU investment data also for the years since 1953 (total of funding sources through 1979).

technological updating and transformation including "other" SOU investment, plus (starting in 1991 for the years since 1986 newly reported) real estate development.

Between 1953 and 1980, the two series of technological updating and transformation, the not further defined series and the series with the note, are identical. The *Statistical Yearbook* (for example, *2002*, p. 181) confirms that the identical 1953-1980 data in both series include "other" SOU investment. Data on technological updating and transformation following the earlier definition to include "other" SOU investment, thus, are available for the years 1953-1993, while data following the new definition, to exclude "other" SOU investment, are available since 1981 with an alternative (lower) 1980 value in some statistics, which in all likelihood excludes "other" SOU investment.[15] The absolute difference between technological updating and transformation that includes "other" SOU investment vs. technological updating and transformation that does not is equal to 4.39 percent of total SOU investment in 1981, rising steadily to 11.20 percent in 1984, and then falling steadily to 4.56 percent in 1993.[16]

SOU investment

SOU investment data come with a number of limitations. Thus, data on FAI by SOUs are not available for the years prior to 1980; what is available for 1953-2003 are data on the *funding sources* of SOU investment, with a total for all sources. This second series is identical to the first in 1980 through 1993, but differs by a few percentage points every year since.[17] Logically, the two series need not be identical; the first supposedly covers actual investment; the second the funding that is in place. The fact that the two series are identical through 1993 suggests that earlier investment data could be based on funding sources rather than on actual investment.

A complication in the use specifically of SOU investment data is that in most publications they exclude investment by some state-controlled companies. This means that what is typically labeled SOU investment does not match the "state-owned and state-controlled" coverage applied to other data, such as those on industrial output, since 1998. One piece of evidence is the labels, which consistently refer to investment by *state-owned units* without any mentioning of state-controlled units. A second piece of evidence is the detailed investment classification in various issues of the *Statistical Yearbook* (for example, *2004*, pp. 190f.) which shows investment by shareholding units to be more than half the size of investment by SOUs, presumably too large to exclude investment by state-controlled units,

[15] The two 1980 data points are CNY 18.701 billion and CNY 13.738 billion. (*Investment 1950-2000*, p. 21 and p. 241 vs. p. 298 in the same source or in the *Statistical Yearbook 2004*, p. 193) The smaller 1980 value appears only in tables that cover technological updating and transformation since 1980, with the years after 1981 showing these data to exclude "other" SOU investment (in contrast to the table that explicitly does not exclude "other" SOU investment until 1994).

[16] Presumably this difference consists of "other" SOU investment only; the phrasing in the sources, such as that technological updating and transformation prior to 1994 includes "other" SOU investment, is not perfectly clear. It does not rule out that yet other items are also included, although that is unlikely and probably not meant to be implied by the phrasing.

[17] See *Investment 1950-2000*, p. 15, for SOU FAI in 1980 through 2000, supplemented by the *Statistical Yearbook 2004*, p. 188, for 2001-3, and *Investment 1950-2000*, p. 25, for SOU FAI by "sources of funds -- total" in 1953-2000, supplemented by the *Statistical Yearbook 2004*, p. 189, for 2001-3. Relative to SOU FAI., investment in fixed assets of SOUs in the sources of fund table are 4.57 percent larger in 1994, 1.13 percent larger in 1995, 0.31 percent larger in 1996, 0.30 percent smaller in 1997, 0.86 percent smaller in 1998, 2.26 percent smaller in 1999, 3.45 percent smaller in 2000, 2.39 percent smaller in 2001, 1.82 percent smaller in 2002, and 0.25 percent smaller in 2003.

while SOU investment appears to be too small to include investment by state-controlled units.[18]

In the case of investment data, the term SOU continues (past 1998) to cover unreformed SOUs, SOU joint units (joint undertakings that involve more than one SOU, or a SOU and a unit in another ownership form), and 100 percent state-owned limited liability companies. The term SOU thereby excludes limited-liability companies with less than 100 percent state ownership as well as state-owned and state-controlled stock companies. Data for 2014 suggest that the ownership category SOUs in the investment statistics may underestimate the true extent of the state by approximately 20 percent.

