

*Background Note on “Historical Statistics” in [www.ggd.net/Maddison](http://www.ggd.net/Maddison)*

Standardised estimates of **GDP growth** provide a coherent macroeconomic framework covering the whole economy, which can be crosschecked in three ways. GDP is by definition equal in each of the three approaches. From the production side, it is the sum of value added in different sectors (agriculture, industry and services) net of duplication. On the demand side, it is the sum of final expenditures by consumers, investors and government. From the income side, it is the total of wages, rents and profits. In all three dimensions these measures need to be adjusted to eliminate changes in the price level in the period they cover, so that they show changes in volume. The volume movement is easiest to measure for production and expenditure.

The first SNA manual for standardising the coverage and modes of estimation of GDP was prepared by Richard Stone and published by OEEC in 1952. Soon after, he produced a similar manual for the United Nations Statistical Office. The latest version is a joint product of EU, IMF, OECD, UN and the World Bank (1993), *System of National Accounts*, Brussels, New York, Paris and Washington DC.

Most official accounts back to 1950 have been standardised according to these guidelines; this is also true for most estimates for earlier years by quantitative economic historians. Until the 1990s, official statistics in communist countries used the Soviet material product system which took a narrower view of the scope of economic activity than the SNA, because it excluded many service activities regarded as ‘non-productive’. It also involved double counting (measuring gross output without deducting inter-sector transfers of inputs), which exaggerated economic growth. Since then all ex-communist countries and China have switched to the SNA system in principle, but implementation was complicated by massive changes in ownership, in the level and structure of prices, allocation of resources between consumption and investment, and statistical reporting procedures. It will take some years before these problems can be fully resolved.

Intercountry comparison of economic performance relies on purchasing power parity converters (PPPs) to measure **GDP levels**, rather than exchange rates. Measures of economic growth over time must be corrected to exclude the impact of inter-temporal price change. The purpose of PPP conversion is precisely analogous: the elimination of inter-country differences in price level, so that differences in the volume of economic activity can be compared across countries. By merging time series for economic growth with the cross-country estimates of GDP levels now available we can make a coherent set of space-time comparisons.

There are several alternative measures of PPPs. For our purpose, the method developed by Kravis, Heston and Summers in their International Comparisons Program (ICP) is by far the best for multilateral comparisons. They adopted the Geary–Khamis (GK) method invented by Roy Geary (1896-1983) and Salem Khamis (1919-2005), which provides transitivity and other desirable properties (see their 1982 volume, *World Product and Income*). In this study, I have taken 1990 as the benchmark year, so my estimates are in 1990 GK \$.

Table 1 shows the sources of the PPPs for the benchmark year 1990. There were ICP indicators for 69 countries and an ICP type estimate for China made by myself; these estimates covered 93.7 per cent of world GDP; for 84 countries, representing 5.6 per cent of world GDP, I used the Penn World Tables (PWT), which is a short-cut measure of Alan Heston and Robert Summers. For the other 48

countries, representing 0.6 per cent of world GDP, I made proxy estimates (see Table 1).

**Table 1 Nature of PPP Converters Used to Estimate GDP Levels in 1990**

	(billion 1990 Geary-Khamis dollars and number of countries)				
	Europe & W. Offshoots	Latin America	Asia	Africa	World
ICP	15,273 (28)	2,131 (18)	8,017 (24)	0 (0)	25,421 (70)
PWT	59 (3)	71 (14)	524 (16)	891 (51)	1,516 (84)
Proxies	16 (10)	38 (15)	87 (17)	14 (6)	155 (48)
Total	15,349 (41)	2,240 (47)	8,628 (57)	905 (57)	27,122 (202)

Source: Maddison, *The World Economy: Historical Statistics*, 2003, p. 230

The World Bank (2008) presented new PPP estimates for 2005 for 146 countries. The estimates were made in five regional groups, and then aggregated. There are several good reasons for being sceptical about the new World Bank results. 1) They use the EKS rather than the Geary-Khamis procedure. EKS is appealing to bureaucrats because the ranking of countries within each region cannot be modified in the linking process, because the regions insist on “fixity”. It gives all countries the same weight, whatever their size, putting Luxemburg on a par with the USA. 2) EKS produces a lower relative standing of low-income countries than the Geary-Khamis measure I used. In the 1982 study of Kravis, Heston and Summers, p. 96, the average Geary-Khamis GDP result for the lowest income group was 16 per cent higher than the EKS measure. However, the discrepancy between the WB and my results is bigger than can be explained by the bias of the EKS procedure. 3) The World Bank estimate for Chinese GDP is only 43 per cent of the USA, whereas my estimate is 80 per cent; their per capita estimate is only 9.8 per cent for China whereas mine is 18.3 per cent. There is also a strong downward bias (see Table 2) in the WB estimates for India, Indonesia, Korea, Thailand and Vietnam. 4) The Bank does not test the plausibility of its new results. For several years its own *Development Indicators* contained estimates for China similar to mine. There were five previous ICP global studies. These are all dismissed (p. 13) as being “based on very old and very limited data”, implying that any discrepancy with earlier findings cannot cast doubt on its weird results for China, India and some other Asian countries. 5) Kravis, Heston and Summers (1982) contained a detailed sophisticated analysis explaining the sensitivity of PPP results to different measurement techniques which is completely lacking in the recent World Bank study; 6) World Bank results for China are highly implausible when one considers their intertemporal implications. My growth estimate shows Chinese per capita income increasing 12.5-fold between 1950 and 2005. If we merge the WB level estimate for 2005 with my growth estimate, one gets a per capita GDP \$4,091 in 2005, and \$326 (well below subsistence) in 1950. If one believes the official estimate of per capita GDP growth (21-fold over 55 years), the 1950 level would be \$196.

