Revisions to China's GDP Data Following the 2004 Economic Census: More Questions Than Answers?

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On 9 January 2006, China's National Bureau of Statistics announced a benchmark revision of national income and product accounts statistics based on the findings of the 2004 economic census. The benchmark revision covers the years 1993-2004 and comprises revised nominal values of economy-wide and of sectoral value added, as well as revised real growth rates. The new data have three implications. (i) Despite all the hype only a few years ago about data falsification by local statistical authorities in China, the 2004 economic census results validate the local aggregate output values and invalidate the center's national ones. (ii) While economy-wide as well as sectoral nominal values were revised, real growth rates of some sectors remained unchanged. That is not plausible, and in some instances outright erroneous. (iii) The revisions raise questions about the quality of a large body of related statistics.

Statistical data published by a country's statistical office are rarely etched in stone. China is no exception. Apart from annual revisions to the national income and product accounts data first published in the previous year, China's National Bureau of Statistics (NBS) has so far conducted two benchmark revisions. The first occurred following the 1993 tertiary (service) sector census with adjustments to 1978-93 tertiary sector value added and, by implication, to the sum of sectoral value added, i.e., gross domestic product (GDP). Tertiary sector value added of 1993 was revised upward by 32%, and GDP by 10%. The second benchmark revision occurred in early 2006, following the 2004 economic census of the secondary sector (industry, construction) and of the tertiary sector. The implications of this second benchmark revision are examined in the following.

The benchmark revision was announced by the NBS on 9 January 2006 with revised nominal values and real growth rates in the production approach to the calculation of GDP for 1993-2004. A follow-up announcement on 8 March 2006 elaborated further. The benchmark revisions are incorporated in the *Statistical Abstract 2006*, a regular annual

publication typically published in May, which provides a broader coverage of national income and product accounts statistics. A four-volume compendium solely on the 2004 economic census (*Economic Census 2004*) became available in June 2006.

Are the provincial data better than the national ones?

National GDP should equal the sum of provincial GDP. But prior to the benchmark revision, the sum of provincial GDP routinely exceeded national GDP. The discrepancy between the sum of provincial GDP and the NBS's national GDP figure increased continuously from 1996 through 2004. By 2004, the sum of provincial GDP was 19% larger than the national value reported by the NBS (part B of Table 1). The NBS consistently revised downward provincial secondary sector and, in particular, tertiary sector value added.

The rising discrepancy coincided with a wave of reports on local data falsification in 1997 through approximately 2001. In response, the NBS, with support of the State Council and the Disciplinary Commission of the Chinese Communist Party Central Committee, in 1997/98 started a campaign against local data falsification. The continuing discrepancy between the national data and the sum provincial data all the way up through 2004 would suggest that the campaign was not successful.

In 2004, the then NBS commissioner, Li Deshui, offered a mix of technical reasons and corrections of exaggerated data as explanation of the discrepancy: provinces use 1990 base year prices when calculating real growth, while the NBS makes adjustments to this procedure based on a price index (and starting in 2004 the NBS fully switched to a price index); provinces double-count cross-provincial economic activities; provinces still use (presumably questionable) report forms for industrial enterprises with annual sales revenue below 5m yuan RMB; provinces use the opportunity of the as yet incomplete measurement of tertiary sector activities to adjust tertiary sector output upward such that the sectoral data add up to their desired aggregate output value; and provinces have incentives to exaggerate output (due to growth targets, comparisons of different localities by their output growth rates, and the use of statistics to measure local cadres' "achievements").

The benchmark revision national data suggest that the pre-economic census provincial GDP values were rather close on target, contrary to Li Deshui's arguments in favor of the original national values over the provincial ones. If the 2004 economic census results are correct, provinces *under-reported* tertiary sector value added, had accurate national data for the primary sector (agriculture), and over-reported in industry and especially in the small sector construction. (See part A of Table 1 for the relative size of sectors.) Overall, the sum of pre-economic census provincial GDP in 2004 was only 2.1% larger than the revised national figure (part C of Table 1).

The pre-economic census national data, on the other hand, turned out to be rather inaccurate. Part D of Table 1 shows the size of revisions to national data following the 2004 economic census. The revised nominal GDP figure of 2004 is 16.8% higher than the originally published one. Most of this increase is due to an almost 50% upward revision to national tertiary sector value added. This contrasts with the NBS commissioner's claim that provinces exaggerate tertiary sector value added. It also contrasts with the NBS's pre-economic census large downward revision to the sum of provincial tertiary sector value added in the derivation of national GDP (part B of Table 1). The annual revisions to primary

sector value added across all years (1993-2004) remain below 1% and those of industry below 4%, while construction value added was reduced by up to 9.2%.

The *Statistical Abstract 2006* (p. 27) includes post-economic census provincial GDP values for 2004 and 2005. In 2004, the sum of these provincial values is 4.8% higher than national post-economic census GDP; provincial sectoral values are not available for 2004. The very preliminary data for 2005 show a sum provincial GDP value that is 7.8% higher than the national value, with no discrepancy in the primary sector, a 11.8% higher sum provincial value in the secondary sector, and a 5.7% higher sum provincial value in the tertiary sector (part E of Table 1).[1] I.e., discrepancies between sum provincial and national data continue. The NBS has recently stated its intention to move to its own calculation of provincial GDP values, which would then presumably side-track data that come out of the provincial statistical bureaus altogether.[2] But does the benchmark revision not perhaps suggest that the NBS should, at least for aggregate GDP, drop its own calculations and rely on the sum provincial data?

Fudging deflators in order not to have to revise real growth rates upward?

