

Discussion

COMPARING REAL GDP ACROSS COUNTRIES: THE ISSUES REVISITED

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A continuing debate

A still-unsettled question in economics is the best procedure for comparing real GDP – that is, the output of goods and services – across countries. Two recognised alternatives are (a) to express each country's GDP in US dollars at the observed exchange rate for the period in question, and (b) to establish a common unit of account on the basis of estimated purchasing power parities (PPPs). In the world of today, the two procedures lead to strikingly different results for the comparative size of national economies. Even for richer countries, such differences can arise. But the critical difference relates to the gap in estimated real GDP, and with it GDP per head, as between richer and poorer countries. Two worryingly different perspectives on the world economy continue to be on offer.

As to the choice of procedure, a firm source of guidance is the internationally agreed System of National Accounts (SNA). The 1993 edition of the SNA specified in its opening chapter that:

When the objective is to compare the volumes of goods or services produced or consumed per head, data in national currencies must be converted into a common currency by means of purchasing power parities [PPPs] and not exchange rates . . . Exchange rate converted data must not . . . be interpreted as measures of the relative volumes of goods and services concerned. (Commission of the European Communities et al. 1993, p. 10)

This instruction is repeated, in slightly different language, in the later (2008) revision of the SNA (European Commission et al. 2009, p. 5). Both reports were commissioned and formally endorsed by statistical agencies across the world.

Despite the message thus officially conveyed, it remains common if not standard practice among economists and commentators, as also official agencies, to prefer, or at any rate to treat as a viable alternative, the exchange-rate-based method. I argued against this majority view (as I think it still remains) in a paper that appeared a decade ago (Henderson 2005), and which I draw on occasionally below.

A serious choice

The choice of procedure is not a trivial one. Real GDP measures the past growth and current size of a country's economy, its capacity to provide goods and services of all kinds including military programmes; for some, it is a measure of economic power. Estimates of GDP per head

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form a recognised first stage for any assessment of material standards of living, and GDP per person employed is likewise a first indicator of productivity. A judgement as to how efficiently an economy is using resources, such as energy, will be affected by which of two rival figures for GDP is preferred where a significant divergence exists. Different figures of GDP per head for countries may point to correspondingly divergent estimates of the numbers of those below a given poverty line, and hence to differing views as to the extent of world poverty. For any assessment of comparative economic circumstances and performance, whether over time or across frontiers, real GDP forms a standard point of departure.

A country's claims, obligations and status on the international scene may also be involved. The capacity of richer countries to provide development assistance, and the claims of poorer countries to receive it, are often linked to figures for GDP per head; and the long-continuing and still-unresolved negotiations to amend the country quotas in the IMF and the World Bank have partly hinged on the question of how best to measure comparative GDP.

It is not only the results and implications for individual countries that are in question: the wide differences extend to both total world GDP and its rate of growth. Hence judgements on the past and possible future of the world economy, and as to problems that might arise from pressures on what are seen as limited resources, will likewise be influenced by the choice.

Underlying all such consequential issues of judgement and policy, there is a fundamental question of how key economic variables are to be specified and defined. As part of the systematic study of economic events and relationships, whether over time or across frontiers, the values for real GDP, and with it GDP per head, need to be appropriately defined and measured. The choice between rival methods affects the results of empirical work, together with the picture of reality that people come to form.

New evidence and the International Comparison Program

Recent developments have given a new salience to the long-continuing debate. In particular, 2014 saw the publication of the latest official set of PPP-based estimates of cross-country GDPs (and hence of world GDP) issued by the International Comparison Program (ICP).¹ The estimates relate to the year 2011. As from July 2014, they have been incorporated into the statistical work of the IMF; and as from the October 2014 issue, they are reflected in the database of the Fund's twice-yearly *World Economic Outlook* (WEO) which I use as a prime source below. The new figures replace those emerging from a previous ICP report, published in 2008 and showing results for the year 2005.

Not only does this latest series provide more up-to-date information: it has also brought substantial revisions. (The differences between the two reports are given a thorough review in Deaton and Aten 2014.) Most notably, the revised estimates for the real GDP of a range of poorer countries are now considerably higher than those shown in the 2008 report. By way of illustration, the PPP-based GDP estimates for China and India for 2013, as given in the April 2014 WEO which was still based on the 2008 report, can be compared with the corresponding figures in the October issue, after the change to the 2014 report. The estimate for China is 46 per cent higher, while the corresponding increase for India is over one-third.

