

China's Economic Performance: How Fast has GDP Grown; How Big is it Compared with the USA?

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In 1998 Maddison published *Chinese Economic Performance in the Long Run*, which dealt with development since the Sung dynasty. Here we have a narrower focus and are concerned with developments in two shorter periods: Maoist from 1952 to 1978, and Reform from 1978 to the present.

The official estimates of GDP growth in China were initially based on the Soviet material product system. They are now based on the western SNA system but still suffer from the original heritage, in that they overstate growth and underestimate the level of economic performance.

Why do we need to adjust the official figures?

a) It is normal practice in scholarly cross-country assessments of economic performance to eliminate national idiosyncrasies in official statistics to enhance comparability of the inter-temporal and inter-spatial results (see Maddison 1995, 2001 and 2003).

b) Until 1985, China used the Soviet material product system of accounts which systematically overstated growth, and excluded a large part of service activity. In the turbulence of the cultural revolution, the statistical office was abolished in 1968 and its staff disbursed. It was re-established in 1972, but most of the old personnel had disappeared and many old records had been destroyed. No new graduates with the requisite training had been produced in the years when the universities were closed. The World Bank reported that the central staff had only 200 people in 1981 compared with 400 in 1966 (see Maddison 1998, p. 101). Although it adopted the international standard SNA guidelines in 1985 and has since constructed input-output tables which make it possible to get a better idea of value added, there are still major problems arising from this heritage. Statistical reports at the basic level reach NBS through several levels of aggregation in the administrative hierarchy. Because of the shakiness of the price reports it receives, the NBS distinguishes between current and "comparable" prices instead of current and "constant" prices as other countries do. State enterprises use price manuals specifying 2,000 items to help them differentiate their price reports. Many reporting units in the private sector cannot or do not distinguish between current and comparable prices. This is an important reason for overstatement in the official statistics.

c) A third reason for adjusting the official volume measures is their implausibility. Taking the Maddison level estimate for 1990 as a common benchmark, backward extrapolation of the official measure produces a per capita level far below subsistence in 1950 and a GDP level in 2003 at 88 per cent of that in the USA (compared with our estimate of 73 per cent-see table 1). Their measure shows a 22-fold increase in per capita GDP, ours a 10-fold increase. Thus they are implausibly low at the beginning and implausibly high in 2003.

d) International comparisons require estimates of purchasing power parity (PPP). This is particularly important for China because the exchange rate understates the volume of GDP to a greater degree than is the case for other countries.

Re-estimation of Chinese Growth, 1952-2003

Maddison (1998) re-estimated Chinese performance to produce a measure of growth and levels closer to western SNA practice. This required recalculation of the annual change in real GDP at 1987 prices from 1952 to 1995, as noted below.

Maddison (2001 and 2003) contained rough updates of the GDP growth estimate beyond 1995, using a “correction coefficient” derived by applying the ratio (.7586) of the Maddison estimates to the official growth rate for 1978-95 to correct the official figures beyond 1995. It is now clear that this type of updating is unsatisfactory, as the difference between the official and the Maddison estimates is not stable from year to year. Maddison (2006) used new preliminary estimates of industrial value added by Harry Wu to make a provisional update from 1990 to 2003. In this paper, Wu and Maddison have made a comprehensive re-estimate for 1952-2003 which supersedes these earlier Maddison estimates of volume movement. When we have finalised the present estimates, those on the Maddison website, www.ggdc.net/Maddison, will need revision.

Adjustment of the 1990 Benchmark Estimate of GDP Level in Geary-Khamis (PPP) dollars

Here a small adjustment of the Maddison (1998) benchmark 1990 level of GDP is necessary. It was derived by updating the estimates of Ren Rouen for 1986 as described in Maddison (1998, pp. 153-154). It has now been raised very slightly from \$2,109,400 to \$2,109,574, as the 1986-1990 change in GDP volume between these years has been adjusted very slightly upwards.

Maddison (1998) methodology and the updating procedure:

(1) for transport and communications, commerce, restaurants and construction, the official figures were used;

(2) Maddison (1998) made his own estimates of gross value added in farming, using price and quantity data of the Food and Agriculture Organisation for 125 crop and livestock items, adjusted for changes in farm and non-farm inputs. The official estimates for this sector showed a 1952-90 movement very close to the Maddison (1998) estimates, so the official estimates for this sector have been used to update the Maddison estimates from 1991 to 2003;

(3) for industry, Harry Wu’s (1997) estimates of gross value added in industry were used in 1998. These showed significantly slower growth than the official estimate. Wu (2002) presented a bigger sample covering more products and prices, and explained in detail why the official figures exaggerated growth. He has since revised and updated his estimates to 2003, and they show a growth rate of 9.75 per cent a year for 1978-2003 compared to the official rate of industrial growth of 11.5 per cent for this period.

Figure 2 compares the time-profile of the official and the Wu estimates for industry. The profile of the two estimates is very different with Wu showing a distinct slowdown of growth in 1996-98, and faster growth than the official estimates thereafter. It seems clear that the official estimates for industry involved a smoothing of the growth path in the 1990s.