Table 2 presents three real growth rate series. These are the pre-economic census real growth rates (as published in the *Statistical Yearbook 2005*), the revised ones (following the 2004 economic census), and a here newly constructed mixed one which uses the *revised* nominal data and the sectoral deflators implicit in the *Statistical Yearbook 2005* data. The latter, non-official ones, are typically the highest. In this instance, the deflators are *calculated* (are implicit) because the NBS does not publish its GDP deflators; the *Statistical Yearbook* reports nominal sectoral value added as well as sectoral real growth rates, and dividing nominal by real growth rates yields the implicit deflators.[3]

Adoption of a new sectoral classification system

In the benchmark revision of GDP data for 1993-2004, released following the 2004 economic census, the revised real growth rates in the primary sector as well as in the secondary sector (including separate data on both industry and construction) are all identical to the previously published, pre-economic census real growth rates.

The primary sector was not part of the economic census. Presumably, the revised primary sector nominal values reflect the adoption of a new sectoral classification system, the

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1 The provincial data are highly preliminary in that they are based on the annual "quick reports" (*kuaibao*); see *Statistical Abstract 2006*, p. 27.

2 See *Xinbao* (a Hong Kong daily newspaper), 22 May 06.

3 Sectoral real growth rates are aggregated into GDP real growth rates using a Törnqvist index (with industry first aggregated to the secondary sector, and then the three main economic sectors aggregated to GDP). The presentation here ignores that the NBS in the *Statistical Yearbook* for each year first offers the preliminary nominal data with a real growth rate for the latest year, and in the next issue provides the final (revised) nominal data for that particular year but usually does not revise the originally published real growth rate. I.e., in the annual revisions embedded in the *Statistical Yearbook* series, the NBS already once implicitly revised the sectoral deflators of all years except of the most recent year. Annual revisions to the deflators are not plausible because the data that underlie the deflators are available when the nominal data are first published, and are not subject to later revisions. On average, between 1978 and 2004, the NBS revised the implicit deflators slightly upward. The revised implicit deflators in the *Statistical Yearbook 2005* are used in the following in order not to complicate matters further. Using the (unrevised) implicit deflators as first published would make only a small difference to what follows.

"standard" (*guobiao*) GB/T4754-2002 (in the following abbreviated "GB2002"), issued in 2002.[4] It modifies the GB1994 (of 1994). The benchmark revision of the nominal values of primary sector value added in the years 2003-04 then reflects solely a reclassification of economic activities from other sectors to the primary sector.

The GB2002 has a number of innovations in comparison to the GB1994.[5] For example, in the GB2002 one second- and one third-level sector move from industry into agriculture: 'logging and transport of timber and bamboo' (in 1994 a sector within 'quarrying and mining'), and 'preliminary processing of textile fibers' (in 1994 a sector of the 'textile industry,' which in turn belongs to 'manufacturing'). One lower-level agricultural sector, namely 'household sideline businesses' (*jiating lianying fuye*), is dissolved into the corresponding other (including industrial) sectors. In industry, the main changes are reallocations of third-level sectors between industrial second-level sectors. In construction, one significant change is the switch of institutions involved in preparatory work for construction from the construction sector to the tertiary sector (into polytechnic services). In the tertiary sector, the first-level classification is revised and expanded considerably, with reclassifications also of lower-level sectors.

Beyond the new sectoral classification that applies to all variables, Xu Xianchun (2006, pp. 17f.), head of the National Income Accounts division of the NBS, elaborates on three innovations in the calculation of sectoral *value added*, implemented to better comply with international practices. Interest on household savings deposits was previously counted as financial sector value added, but is now attributed to the individual sectors that produced this particular value added. Depreciation on residential housing was previously based on construction costs, but is now based on current market values. Expenditures on computer software are not handled uniformly by all statistical units in China (the United Nations 1993 System of National Accounts regards it as gross fixed capital formation, the 1968 version, however, as an intermediate input); the economic census collected data on income from computer software sales which allows the NBS to systematically include approximate expenditures on computer software in gross fixed capital formation.

Overall, the three main economic sectors appear only approximately compatible between the GB1994 and the GB2002, with minor and bi-directional changes between the three main economic sectors.

Primary and secondary sector real growth rates 1993-2004

In the primary sector, the post-economic census reclassification of value added, due to the adoption of the GB2002 and perhaps the impact of the innovations in calculating value added, should have gone hand in hand with a change in real growth rates. The reclassification increased the previously published nominal primary sector value added of 1993 by only 0.1%, but that of 2004 by 0.9% (with a continuous increase in the years in between, see part D of Table 1). I.e., the value of newly added agricultural activities between 1993 and 2004 increases significantly faster than the value of original agricultural activities, and if the newly added activities were subject to a similar deflator as the original ones, the resulting new real

[4] The economic census stipulation (SC/NBS, 5 Sept. 2004), explicitly requires the economic census to collect data according to the GB2002.

[5] For a summary of the major changes see first through seventh 2003 issues of the magazine *Zhongguo tongji*.

growth rate of total agricultural activities should go up. What the NBS has done, instead, by not changing the real growth rates, is to impose an upward revision on the implicit deflator.[6]

The case of industry and construction is similar, except that the revisions to the 2004 values are much larger (+3.8%, -9.2%) than in the primary sector. The pattern of change over time is similar to the primary sector in that the revisions to the *1993 values* are also significantly smaller (+0.3%, -0.8%) than those to the 2004 values. I.e., both sub-sectors have experienced changes in nominal output that differ significantly from the pattern inherent in the previously published data, and one would expect the real growth rates to change correspondingly. Again, the implication of not changing real growth rates is that the NBS has imposed revisions on the implicit deflators. The NBS raised the implicit deflator of industry, and lowered that of construction.