The revisions likewise extend to the figure for world GDP. For 2013, the exchange-rate-based world total now appears as US\$74.7 trillion, only fractionally higher than the

previous estimate as given in the April WEO database. The corresponding PPP-based figure, at US\$101.9 trillion, is more than one-sixth higher (IMF 2014b, p. 184). Hence the margin between the two rival figures for world GDP has widened, from over one-sixth to well over one-third.

As a consequence of these important revisions, the differences between the results of the two rival procedures for cross-country comparisons, exchange-rate-based and PPP-based, now appear as greater. The debate has intensified.

It is on the basis of this latest set of ICP estimates that the newsworthy possibility has emerged that in the course of 2014 the real GDP of China surpassed that of the US, so that the Chinese economy has now become the largest in the world.

Getting it wrong at the *Financial Times*

By way of final background, here is some recent illustrative material drawn from the *Financial Times* (FT). The months of October and November 2014 brought 12 separate instances in the paper of unqualified statements or formulae, all in my view misleading, about the real GDP of developing countries. In none of these instances did the FT staffers concerned refer to the existence of PPP-based estimates of GDP: with one partial exception, they wrote as though the questionable exchange-rate-based numbers that they quoted were the only ones to be considered. My own return to the debate was prompted by these numerous cases, and by the failure to appear of my two separate and distinct letters of protest to the editor.

The most frequent case involved the economy of India, which was described, in a then standard FT formula, as ‘the third largest in Asia’, behind China and Japan. The ICP PPP-based estimates for 2011 tell a different story, placing the GDP of India in that year as just over 30 per cent higher than that of Japan. Since then the disparity has widened, since the growth of output has been more rapid in India: for 2013, the difference appears as close to 40 per cent. On this showing, the Indian economy is clearly the world’s third largest, following the US and China but well above that of Japan. By contrast, an exchange-rate-based comparison for 2013 yields the absurd result that it was the tenth largest, with the real GDP of India some 10 per cent below that of Italy.

In other pieces by FT staffers during these weeks it was wrongly taken for granted, without reservation or qualification, that the GDP of China remains considerably smaller than that of the US. Exchange-rate-based figures for GDP (or GDP per head) were likewise presented as authoritative for Sri Lanka, Tajikistan and Indonesia. In the latter case, the FT journalist concerned missed the newsworthy fact that the PPP-based numbers show the GDP of Indonesia for 2013 as slightly higher than that of the UK.

I should add that, since the above instances came my way, typical FT practice has changed. For example, in an article on Indonesia dated 25 January 2015 the author noted that ‘in purchasing power parity terms, its economy is roughly on a par with Britain’s’. Again, a piece dated 4 March made the point that ‘Last year, China overtook the US as the world’s largest economy in purchasing power parity terms’. Such wording marks a big improvement. Reasonably, it leaves open the question of what claims can be made for the alternative exchange-rate-based comparisons, a matter to which I now turn.

The non-involvement of exchange rates: single economies

Among the leading critics of claims made for PPP-based comparative GDP data is the distinguished Harvard economist, Richard Cooper. In a recent article (Cooper 2014) he dissents from the assertion, made in this latest ICP report (World Bank 2014) that in 2014 the GDP of China will have overtaken that of the US. That specific conclusion of his follows from his general position, which is that:

The relative size of open economies in the modern global economy is best measured using market exchange rates, perhaps smoothed out over several years to iron out erratic short-term movements (not relevant in the case of China).

I have some basic criticisms of this argument. Before coming to them, however, I consider the – as I think instructive – case of a single economy; and here I would underline an important truth which Cooper rightly emphasises on his opening page:

Of course, for each economy total output is measured in the currency of that economy, USD for the United States, rmb for China.

That is indeed the correct procedure, and as such it is duly reflected in (among countless other sources) the WEO series for each country's GDP (and by the same token, GDP per head). Both GDP and GDP per head are given in 'constant prices, domestic currency'.