(4) In the old Soviet-style national accounts so-called “non-productive services” were excluded from “material product”. These are banking, insurance, housing services, administration of real estate, social services, health, education, entertainment, personal services, R & D activities, the armed forces, police, government and party organisations. They are now incorporated in the Chinese accounts. All are measurement resistant. The international standardised *System of National Accounts* (1993, p. 134), recommends valuation of non-market output by the cost of labour input minus intermediate consumption. NBS credits these activities with improbably high rates of growth of labour productivity (4.4 per cent per annum per person employed). Maddison made a rough alternative estimate, assuming no increase in productivity in these activities. He used employment as a proxy indicator

of growth in real value added, and the same assumption is made in the present estimates. Maddison (1998) used the employment estimates in the NBS Statistical Yearbooks, adjusted them from an end-year to a mid-year basis, and added a proxy estimate of 3 million a year for the military which were not then included in the official figures (see Maddison 1998, p, 171). For the years of the ‘Great Leap Forward’, Maddison smoothed the series for ‘non-productive ‘ services, interpolating growth between the 1957 and 1963 levels. A similar procedure has been used here.

Wu now has revised the estimates of employment in this sector and adjusted them to a midyear basis. Instead of Maddison’s proxy of 3 million in the armed forces for all years, he uses newly available data on number of persons in the armed forces, which varied considerably over the whole period as shown in Table 5. Table 6 shows the difference between the new Wu and Maddison (1998) estimates.

(5) Maddison used 1987 sector weights derived from the Chinese input-output table for that year, instead of the segmented weights used in the official estimates.

Table 1 summarises the difference between the revised Maddison-Wu estimates and those of the NBS.

TABLE 1
OFFICIAL & MADDISON-WU ESTIMATES OF CHINESE GDP AND GDP PER CAPITA
(1990 international Geary-Khamis \$)

	Official GDP	Population	Official per Capita GDP	GDP Revised by Maddison- Wu	Revised Maddison-Wu per capita GDP	US GDP
	(million \$)	(000s)	(\$)	(million \$)	(\$)	(million \$)
1950	<i>141,016</i>	546,815	258	251,920	461	1,455,916
1952	<i>179,719</i>	568,910	316	321,059	564	1,625,245
1978	758,598	956,165	793	947,699	991	4,089,548
1990	2,136,969	1,135,185	1,882	2,109,574	1,885	5,803,200
2003	7,453,351	1,288,400	5,785	6,165,714	4,786	8,430,762

Source: Official GDP volume movement, 1952-78, from Maddison (1998, p.161), 1978-2003 from *China Statistical Yearbook* (2006, p. 59). Here they are benchmarked on 1990, using the Maddison estimate of GDP in that year in 1990 Geary-Khamis (purchasing power parity) dollars. The official estimates do not include 1950. The italicised “official” figures above for the 1950-52 movement are based on Liu and Yeh (1965), see Maddison (1998), p. 149.

Estimates in Maddison (1998, pp.137, 1950-90, for volume movement in agriculture, construction, transport and communications, and commerce were updated from 1990 from *China Statistical Yearbook* (2006). Estimates of industrial value added 1952-2003 in 1987 yuan are the latest revisions by Harry Wu (see Table 4). Value added in “non-productive” activities was assumed to move parallel to midyear employment in this sector as re-estimated by Harry Wu (see Table 5).