There are two possible interpretations of this pattern. One, the NBS used the opportunity of the 2004 economic census to in agriculture, industry, and construction switch to a new deflator. It seems unlikely that the nationwide collection of comprehensive secondary and tertiary sector data changes deflators (including of the primary sector) and nothing else; the census was not about deflators for the years 1993-2004, nor about year 2004 prices. The new deflators, then, must come from some other source, and the 2004 economic census must only provide an excuse to apply the new deflators to earlier data.

It is strange, however, that better deflators are only available for the years since 1993 and not for the years 1978-92. The years 1978-93 were subject to the previous benchmark revision following the 1993 tertiary sector census; that census largely retained the earlier published implicit deflators.[7] It is also strange that the new deflators of 1993-2004 are able to perfectly compensate for the newly found nominal value added in each year, such that the real growth rates of 1993-2004 remain exactly unchanged from the pre-economic census ones. That is hardly plausible.

A second possible interpretation is that the implicit deflators are not changed. To take the case of industry, the 2004 economic census resulted in an increase of 2004 nominal value added of industry by 3.8%, and no change in the 1992 value. If the deflator of the years 1993-2004 were indeed unchanged, then either the revised pre-2004 nominal values or the revised (equals original) real growth rates (or both) must be incorrect. To explore these possibilities further, it is useful to distinguish between a pure net reclassification of economic activities from the primary and tertiary sector (as well as construction) to industry, vs. the collection of new data within a given sectoral classification.

Suppose *all* of the 2004 adjustment were due to reclassifications. Then the reduction in reclassifications to zero in 1992 is not plausible. More likely than not, the reclassification

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[6] One could believe a constant real growth rate series if the 1993 nominal primary sector value had been revised by the same percentage as the 2004 primary sector value, but that is not what the statistics show. On the other hand, it may also be the case that the annual changes in real growth rates are too small to be captured by a (percentage) real growth rate reported only with one decimal.

[7] That was a tertiary sector census. Of the two sub-sectors of the tertiary sector on which data were published in the *Statistical Yearbook* prior to and after the tertiary sector census, the first, transport & telecommunications, did not experience any change in deflator in the years 1979-89, and the second, commerce & catering, did not experience any change in deflator in 1979 and 1980, a two percentage point change in 1981, and very minor changes, typically at the first percentage decimal, in 1982-1992. The primary and secondary sector (and secondary sector sub-sectors) did not experience any change in deflator. (*Statistical Yearbook 1993*, pp. 31f., *1994*, p. 32, *1995*, p. 32, and *2005*, pp. 51 and 54.)

should occur in roughly the same proportion in each year. Reducing the revisions to zero in 1992 would simply be a matter of convenience, in order to obtain a smooth-looking time series and to not have to revise pre-1993 data. The implication would be that the pre-2004 nominal values are all underestimates (should have experienced larger reclassifications); in this case it cannot be ruled out that the original industrial real growth rates may still be the relevant ones, and it is the official, revised nominal values that are wrong.

But reclassifications cannot account for all the changes to nominal data in 1993-03. Since the 2004 economic census focused on 2004 nominal values, those of earlier years were simply adjusted backwards such that by 1992 each variable could retain its previously published value. According to Xu Xianchun (2006, p. 19), the NBS followed OECD advice and used the "trend-difference" method; the 1992-04 trend is established twice, using the pre-economic census (original) 2004 value as well as the post-economic census (new) 2004 value, and the original annual relative divergence from the trend applied to the new trend line to obtain annual post-economic census values for 1993-2003. I.e., the one concern in adjusting pre-2004 values is not reclassifications, but a distribution of nominal changes over time such that, going backwards in time, no changes to 1992 data are needed.

Reclassifications also cannot account for all of the revisions to *2004* industrial nominal value added. The NBS in the *Statistical Yearbook 2005* published pre-economic census 2004 values for the group of "industrial SOEs with independent accounting system and industrial non-SOEs with independent accounting system and annual sales revenue in excess of 5m yuan RMB," i.e., the "directly reporting industrial enterprises" (DRIEs). The post-economic census 2004 number of DRIEs is up 26% over the pre-economic census 2004 value, and the post-economic census 2004 gross output value up 8% (with similar changes for other variables). Values change across virtually all individual industrial sectors, and independent of if their label changed between the pre-economic census GB 1994 and the post-economic census GB2002 or not.[8]

This suggests that the 2004 economic census collected a new set of data on industry that reflects not only (i) reclassifications, but also, and perhaps more significantly, (ii) the coverage of new (more) statistical units, and (iii) the coverage of economic activities not (or not properly) covered under the previous classification system.[9] Xu Xianchun (2006, p. 17) writes that the GDP coverage was expanded to newly include (i) economic activities previously ignored, such as those occurring in sub-ordinate units of an enterprise and outside the main business of the enterprise, and (ii) economic activities captured through statistical compilations outside the economic census (and previously not included in GDP), such as home-owners renting out housing, home teaching, or childcare services.

In this more realistic case of the benchmark revision capturing more statistical units and/or more economic activities, reducing the adjustment of nominal values to zero by 1992 is realistic if these additional statistical units or economic activities did not exist in 1992. The revised data of 2004 then simply reflect the inability of the NBS to *in recent years* capture the

[8] For the data, see *Statistical Yearbook 2005,* pp. 488, 493, and *Economic Census 2004,* Vol. 2, pp. 10ff.