This agreed procedure carries with it a clear corollary. *Exchange rate changes, whether past, current or prospective, do not enter directly into the measurement of real GDP for a single economy; and they have no place in a country's national income accounts.* Cooper accepts this ('of course'): his thesis is that exchange-rate-based numbers should be used for cross-country comparisons of GDP and in deriving a world total.

However, even where single countries are concerned it is a surprisingly common (though mistaken) practice to treat exchange rate changes, actual or projected, as directly entering into measured real GDP. Here are three illustrative cases.

Getting it wrong in divers places

1. In a recently published paper, two other leading Harvard economics professors, Lant Pritchett and Lawrence Summers (a former Secretary of the US Treasury), review in the light of historical experience the prospective growth of GDP and GDP per head in China and India. In the paper they write that:

We start the scenarios using the International Monetary Fund (IMF) World Economic Outlook 2013 US dollar GDP (which . . . already includes the depreciation of the rupee in 2013). (Pritchett and Summers 2014, p. 6)

It is indeed true that the recent series for the GDP of India expressed in US\$ has been affected by the fall in the rupee; but *such a series does not measure changes in real GDP*. Defined and measured in constant domestic prices, which 'of course' is the correct procedure, the GDP of India rose between 2012 and 2013 by an estimated 5.1 per cent. In US\$ terms, the increase was

only 1 per cent. Whatever meaning can be attached to the latter figure and others of its kind – a question I return to below – they do not represent changes in a country's real GDP.

It is worth adding that the historical series for (real) GDP that Pritchett and Summers drew on, for their review of possible future trends, correctly took no account of exchange rate changes. They should have followed the same procedure in making projections of the future.

2. Over ten years ago a team from Goldman Sachs published a paper which drew world-wide attention (Wilson and Purushothaman 2003). It presented long-term projections of economic growth across the world; and its central theme was the growing relative importance, through high growth rates of real GDP, of 'emerging economies' in general and 'the BRICS' (Brazil, Russia, India and China) in particular. A new version of the study, updated and revised, was published in 2011 (Wilson et al. 2011).

In these twin studies, the base-year starting point is taken to be countries' GDP valued in US\$ at the then prevailing exchange rates. At those rates, as noted, the GDP of many poorer countries today appears as substantially lower than with PPP-based estimates. The Goldman-Sachs model builds in a progressive narrowing of this gap for 'emerging economies' as their output per head (by assumption) catches up with that of the richer countries; and it treats this presumed exchange rate convergence as a separate integral part of the growth of those countries' real GDP. The modelled growth of such an economy thus comprises two distinct elements: the actual projected growth of its output, and an accompanying rise in its exchange rate projected to result from a relatively higher growth of output per head.

This is a mistaken procedure. A country's output growth, whether projected or past, is measured by its output growth (as given in domestic currency at constant prices), not by its output growth plus a model-derived appreciation of its exchange rate. Exchange rate changes (to repeat) have no place in the definition and measurement of a country's GDP; and it does not make sense to say, as the original Goldman Sachs study did (since echoed by its successor), that alongside the growth of output per head 'Countries also grow rich on the back of appreciating currencies' (Wilson and Purushothaman 2003, p. 6).

Here as with the Pritchett–Summers study, the correct point of departure would have been the PPP-based estimates: only these reflect real GDP.

3. In the late 1990s a number of Asian economies went through a period of economic stress. One of those most seriously affected was Indonesia. In a book published over a decade ago, Jagdish Bhagwati wrote that during this episode 'per capita incomes tumbled to almost one-third of their 1996 level in Indonesia' (2004, p. 199). This is an exchange-rate-based figure, though the reader was not told so. If GDP is correctly defined and measured, at (to repeat) constant prices in domestic currency, the largest year-to-year fall for Indonesia in this period, as between 1997 and 1998, appears as just over 13 per cent. This went together with a fall in real GDP per head of just over 14 per cent – one-seventh, as compared with Bhagwati's figure of almost two-thirds.

Wider issues

This last case raises a basic question. It could well be argued that between 1997 and 1998, or in the episode as a whole, the worsening of the economic situation of Indonesia was much more serious than would appear from the figures for real GDP. In any country, it can of course happen that economic policy has to focus on exchange rate developments, which themselves

may be linked to problems arising from debts, deficits and price movements. A GDP series defined in real terms has nothing to say about issues and events in financial markets which may deserve close attention in their own right. Hence it is often necessary, in assessing the state of an economy and the issues that arise for policy, to make use of facts and data, and to construct statistical series, that take due account of developments which fall outside national income accounts. In such constructions, exchange-rate movements may well feature. It is not correct, however, to treat any resulting series of numbers as yielding a valid, still less a more authentic, alternative measure of real GDP.