Overall, SOU data reveal the following coverage:

(i) Between 1953 and 1985, SOU investment equals capital construction plus technological updating and transformation, the latter including "other" SOU investment.
(ii) Between 1986 and 1992, SOU investment de facto equals capital construction, technological updating and transformation including "other" SOU investment, plus (starting in 1991 for the years since 1986 newly reported) real estate development.[19]
(iii) Starting in 1993, SOU investment falls short of the sum of capital construction, technological updating and transformation including "other" SOU investment, and real estate development.
(iv) Starting in 1996, SOU investment for the first time falls below the sum of capital construction and technological updating and transformation.[20]

The data, thus, also imply that through 1992 capital construction, technological updating and transformation, and real estate development only cover *state-owned* investment.[21] Presumably, the following is happening. The Company Law of 1992 led to the establishment of shareholding companies (i.e., limited liability companies and stock companies) that began to invest in 1993. Investment by such companies, if largely or exclusively in state ownership, is almost surely included in the investment plan and thus enters one of the two categories of capital construction and technological updating and transformation. Capital construction and technological updating and transformation then capture investment (of value CNY 500,000 and above) by "state-owned and state-controlled" units. But the narrow definition of the term "SOUs" in the investment statistics excludes investment by state-controlled companies from the category SOU investment.

Additional reference used in this appendix

Finance Ministry (General Office). *Xianxing caiwu kuaiji zhidu quanshu* (Almanac on the current financial and accounting system). Two volumes. Beijing: Zhongguo caizheng jingji chubanshe, 1999.

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[18] The individual categories add up to the total, ruling out double-counting of investment by state-controlled units in both categories, shareholding units and SOUs.
[19] The category real estate development is by definition "urban" only.
[20] The ratio of SOU investment to capital construction and technological updating and transformation rises from unity in 1980 (and earlier years) to a maximum of 1.2291 in 1992, before falling to 1.1636, 1.0747, 1.0298, and 0.9885 in 1993-1996.
[21] *Seventeen Years* claims that this is the case for 1985 through 1995, but the turning point may have come as early as 1993 or 1994. *Seventeen Years*, p. 134, with investment data for the years 1985-1995, lists capital construction and technological updating and transformation as subcategories of SOU investment, where the data all match those in other sources, and the technological updating and transformation values are those without "other" SOU investment.

Appendix 2. Urban-Rural Definition 2003-2010

Starting with data for 2003 (2004), the *Investment Yearbook 2004* (*Statistical Yearbook 2005*) switched to a primary urban-rural distinction (rather than an ownership distinction). Publication of data on capital construction and technological updating and transformation ended after 2003. The definition of the coverage became greatly simplified:[22]

(i) Urban (*chengzhen*) investment: investment of value CNY 500,000 or more in construction, in real estate development, and in private housing construction in urban and in mining areas, by any type of registered unit (enterprise, administrative facility [*shiye danwei*], administrative institution [*xingzheng danwei*], sole proprietorships). Construction projects directly led and administered by governments at county level and above as well as investment by enterprises and administrative facilities are typically to be included in urban investment. Real estate development explicitly does not include pure trading in land (*bu baokuo danchun de tudi jiaoyi huodong*), but includes land improvements.

(ii) Rural (*nongcun*) investment: investment by enterprises, administrative facilities and administrative institutions in rural areas (*zai nongcun quyu fanweinei*), and investment by village individuals (*nongcun geren*) in rural areas. The official NBS translation of the term *nongcun* as "rural" potentially obscures the precise coverage of this term. In all likelihood, *nongcun* in the statistics refers to the geographically and administratively defined entity of the *nongcun*. A literal translation of *nongcun* would be "agricultural village," while a common translation into English is simply "village."[23]

Variations in the definition of urban FAI

The definition of urban investment varies across sources and years in the period 2003-2009. In the urban case the following applies:

- The *Investment Yearbook 2004* (preface),[24] i.e., the first issue in the *Investment Yearbook* series to switch to the urban-rural distinction, for urban investment offers all urban investment of value CNY 500,000 or more, real estate development, and private housing construction in urban and mining areas. In contrast to (i) above, it is unclear from the phrasing if the CNY 500,000 limit applies to real estate development and private housing construction.
- In the *2007* issue (p. 5), with 2006 and earlier data, a note states that *starting 2006*, private housing construction in urban and mining areas is to be reported by project in the regions' comprehensive reports, and to be included in the regional database of projects with value of value CNY 500,000 and more. As the *Statistical Yearbook 2014*, p. 276, confirms for the years starting 2006, only urban private housing construction with a value of CNY 500,000 or more is included in investment.
- By the *Statistical Yearbook 2008* (p. 234), private housing construction in urban and mining areas has disappeared from what is to be included in urban investment, though

[22] *Statistical Yearbook 2005*, p. 246.
[23] Data on investment by rural households is explicitly compiled from the sample survey material collected by the NBS Village Division (with no minimum value stated as prerequisite for inclusion).
[24] And similarly in subsequent issues, such as the *2007* issue (p. 5).

other sources, such as the *Investment Yearbook 2008* (p. 5), continue to include urban private and individual-owned investment in projects with a value of CNY 500,000 or more.