[9] Theoretically, the NBS could in the economic census have moved some of the non-DRIEs into the DRIE category, and the non-DRIE category could then have been reduced correspondingly in the economic census. This cannot be checked, because the *Statistical Yearbook* series did not publish 2004 data on non-DRIEs (nor did any other source).

proliferation of economic activities. But in that case, real growth rates should have been revised, which they were not. I.e., the published "revised" real growth rates are incorrect.[10]

Inexplicable method of calculating secondary sector real growth rates 1993-2004

The fact that the NBS retained its *secondary sector* real growth rate reveals an inconsistency. The secondary sector real growth rate is a weighted average of the real growth rates of industry and construction, with as weights the shares of industry and construction in secondary sector nominal value added. Retaining the pre-economic census secondary sector real growth rates implies that the NBS did not change the weights of industry and construction in the calculation of secondary sector real growth rates. This is despite the increase in nominal value added of industry and the decrease in nominal value added of construction, and even though these changes are sufficiently large to at least in some years change the real growth rate of the secondary sector, calculated with one decimal and using a Törnqvist index or previous-year weights. This appears an outright mistake.

It is not an outright (calculation) mistake only if the NBS uses pre-1993 nominal weights to aggregate sectoral real growth rates. However, that would amount to gross misspecification because inappropriate weights would be applied to sectoral growth rates. It would also mark a severe deviation from earlier practice in that the official pre-economic census GDP real growth rates are best matched by applying previous-year weights to sectoral real growth rates or by using a Törnqvist index. Using decennial weights (1990, 2000), on the other hand, yields results that are rather different from the official pre-economic census GDP real growth rates.

Alternative real GDP growth rates 1993-2004

With only the tertiary sector real growth rates allowed to increase, the overall effect on real GDP growth is smaller than the increase in nominal 2004 GDP of 16.8% over the original figure would suggest. The original average annual real growth rate (*Statistical Yearbook 2005*) between 1992 and 2004 is 9.4%, the revised one (*Economic Census 2004*, 9 Jan. 2006) is 9.9%, but a revised real growth rate based on the revised nominal data combined with the pre-economic census sectoral deflators implicit in the *Statistical Yearbook 2005* data, using a Törnqvist index of real GDP growth, is 10.7% (mixed case in Table 2).[11] This calculation obviously has to assume that the reclassifications do not change the appropriateness of the earlier implicit sectoral deflators.

Going one step further, and applying the *first published* implicit sectoral deflators (agriculture, industry, construction, tertiary sector) to the *revised* nominal sectoral values (following the 2004 economic census), and aggregating into real GDP growth using the Törnqvist index results in an average annual real growth rate for 1992-2004 of 10.9%.[12] This

[10] Perhaps the truth is somewhere in between: 1992 (and earlier) nominal values should have been revised upward somewhat, and 1993-2004 real growth rates should have been revised upward somewhat. The implicit deflators, in all likelihood should not have been revised.

[11] The latter real GDP growth rate (of 10.7%) is the weighted average of the real growth rates of primary, secondary, and tertiary sector, where the secondary sector real growth rate itself is the weighted average of the real growth rates of industry and construction. Weights are based on revised (following the 2004 economic census) nominal sectoral value added. Real growth rates of individual sectors are obtained using the revised nominal values combined with the deflators implicit in the *Statistical Yearbook 2005* data.

[12] In detail, (i) the nominal revised (2004 economic census) value added data of the primary sector, industry, construction, and the tertiary sector of all years 1993-2004 are deflated using the first published implicit

again assumes that the earlier implicit sectoral deflators are appropriate for the new classification. Beyond reclassifications at the level of the main economic sectors, this also ignores that the first published tertiary sector deflator may no longer be accurate due to changes in the relative nominal size of tertiary sector sub-sectors in the benchmark revision. Compared to the real growth rates as first published, the combination of 2004 economic census nominal values and the first published implicit deflator yields real growth rates that in 1993 and 1994 are several percentage points higher (the 1993 difference represents in part the benchmark revision following the 1992/93 tertiary sector census), and in the years since are higher by between a fraction of a percentage point and up to two percentage points, except in 1996, with a 0.2 percentage point decline.

Pre-1993 tertiary sector values

The *Statistical Abstract 2006* incorporates not only the benchmark revision, but also revises nominal tertiary sector value added, and thereby also nominal GDP, of 1978-1992.[13] These revisions are not accompanied by changes to real growth rates, and therefore imply a revision of the implicit deflators of the tertiary sector and GDP in these years. But because the proportion of the change to tertiary sector value added is rather similar in 1978 and 1992, with 2.4% and 3.1% upward revisions, keeping the old real growth rates appears a simplifying assumption with limited consequences. Between 1978 and 1992, the (cumulative) implicit deflator of tertiary sector value added using the pre-economic census nominal values rose 28.5%, and the implicit deflator using the post-economic census nominal values 29.9%. No systematic difference persists across all individual years.[14]

One possibility as to why these earlier tertiary sector nominal values (and by implication nominal GDP) were revised, is that the pre-economic census data contained a mistake. The preface to the compendium *GDP 1952-95* with long-run GDP data, nationally and by province, for 1952-95, states that the national and provincial data reflect the benchmark revisions that followed the tertiary sector census of 1993, except for the case of Guangdong. The phrasing is ambiguous as to if the Guangdong exception also affects the national data.