Table 2 compares my estimates of per capita GDP levels for 2005, in 1990 Geary-Ghamis dollars, with the new World Bank estimates in 2005 EKS dollars from World Bank (2008), *Global Purchasing Power Parities and Real Expenditure, 2005*; International Comparison Program, Washington DC. The 130 countries covered in the table represent about 95 percent of world GDP.

**Table 2 Maddison & World Bank per Capita GDP Relatives in 2005**

	<i>Maddison 1990 GK \$</i>		<i>W. B. ICP, 2005 EKS \$</i>	
		<i>% of USA</i>		<i>% of USA</i>
USA	30,458	100.0	41,674	100.0
Canada	24,172	79.4	35,078	84.2
Australia	24,234	79.6	32,798	78.7
New Zealand	18,136	59.5	24,554	58.9
<b>4 W Offshoots</b>	<b>29,378</b>	<b>96.5</b>	<b>40,360</b>	<b>96.8</b>
Austria	22,048	72.4	34,108	81.8
Belgium	22,132	72.7	32,077	77.0
Denmark	24,131	79.2	33,626	80.7
Finland	22,171	72.8	30,469	73.1
France	22,313	72.3	29,644	71.1
Germany	19,434	63.8	30,496	73.2
Greece	14,841	48.7	25,520	61.2
Ireland	26,604	87.3	38,058	91.3
Italy	19,303	63.4	27,750	66.6
Luxembourg	37,177	122.1	70,014	168.0
Netherlands	22,820	74.9	34,724	83.3
Norway	27,385	89.9	47,551	114.1
Portugal	14,093	46.3	20,006	48.0
Spain	18,196	59.7	27,270	65.4
Sweden	23,272	76.5	31,995	76.8
Switzerland	23,292	76.5	35,520	85.3
UK	22,439	73.7	31,580	75.8
<b>17 W Europe</b>	<b>20,637</b>	<b>67.8</b>	<b>30,137</b>	<b>72.3</b>
<b>12 E. Europe</b>	<b>7,204</b>	<b>23.7</b>	<b>12,260</b>	<b>29.4</b>
<b>15 Former USSR</b>	<b>6,264</b>	<b>20.6</b>	<b>9,646</b>	<b>22.4</b>
Argentina	8,938	29.3	11,063	26.5
Brazil	5,839	19.2	8,596	20.6
Mexico	7,485	24.6	11,317	27.2
Iran	5,737	18.8	10,692	25.7
Turkey	7,699	25.3	7,786	18.7
<b>15 West Asia</b>	<b>6,380</b>	<b>20.9</b>	<b>9,738</b>	<b>23.4</b>
Japan	21,999	72.2	30,290	72.7
Hong Kong	27,770	91.2	35,680	85.6
Taiwan	18,858	61.9	26,069	62.6
Singapore	24,608	80.8	41,479	99.5
S. Korea	17,297	56.8	21,342	51.2
China	5,578	18.3	4,091	9.8
India	2,448	8.0	2,126	5.1
Pakistan	2,084	6.8	2,396	5.7
Indonesia	3,875	12.7	3,234	7.8
Thailand	7,878	25.9	6,869	16.5
Vietnam	2,456	8.1	2,148	5.1
<b>11 Asia-Pacif</b>	<b>5,183</b>	<b>17.0</b>	<b>4,895</b>	<b>11.7</b>
<b>53 Africa</b>	<b>1,625</b>	<b>5.3</b>	<b>2,223</b>	<b>5.3</b>

## Detailed Source Notes by Country for updates to 2006

There are detailed source notes by country in three earlier OECD publications of books by Maddison: *Monitoring the World Economy*, 1995, *The World Economy: A Millennial Perspective*, 2001, and *The World Economy: Historical Statistics*, 2003. Estimates are shown for the years 1, 1000, 1500, 1700, and annually from 1820 onwards where available. They were updated to 2003 in Maddison, *Contours of the World Economy, 1-2030 AD: Essays in Macroeconomic History*, Oxford University Press, 2007. For updates to 2006 and revisions of GDP volume movement for earlier years, the sources are shown below.