Overall, the available definitions paint a picture of changing coverage (which may, however, have only a small impact on the aggregate investment figure), as well as of the (possibly increasingly over time) exclusion of various types of investment projects with a value below CNY 500,000.[25]

Variations in the definition of rural investment

Starting in the *Investment 2007* issue (p. 5), with 2006 data, rural investment covers planned investment of value CNY 500,000 or more by rural non-households, plus investment by rural households. In other words, investment by rural non-households is subject to a minimum size requirement in order for it to be included in FAI.

Comparing the geographic (location-based) investment classification system with its first breakdown into urban vs. rural investment to the ownership classification system with an urban-rural breakdown for some of the individual ownership forms shows the following correspondence:

In 1995 through 2005, (i) the sub-category "village non-household" (*fei nonghu*) investment of the geographic category "investment in rural areas" is of same value as the sub-category "rural" (*nongcun*) investment of the ownership category "investment by collective-owned units" (in contrast to "urban" investment by collective-owned units); and (ii) the exhaustive second sub-category "village household" (*nonghu*) investment of the geographic category "investment in rural areas" is of same value as the sub-category "rural" investment of the ownership category "investment by private enterprises and sole proprietorships" (in contrast to "urban" investment by private enterprises and sole proprietorships).[26]

- Table 1 illustrates the correspondence.
- In 2006-2009, the match has disappeared.[27] What remains is the consistency *within* the geographic investment statistics (FAI equals urban investment plus rural investment, and rural investment equals the sum of village non-household and village household investment), while investment by ownership categories starts a steady new trend after a sharp downward revision to investment by rural collective-owned units and a sharp but not equivalent upward revision to rural investment by private enterprises and sole proprietorships.[28] Since 2006, "village non-household"

[25] A note for Beijing in *Sixty Years* states that starting in 2004, investment excludes "the odd investment purchase" (*lingxing gouzhi touzi*). With national investment data reflecting an aggregation of provincial data, the note for Beijing could indicate that the national value is the outcome of varying transition practices across provinces in accounting (or not accounting) for small-scale investment.

[26] See *Investment Yearbook 2005*, pp. 16f; *2006*, pp. 15f.

[27] For the 2006-2009 data on FAI and urban investment, see, for example, the NBS database, or individual issues of the *Investment Yearbook*. For the rural investment data, see *Investment Yearbook 2007*, p. 447, *2008*, p. 25, *2009*, p. 447, and *2010*, p. 405.

[28] In the ownership-based investment statistics, between 2005 and 2006 rural investment by collective-owned units falls from CNY 974 billion to CNY 154 billion, while rural investment by private enterprises and sole proprietorships rises from CNY 394 billion to CNY 978 billion; i.e., the drop in collective rural investment (by 820bn) appears compensated for, in part, by a rise in rural investment by private enterprises and sole proprietorships (by CNY 584 billion). In the urban-rural location-based investment statistics, rural investment

investment (within investment in rural areas) is of larger size than the sum of rural investment by collective-owned units and by private enterprises and sole proprietorships together, which means that some of the "village non-household" investment (within investment in rural areas) is by units in additional (unspecified) ownership forms, possibly HKMT enterprise located in villages and townships, or administrative units.[29] At the same time, "village household" investment (within investment in rural areas) is smaller than rural investment by private enterprises and sole proprietorships in rural areas, which means that some of the private enterprises and sole proprietorships are not considered to be (village) *households*.

The urban-rural distinction may be somewhat arbitrary. Not only does the distinction depend on the (over time changing) administrative definition of urban vs. rural, but the definition of urban vs. rural may further have been ignored prior to 2006 in that some non-collective non-private/sole proprietorship investment in rural areas—investment in rural areas not implemented by units in one of these two ownership forms—was simply classified as urban, or ignored.