Suppose the *national* data in *GDP 1952-95* were indeed based on the *pre*-tertiary sector census Guangdong tertiary sector values. The value of national 1992 tertiary sector value added in *GDP 1952-95* (p. 27) is identical to that in the *Statistical Yearbook 2005* (p. 51), i.e., the pre-economic census national values in the *Statistical Yearbook* would then also be based on Guangdong values that do not incorporate the 1993 tertiary sector census. The *Statistical Abstract 2006* (p. 26), revising 1978-1992 tertiary sector value added (in addition to the post-economic census benchmark revisions of the years 1993-2004), raises tertiary sector value added of 1992 by 28.54b yuan RMB. This amount is equal to 36.87% of the published Guangdong 1992 tertiary sector value added of 77.41b yuan RMB (*GDP 1952-95*, p. 724)

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deflators of these sectors (as calculated from first published nominal and real growth data in the *Statistical Yearbook* series); (ii) the real growth rates of industry and construction are aggregated into secondary sector real growth rates using the Törnqvist index with post-economic census nominal value added weights for industry and construction; (iii) the real growth rates of the primary sector, secondary sector, and tertiary sector are aggregated into real GDP growth rates again using the Törnqvist index with post-economic census nominal value added weights of these three sectors. (The corresponding annual series are not included in Table 2.)

[13] This is a measure presumably unrelated to the benchmark revision. It was not mentioned in any of the announcements related to the 2004 economic census and to the benchmark revision.

[14] The two implicit deflators differ significantly in 1978, the connecting year. In 1978, the original pre-economic census implicit deflator (from the *Statistical Yearbook 2005*) is 0.8% and the post-economic census implicit deflator 3.3%.

which does not incorporate the tertiary sector census revisions of 1993. This percentage is remarkably close to the average (i.e., national) upward adjustment of 1992 tertiary sector value added by 33.15% (*Statistical Yearbook 1994*, p. 32, *2005*, p. 51).

If the Guangdong factor were the explanation of the revisions to 1978-92 nominal tertiary sector value added (and GDP) in the *Statistical Abstract 2006*, then the corresponding real growth rates should also change, as they did in the process of the previous benchmark revision, following the 1993 tertiary sector census, for all other provinces (and at the national level). If the Guangdong factor cannot explain the pre-1993 revisions to nominal tertiary sector value added, then the GB2002 may have been applied to the tertiary sector 1978-92 data and capture tertiary sector economic activities that were ignored in the previous GB1994. I.e., the revisions to 1978-2004 tertiary sector nominal value added then reflect in part the inclusion of previously excluded economic activities. The implications for the need to revise real growth rates are the same.

Statistical breaks

A final question is if the published national income and product accounts data in the *Statistical Abstract 2006* with data for 1978-2005 follow the GB1994 through 1992, and since 1993 the GB2002, or the GB2002 in all years. If the Guangdong factor explains the revisions to nominal tertiary sector value added in 1978-1992, then the NBS seems to believe that the difference between the GB1994 and the GB2002 in 1992 (and earlier), at the sectoral level, is zero. Theoretically, there is a statistical break, but the size in 1992 would then be so small as to not be noticeable at the level of accuracy at which the NBS reports data. Furthermore, due to the "trend-difference" method used in estimating pre-2004 nominal values, the statistical break is, de facto, distributed across the years 1993-2004.

Alternatively, if the revisions to 1978-92 tertiary nominal tertiary sector value added were due to the new application of the GB2002, the national income and product accounts data would potentially experience a statistical break between the GB1994 and the GB2002 in the tertiary sector in 1978 (onwards), and in the primary and secondary sector in 1993 (onwards). This would further imply that the revised 1978-92 sectoral values are potentially internally inconsistent, due to double-counting and/or omission of economic activities that were reclassified between the GB1994 and the GB2002. Since an inconsistent treatment of sectors is little plausible, perhaps the Guangdong factor, after all, explains the—incomplete because limited to nominal values—revisions of pre-1993 tertiary sector and GDP values, and the statistical break across all sectors occurs in 1993 (onwards).

How important the statistical break potentially is can only be seen for the primary sector, where value added of 2004 was revised upward by 0.9%. A one-percentage point change in sectoral values may not be particularly large if a sector experiences real growth of around 4-10% a year, and perhaps even higher in nominal terms. (The size of the upward revisions fall to 0.1% in 1993, but this presumably simply reflects an attempt to prevent the need for any pre-1993 revisions by gradually reducing the 2004 discrepancy to zero in 1992.)

While the adoption of the new classification system affects all economic sectors, it may also affect GDP. It affects GDP to the extent that economic activities are newly included which were not previously covered in the GB1994.

Summary

No matter where one searches for an explanation of the unrevised real growth rates in the primary and secondary sector, a compelling explanation cannot be found unless one assumes that the nominal values of earlier years are underestimates, or that the NBS all of a sudden has available new price data, by sector, for the years 1993-2004. Both assumptions are not particularly plausible. It appears more likely that the NBS simply did *not want to* increase the real growth rates in these two sectors, for whatever reason (convenience? political reasons?).[15] It therefore adjusted the deflators of agriculture, industry, and construction in a very peculiar way, to exactly match changes to the nominal data, and ignored the changing weights of the real growth rates of industry and construction.

Beyond the revision to 1993-2004 values, the NBS also adjusted 1978-1992 tertiary sector nominal value added (and by implication GDP of these years), without explaining the reason for this special treatment of the tertiary sector prior to 1993, nor why only nominal values are affected. The switch from the GB1994 to the GB2002 sectoral classification system implies a statistical break in the published time series on GDP and sectoral value added, but it is unclear if the break occurs in 1978 or 1993 (and the years thereafter), or for the tertiary sector only in 1978 (onwards), and for the primary and secondary sector in 1993 (onwards). The statistical break may be of minor size.

Creating havoc across the whole body of statistical data?