TABLE 2
UPDATED AND REVISED ESTIMATES OF CHINESE GDP BY SECTOR, 1952-2003

	GDP in million 1987 yuan						Total GDP	GDP in million 1990 G-K PPPs
	Agriculture	Industry	Construction	Transportation & Communication	Commerce	“Measurement-Resistant” Services		
1952	127,891	17,796	3,658	5,183	14,272	57,661	226,461	321,059
1953	130,139	22,615	4,990	5,406	14,730	56,005	233,885	331,583
1954	132,229	26,373	4,821	5,679	15,173	55,798	240,073	340,358
1955	142,595	27,616	5,487	5,852	15,498	54,193	251,241	356,190
1956	149,135	33,926	9,238	6,447	16,472	57,195	272,413	386,207
1957	153,649	38,220	8,662	6,695	16,916	62,574	286,716	406,483
1958	154,538	58,569	12,993	9,827	17,522	62,008	315,457	447,231
1959	130,265	79,592	13,728	12,874	18,555	63,155	318,169	451,075
1960	109,107	87,155	13,919	14,213	16,927	66,748	308,069	436,757
1961	110,965	47,272	4,821	9,237	12,359	71,321	255,975	362,902
1962	116,172	40,990	5,970	7,488	11,865	76,263	258,748	366,833
1963	129,505	47,439	7,514	7,368	12,830	81,608	286,264	405,842
1964	146,495	56,319	9,434	7,761	14,525	87,221	321,755	456,160
1965	161,098	69,902	10,433	10,441	14,446	93,969	360,289	510,790
1966	173,034	83,550	11,413	11,521	17,398	98,039	394,955	559,937
1967	176,576	69,624	10,846	9,907	18,106	99,810	384,869	545,638
1968	174,153	66,705	8,794	9,677	16,433	102,386	378,148	536,109
1969	175,885	87,236	11,826	11,878	19,587	103,886	410,298	581,689
1970	189,751	115,113	15,422	13,871	21,417	104,099	459,673	651,689
1971	193,604	129,437	17,295	15,027	21,406	105,770	482,539	684,106
1972	192,235	139,139	16,929	16,471	23,280	108,816	496,870	704,424
1973	209,868	152,188	17,500	17,500	25,391	111,064	533,511	756,371
1974	218,892	149,357	18,583	17,555	24,874	113,744	543,005	769,831
1975	223,928	170,306	21,151	19,562	24,841	116,457	576,245	816,956
1976	220,352	167,385	22,053	19,246	23,909	118,113	571,058	809,603
1977	215,841	189,968	22,420	21,679	27,119	125,992	603,019	854,914
1978	225,079	219,314	22,292	23,617	33,383	144,781	668,466	947,699
1979	238,994	236,940	22,731	25,432	36,312	159,722	720,131	1,020,947
1980	235,798	248,837	28,810	26,876	35,841	166,965	743,127	1,053,548
1981	252,451	253,557	29,722	27,389	46,594	176,268	785,981	1,114,303
1982	281,773	270,242	30,739	30,589	48,424	181,533	843,300	1,195,565
1983	305,265	291,058	35,984	33,648	59,020	188,098	913,073	1,294,484
1984	345,075	323,239	39,891	38,695	71,704	210,013	1,028,617	1,458,294
1985	351,680	364,042	48,747	43,903	92,392	228,502	1,129,266	1,600,986
1986	363,504	394,974	56,484	49,519	102,180	235,033	1,201,694	1,703,670
1987	381,013	460,943	66,580	54,490	115,930	246,411	1,325,367	1,879,002
1988	390,373	501,043	71,899	61,756	132,475	261,301	1,418,847	2,011,531
1989	402,216	517,891	65,826	64,669	121,453	272,282	1,444,337	2,047,670
1990	431,708	528,408	66,609	70,205	115,672	275,400	1,488,002	2,109,574
1991	441,895	584,966	72,984	78,054	120,880	280,588	1,579,367	2,239,105
1992	462,722	661,456	88,321	86,249	136,670	298,619	1,734,037	2,458,385
1993	484,455	752,626	104,215	98,755	148,150	328,563	1,916,764	2,717,440
1994	503,923	849,759	118,482	110,211	162,225	364,067	2,108,666	2,989,504
1995	529,052	1,071,138	133,172	125,750	174,716	392,893	2,426,722	3,440,419
1996	555,991	1,036,432	144,497	142,852	187,295	409,947	2,477,015	3,511,721
1997	575,460	1,089,751	148,286	161,280	206,774	425,931	2,607,483	3,696,688
1998	595,608	1,012,770	161,662	178,376	222,902	444,242	2,615,560	3,708,139
1999	612,360	1,109,987	168,572	202,279	243,187	450,454	2,786,838	3,950,964
2000	627,075	1,270,707	178,180	229,788	267,748	464,466	3,037,965	4,306,993
2001	644,732	1,490,760	190,307	256,444	292,649	486,756	3,361,648	4,765,885
2002	663,522	1,798,983	207,048	281,832	321,914	504,690	3,777,989	5,356,141
2003	680,048	2,246,790	232,104	305,224	357,325	527,536	4,349,026	6,165,714

Source: First seven columns derived as described above. Movement in GDP 1952-2003 assumed to move as in column 7 estimate of GDP in 1987 yuan. GDP figures for all years in 1987 yuan are adjusted upwards by the benchmark ratio of the two last columns in 1990 (1.417723).

Problems Arising from the 2004 Census of Economic Activity

The Chinese statistical office produces two types of basic survey which provide crosschecks on the accuracy of the national accounts. The first input-output estimates for the whole economy appeared in 1987. They were used to estimate sector value added in Maddison (1998). Since then, four condensed input-output tables were published for 1990, 1992, 1995 and 2000, and a full-scale set of tables for 1997.

The other major source of cross-section information is the census of economic activity. A first industrial census was made for 1985, a second for 1992, and a third for 1995. There was a census for the service sector in 1992 and a rather slim census for agriculture in 1996. The latest census for 2004 covers the whole economy excluding agriculture. Its results were published in four volumes in January 2006. The respondents had to supply information on the value of their sales between January 1 and December 31 of 2004 at current prices; estimates of their capital stock (at book value), employment, wages, taxes, debt, but nothing on value added. Since its publication, in the light of the new information, the statistical office has modified its GDP estimates for 1993-2004. The main change was an upward adjustment of the value of sales and employment in the service sector.

The former official estimate of value added in services in 2004 was 4,372 billion yuan. The new valuation of raised it to 6,502 billion yuan-an increase of 48.9 percent. There were minor increases for industry of 2.1 per cent, and 0.9 per cent for agriculture. The overall effect was to raise 2004 GDP in 2004 prices by 16.8 percent.

The NBS posted new estimates of growth by sector in the light of the 2004 census results on January 9, 2006 on its website (www.stats.gov.cn). These are no longer posted and have not been published, so they should perhaps be regarded as provisional. They presented amended estimates of service sector and GDP growth from 1992 to 2004-see middle panel of Table 3. NBS assumed that their previous estimates for service value added and employment in 1992 were correct and in no need of amendment. They therefore limited their amendments to the years 1993-2004. They did this by calculating a new trend in output (value added) at current prices between the years 1992 and 2004-this showed an annual average growth of 17.8 for services compared to the 13.9 percent trend derived from the former output estimates.