The statistics also struggle with the use of language. In the location-based investment statistics, the Chinese terms *fei nonghu* and *nonghu* denote the two exhaustive subcategories of *nongcun* (village) investment. In the period 2003-2009, the terms appear in the Chinese language *Investment Yearbook* only. At first sight, the terms would probably best be translated as "not-agricultural-household" vs. "agricultural household." It is only with the changes in the next period (2010 onward) that their specific meaning in the context of the investment statistics as "village non-household" vs. "village household" is clarified by the NBS. At that point, the NBS translates *nonghu* into English as "rural household" (and *nongcun nonghu* as "farm households in rural areas"), while the term "non-agricultural-household" (*fei nonghu*) is discontinued.

In the years 2003-2009, urban investment accounts for a steadily increasing share of 82 to 86 percent of FAI (NBS database). Details on urban investment are provided in the official investment statistics with breakdowns along numerous dimensions, including economic sectors. Details on the much smaller share of rural investment in FAI, on the other hand, are comparatively limited (although a breakdown by economic sector, separately for the non-agricultural households and the agricultural households, is available.)

Table 1. Correspondence between Investment by Ownership Vs. in Rural Areas

		Ownership-based investment statistics			
		Collective-owned Units		Individual-owned Units	
		Urban	Rural	Urban	Rural
Location-based investment statistics					
Rural	Village household				1995-2005
	Village non-household		1995-2005		

Individual-owned units: private enterprises and sole proprietorships.

The category "rural" in the urban-rural investment statistics (first column) is discontinued after 2010. "Village household" investment continues to be published (while the variable "village non-household" disappears).

values for village non-households and village households in 2006 continue their earlier trends. (For the 2005 and 2006 data, see *Investment Yearbook 2006*, pp. 15f.; *2007*, pp. 26, 447.)

[29] The question arises as to which ownership category such investment (investment by institutions such as HKMT enterprises or administrative units in villages) was included in before 2006 and then from 2006 onwards. Perhaps it was included in the ownership category "collective-owned units" prior to 2006. Since 2006, it may be included in the ownership categories HKMT enterprises or state investment (in the case of administrative facilities and institutions), ownership categories that do not come with an urban-rural breakdown.

Appendix 3. Fixed Asset Investment and "Investment, Except by Rural Households" 2011-

The urban and rural investment series that began in 1995 were discontinued after 2010, with values according to the old and new definitions available for 2010. FAI is now split into "investment, except by rural households (*bu han nonghu*)" and "investment by rural households (*nongcun nonghu*)." The latter category is one of the two sub-categories of rural investment in the 2003-2009 period (and previously accounted for approximately one-quarter of rural investment).[30] The data series on investment by village non-households, the other sub-category of rural investment, was discontinued after 2010; these values are now included in "investment, except by rural households."

Between 2010 and 2018, "investment, except by rural households" accounted for a 97 to 99 percent steadily rising share of FAI (while the urban share, before the adoption of the new classification system, was 86 percent in 2009). These data, as the urban data before, come with significantly more detail than the investment data for rural households (although a breakdown by economic sector at the first-digit secctor level is still available for the latter).

A second innovation in 2010/2011 is the switch from the CNY 500,000 size criterion in the case of urban investment to a CNY 5 million size criterion for non-rural-household (non-real estate) investment. According to the *Investment Yearbook 2012* (preface), the new coverage of FAI starting 2011 then is:

- "investment, except by rural households," comprising planned investment of value CNY 5 million or more and real estate development investment; and
- "rural household investment" with a minimum value of CNY 1,000.

In 2018, the size criterion for "investment, except by rural households" increased to CNY 50 million.

The *Statistical Yearbook 2014* (p. 320) provides a similar coverage:[31]

- "investment, except by rural households," comprising investment in construction projects with a value of CNY 5 million or more and in real estate development, undertaken by registered enterprises, administrative facilities, administrative institutions and urban sole proprietorships; and

[30] Data on "investment, except by rural households" is collected on a monthly basis (by project; in the case of real estate development investment, by enterprise), while data on "investment by rural households" is collected in quarterly sample surveys covering investment (with a minimum value of CNY 1,000 and a service life of at least two years) in 160,000 households. The rural household survey distinguishes between non-building investment and building investment; the survey yields per capita investment values for each of the two types, and these per capita values are then aggregated to provincial values by multiplying with the provincial *xiangcun* (rural township plus village) population values. The use of *xiangcun* (rural township plus village) population data rather than just *nongcun* (village) population data appears conceptually correct in that *xiang* (rural township) household investment would otherwise not be captured by the NBS in its investment statistics; in the corresponding published investment statistics, the NBS, however, refers to *nongcun* (village) only. (NBS 2013, pp. 203f., 208)