In the expenditure approach to the calculation of GDP, which is not the official approach to calculating GDP in China, the NBS has chosen not to revise the 1993-2003 values. The original and revised 2004 nominal values are reported in Table 3. Expenditure approach GDP was revised upward by 12.6%. This comprises, first, a 15.4% upward revision to final consumption, which in turn reflects an 8.2% upward revision to household consumption and a 41.1% upward revision to government consumption. Second, gross capital formation was revised upward by 10.0%, which in turn reflects a 4.4% upward revision to gross fixed capital formation and a 673.2% upward revision to inventory investment.

The accuracy of the expenditure approach has been questioned before in an examination of the NBS's derivation of household consumption in the national income and product accounts. Calculating expenditure approach household consumption in accordance with the NBS explanations on how the NBS does it, one is unable to replicate the NBS's results (Holz, 2004). The post-economic census revisions to 2004 data only confirm the earlier suspicions.[16] The revisions to government consumption are very large and one may wonder

[15] Xu Xianchun (2006, p. 17) perhaps hints at the reason for avoiding revisions. He explains that the new treatment of financial sector value added has been on the agenda for a long time, but the resulting large change in the value of financial sector value added would have created a statistical break which would have been "not easy for the relevant departments and society to accept," while retrospective revisions of earlier data require a suitable opportunity, "otherwise everybody disapproves."

[16] The household consumption measure relies largely, but not solely, on social retail sales (see Holz, 2004). Retail sales focus on purchases by households and other social entities in retail transactions, something that is difficult to measure. The NBS is reportedly "gradually" (*zhubu*) switching to the sales of commercial units as the variable on which to collect data. Since 2003, it reportedly dropped the direct retail sales of consumer goods by factories from the "social retail sales." In addition, or as consequence, the two categories "manufacturing" and "agricultural production" within the social retail sales measure were dropped. (*Zhongguo tongji*, no. 1, 2003, p. 15)

where the 41.1% upward revision could possibly come from. Does the government have many more people on its payroll than it officially admits, or did it spend many times more on its military than originally thought?[17]

The 4.4% upward revision to 2004 gross fixed capital formation appears relatively small, but because gross fixed capital formation accounts for 41% of total expenditure approach GDP, it is a large absolute amount. Without explanations by the NBS of where the increase comes from, it is not clear if (i) this is a statistical break per se, in terms of a redefinition of the term "gross fixed capital formation", (ii) constitutes an admission by the NBS that its investment statistics, from which gross fixed capital formation values are derived, have been inaccurate in the past, or (iii) is simply a convenient adjustment for expenditure approach GDP to come close to the post-economic census production approach GDP value. Presumably, part of the 4.4% consists of expenditures on computer software that are now supposedly consistently counted as gross fixed capital formation (Xu Xianchun, 2006, p. 18).

The seven-fold upward revision to inventory investment suggests that this item is a rather meaningless residual in the NBS's calculations.[18] It implies, for example, that the data on inventory change cannot serve as a measure of macroeconomic cycles.

In the as yet absence of revised real growth rates of consumption and gross capital formation, the question of if the implicit consumption and investment deflator has been revised cannot be answered.[19] If real growth rates were not changed corresponding to the nominal growth rates, the whole body of price indices, from the consumer price index with its numerous sub-indices to the investment in fixed asset price index, would all have to be revised for the years 1993 through 2004. The task appears so daunting (how should previously final price indices be improved?) that the NBS may rather choose to limit its revisions in the expenditure approach to the revision of nominal 2004 values only, not bother with publishing revised real growth rates, and live with the large statistical break this creates in the expenditure approach series.

A third approach to the calculation of GDP is the income approach, where GDP equals labor remuneration, net taxes on production, depreciation, and the operating surplus. These have always been published at the provincial level only. Revised income approach data are not yet available; only a few provinces have so far released their 2004 economic census results, and only for the production approach (apart from the production approach summary statistics published in the *Statistical Abstract 2006* for all provinces).[20] The *Statistical Abstract 2006* does not report income approach values.

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[17] Government consumption comprises the four items (i) routine (*jingchangxing*) expenditures of administrative facilities (*shiye*) paid for out of the budget, (ii) routine expenditures paid for out of extrabudgetary funds, (iii) fixed asset depreciation of administrative units (*xingzheng danwei*) and of not-for-profit administrative facilities, and (iv) gross output value less business revenue of urban and rural neighborhood committees. For details on the numerous subcategories of each of these three items see NBS (1997), pp. 153-6; the first item, for example, includes military expenditures.

[18] At the provincial level, on the other hand, net exports are likely to be obtained as residuals. That in turn requires inventory investment to be estimated rather than being obtained as residual. The sum provincial inventory investment may therefore be a somewhat reliable measure for use in business cycle analysis. In recent years, the (pre-economic census) sum provincial value was many times the national value.

[19] Real growth rates are not available in the *Statistical Abstract 2006*, except for per capita household consumption (average, rural, urban) in the years *through 2003* (p. 37).

[20] See http://www.stats.gov.cn/zgjjpc/cgfb/ (accessed on 29 April 2006), with only Inner Mongolia and Hunan presenting detailed benchmark revisions for (production approach) GDP.

The NBS's trick of only revising *tertiary sector* real growth rates (together with the tertiary sector implicit deflators, as in the other sectors) may facilitate the revisions to income approach data, in that the NBS could somewhat plausibly focus on revising labor remuneration data only, corresponding perhaps most to tertiary sector activities. On the other hand, that would raise questions about what that newly found labor remuneration consists of. If the wage data on staff and workers (formal employees) were relatively accurate, such revised data would suggest much higher incomes of non-formal staff and workers than previously implied, which in turn would have one rethink the degree of inequality in China (which would probably be lower). In the end, the necessary adjustments may not be too large because income approach data were so far compiled only at the provincial level. Provincial income approach GDP typically equaled provincial production approach GDP, and provincial production approach GDP always added up to a value that comes close to the national benchmark revision values.