NBS compared the new trend between the value of output for the years 1992 and 2004, with the trend based on its former estimates for the same period. The ratio of the two trends was used to inflate its former estimates of the year-to-year change in the component series of real GDP. NBS also made some ad hoc amendments to this procedure for particular years for reasons which are not very clear. Table 3 shows the outcome of this procedure in real terms-it involved an increase annual average real GDP growth from 9.4 to 9.8 per cent for 1992-2003, the new Maddison-Wu estimate shows an 8.7 growth rate.

TABLE 3
REAL SECTORAL GDP GROWTH RATES: OLD AND REVISED OFFICIAL AND
MADDISON-WU ESTIMATES, 1992-2003
(Annual average percentage growth rates)

	GDP	Agriculture	Industry	Construction	Transportation, Communication	Commerce	“Measurement- Resistant” Services
Original NBS							
1992	14.2	4.7	21.2	21.0	10.5	13.1	12.8
1993	13.5	4.7	20.1	18.0	12.4	6.6	11.8
1994	12.6	4.0	18.9	13.7	9.5	7.7	10.4
1995	10.5	5.0	14.0	12.4	12.0	5.9	8.1
1996	9.6	5.1	12.5	8.5	11.4	5.4	7.6
1997	8.8	3.5	11.3	2.6	10.8	8.5	8.7
1998	7.8	3.5	8.9	9.0	10.6	7.7	7.6
1999	7.1	2.8	8.5	4.3	11.3	7.2	6.5
2000	8.0	2.4	9.8	5.7	11.5	8.2	6.7
2001	7.5	2.8	8.7	6.8	9.5	7.5	8.3
2002	8.3	2.9	10.0	8.8	7.9	8.1	9.3
2003	9.5	2.5	12.8	12.1	6.3	9.1	8.0
1992-2003	9.4	3.6	12.3	9.2	10.3	7.4	8.4
Revised NBS							
1992	14.2	4.7	21.2	21.0	10.5	13.1	12.8
1993	14.0	4.7	20.1	18.0	14.5	8.4	12.8
1994	13.1	4.0	18.9	13.7	11.6	9.5	11.4
1995	10.9	5.0	14.0	12.4	14.1	7.7	9.1
1996	10.0	5.1	12.5	8.5	13.6	7.2	8.7
1997	9.3	3.5	11.3	2.6	12.9	10.4	10.0
1998	7.8	3.5	8.9	9.0	10.6	7.8	7.6
1999	7.6	2.8	8.5	4.3	13.4	9.1	7.7
2000	8.4	2.4	9.8	5.7	13.6	10.1	7.9
2001	8.3	2.8	8.7	6.8	11.6	9.3	9.9
2002	9.1	2.9	10.0	8.8	9.9	10.0	10.8
2003	10.0	2.5	12.8	12.1	8.3	11.0	9.5
1992-2003	9.8	3.6	12.3	9.2	12.2	9.1	9.6
Maddison-Wu							
1992	9.8	4.7	13.1	21.0	10.5	13.1	6.4
1993	10.5	4.7	13.8	18.0	14.5	8.4	10.0
1994	10.0	4.0	12.9	13.7	11.6	9.5	10.8
1995	15.1	5.0	26.1	12.4	14.1	7.7	7.9
1996	2.1	5.1	-3.2	8.5	13.6	7.2	4.3
1997	5.3	3.5	5.1	2.6	12.9	10.4	3.9
1998	0.3	3.5	-7.1	9.0	10.6	7.8	4.3
1999	6.5	2.8	9.6	4.3	13.4	9.1	1.4
2000	9.0	2.4	14.5	5.7	13.6	10.1	3.1
2001	10.7	2.8	17.3	6.8	11.6	9.3	4.8
2002	12.4	2.9	20.7	8.8	9.9	10.0	3.7
2003	15.1	2.5	24.9	12.1	8.3	11.0	4.5
1992-2003	8.7	3.6	11.8	9.2	12.2	9.1	3.5

Source: Original NBS estimates are from *China Statistical Yearbook 2005*, Table 3.3, revised NBS estimates are from *China Statistical Yearbook 2006*, Table 3.3, and Maddison-Wu estimates are derived from Table 2.

Note: Figures in bold italics in the middle panel indicate differences from the original NBS estimates. Figures in bold italics in the bottom panel indicate differences from the revised NBS revised estimates.

Conclusion

The bottom panel of Table 3 shows the Maddison-Wu estimates. The column for industry is based on the latest estimates of Harry Wu which differ markedly from the NBS estimates (which NBS has not modified). The new Wu estimates for services differ from NBS only for so-called non-productive services. It is not clear why the new official volume estimates for other services involve such a large increase in 1992-2004, and why they assumed no upward adjustment was necessary for 1992.