In my opinion, this last conclusion applies to an argument advanced by IMF staff in the July 2014 update of WEO. After noting the Fund's decision to use the results of this latest ICP report as a basis for reweighting its PPP-based measures of GDP growth for groups of countries and the world as a whole, the text continues:

... a purchasing-power-parity-based weight is only one measure of systemic relevance in the global economy. When weighted by GDP at market exchange rates, emerging market and developing economies account for less than 40 percent of global GDP, reflecting their more limited purchasing power in international markets. (IMF 2014a, p. 4)

The concept of a country's 'systemic relevance in the global economy' is new to me, as also is that of its 'purchasing power in international markets'. Neither appears as well defined, and to link either or both to 'GDP at market exchange rates' raises questions. Consider the Indonesian example just quoted. Did the country's 'systemic relevance' and/or its 'international purchasing power' fall, as between 1996 and 1998, by an estimated 58.1 per cent, as given by GDP expressed in current US\$? If so, then there was a huge divergence from the estimated fall in real GDP (at constant prices in domestic currency) between the two years, which is 9.1 per cent.

For any country, rich or poor, such divergences, often as in this case considerable, are liable to occur at any time, sometimes unexpectedly and overnight: there is no systematic predictable relationship between the two series. In describing this situation, it is not correct to say that there are two alternative concepts and measures for real GDP, each useful in its place: there is just one valid (and well defined) meaning of the term, and converting national data into US\$ *in itself* entails a departure from it. The IMF staff's concept of 'GDP at market exchange rates', in so far as it carries with it an implied reference to real GDP, involves a contradiction in terms. More on this below.

The non-involvement of exchange rates (continued)

Where two economies are being compared, Richard Cooper's (2014) position is that:

To compare two countries, we need to convert their GDP into the same currency, e.g. rmb into USD. What rate of exchange should we use? It is natural to use the exchange rate that everyone uses in trade between the two countries, or to purchase assets across borders . . .

It is true that in order to compare the GDP of two (or more) countries it is necessary to arrive at a common unit of account; but in my view it is not correct (even if 'natural') to achieve that result by choosing a particular supposedly appropriate recorded exchange rate. What is

required is a common set of prices for the outputs concerned; and this can only be derived from the array of actual observed prices in each of the two economies. The result is not an exchange rate, while actual recorded exchange rates do not enter into the process of deriving it. Moreover, the outcome is not a single uniquely appropriate figure: index number problems are necessarily involved.

There is an exact analogy here with estimating the change in the real GDP of a single country as between one year and another. To measure such a change, the outputs of the two years have to be valued at a set of common ('constant') prices. These can be the prices of Year 1, yielding a Laspeyres quantity index; the prices of Year 2, yielding a Paasche quantity index, or some average of the two sets of prices, yielding (for example) a Fisher-type quantity index: there is no single uniquely correct figure. Exchange rates are not involved: they are not relevant.

For two countries within the same year, just the same procedure applies, with the respective sets of prices then being those of (as it might be) the US and China. Output in each country is then valued at US prices, Chinese prices, or some intermediate average. The chosen price measure provides the common unit of account; and this is the spatial equivalent of the 'constant prices' derived for intertemporal comparisons. Here again, index number problems are unavoidable, while exchange rates do not enter in. The analogy is exact.

Where more than two countries are in question, the plot thickens: as noted by Irving Kravis (1984, p. 9), 'new complications develop, and new demands are made of the formulas used'. However, much the same basic procedure is involved. PPP-based estimates of comparative GDP across the world, as presented in the successive ICP reports, do not involve exchange rates, either as inputs or outputs: the results flow from detailed systematic estimates of cross-country price differences which are brought together; and the resulting common unit of account, which for convenience has been 'international US\$', is then shared by all the countries. The weighting choices and index number problems that are involved have come to form the subject of an extensive technical literature.