Conclusions

The fact that the 2004 economic census validated original provincial GDP data and invalidated original national GDP data raises questions about the capacity of the NBS to accurately compile national data. It retrospectively questions the existence, or at least the seriousness, of the supposed "wind of falsification and embellishment" that was claimed to rage across China in the late 1990s. Was this only a ploy by the NBS to strengthen its power vis-à-vis provincial governments and central ministries?

In recent years, the NBS has repeatedly dropped hints of under-reported national tertiary sector value added, which suggests it knowingly reported false GDP data for at least the most recent years. That the NBS did not revise the 1993-2004 real growth rates of the primary sector, industry and construction is inexplicable. That it did not revise 1993-2004 secondary sector real growth rates appears an outright mistake. The combination of fudging and seemingly outright mistakes implies that economic activities that account for almost two-thirds of China's GDP (primary and secondary sector) had their implicit deflators of 1993-2004 revised, rather than their real growth rates.

The scope of revisions that the 2004 economic census entails is enormous, and in terms of the expenditure and income approaches to the calculation of GDP, the bulk of it has not (yet?) been made public. What is potentially affected includes consumption data, retail sales, household survey statistics, investment statistics (with gross fixed capital formation in the national income and product accounts), wage statistics and welfare statistics, profit in the national income and product accounts, and the whole range of price indices. Having to somehow find on the order of 16.8% "more" in 2004 across a range of economic variables appears somewhat of an embarrassment, although perhaps less so for a rapidly developing economy. The only consolation is that a 16.8% upward revision to GDP in 2004, once spread over 12 years (1993-2004), amounts to little more than one percentage point every year, and that, starting from a presumably clean 2004 slate, future data may be more reliable.

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Table 1. Economic Census 2004 Results

	GDP	Primary sector	Secondary sector	# Industry	# Construction	Tertiary sector
A. Nominal values (b yuan RMB), 2004 economic census						
1993	3533.4	688.7	1645.4	1418.8	226.6	1199.2
1994	4819.8	947.1	2244.5	1948.1	296.5	1628.1
1995	6079.4	1202	2867.9	2495.1	372.9	2009.4
1996	7117.7	1388.6	3383.5	2944.8	438.7	2345.6
1997	7897.3	1426.5	3754.3	3292.1	462.2	2716.5
1998	8440.2	1461.8	3900.4	3401.8	498.6	3078
1999	8967.7	1454.8	4103.4	3586.1	517.2	3409.5
2000	9921.5	1471.6	4555.6	4003.4	552.2	3894.2
2001	10965.5	1551.6	4951.2	4358.1	593.2	4462.7
2002	12033.3	1623.9	5389.7	4743.1	646.5	5019.7
2003	13582.3	1706.8	6243.6	5494.6	749.1	5631.8
2004	15987.8	2095.6	7390.4	6521	869.4	6501.8
B. Pre-economic census values: percentage difference in sum provincial vs. national values						
1993	-1.17	-0.66	-0.77	0.09	-6.09	-2.08
1994	-2.94	-1.98	-3.73	-2.92	-8.95	-2.37
1995	-1.46	-0.39	-5.50	n.a.	n.a.	4.24
1996	1.03	0.69	-5.03	-4.04	-11.42	11.24
1997	3.35	2.87	-3.11	-2.63	-6.32	14.08
1998	5.66	2.18	-0.08	-0.09	-0.01	16.48
1999	6.83	1.04	0.49	-0.02	3.78	19.43
2000	8.65	1.48	1.89	1.12	7.01	22.32
2001	9.71	0.83	2.27	1.09	10.15	24.79
2002	12.22	0.61	4.88	3.51	13.90	28.17
2003	15.46	1.47	8.39	6.94	17.81	32.56
2004	19.26	0.62	13.89	12.77	21.29	37.00
C. Percentage difference in sum provincial pre-economic census values vs. national post-economic census values						
1993	-3.13	-0.73	-0.92	-0.22	-5.30	-7.54
1994	-5.84	-2.13	-4.04	-3.53	-7.48	-10.47
1995	-5.22	-0.61	-5.96	n.a.	n.a.	-6.90
1996	-3.64	0.39	-5.66	-5.23	-8.53	-3.12
1997	-2.55	2.48	-3.93	-4.14	-2.48	-3.29
1998	-1.92	1.72	-1.06	-1.94	4.90	-4.73
1999	-2.24	0.51	-0.67	-2.18	9.78	-5.29
2000	-2.02	0.87	0.50	-1.38	14.10	-6.06
2001	-2.63	0.16	0.69	-1.71	18.38	-7.30
2002	-1.92	-0.15	3.10	0.33	23.41	-7.89
2003	-0.21	0.64	6.37	3.33	28.67	-7.76
2004	2.10	-0.28	11.56	8.62	33.54	-7.87
D. Percentage difference in post-economic census national values vs. pre-economic census national values						
1993	2.02	0.07	0.15	0.31	-0.83	5.90
1994	3.08	0.15	0.33	0.63	-1.59	9.05
1995	3.96	0.23	0.49	0.94	-2.38	11.96
1996	4.85	0.30	0.66	1.26	-3.16	14.82
1997	6.06	0.38	0.86	1.57	-3.93	17.96
1998	7.73	0.45	1.00	1.89	-4.68	22.27
1999	9.27	0.53	1.17	2.21	-5.47	26.10
2000	10.89	0.60	1.38	2.53	-6.22	30.22