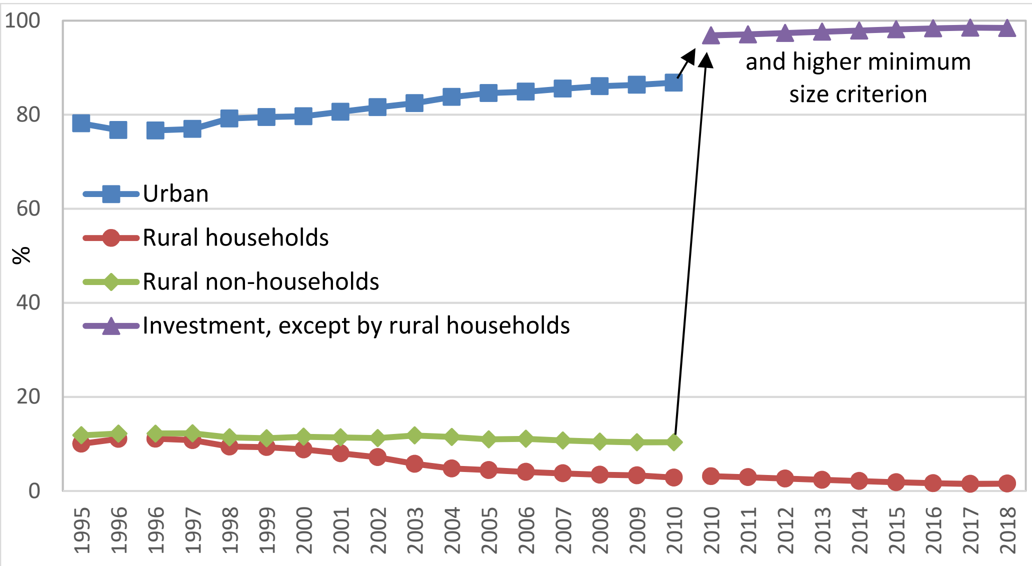
[31] Both, the *Investment Yearbook* and the *Statistical Yearbook* contain a note clarifying that the new-definition category "investment, except by rural households" equals the previous-definition category "urban investment" plus investment by village enterprises and by village administrative facilities and institutions. This suggests that all households in villages are considered "agricultural"—or "rural"—households. The term *fei nonghu*, "non-agricultural households," used in the earlier classification scheme, then needs to be (re)interpreted, first, as not 'agricultural households,' and second, with *nong* referring to village or "rural" rather than agricultural, as not 'rural households,' something quite different from 'households that are not in agriculture.'

- “rural household investment.”[32]

Due to the increase in the size criterion, the 2010/2011 change in coverage leads to a substantial reduction in FAI. 2010 FAI according to the new definition is 9.51 percent lower than 2010 FAI according to the old definition.[33]

In the case of the detailed investment statistics, the switch from urban investment to “investment, except by rural households” (while retaining the original size criterion) expanded the coverage by 11.93 percent.[34] Combining the change in coverage of the detailed investment statistics from “urban” investment to “investment, except by rural households” with the change in size criterion (CNY 500,000 for urban investment, CNY 5 million for “investment, except by rural households), the latter is 0.98 percent larger in 2010 than the former.[35] In other words, combining the two statistical breaks leads to an almost identical *aggregate* 2010 investment value for this particular set of investment (urban through 2010, “investment, except by rural households” since 2011).

Figure 1 illustrates the transition in 2010. Up through 2010, FAI comprises urban investment and rural investment, where rural investment comes with a breakdown into rural households and rural non-households. Since 2011 (and with data retrospectively available for 2010), FAI comes with a breakdown into “investment, except by rural households” (capturing the former urban investment plus the former rural non-household investment, both subject to the higher minimum size requirement), and investment by rural households. For each of the years 1996 and 2010, two sets of data are available due to a changing size criterion for inclusion in non-rural-household investment. The values of rural household investment are unchanged across the statistical breaks.



Sources: *Statistical Yearbook 2011*, p. 144; *Statistical Yearbook 2016*, Table 10-2; *Statistical Yearbook 2019*, Table 10-1; NBS database.

Figure 1. Composition of Fixed Asset Investment

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[32] The same coverage of the FAI reporting system can also be found at http://www.stats.gov.cn/statsinfo/auto2073/201501/t20150106_663870.html (accessed 25 February 2015). This source further mentions a FAI reporting system for national and civil defense investment projects.