TABLE 4
NEW WU ESTIMATES OF INDUSTRIAL VALUE ADDED
1952-2003

	Industrial GDP in 1987 Yuan (Million)				Industrial GDP Index (1990=100)	
	Manufacturing	Mining	Utilities	Total	Wu	Official
1952	15,548	1,889	359	17,796	3.37	1.97
1953	20,246	1,916	452	22,615	4.28	2.62
1954	23,427	2,405	541	26,373	4.99	3.11
1955	23,912	3,099	605	27,616	5.23	3.31
1956	29,920	3,190	816	33,926	6.42	4.26
1957	33,116	4,155	949	38,220	7.23	4.78
1958	49,262	7,955	1,352	58,569	11.08	7.47
1959	66,796	10,717	2,080	79,592	15.06	9.79
1960	71,770	12,465	2,920	87,155	16.49	10.55
1961	36,504	8,409	2,360	47,272	8.95	6.16
1962	31,978	6,760	2,252	40,990	7.76	5.21
1963	38,100	6,930	2,409	47,439	8.98	5.86
1964	46,841	6,725	2,753	56,319	10.66	7.30
1965	57,992	8,587	3,324	69,902	13.23	9.30
1966	69,882	9,612	4,056	83,550	15.81	11.66
1967	57,385	8,433	3,805	69,624	13.18	9.83
1968	54,205	8,979	3,520	66,705	12.62	8.94
1969	71,884	10,730	4,622	87,236	16.51	12.15
1970	94,673	14,742	5,698	115,113	21.78	16.84
1971	104,960	17,672	6,804	129,437	24.50	19.10
1972	112,177	19,469	7,493	139,139	26.33	20.34
1973	123,493	20,494	8,201	152,188	28.80	22.14
1974	118,354	22,704	8,299	149,357	28.27	22.01
1975	134,009	26,670	9,627	170,306	32.23	25.32
1976	129,346	28,053	9,985	167,385	31.68	24.37
1977	147,732	31,252	10,984	189,968	35.95	27.97
1978	171,695	35,003	12,616	219,314	41.50	32.76
1979	188,271	34,803	13,865	236,940	44.84	35.61
1980	199,233	34,825	14,779	248,837	47.09	40.13
1981	204,491	33,860	15,207	253,557	47.99	40.81
1982	219,478	34,653	16,111	270,242	51.14	43.18
1983	237,326	36,455	17,277	291,058	55.08	47.36
1984	265,054	39,649	18,535	323,239	61.17	54.42
1985	302,008	41,842	20,192	364,042	68.89	64.33
1986	328,943	43,931	22,100	394,974	74.75	70.50
1987	390,072	46,420	24,450	460,943	87.23	79.81
1988	425,387	48,852	26,805	501,043	94.82	92.02
1989	437,587	51,552	28,752	517,891	98.01	96.71
1990	446,245	51,622	30,542	528,408	100.00	100.00
1991	498,600	53,056	33,310	584,966	110.70	114.40
1992	569,410	54,979	37,066	661,456	125.18	138.65
1993	655,098	56,253	41,274	752,626	142.43	166.52
1994	744,676	59,452	45,630	849,759	160.81	197.99
1995	956,156	65,472	49,510	1,071,138	202.71	225.71
1996	916,307	66,963	53,162	1,036,432	196.14	253.93
1997	965,662	68,257	55,832	1,089,751	206.23	282.62
1998	893,110	62,284	57,376	1,012,770	191.66	307.78
1999	990,267	58,789	60,931	1,109,987	210.06	333.94
2000	1,146,735	57,324	66,649	1,270,707	240.48	366.66
2001	1,356,913	61,043	72,804	1,490,760	282.12	398.56
2002	1,651,151	66,513	81,319	1,798,983	340.45	438.42
2003	2,079,632	73,222	93,935	2,246,790	425.20	494.54

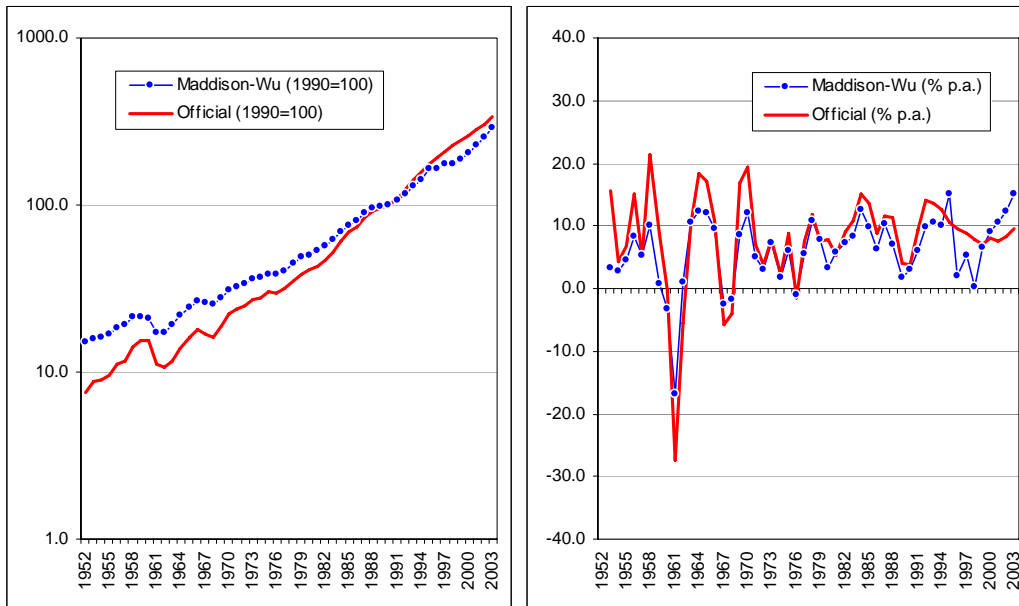
TABLE 5
EMPLOYMENT IN “NON-PRODUCTIVE” CIVILIAN AND MILITARY ACTIVITIES, 1949-2003
(Estimates at mid-year)