2001	12.68	0.67	1.56	2.85	-6.95	34.61
2002	14.42	0.76	1.73	3.17	-7.71	39.15
2003	15.70	0.83	1.90	3.49	-8.43	43.71
2004	16.80	0.91	2.10	3.81	-9.17	48.71
E. Post-economic census: percentage difference in provincial vs. national values (Statistical Abstract 2006)						
2004	4.83					
2005	7.81	-0.01	11.82	11.39	15.07	5.71

# denotes a sub-category.

Pre-economic census national values from the *Statistical Yearbook 2005* have typically undergone the single annual revision, while pre-economic census provincial values of each year are only published once in the *Statistical Yearbook* series, when they first become available (and thus no revised values are available, although in the early years the provincial data were released a year late, i.e., might incorporate an annual revision). The data in part B relate the provincial values from the various *Statistical Yearbook* issues to the national values in the *Statistical Yearbook 2005*.
Sources: *Economic Census 2004* (9 Jan. 2006, with original and revised nominal values); pre-economic census national values: *Statistical Yearbook 2005*, p. 51; pre-economic census provincial values: each year's issue of the *Statistical Yearbook*; 2005 values: *Statistical Abstract 2006*, pp. 20f., 31f.

Table 2. Original Vs. Revised Real Growth Rates (2004 Economic Census)

	GDP			Primary sector			Secondary sector		
	Orig.	Rev.	Mix	Orig.	Rev.	Mix	Orig.	Rev.	Mix
1993	13.5	14.0	15.9	4.7	4.7	4.8	19.9	19.9	20.0
1994	12.6	13.1	13.7	4.0	4.0	4.1	18.4	18.4	18.4
1995	10.5	10.9	11.3	5.0	5.0	5.1	13.9	13.9	14.0
1996	9.6	10.0	10.3	5.1	5.1	5.2	12.1	12.1	12.2
1997	8.8	9.3	9.7	3.5	3.5	3.6	10.5	10.5	10.4
1998	7.8	7.8	9.2	3.5	3.5	3.6	8.9	8.9	9.1
1999	7.1	7.6	8.4	2.8	2.8	2.9	8.1	8.1	8.2
2000	8.0	8.4	9.2	2.4	2.4	2.5	9.4	9.4	9.5
2001	7.5	8.3	9.2	2.8	2.8	2.9	8.4	8.4	8.7
2002	8.3	9.1	10.0	2.9	2.9	3.0	9.8	9.8	10.1
2003	9.5	10.0	10.9	2.5	2.5	2.6	12.7	12.7	12.9
2004	9.5	10.1	11.0	6.3	6.3	6.4	11.1	11.1	11.3
	# Industry			*# Construction*			*Tertiary sector*		
	Orig.	Rev.	Mix	Orig.	Rev.	Mix	Orig.	Rev.	Mix
1993	20.1	20.1	20.5	18.0	18.0	17.0	10.7	12.1	17.2
1994	18.9	18.9	19.3	13.7	13.7	12.8	9.6	11.0	12.9
1995	14.0	14.0	14.4	12.4	12.4	11.5	8.4	9.8	11.3
1996	12.5	12.5	12.8	8.5	8.5	7.6	7.9	9.4	10.7
1997	11.3	11.3	11.6	2.6	2.6	1.8	9.1	10.7	12.1
1998	8.9	8.9	9.2	9.0	9.0	8.1	8.3	8.3	12.3
1999	8.5	8.5	8.8	4.3	4.3	3.4	7.7	9.3	11.1
2000	9.8	9.8	10.1	5.7	5.7	4.9	8.1	9.7	11.6
2001	8.7	8.7	9.0	6.8	6.8	6.0	8.4	10.2	12.1
2002	10.0	10.0	10.3	8.8	8.8	7.9	8.7	10.4	12.4
2003	12.8	12.8	13.2	12.1	12.1	11.2	7.8	9.5	11.3
2004	11.5	11.5	11.8	8.1	8.1	7.2	8.3	10.0	12.1

# denotes a sub-category

Orig.: original, pre-economic census real growth rates as published in the *Statistical Yearbook 2005*.

Rev.: revised values real growth rates following the 2004 economic census.

Mix: revised nominal values from 2004 economic census combined with implicit deflators from *Statistical Yearbook 2005*; secondary sector real growth rates are aggregates of industry and construction real growth rates (using a Törnqvist index, with 2004 economic census nominal values for weights); real GDP growth rates are aggregates of the three main economic sectors.

Sources: *Economic Census 2004* (9 Jan. 2006); *Statistical Yearbook 2005*, pp. 51, 53.

Table 3. Expenditure Approach GDP, Pre- Vs. Post-Economic Census (b yuan RMB)

	--- --- --- 2004 --- --- ---			2005
	Statistical Yearbook 2005 (1)	*Statistical Abstract 2006* (2)	(1) / (2)	*Statistical Abstract 2006*
Expenditure approach GDP	14239.42	16028.04	1.126	18549.62
1. Final consumption	7543.97	8703.29	1.154	9671.41
(a) household consumption	5899.45	6383.35	1.082	7084.98
(b) government consumption	1644.52	2319.94	1.411	2586.43
2. Gross capital formation	6287.53	6916.84	1.100	8043.66
(a) gross fixed capital formation	6235.14	6511.77	1.044	7817.64
(b) inventory investment	52.39	405.07	7.732	226.02
3. Net exports of goods and services	407.92	407.91	1.000	834.55

Sources: *Statistical Yearbook 2005*, pp. 63f.; *Statistical Abstract 2006*, pp. 34f.