

Treatment of China in PWT 6.

Background

In earlier versions of PWT we have made estimates for the PRC based upon quasi-benchmark estimates of individual researchers including Irving Kravis, who, in the early 1980s, made PPP estimates for the year, 1975. Because of its large population, much interest has attached to real product estimates for China. The present range of estimates for the PRC would put it as the 2nd or 3rd largest economy in the world. The wide range of PPP estimates for China and the large size of their difference from the exchange rate suggest that substantial uncertainty is associated with these numbers. China participated in an ESCAP benchmark study for 1993 limited to comparisons between Shanghai and Tokyo and Hong Kong and Guangdong. In the end only the Hong Kong-Guangdong comparison was completed. Currently there is a study of prices in 10 cities within China and discussions have taken place about a possible link to the OECD comparisons for 1996; however that has not yet been realized. Put another way, the basis for purchasing power estimates for China is very little improved over previous versions of PWT. Further, the need to look seriously at the current and constant price estimates of China remains. The previous discussion of China is preserved in the notes to PWT 5.6. The present discussion will only deal with changes in PWT 6.0.

Treatment of National Accounts

In PWT 5.6 we made two types of adjustments to China's national accounts, the first to raise the nominal level of output and the second, to lower official growth rates especially after 1978. China has since revised its national accounts based upon methods closer to the SNA, and based upon a more recent input output table and a census of the tertiary sector. These revisions raised GDP by about 20% for the period 1978-2000. Despite the efforts of Chinese and Japanese scholars to convert Material Product System accounts to the SNA, estimates for 1952-78 remain much less reliable than for later years. (Hitosubashi University, 1996). Angus Maddison (Chinese Economic Performance in the Long Run, OECD, Paris, 1998) has made additional adjustments to the Chinese national accounts both from the production and expenditure side. We have followed Maddison's adjustments though our procedure was somewhat different. Maddison began with a 1987 revision of accounts by sector of production that mainly affected agriculture and services. He then moved those estimates backward and forward to other benchmark years in 1987 prices to obtain a series from 1952 to 1995. Our basic method is to first obtain a set of current price estimates from the expenditure side, and to then use

expenditure deflators to produce an alternative constant price series and set of growth rates.

Level of GDP in Current Prices

Table China-1 sets out the adjustment to the national accounts for 1987 allocating Maddison's revisions to the major expenditure aggregates. Column (1) provides the official accounts in 1987 from the expenditure side. Column (2) incorporates the following adjustments. First, Maddison has increased the service estimates by 60.1 billion yuan to account for consumption goods like housing and health that state owned enterprises have supplied to employees, that in most countries are treated as final consumption rather than intermediate product. The second adjustment of 60.6 billion is to agriculture, which also would go to consumption. The third adjustment of 2 billion yuan is to based upon the recent input-output table, and is also assigned to household consumption. The total of these three adjustments is 122.7 billion. There is one offsetting adjustment based upon on the expenditure side treatment of investment.

Maddison notes that China includes military goods in investment, while the SNA allocates these to government consumption. Also, China still includes maintenance expenditures of enterprises in investment following the MPS treatment. Maddison reduces investment by 10% for these two items and we will follow this practice. However, that portion that is maintenance needs to be subtracted from final product, which we have taken as 3% of investment. 7% of investment is transferred to government consumption. These adjustments are in column (2). The official figures for household and public consumption go up and those of investment go down. The total effect is to raise GDP by about 9% in 1987. Column (3) provides the factors that are applied to the current price expenditure series for years other than 1987.

The adjustment factors described in Table China-1 were applied to the official national accounts statistics from 1952-98. Basically no adjustments were made to the net foreign balance or exports and imports. However, for the years prior to 1960 there is only a net foreign balance series and some scattered trade numbers. Therefore the export and import series for these early years are weak but do retain the official net foreign balance.

The other difficulty is the breakdown of total consumption for the earlier years. Official figures do not generally divide public and private consumption for the years prior to 1978. In earlier versions of PWT we have used the WDI, but it is not clear how their breakdown of public and private consumption was obtained, as that series does not seem consistent with the breakdown after 1978. We

have used the per capita consumption expenditures of households for available years prior to 1978 and taken the total as the total of private consumption. Finally, GDP is usually estimated from the production side and usually the discrepancy from the expenditure total is non-trivial prior to 1978. However, there is no consistent bias, the average for the years 1952 to 1978 of the discrepancy being that expenditures were on average 0.27% per year less than production estimates of GDP. We have therefore not taken account of this discrepancy in our work.