Here again, an analogy can be drawn with comparisons over time for a single economy over an extended period of years. If from an economic viewpoint it was of interest to estimate the cumulative total output of such an economy over a period of (say) 150 years, the problems of deriving an appropriate common unit of account would be similar. In this case also, the past behaviour of the exchange rate would not enter as an input into the result.

Misconceptions

The presumption that making cross-country comparisons of GDP requires fixing on a particular exchange rate as the common unit of account leads many authors and commentators astray. The choice is wrongly presented as lying between (a) a figure readily derived from real-life values, at which actual international transactions have taken place, or (b) a specially contrived and laboriously calculated 'PPP exchange rate' which is no more than notional. There is a dual misunderstanding here. First, the common unit of account which emerges from an exercise such as the ICP is not, and does not pretend to be, an exchange rate (though it serves the same purpose): it represents a drawing together of an array of price comparisons. Second, the numbers involved are not just 'notional': the comparisons, admittedly laborious, relate largely, and wherever possible, to actual prices that have entered into recorded market exchanges. The

objection sometimes made, that ‘people do not make purchases at PPP exchange rates’, reveals twin layers of misunderstanding.

In the real world as distinct from some model constructs, there is no such thing as a ‘PPP exchange rate’, nor is there a ‘PPP growth rate’, whether for single economies or groupings of countries.

Cooper (2014) and some other authors have argued that PPP-based estimates of real final expenditure per head are acceptable with respect to household consumption, where they yield valid measures of comparative welfare,² but that for GDP as a whole an exchange-rate-based figure should be used. But as noted above, there is only one concept and measure of real GDP, not two differently measured and irregularly divergent series. In any case, it is not convincing to argue, as Cooper seems to, (a) that aside from household consumption no useful systematic cross-country price comparisons of goods and services can be made; (b) that where comparisons are seen as doubtful or impossible a particular recorded exchange rate should be chosen as the unit of account; and (c) that the same unit of account should then be used for GDP as a whole (including household consumption).

A rival aggregate?

For Cooper and others, including IMF staff, an understanding of developments in the world economy requires a world expenditure total, defined in real terms, that differs from PPP-based GDP by bringing in market exchange rates. Such a series is designed to bring together the corresponding series for each individual economy: the idea is to reflect, in each case, that economy’s ‘systemic relevance’ or ‘international purchasing power’ (as per the IMF staff), or (to quote correspondence on my files) its ‘impact on the world economy’.

One path that could be visualised for constructing such a measure would indeed take as a starting point each country’s GDP expressed in US\$. But as noted above, any such series is liable to short-run volatility, and bears a varying and uncertain relationship to the behaviour of real GDP. Moreover, some procedure for deflating the original data would be called for. So far as I know, no serious attempt has been made to face these twin problems, and thus to derive, from time series of ‘GDP at US\$’ for each country, a meaningful total for world demand at constant prices.

As seen above, the alternative WEO response is to offer ‘GDP at market exchange rates’. In this case, the year-to-year changes for each economy are the estimated (proportional) changes in real GDP: it is only the weights that reflect exchange-rate-based values. But for this purpose, such weights are not appropriate. Where the real GDP of different countries is brought together in a combined aggregate measure, the quantity relatives should be weighted by the relative outputs of the countries concerned. Such output weights are yielded only by PPP-based comparisons. Converting national data into US\$ *in itself* entails a departure from real GDP.

As I see it, the widely accepted case for alternative time series for real GDP to that provided by PPP-based data remains ill defined: the interrelated issues of rationale, definition and measurement have not been thought through. The situation today remains as described over ten years ago by the leading Canadian statistician Jacob Ryten (2004, p. 365): ‘The only viable alternative to the use of inadequate PPP-based estimates is better PPP-based estimates.’ My impression is that the 2014 ICP report has marked a real advance on its predecessor.

Summing up

The above main argument can be summarised as follows. In order to measure *changes* in the real GDP of a single economy, *intertemporal* price comparisons are required as a means to creating a common unit of account. Where cross-country *differences* are in question, *interspatial* price comparisons have to be constructed for the same purpose. The two cases are analogous. In both of them, whether in estimating changes over time or differences across space, index number problems arise; and in neither case does the actual exchange rate (or a specially constructed smoothed or projected rate) enter in.