[33] *Statistical Yearbook 2012*, p. 158.

[34] *Statistical Yearbook 2011*, p. 144, comparing the sum of “urban” investment (CNY 24,143.09 billion) and “rural areas, non-farm-household investment” (CNY 2,880.50 billion) to the “urban” investment figure.

[35] *Statistical Yearbook 2012*, p. 158, with CNY 24,379.78 billion vs. CNY 24,143.09 billion.

The comparison between the ownership shares in FAI of SOSCUs vs. SOUs presented in the paper is based on the following calculations. The *Investment Yearbook 2015* (p. 15) for 2014 reports a 26.8 percent SOU share in national FAI. A separate table (pp. 50-54) reports "investment, except by rural households" (equal to 97.9 percent of national FAI) by type of enterprise registration. In this more detailed ownership table, the investment value of state-owned units is 24.4 percent of (national) FAI. Adding joint state enterprises (0.15 percent of FAI), joint state-collective enterprises (0.04 percent), and solely state-owned companies (2.2 percent) yields a share of 26.8 percent. The *Statistical Yearbook 2015* (p. 323) reports data on "state-owned and state-controlled" units (in a table on "investment, except by rural households), equal to 31.5 percent of FAI. The difference of 26.8 percent and 31.5 percent is 14.9 percent of the latter, the difference of 24.9 percent and 31.5 percent is 22.5 percent of the latter. In 2017, unreformed SOUs accounted for 21.7 percent of FAI, the 1998-definition SOUs for 28.2 percent, and SOSCUs for 36.4 percent (*Investment Yearbook 2018*, Tables 1-9 and 2-1-7).

Appendix 4. Fixed Asset Investment and Changes to the Sector Classification System

Changing Sector Classification System

The NBS first adopted a formal sector classification system (*guobiao*, in the following abbreviated "GB") in 1984, replacing a non-standardized sector classification system that was previously used for all earlier published data. The sector classification system then changed repeatedly over time. In the summary compendia *Investment 1950-1995* and *Investment 1950-2000*, some of the pre-1994 investment data have been partly fitted into the 1994 classification system. Across these compendia and the *Investment Yearbook* series (and compendia) and the *Statistical Yearbook* series, data availability according to the various sector classification systems is as follows:

- 1953-1980 investment data are available according to the pre-1984 classification system, according to GB1984, and according to GB1994 (not all types of investment data may be available according to all three classification systems),
- 1981-1992 investment data according to the pre-1984 classification system (1981-1983), GB1984 and GB1994,
- 1993-2002 investment data according to GB1994,
- 2003-2011 investment data according to GB 2002,
- 2012-2017 investment according to GB2011,
- and investment since 2018 according to GB2017.

In the transition from one classification system to another, second-digit sectors could move between first-digit sectors, third-digit sectors between second-digit sectors, etc., while some sectors were newly created. Investment data prior to 2003 come at most according to a first- and second-digit sector breakdown, and only for specific ownership forms or types of investment (such as capital construction).

Between 2003 and 2010, urban investment reported in the *Investment Yearbook* series comes with a breakdown up to fourth-digit sectors following the 2002 classification system, and since 2011 the same holds for "investment except by rural households" (2011 following GB2002, and in 2012-2017 following GB2011).

Changing Sector Classification System and the 2010/2011(/2012) statistical break

The 2012 change in sector classification system adds to the data complications around the 2010/2011 statistical break, which, in total, then are:

- The coverage of the detailed sector data changed in 2011, from urban investment to "investment, except by rural households."
- The size criterion for inclusion changed in 2011 (and in some sources is applied retrospectively to 2010 aggregate data).
- The sector classification scheme changed in 2012.

In the case of the detailed data available for first "urban" investment (through 2010) and then "investment, except by rural households" (since 2011), the two statistical breaks in 2011 imply a potential change in sector investment patterns: The smallest investment projects dropped out in 2012, while rural non-farm-household investment was newly included in the subset of FAI on which these detailed sector data are reported (now "investment, except by rural households"). The adoption of GB2011 in 2012 then added yet another statistical break in sector investment data (for all investment data, i.e., FAI and the detailed investment data).