	Civilian	Military	Total “Non-productive” Services	Index of Total “Non-productive” Services (1990=100)
	(000s)	(000s)	(000s)	
1949	2,273	5,500	7,773	0.131
1950	4,553	4,750	9,303	0.157
1951	5,785	5,350	11,135	0.188
1952	6,692	5,700	12,392	0.209
1953	7,336	4,700	12,036	0.203
1954	7,529	4,463	11,991	0.203
1955	7,659	3,988	11,646	0.197
1956	8,542	3,750	12,292	0.208
1957	10,035	3,413	13,447	0.227
1958	17,663	2,738	20,401	0.225
1959	27,270	2,400	29,670	0.229
1960	31,081	2,556	33,637	0.242
1961	24,495	2,889	27,384	0.259
1962	15,179	3,265	18,444	0.277
1963	13,848	3,689	17,538	0.296
1964	14,575	4,170	18,744	0.317
1965	15,482	4,712	20,194	0.341
1966	15,992	5,077	21,069	0.356
1967	16,216	5,234	21,450	0.362
1968	16,608	5,395	22,003	0.372
1969	16,764	5,562	22,326	0.377
1970	16,638	5,733	22,371	0.378
1971	16,820	5,910	22,731	0.384
1972	17,293	6,093	23,385	0.395
1973	17,588	6,281	23,868	0.403
1974	17,970	6,474	24,444	0.413
1975	18,353	6,674	25,027	0.423
1976	19,068	6,315	25,383	0.429
1977	21,329	5,747	27,076	0.457
1978	25,580	5,534	31,114	0.526
1979	29,005	5,320	34,325	0.580
1980	30,775	5,107	35,882	0.606
1981	32,990	4,891	37,881	0.640
1982	34,335	4,677	39,012	0.659
1983	35,950	4,473	40,423	0.683
1984	40,855	4,278	45,133	0.763
1985	45,015	4,091	49,106	0.830
1986	47,010	3,500	50,510	0.853
1987	49,955	3,000	52,955	0.895
1988	53,155	3,000	56,155	0.949
1989	55,515	3,000	58,515	0.989
1990	56,185	3,000	59,185	1.000
1991	57,300	3,000	60,300	1.019
1992	61,175	3,000	64,175	1.084
1993	67,610	3,000	70,610	1.193
1994	75,240	3,000	78,240	1.322
1995	81,435	3,000	84,435	1.427
1996	85,100	3,000	88,100	1.489
1997	88,535	3,000	91,535	1.547
1998	92,558	2,912	95,470	1.613
1999	94,065	2,740	96,805	1.636
2000	97,238	2,578	99,816	1.687
2001	102,107	2,500	104,607	1.767
2002	105,961	2,500	108,461	1.833
2003	110,870	2,500	113,370	1.916

TABLE 6
 NEW WU ESTIMATES OF “NON-PRODUCTIVE” CIVILIAN SERVICE EMPLOYMENT
 COMPARED WITH THOSE OF MADDISON (1998) 1952-1995
 (000s at mid-year, and indices benchmarked on 1990)