GDP volume movement in thirty OECD countries was updated from *National Accounts of OECD Countries*, Volume 1, *Main Aggregates, 1995-2006*, pp. 344-5. This provided volume movements which were used to link 1998 to 1990, and annually from 1998 to 2006. They cover the USA, Canada, Australia, New Zealand, Japan, the Czech and Slovak republics, Hungary, Korea, Mexico, Poland, Turkey and 18 West European countries (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the UK). These 30 countries accounted for 52.7 percent of world GDP in 2006 (24.8 trillion Geary Khamis 1990 dollars). Figures for Cyprus and Malta are available from the Conference Board estimates on the Groningen website. GDP movement in 9 small countries (Andorra, Channel Islands, Faeroe Islands, Gibraltar, Greenland, Isle of Man, Liechtenstein, Monaco, and San Marino), representing 0.015 per cent of West Europe's population, was assumed to move parallel to the average for the 12 West European countries shown on my website. Estimates for Norwegian GDP for 1820-1990 from Ola Grytten, "The Gross Domestic Product of Norway 1830-2003" in Eitrem, Klovland and Qvigstad (eds.) *Historical Monetary Statistics for Norway, 1819-2003*, Norges Bank.

Estimates for the year-to-year volume movement 1999-2006 in East European countries not included above, were taken from IMF, *World Economic Outlook*, October, 2007, p. 220, for Albania, Bulgaria, Romania, and the component republics of former Yugoslavia. This source was also used for 14 of the component countries of the former USSR. Estimates for the Russian republic are from Russian sources.

Estimates for 2002-2006 year-to-year GDP volume movement in 22 Latin American and Caribbean countries were taken from ECLAC, *Anuario Estadístico de América y el Caribe 2006*, p. 85. GDP movement in Puerto Rico from Conference Board estimates on the Groningen website. GDP movement, 2003-2006 in 24 small Caribbean countries which represented less than 1 per cent of the GDP of the region was assumed to be parallel to that in the 23 bigger countries. GDP for Chile 1820-1990 from Rolf Lüders (1998), "The Comparative Economic Performance of Chile, 1810-1995", *Estudios de Economía*, 25, no. 2, with revised population estimates 1810-1949 from J. Diaz, R. Lüders, and G. Wagner (2005), "Chile 1810-2000, La República en Cifras", mimeo, Instituto de Economía. Universidad Católica de Chile. Peruvian GDP 1896-1990 and population 1896-1949 from Bruno Seminario and Arlette Beltran, (1998), *Crecimiento Económico en el Perú, 1896-1995*, Universidad del Pacífico.

Estimates for east and south Asian countries, 2003-2006, were generally derived from year-to-year volume movements in Asian Development Bank, *Key Indicators of Developing Asian and Pacific Countries*, Table 13. For Japan, Korea and Turkey they are from the above OECD source. For Indonesia, annual GDP volume movements, 1990-2006, are from the official national accounts. For India,

year-to-year volume movements in fiscal years 2002-3 to 2006-7 are from the Reserve Bank of India, *Macroeconomic and Monetary Developments in 2003-4 to 20067*, Table 1. For China, 1952-2003 they are from A. Maddison and H. Wu, "Measuring China's Economic Performance", *World Economics*, vol 12, no. 2, April-June 2008, pp. 13-44. A rough estimate of the Chinese 2004-2006 movement was derived by adjusting downwards the official year-to-year volume movement in GDP for these years in the *China Statistical Yearbook, 2007*, National Bureau of Statistics, Beijing, using the ratio (81.77%) of the Maddison-Wu movement to the official estimate for 1978-2003. GDP of the Philippines, 1902-40 from R. Hooley (2005) "American Economic Policy in the Philippines, 1902-1940: Exploring a Dark Age in Colonial Statistics", *Journal of Asian Economics*, April, pp. 464-488. The GDP estimates for North and South Korea 1911-1974 were amended to correct an error in Maddison 2003.

For 12 west Asian countries, they are from IMF, *World Economic Outlook*, October 2007, p. 221, for 1999-2006, Israel from p. 216 in the same publication. Turkey 1998-2006 from OECD as above. West Bank and Gaza GDP 2004-2006 assumed stagnant at 2003 level.

Estimates of the year-to-year volume movement for fifty African countries, 1999-2006, were derived from IMF, *World Economic Outlook*, October, 2007, p. 219. The IMF does not include Egypt and Libya in Africa, but includes them in the "Middle East" on p. 221. Here they are included in the African total. The IMF does not provide estimates for Reunion, Mayotte, St. Helena and Western Sahara; here I have assumed that their GDP movement was the same as the total for the other 52 African countries.