Table China-1 Showing Adjustments to Chinese National Accounts in Current Prices, 1987

Figures in billions of yuan	Official Accounts	Adjusted National Accounts	Adjustment Factors 1952-98
	(1)	(2)	(3)
Household Consumption	596.1	718.8	1.206 times official Consumption
Government Consumption	149.0	179.3	Official Government + .07 Investment
Investment	432.2	389.0	90% times official Investment
Net Foreign Balance	1.1	1.1	Official
GDP	1178.4	1288.2	

Note: Allocation of production adjustments in 1987. Maddison adjustments were (1) 60.6 billion yuan for agriculture, all allocated to household consumption; (2) 60.1 billion for non-productive services and 2 billion for industry all to household consumption. Investment is reduced by 10% and 7% of investment is added to government as an estimate of military investment.

What about the level of output after 1995? Will the understatement of output now be more or less? Here special adjustments have been made for 1996-98 to take account of the "winds of falsification" that apparently influenced Chinese statistical reporting since about 1996. Whereas many observers shaved Chinese growth rates by up to 1/3 in the 1980s and early 1990s it is not uncommon now to talk of official growth rates being twice actual growth rates. For 1998 Tom Rawski has suggested total growth of -2 to + 2%. The approach here is maintain our level adjustments for the 1952-98 period but to lower nominal consumption for the 1996-98 period. The rationale for this adjustment is that from the expenditure side the reported consumption and income for rural households especially has seemed to large in these years. The details are provided in the table and discussion below. The years covered go through 1999 in anticipation of later updates.

	Ratio Priv	APC	Ratio of	Factor	Official	Adjusted
	Consum	Zhang-	to 2	1996-99	Private	Private
	C+ I + G	Rawski	1		C	C
	(1)	(2)	(3)	(4)	(5)	(6)
1990	0.512	0.85	0.602			
1991	0.499	0.86	0.580			
1992	0.487	0.83	0.587			
1993	0.446	0.83	0.537			
1994	0.451	0.83	0.544			
1995	0.468	0.83	0.564			
1996	0.480	0.82	0.585	1.029	3209909	3120072
1997	0.483	0.79	0.611	1.074	3477819	3238135
1998	0.485	0.77	0.629	1.106	3681117	3327676
1999	0.486	0.76	0.639	1.123	3892917	3467343

The table above compares the 1990s APC figures of Zhang in column (2) with the ratio of private consumption to domestic absorption in column (1). Since the denominator for column (1) is not disposable income, there are many reasons why the ratio in column (1) might vary over time, but for simplicity they are ignored here. Column (3) gives the ratio of column (1) to column (2), and it quite clearly rises over time. We accept this rising ratio in column (3) to support the proposition that official figures appear to maintain higher consumption numbers than other evidence would warrant. We have taken the average of column (3) for the 6 years 1990 to 1995, and assumed it applies to the years after 1996 when supposed overestimation may have begun. In column (4) we have divided the column (3) values for the suspect years 1996-99 by this average of .569, to obtain the entries there which we have treated as the degree of overstatement of consumption. When we reduce the official figures of consumption in column (5) by this factor we obtain the adjusted figures in column (6) for these years. In PWT where we have actually adjusted nominal expenditures totals as given in Table China-1. These adjusted consumption figures have been then divided by the column (4) entries for 1996-98.

To provide some sense of these adjustments Table China-2 gives the official and adjusted components of domestic absorption and total GDP for the years 1952-98. The overall effect is to raise current price GDP by about 12-13% a year. We have also provided the official GDP and GDE (gross domestic expenditures).