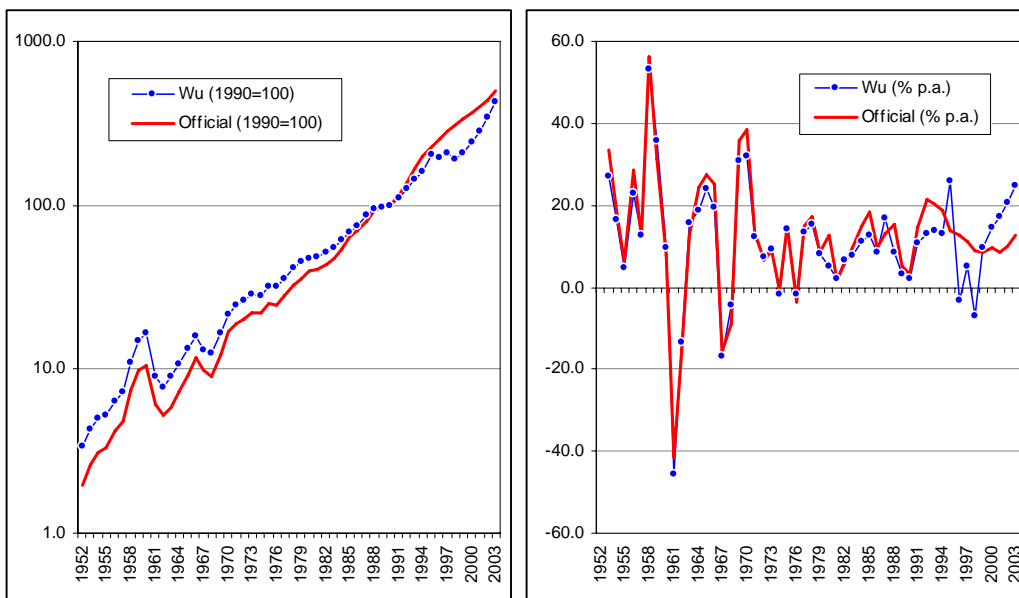
	Wu (2006) (A)	Maddison (1998) (B)	Gap (=A-B)	Wu (2006) (C)	Maddison (1998) (D)	Gap (=C/D*100)
1952	6,692	7,023	-331	12.84	11.09	107.83
1953	7,336	7,365	-29	13.47	12.16	103.15
1954	7,529	7,580	-51	13.86	12.48	103.44
1955	7,659	7,754	-95	14.18	12.69	104.02
1956	8,542	8,688	-146	15.89	14.16	104.50
1957	10,035	10,194	-159	18.64	16.63	104.37
1958	17,663	17,905	-242	32.74	29.27	104.15
1959	27,270	27,615	-345	50.50	45.20	104.04
1960	31,081	31,515	-434	57.63	51.51	104.18
1961	24,495	24,900	-405	45.53	40.60	104.44
1962	15,179	15,450	-271	28.25	25.16	104.58
1963	13,848	14,085	-237	25.76	22.95	104.50
1964	14,575	14,840	-265	27.14	24.16	104.61
1965	15,482	15,780	-298	28.86	25.66	104.72
1966	15,992	16,305	-313	29.82	26.50	104.75
1967	16,216	16,535	-319	30.24	26.88	104.76
1968	16,608	16,935	-327	30.97	27.53	104.77
1969	16,764	17,100	-336	31.27	27.78	104.80
1970	16,638	16,980	-342	31.05	27.58	104.85
1971	16,820	17,205	-385	31.46	27.88	105.09
1972	17,293	17,735	-442	32.43	28.66	105.37
1973	17,588	18,065	-477	33.03	29.15	105.53
1974	17,970	18,495	-525	33.82	29.78	105.74
1975	18,353	18,935	-582	34.63	30.42	106.00
1976	19,068	19,705	-637	36.03	31.60	106.17
1977	21,329	22,045	-716	40.31	35.35	106.19
1978	25,580	25,965	-385	47.48	42.40	104.29
1979	29,005	29,005	0	53.04	48.07	102.74
1980	30,775	30,775	0	56.28	51.01	102.74
1981	32,990	31,490	1,500	57.58	54.68	98.07
1982	34,335	34,335	0	62.79	56.91	102.74
1983	35,950	35,945	5	65.73	59.58	102.73
1984	40,855	40,050	805	73.24	67.71	100.72
1985	45,015	45,015	0	82.32	74.61	102.74
1986	47,010	47,010	0	85.97	77.91	102.74
1987	49,955	49,955	0	91.35	82.79	102.74
1988	53,155	53,170	-15	97.23	88.10	102.77
1989	55,515	56,835	-1,320	103.93	92.01	105.19
1990	56,185	54,685	1,500	100.00	100.00	100.00
1991	57,300	57,300	0	104.78	108.37	102.74
1992	61,175	61,175	0	111.87	114.21	102.74
1993	67,610	67,610	0	123.64	125.25	102.74
1994	75,240	75,240	0	137.59	138.29	102.74
1995	81,435	81,440	-5	148.93	150.38	102.75
1952-1978	5.29	5.16		5.29	5.16	
1978-2003	7.05	6.96		7.05	6.96	

FIGURE 1
CHINESE REAL GDP GROWTH: OFFICIAL COMPARED WITH MADDISON-WU ESTIMATES
1952-2003



Source: Table 2.

FIGURE 2
ESTIMATES OF INDUSTRIAL VALUE ADDED: NBS AND WU ESTIMATES
1952-2003



Source: Table 4.

The time-profile of the Wu estimates of industrial value added is shown in Figure 2. It shows slower growth than the official estimates for 1992-1999, and significantly faster growth thereafter. This suggests that the official estimates of growth performance in recent years have been smoothed.