Exchange rates – whether past, current or prospective, historical, conjectured or model-derived – are not relevant to the definition or measurement of either output (real GDP), changes in output over time, or differences in output across frontiers. Any notion of ‘real GDP at market exchange rates’ does not make sense.

China versus the US

For 2013 the GDP of China expressed in US\$ is currently given as \$9.47 trillion, as compared with a figure of \$16.77 trillion for the US (IMF 2014b). On this basis, the Chinese economy in that year appears as 43.5 per cent smaller than that of the US; and it is on this basis that Richard Cooper (2014) reaches the conclusion that ‘even with higher growth rates China will not reach US GDP until well into the next decade’. By contrast, the latest PPP-based figures for 2013 show the difference in GDP as only 4 per cent, while for 2014 the IMF (2014b) projections show the GDP of China as fractionally higher than that of the US. On all projections that I am aware of, Chinese output is seen as continuing to increase faster than American, so that the gap which has now arguably emerged is likely to widen over time.

In weighing up the rival claims of the two above strikingly different pictures of the relative size of these two economies, the following evidence for 2013, from divers accepted sources, is worth taking into account:

- Estimated consumption of primary energy in China was over 25 per cent higher than in the US.
- Electric power generation in China appears as 27 per cent higher than in the US.
- The total value of exports of goods and services from China exceeded by an estimated 7.7 per cent the corresponding figure for the United States.
- Production of vehicles in China was almost exactly double that in the US.
- Chinese production of steel was almost nine times that in the US.
- Chinese production of cement was almost 30 times that in the US.

How much does it matter?

The systematic comparison of prices across the world is a large and complex task. The work of the ICP itself forms a central element; but its periodic reports chiefly reflect, and depend on, the huge volume of information supplied, and the prior analysis carried out, by national statistical offices and international agencies. Maintaining and improving this worldwide collaborative process is not costless, and it is reasonable to ask how far the results can justify the costs.

In my view the chief benefit, still far from fully realised, results from undermining mistaken beliefs and presumptions that are widely held and could bring unfortunate consequences. Here are just a few examples among many, to set alongside those already cited: across the world, each new day brings forth its own misperceptions.

It is a worrying situation when people who are in general well informed, and some of whom are influential, accept without question that the real GDP of China is currently 40 per cent lower than that of the US, and the GDP of India 10 per cent below that of Italy; yet such beliefs, with their departures from reality, are constantly voiced or implied.

A recent instance is *BP Energy Outlook 2035*, the 2015 edition of the well-known annual series produced by BP. On page 9 the text reads:

China and India are . . . are projected to grow by 5.5% per annum (p.a.) between 2013 and 2035. By 2035, they will be the world's largest and 3rd largest economies respectively, jointly accounting for about one-third of global population and GDP. (BP plc 2015)

These are exchange-rate-based comparisons, though the reader is not told so. Despite the statement made on page 6 in the report, that 'GDP is expressed in terms of real Purchasing Power Parity (PPP) at 2011 prices', the PPP-based data for China and India are disregarded here. Those data clearly indicate (a) that the Indian economy is already, by a wide margin, the third largest in the world, and (b) that the real GDP of China now exceeds, by a small but growing margin, that of the US. The idea that these rankings might take till close to 2035 to come about, even with the GDP of both countries growing at an assumed average rate of 5.5 per cent per annum, is not to be taken seriously.

The World Bank continues to give prominence to non-PPP-based figures for the comparative gross national income (GNI), and GNI per head, of countries across the world. The numbers are derived by expressing the GNI for each economy in US\$, using a formula which takes account of exchange rates over a three-year period with adjustments for the difference between inflation in each economy and 'international inflation' as given by the Special Drawing Rights deflator. The results for GNI per head have long been published in the (now expanded) *World Bank Atlas*, and form the basis for the Bank's country income groups. A developing country's 'Atlas GNI per capita' thus determines its eligibility for concessional and non-concessional World Bank lending; and the OECD's Development Assistance Committee uses the same metric as the basis for determining country eligibility for official development assistance.

Contrary to what is often presumed, and implicitly claimed for them in the above context, these figures do not reflect real GDP (or GDP per head). The Atlas series should long ago have been discontinued.