At the first- and second-digit sector, GB2002 and GB2011 are quite similar and the changes to the sector classification system in 2012 are minor. The first-digit sector classification—comprising 19 sectors (plus an "international" sector with typically zero investment)—is largely unchanged; only one second-digit sector moves between first-digit sectors.[36] Within first-digit sectors, one dozen of the approximately one hundred second-digit sectors are re-arranged, typically with minor effects on the relevant second-digit sector values.[37]

To use a continuous time series starting 2003 through 2017 for the analysis of the sector distribution of investment, one has to assume that rural non- household investment exhibits the same sector patterns as does urban investment (unlikely, with the rural non- household investment likely concentrated in construction-related sectors), that small-scale investment exhibits the same sector patterns as larger investments, and that the changes to the sector classification scheme in 2012 are minor enough to be ignored.

The NBS on its website (www.stats.gov.cn) does exactly that. For example, it presents second-digit sector data for 2003-2017 labeled "investment, except by rural households" as one consistent time series based on GB2002, when the data for the years prior to 2011 are, in fact, "urban" data, the size criterion for inclusion increased in 2011, and the sector classification scheme for data collection and compilation by the NBS changed to GB2011 in 2012. This also means that since 2012 several listed sectors come without data because the data because since 2012 data are collected according to GB2011 and in the case of some sectors cannot easily be fitted into GB2002.

Thus, sector time series investment data published by the NBS in its publications or online, or published by CEIC, need to be carefully examined as to their handling of the change in sector classification. When data are compiled according to one classification scheme but then in publications fitted into a different classification scheme, the sector values typically do not add up to the total, and some sectors will not have values for all years.

Sources of sector investment data and organization of investment data

The *Statistical Yearbook* series provides first digit-sector data on FAI and second-digit sector data on urban investment for the years 2004–2010, and similarly on FAI and on "investment, except by rural households" for the years since 2011. Data are typically published on FAI, 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

[36] The first-digit sector "Health, Social Security and Social Welfare" in GB2002 loses the second-digit sector "social security" to the first-digit sector "Public Management, Social Security and Social Organizations" in GB2011 (with corresponding changes in the first-digit sector labelling). Moves of third- or fourth-digit sectors from one first-digit sector to another first-digit sector cannot be ruled out. The NBS in its time series simply ignores the reclassification: the *Statistical Yearbook 2012*, pp. 164ff. reports national first-digit sector investment data for 2003–2011 following GB2002, while the *Statistical Yearbook 2013*, pp. 159ff., reports national first-digit sector investment data for 2003–2012 following GB2011; the values through 2011 in the two affected sectors were not revised in the more recent *Statistical Yearbook 2013* edition, which follows GB2011.

[37] For details on the transition, see Holz (2017).

same range of data availability holds for the NBS database (with the caveats about its time series consistency).[38]

The *Investment 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 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 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 (x*injian*, 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, Macau, and Taiwan 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 report such monthly FAI data, which are also available in the NBS magazine *China Monthly Statistics*. The NBS database and CEIC also include first- and second-digit sector FAI data. Since 2018, only growth rates are reported, not monthly absolute values.

[38] CEIC proceeds as the NBS database does, with annual second-digit sector investment data since 2003; the only breakdown available is by composition.

Appendix 5. Xinjiang Production and Construction Corps

In some statistics, the Xinjiang Production and Construction Corps is listed separately from the provinces. The Xinjiang Production and Construction Corps is a semi-military governmental organization in Xinjiang province, set up in 1954 to secure and develop the frontier region while drawing on disbanded military units for labor.

Sixty Years lists the Xinjiang Production and Construction Corps as a provincial-level entity at the end of its list of provinces and provides data on this corps as it does on the provinces. In 2008, the last year covered by *Sixty Years*, FAI of this corps was equal to 0.014 percent of national FAI (*Sixty Years*, pp. 15, 1145). The Xinjiang values reported in the NBS database are equal to the Xinjiang values reported in *Sixty Years* in the years 1981 (year when data reported in the NBS database start) through 2008 (last year covered in *Sixty Years*) except in 1998, 1999, and 2002-2005 when the Xinjiang value reported in *Sixty Years* is slightly larger (by less than the FAI value of the corps). Thus, there is no evidence that *Sixty Years* reports Xinjiang FAI excluding the corps and the NBS database reports Xinjiang FAI including the corps; either both sources exclude or both sources include the corps with Xinjiang. If both sources exclude the corps, then national FAI also excludes it since summed provincial investment (including investment "not classified by region") exactly equals national FAI since 1998 (except in 2010, see Figure 2 in the article), while including investment by the corps in the summed provincial figure leads to ratios above unity at the third decimal.