SOURCES FOR ESTIMATION OF CHINESE MILITARY PERSONNEL, 1949-2005

Main references:

- 1) Contemporary China Series Editorial Committee (CCSEC), *People's Liberation Army*, Vol. 1 and Vol. 2. Beijing: Contemporary China Press, 1994
- 2) Yuan, Houchun, *Great Disarmament by One Million*. Huacheng Press, 1987
- 3) Information Office of the State Council (IOSC), *China's National Defense in 2000*, Beijing: Information Office of the State Council, PRC, 2000
- 4) Information Office of the State Council (IOSC), *China's National Defense in 2002*, Beijing: Information Office of the State Council, PRC, 2002
- 5) Chen, Hui, "China's Ten Disarmaments: From 'Millet-and-Rifles' to Information Technology", *China Youth Daily*, September 7, 2003
- 6) Zhang, Xingxing, "General Disarmament of the Chinese Armed Forces and the Chinese Economic Development in the New Period", published in *Contemporary Chinese History*, 2006 (1)

TABLE 7
ESTIMATED CHINESE MILITARY PERSONNEL AND INFORMATION FOR ESTABLISHING
KEY BENCHMARKS AND ASSUMPTIONS FOR MOVEMENTS BETWEEN BENCHMARKS
 (000s)

	End-year	Average	Key Benchmarks and Assumptions between Benchmarks (Refer to the end-year figure)
1949*	5500	5500**	Official estimate of the size of PLA at the time of the end of the Chinese Civil War
1950*	4000	4750	The 1 st disarmament, mainly in army, while increasing air force and navy, as ordered by Mao & Zhou on June 31, totally demobilized by 1.5 ml
1951*	6700	5350	Large scale recruitment for the Korean War, including .5 ml armed police force
1952*	4700	5700	The 2 nd disarmament, decision made as the Korean War entered a stage of stalemate, demobilized by 2 ml., also to allocate more resources to the development of the air force and navy
1953	4700	4700	As a decision on a new round of disarmament made in the late 1953, assuming no change for this year
1954	4225	4463	Assumed a mid point between 1953 and 55
1955*	3750	3988	The 3 rd disarmament was carried out in 1954-55, by the end of 1955 cut by 21.2% from the level of 1953
1956*	3750	3750	Based on the information for the disarmament result at the end 1958
1957	3075	3413	Assumed a mid point
1958*	2400	2738	The 4 th conducted in 1957-58; by the end 1958 the Chinese military force reduced to the smallest size since 1949; as suggested reduced by 36% from the 1956 level
1959	2400	2400	Assume no change from 1958
1960	2712	2556	Constant growth rate interpolation between 1958 and 1965
1961	3065	2889	Constant growth rate interpolation between 1958 and 1965
1962	3464	3265	Constant growth rate interpolation between 1958 and 1965
1963	3915	3689	Constant growth rate interpolation between 1958 and 1965
1964	4424	4170	Constant growth rate interpolation between 1958 and 1965
1965*	5000	4712	Based on the information cited for 1971
1966	5154	5077	Constant growth rate interpolation between 1965 and 1971
1967	5313	5234	Constant growth rate interpolation between 1965 and 1971
1968	5477	5395	Constant growth rate interpolation between 1965 and 1971
1969	5646	5562	Constant growth rate interpolation between 1965 and 1971

1970	5820	5733	Constant growth rate interpolation between 1965 and 1971
1971*	6000	5910	As suggested by CCSEC, the increase of military personnel had been out of control and by this year reached a level that was 2.5 times the 1959 level, or by 3.6 ml. and 120% of the 1965 level
1972	6185	6093	Assume to follow the growth rate of 1965-71
1973	6376	6281	Assume to follow the growth rate of 1965-71
1974	6573	6474	Assume to follow the growth rate of 1965-71
1975	6775	6674	Assume to follow the growth rate of 1965-71
1976*	5854	6315	The 5 th disarmament conducted in 1976, reducing the military personnel by 13.6% from the 1975 level
1977	5640	5747	Mid-point interpolation
1978	5427	5534	Mid-point interpolation
1979	5213	5320	Mid-point interpolation
1980*	5000	5107	The 6 th conducted in late 1980; The 7 th in 1982, together with the 6 th disarmament demobilized 1 ml. by 1985, i.e. reached 4 ml.
1981	4782	4891	Mid-point interpolation
1982	4573	4677	Mid-point interpolation
1983	4373	4473	Mid-point interpolation
1984	4183	4278	Mid-point interpolation
1985*	4000	4091	The 8 th in 1985 ordered by Deng to cut 1 ml; completed in 1986
1986*	3000	3500	Target achieved
1987*	3000	3000	As in 1986, announced in a news release of the PLA
1988	3000	3000	Assume no net change until 1998
1989	3000	3000	Assume no net change until 1998
1990	3000	3000	Assume no net change until 1998
1991	3000	3000	Assume no net change until 1998
1992	3000	3000	Assume no net change until 1998
1993	3000	3000	Assume no net change until 1998
1994	3000	3000	Assume no net change until 1998
1995	3000	3000	Assume no net change until 1998
1996	3000	3000	Assume no net change until 1998
1997*	3000	3000	The 9 th disarmament took place in 1997 to cut 0.5ml in three years as given by IOSC
1998	2823	2912	Assume declined at a constant rate between 1997 and 2000
1999	2657	2740	Assume declined at a constant rate between 1997 and 2000
2000*	2500	2578	Maintained at 250 as given by SCIO
2001	2500	2500	Maintained at 250 as given by SCIO
2002	2500	2500	Maintained at 250 as given by SCIO
2003*	2500	2500	The 10 th was conducted in 2003 to further cut 0.2ml by 2005
2004	2400	2450	Assume declined at a constant rate between 2003 and 2005
2005*	2300	2350	Target achieved

*Benchmark year that is supported by available information.

** Assume year average figure is equal to the end-year figure for 1949.