Growth Rates of Constant Price GDP

The Chinese government attributed much of the unrest associated with Tianamen Square to the rapid inflation of the previous year that had not been accompanied by wage increases. There was rapid inflation in 1988 and much of it was not captured in official price indexes or in implicit national accounts

deflators. This did lead to some improvements in the measurement of inflation in subsequent years. It should be noted in light of the adjustments mentioned in the previous section that it is not inconsistent to have the same entities reporting levels of output that are too low while at the same time reporting growth rates in output that are too high. Growth has always been a desirable goal for all levels of Chinese economic production. For any reported growth in money production, higher growth means a lower rate of inflation. And the lower the official rate of inflation the lower will be the need for wage increases, for example. There has been considerable discussion of the sources of the underreporting of inflation. From the production side, a common problem is that enterprises are often asked to report their current and constant price estimates of output, but often no distinction is made for very small enterprises, leading to reports of low inflation and high growth. In dealing with Chinese growth rates we feel there is no choice but to reject official growth rates as was done in PWT 5.6a. Again, rather than proliferate adjustments we have followed those of Maddison for the period 1952-78 that are in turn based on the work of H. X. Wu (1997) and have the effect of substantially reducing growth rates of industry. What this has involved is using the GDP deflator implicit in Maddison's estimates. This deflator is applied to both public and private consumption. For investment, we have used the same implicit deflator of GDP from Maddison for producers durables and change in inventories, because this seemed where most of the adjustment suggested by Wu would be. For construction we have accepted the construction deflators implicit in the official figures. This method for investment has been applied for the whole period 1952-98.

The National Statistical Bureau (NSB) reports growth in volume of output in comparable prices. Deflation of production accounts usually means applying physical indicators to value series to obtain volume estimates, with the price index being inferred from the difference between volume growth and money growth of output. Or by asking reporting entities to make a constant price estimate. A preferred deflation method is from the expenditure side where price indexes are used to deflate growth in money expenditures to produce expenditures in constant prices. This latter technique is the approach that we have taken for the period after 1978. Before 1978, price indexes are not satisfactory, and that is why we have used the growth rates for GDP that have been developed by Maddison for that period.

We have used the consumer price index for the period 1985-98 when it is available on a national basis. For the period from 1978 to 1985 only the urban consumer price index is available. (There is also a retail price index but it contains no service items) We have linked these two indexes in order to have a price deflator for all 20 years. This has been used for both public and private consumption. For investment, we have used the approach described above for the 1952-78 period.

As mentioned above, after 1995 there is suspicion that reported growth rates may have been further overstated. This is about the time of a major structural change in China involving TVEs that had previously been able to absorb many workers displaced from state enterprises and agriculture. Many TVEs were no longer profitable or able maintain production levels, let alone the ability to maintain previous growth. The private sector was probably expanding. But state enterprises were under increasing financial and political pressure to lay off excess workers. Despite this slowdown the Chinese leadership has chosen to maintain implausibly high growth targets. Our approach has been to lower nominal consumption estimates as discussed above. The constant price series for the components of GDP on a 1996 base are given in Table China-3. In addition the official GDP figures in comparable prices are given as index numbers.

Treatment of PPPs

The Table below provides information on PPPs for C, I and G for China from two basic sources. The first in row 2 is the extrapolation of PPPs from PWT 5.6 in

**Table China-4 of Chinese Price Level Estimates
(PPP/Exchange Rate)**

	Consumption		
	Investment	Household	Government
1. 1985 PWT 5.6	.265	.084	.503
2. Extrapolation of (1) to 1996	.205	.079	.515
3. 1993 Binary Estimate to 1996	.459	.219	.402
4. Adjustment of (3) to a Multilateral Basis	.287	.137	.351
5. Final Input Price Level (2*4) ^{1/2}	.243	.104	.425

1985 (row 1) to 1996 based upon the revised deflators implicit in the national accounts we have used for China. The second set in rows 3 and 4 is based upon the 1993 Guangdong-Hong Kong binary comparison. The published binary estimates (ESCAP, 1999, p. 35) do not provide Paasche-Laspeyere spread for 1993, only the Fisher indexes given in row 3. What can we say about this binary comparison of one relatively affluent and expensive province in China with respect to all of China. Migration flows even before easing of restrictions on residence have been from the interior to the South Coast especially, and other areas as well. Anecdotal evidence from China and the experience in many other countries suggests the pattern of higher price levels in more affluent areas than poorer areas. All of this suggests that the Guangdong-Hong Kong binary comparison is likely to represent a substantial higher price level than for all of China.