Appendix 6. System of National Accounts Details on Gross Fixed Capital Formation

Further details regarding the measurement of GFCF in accordance with the SNA (2008) are the following.

- The "asset boundary" for fixed assets (gross fixed capital formation) vs. consumption "consists of goods and services that are used in production for more than one year" (Paragraph 10.33, p. 198), with consumer durables and items such as hand tools (inexpensive goods used repeatedly over many years) by definition not treated as fixed assets (but as consumption and as intermediate inputs).
- When the sale of an existing fixed asset takes place—rather than the sale of a in this period newly produced fixed asset—the purchaser undergoes positive gross fixed capital formation (sales price plus costs incurred in ownership transfer), while the seller undergoes negative gross fixed capital formation (sales price).
- Improvements to land in its natural state is treated as the creation of a new fixed asset.
- Maintenance and repairs are not regarded as gross fixed capital formation as long as the activities must be undertaken regularly to maintain the fixed asset in working order and they do not change the fixed asset's performance (or expected service life).
- GFCF occurs at the time when the ownership of the fixed asset is transferred to the institutional unit that intends to use it in production. (I.e., not necessarily at the time when the fixed asset is produced, nor the time when it is put to use.) During the periods in which a fixed asset is being created but not yet transferred to the institutional unit that intends to use it in production, the fixed asset adds to inventory investment in form of work-in-progress or finished goods. There are two exceptions. First, if the asset is produced on own account, it constitutes GFCF all along. Second, when stage payments are made under a contract of sale, these are regarded as purchases of a fixed asset and thus GFCF. (Paragraphs 10.34-10.55, pp. 198-201)

Appendix 7. Provincial Gross Fixed Capital Formation Data

Provincial GFCF (and inventory investment) data come with a number of complications. For example, in *Sixty Years*, at the aggregate level, no GFCF (or inventory investment) data are available for Jiangxi, Hubei, Ningxia and Hainan provinces before 1978, and for Tibet before 2000.[39]

Figure 5 in the article is based on the most recent (as of December 2019) provincial values available in the NBS database, reaching back to 1993, and are supplemented by values for the earlier years from *Sixty Years*, accepting that some provincial data are missing. (Data in *Sixty Years* have undergone the benchmark revision following the first economic census, but not the benchmark revision of 1980-2013 data following the third economic census, or the revisions of 1978-2014 data following the inclusion of R&D expenditures in 2016.). Obvious errors in the original data—such as a number being off (in time series comparison and in comparison to aggregate expenditures) by an order of magnitude were corrected.

[39] Data on economic sector GFCF (available in the earlier GDP compendia) suggest that aggregate GFCF values, even when available, may be problematic. Thus, the share of each of the three economic sectors in GFCF is constant in Liaoning province for the years 1978 through 1992, in Sichuan province for the years 1978 through 1992, and in Qinghai province for the years 1978 through 1993. In the case of Zhejiang province in 1996 through 2002, the three economic sectors' GFCF do not sum to provincial GFCF.

Appendix 8. Cumulative Inventory Investment 1952-1978

The volume of inventory investment (Figure 6 in the article) appears implausibly large. To further explore the issue, inventory investment is added up over time and cumulative inventory investment then compared to GDP. Because prices change over time, the calculation needs to be done in constant prices.

This requires three steps. First, a constant-price GDP (or aggregate expenditure) series for 27 years (1952-1978) is constructed based on the average annual real growth rate of GDP (lacking a real growth rate of aggregate expenditures) between 1952 and 1978 of 6.15 percent (*GDP 1952-1995*, p. 36). Second, annual constant-price inventory investment is obtained by multiplying the constant-price GDP series by 7.00 percent, where 7.00 percent is the (arithmetic) average annual share of nominal inventory investment in nominal aggregate expenditures in 1952-1978. Third, inventory investment is added up over time. Thus, if GDP in the first year equals 100, cumulative inventory investment in the first year is 7. In the second year, cumulative inventory investment equals 13.59 percent of the second year's GDP (7 percent in the second year plus 7 units inventory investment of the first year divided by GDP of 106.15 in the second year), in the fifth year 31.17 percent, in the tenth year 54.30 percent, and in the twenty-seventh year (1978 vs. 1952) 96.73 percent. This means that by the end of the pre-reform period, cumulative inventory investment was equal to approximately one full year's GDP. For a market economy, that would not seem credible, though for a planned economy it may just possibly pass. If half of each year's inventory investment were waste, cumulative inventory investment in the final year would be equal to half of GDP, a slightly more plausible value.