One result of taking misleadingly low figures for the GDP of many poorer countries is an overstatement of the energy-intensity and CO₂ emissions-intensity of these economies. An example involving China is to be found in a flawed IMF study (IMF 2008), criticised in Henderson (2008). A parallel recent instance relates to total world GDP. IMF staff have just publicised (Gupta and Keen 2015) their estimate of a world total of \$4.9 trillion in 2013 for what they (questionably) term 'post-tax subsidies' of fossil fuels; and this figure is said to constitute 6.5 per cent of global GDP. The implicit global total used here, of \$74.2 trillion, is an exchange-rate based number, though the reader was not told so. Taking instead the PPP-based estimate, of \$101.9 trillion, would yield a ratio of 4.8 per cent.

As to richer countries, in a recent FT op-ed article (9 February 2015), Professor Ian Bremmer wrote that ‘the US economy . . . accounts for less than a quarter of world economic output’. This figure is exchange-rate-based, though the reader was not told so. Taking the PPP-based total for world GDP, the US share for 2013 appears, more realistically, as just under one-sixth. The difference is not trivial.

As noted above, the IMF – erroneously, in my view – presents two alternative series for the growth of world output: the difference lies in the respective weights assigned to the GDP of the individual countries. I have argued above that the exchange-rate-based country weights are unfit for purpose, since they do not reflect real GDP. However, this series, though in reality it is not a genuine alternative measure, is given equivalent status; and in the situation of today it yields an underestimate of the recent growth of the world economy. The reason for this is that ‘GDP at market exchange rates’ assigns a lower weight than PPP-based estimates to the GDP of poorer countries, including especially China, which have been growing faster than the rest of the world. For the period 2000–13, in round terms, world GDP is estimated to have grown by 39 per cent with exchange-rate-based weights, and by 64 per cent with PPP-based values for each country’s GDP (based on IMF 2014b). Only the latter estimate incorporates correctly-defined comparative measures of real output and weights that reflect these.

Across the whole range of estimates of real GDP – for countries, regions and the world as a whole, over time and across space – the use of exchange-rate-based comparative figures is liable to create, to quote a UN expert statistical panel of some years back, ‘a fundamentally distorted view of the phenomenon being described’.³

Conclusions

For a true understanding of events and relationships in the world economy, well-based information about the comparative size of different national economies is required. This information can be derived only from systematic cross-country comparisons of the prices of the goods and services that enter into GDP: that is how a common unit of account should be derived. Conceptually, there is a near-exact parallel with the procedure for deriving time series for the GDP at constant prices of a single economy.

In both contexts, exchange rates are not relevant. Comparisons that are based on them do not in fact measure real GDP, while in the world of today, across countries, the results of such comparisons are often seriously misleading. Exchange rates do not enter into national income accounts.

At the level of specific actions, two conclusions can be drawn. First, the above principles need to be reflected in the presentation and treatment of GDP data, and the design of databases, across the world: as the above discussion shows – and much more could be said – there is a long way to go. A special focus should be on the IMF and the World Bank. Second, the work that has borne fruit in the periodic reports of the International Comparison Program, together with the Program itself, should receive continuing informed and judicious official support.

Notes

1. The history of the ICP begins in 1968, while the underlying ideas go back further. A foundation for subsequent work was the path-breaking report, essentially designed by Milton Gilbert and jointly authored by him and Irving

- Kravis, which was published in 1954 by what was then the OEEC (Gilbert and Kravis 1954). In the later context of the ICP, a special tribute is due to Kravis and his two leading associates at the University of Pennsylvania, Alan Heston and the late Robert Summers. The evolution of this whole mode of analysis marks in my view a real contribution to economics as a subject. There is a fine memorial essay on Kravis by his friend and faculty colleague – and a former Nobel prizewinner – the late Lawrence Klein: it was published in 1993 in the *Journal of Economic Perspectives*. An overview of the ICP is provided by the World Bank at <http://go.worldbank.org/X3R0INN80>.
2. Even for a first approximation to material welfare per head, a GDP series may in fact need to be adjusted in order to allow for changes in a country's terms of trade: in such cases, gross domestic income (GDI) is a better indicator. Within the national accounts framework, there is a recognised procedure for moving from GDP to GDI. It does not involve exchange rates.
 3. The instructive episode which gave rise to the panel's judgement is recorded in Henderson (2013, pp. 611–12).

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