Further, binary estimates compared to multilateral estimates of PWT tend to yield higher price levels of poor with respect to rich countries, with the average being 10% or more. As an allowance for both the binary-multilateral effect and of higher price levels in Guangdong, we have used as our adjustment to the Guangdong-Hong Kong 1996 estimate, taken the average of the Paasche and the Fisher Index. While we do not have the published Paasche-Laspeyeres spread from the 1993 study, we know that in the study of Kravis (1981) and Rouen and Kai (1994) this spread was around 3 with the United States. Since China's prices have moved closer to world prices since those studies and since Hong Kong is likely to be more similar to China than the United States we have adopted a spread of 2.56 which is closer to that of other large Asian countries. Using this as the spread, we arrive at row 4 in the Table China-4. The inputs for PWT 6.0 in row 5 are simply the geometric mean of rows 2 and 4, reflecting our uncertainty about both sources. Our earlier hope remains that these PPP estimates for China in PWT 6.0 will soon superseded by better numbers.

Table China-2: Official and Adjusted National Accounts (millions) 1952-98

Year	Official Current Yuan Expenditure Totals					Adjusted Current Yuan Totals				
	Private C	Public C	Invest	Exports	Imports	GDP	Private C	Public C	Invest	GDP
1952	44193	9120	15370	1717	2497	67900	53297	10196	13833	76546
1953	52062	11350	19830	1830	2670	82400	62787	12738	17847	92532
1954	53390	10090	22690	2465	2735	85900	64388	11679	20421	96218
1955	58165	11580	22150	2005	2895	91000	70147	13131	19935	102323
1956	64152	12490	25760	3500	3100	102800	77367	14294	23184	115244
1957	65814	12440	28000	3681	3131	106800	79372	14400	25200	119522
1958	73733	13110	43200	4180	3520	130700	88922	16134	38880	144596
1959	68060	12870	62170	5412	4602	143900	82081	17222	55953	156066
1960	70090	18070	57500	6878	6838	145700	84529	22095	51750	158414
1961	77171	16821	27460	5239	4689	122000	93068	18743	24714	137075
1962	81583	14281	17810	5128	3868	114930	98390	15527	16029	131206
1963	79410	16040	26530	5462	4112	123330	95769	17897	23877	138893
1964	89990	19091	35030	5998	4708	145400	108528	21543	31527	162888
1965	102260	22291	46210	6878	6028	171610	123326	25526	41589	191290
1966	105431	23770	56980	7201	6581	186800	127149	27759	51282	206810
1967	113790	20401	42570	6443	5813	177390	137231	23381	38313	199555
1968	108840	19510	43220	6332	5592	172310	131261	22535	38898	193435
1969	119490	24470	48590	6544	5304	193790	144105	27871	43731	216947
1970	124500	26040	74490	6220	5980	225270	150147	31254	67041	248682
1971	128940	30240	81900	7535	5975	242640	155502	35973	73710	266745
1972	138570	32290	79110	9062	7222	251810	167115	37828	71199	277982
1973	147450	32810	90350	12764	11284	272090	177825	39135	81315	299754
1974	150910	35170	93610	15171	15871	278990	181997	41723	84249	307269
1975	156680	36750	106230	15606	15536	299730	188956	44186	95607	328819
1976	156950	37540	99010	14737	13867	294370	189282	44471	89109	323732
1977	167710	41660	109810	15283	14273	320190	202258	49347	98829	351444

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Year	Official Current Yuan Expenditure Totals						Adjusted Current Yuan Totals			
	Private C	Public C	Invest	Exports	Imports	GDP	Private C	Public C	Invest	GDP
1978	175934	47976	137790	17600	18740	360560	212177	57621	124011	392669
1979	204811	57129	147420	22420	24380	407390	247002	67449	132678	445168
1980	231571	66039	159000	28400	29880	455130	279275	77169	143100	498064
1981	258639	72271	158100	38070	36940	490140	311919	83338	142290	538677
1982	285612	78178	176020	45410	36300	548920	344448	90500	158418	602475
1983	317057	84993	200500	47310	42230	607630	382370	99028	180450	666929
1984	371851	97599	246860	61840	61710	716440	448453	114879	222174	785636
1985	459293	118007	338600	89090	125780	879210	553907	141709	304740	963666
1986	521921	132279	384600	124310	149830	1013280	629436	159201	346140	1109258
1987	596199	148921	432200	162570	161420	1178400	719016	179175	388980	1288321
1988	763406	172604	549500	190400	205510	1470400	920668	211069	494550	1611177
1989	852391	203259	609500	201440	219990	1646600	1027983	245924	548550	1803907
1990	911534	224986	644400	274500	223470	1831950	1099309	270094	579960	2000394
1991	1031077	283513	751700	350700	288950	2128040	1243479	336132	676530	2317891
1992	1246498	348712	963600	434700	407140	2586360	1503276	416164	867240	2814241
1993	1568453	449757	1499800	498700	566640	3450060	1891554	554743	1349820	3728177
1994	2079343	600257	1926060	1025000	961590	4669070	2507687	735081	1733454	5039633
1995	2690633	672867	2387700	1229500	1129650	5851050	3244903	840006	2148930	6333689
1996	3209909	790481	2686720	1426600	1280670	6833040	3762807	978551	2418048	7305336
1997	3477819	880121	2845760	1718500	1432780	7489430	3905191	1079324	2561184	7831419
1998	3681117	959473	2954590	1718627	1413477	7900330	4013178	1166294	2659131	8143752

Table China-3: Adjusted Constant Price GDP

	(Millions of 1996 Yuan)				Indexes of GDP From			
	Private Consumption	Public Consumption	Capital Formation	GDP	Official	PWT	Maddison	World Bank
					1952	1952	is 100	
1952	478101	91462	115680	682321	100	100	100	100
1953	488676	99142	131920	714950	116	105	105	105
1954	496258	90010	151653	736164	120	108	109	109
1955	537663	100643	146189	775728	129	114	115	115
1956	576999	106600	160299	848204	148	124	126	126
1957	601434	109115	183183	897948	155	132	133	133
1958	613520	111318	261280	993474	189	146	148	148
1959	527272	110631	352917	1000871	205	147	152	152
1960	518630	135565	311980	971497	205	142	147	147
1961	559343	112648	147493	827795	149	121	120	117
1962	627701	99060	99288	839835	140	123	120	115
1963	624626	116729	151824	907769	155	133	132	127
1964	673042	133600	192518	1013147	183	148	148	147
1965	723181	149682	243840	1125885	214	165	165	168
1966	750802	163911	302545	1219495	237	179	181	182
1967	827673	141015	230061	1202090	224	176	176	177
1968	797053	136841	235158	1172096	214	172	172	172

Table China-3: Adjusted Constant Price GDP					Indexes of GDP From			
(Millions of 1996 Yuan)					Official	PWT	Maddison	World Bank
	Private Consumption	Public Consumption	Capital Formation	GDP		1952	is 100	
1969	851437	164677	258145	1280498	251	188	188	191
1970	851136	177171	380590	1406481	299	206	210	219
1971	857756	198430	407589	1460607	320	214	220	232
1972	914285	206955	390867	1508697	332	221	226	239
1973	963567	212056	440888	1621702	359	238	242	257
1974	978353	224286	452743	1645721	367	241	246	264
1975	1005866	235215	508226	1744932	399	256	262	284
1976	1015976	238698	476109	1731596	392	254	259	280
1977	1062340	259189	517449	1840716	422	270	276	296
1978	991715	269320	639562	1885794	472	276	306	326
1979	1132961	309376	654153	2075411	507	304	330	349
1980	1192084	329393	656253	2168167	547	318	342	373
1981	1299384	347166	634947	2284048	576	335	359	394
1982	1407297	369752	686333	2489410	628	365	390	430
1983	1531447	396623	763561	2705246	696	396	423	478
1984	1748180	447826	891825	3083991	802	452	474	550
1985	1871019	478674	1105498	3232712	910	474	523	623
1986	1991807	503781	1160277	3551886	991	521	557	677
1987	2106170	524847	1216646	3839367	1105	563	605	754
1988	2252548	516411	1346056	4079538	1230	598	654	836
1989	2147132	513658	1366675	4002967	1281	587	669	866
1990	2246285	551900	1342098	4252450	1330	623	690	899
1991	2438112	659059	1430612	4655164	1452	682	730	984
1992	2742503	759230	1643545	5222703	1658	765	800	1129
1993	2990602	877064	2064326	5868633	1882	860	878	1286
1994	3183230	933104	2174363	6371088	2119	934	965	1453
1995	3522131	911772	2340702	6926341	2341	1015	1046	1608
1996	3871150	978551	2418048	7413680	2566	1087	1122	1763
1997	4073906	1048356	2484108	7933955	2792	1163	1194	1919
1998	4342500	1140830	2559847	8457270	3010	1239	1258	2068