The Flaw of One Price: Some Implications
For MER-PPP Discussions

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Presented to the
PPP vs MER Workshop, Hartley Conference Center
Stanford University, February 19-20, 2004

"The real difficulty in changing any enterprise lies not in developing new ideas, but in escaping from the old ones." John Maynard Keynes

Introduction

Many models that estimate future social, political and economic outcomes make use of the market exchange rate (MER) for some or all conversions of prices or other value figures to a common currency. This paper addresses the question of when it is appropriate to use a purchasing power parity (PPP) for such conversions versus the MER, taking as a point of departure the paper of Manne and Richels (2003, hereafter M-R). That paper, *Market Exchange Rates or Purchasing Power Parity; Does the Choice Make a Difference for the Climate Debate?*, provides the focus of this paper because it has been widely used to defend the past and future work program of the the International Panel on Climate Change (IPCC). This paper is only concerned with the "Climate Debate" to the extent that the heavy use of the MER by the IPCC has generated a literature about the use of MERs versus PPPs.[1]

The the M-R paper puts forward as its main conclusion that past climate change scenarios would not be greatly changed if PPPs were used in place of MERs. The inference drawn by many is that therefore MERs are still an acceptable measure to use in the future.   This paper challenges both the substance of the claim of the M-R paper and the implicit message that future studies should use MERs rather than PPPs.

We begin in Part A with a discussion of the *Purchasing Power Parity Doctrine* of Gustav Cassel because the M-R paper appears to be completely wrong in confusing the *Doctrine* with the use of PPPs as a conversion factor. Part B puts forward our doubts on the substance of the M-R conclusions. Part C addresses the question of the appropriate

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[1] One set of exchanges occurs in the journal, *Energy and Environment*, involving Ian Castles and David Henderson and the Intergovernmental Panel on Climate Change and is cited in the references as EE (2003).

use of the PPP and MER and presents the basic weakness of the MER as a conversion factor to study economic structure at a point of time, or over time. Many defend the use of the MER because they say *people of influence* use the MER and Part D puts this defense of the MER in perspective, providing a discussion of the dual use of international organizations and national governments of both PPPs and MERs in their research and operations.

A. Cassel's Purchasing Power Parity Doctrine

If the Nobel Prize in Economics had been awarded in the 1920s it is very likely that one of the winners would have been Gustav Cassel, the Swedish economist who wrote,

"I propose to call this parity "*the purchasing power parity*[1]. As long as anything like free movement of merchandise and a somewhat comprehensive trade between two countries take place, the actual rate of exchange cannot deviate very much from this purchasing power parity." Gustav Cassel (1918, p. 413).

This became known as the Purchasing Parity Doctrine and was a major contribution to the understanding of the international economy at the time. It strongly supported the notion of a world where prices would tend to converge to one common level, as transport costs and other obstacles to trade declined both within and between countries. The law of one price, an implication of Cassel's doctrine, became a powerful anchor to a variety of theories.

In most international trade text books the Purchasing Parity Doctrine is described in its *absolute* and its *relative* version. The absolute version suggests that the price ratio of all goods in two countries would equal the exchange rate. That is, the Law of One Price would prevail. Use of the MER essentially accepts the absolute version of the doctrine. In the weaker relative version of the Purchasing Power Parity Doctrine, changes in the prices of goods in country A relative to country B. would be reflected in comparable movements in their exchange rate. The relative version of the Purchasing Power Parity doctrine is consistent with use of either PPPs or MERs.

What are the criticisms of Cassel that have led to dismissal of the absolute version from serious consideration? First, there are non-traded goods that are commonly 50% of GDP. The forces driving prices of say wheat to one world price are not as pervasive for non-tradables, like auto repair. (The prime text-book examples of non-tradables in

freshman Economics 1 would be haircuts!) Secondly, there are barriers to trade across countries that impose wedges between national and world prices of tradables.   However, the third and the most important criticism today relates to the fact that the world is much more financially integrated than it was when Cassel wrote. This means that exchange rates are affected by relative interest rates in different countries. The volume of capital movements across countries today is over 50 times larger than the international trade in goods and services.

The Treatment of Cassell by M-R

The Cassel doctrine is raised here because M-R (2003, p. 2) treat criticisms of the Purchasing Power Parity doctrine as if they were criticisms of the use of PPPs as a conversion factor, when the exact opposite is the case!   Criticism of Cassel and one price is a strong argument in favor of using PPPs rather than MERs for converting monetary aggregates, like GDP, to a common currency for purposes of comparing quantities or levels of productive activity.[2]

M-R (p. 2) begin saying,

"Critics of PPP suggest that it has serious limitations for exchange rate conversions. Among the criticisms are that: 1) the market basket of goods and services includes non-traded goods, and this precludes arbitrage: 2) there are significant transaction costs for traded goods; and, 3) the composition of the market basket is likely to differ across countries."

Note these are all criticisms of the Purchasing Power Parity Doctrine; and in fact are arguments in favor of using PPPs as the conversion factor. In the next sentence they say,

"Samuelson expressed his skepticism of PPP noting, 'unless very sophisticated indeed, PPP is a misleading pretentious doctrine, promising what is rare in economics, detailed numerical precision.'"

Observe that Samuelson is not criticizing the use of estimated PPPs for conversion of economics aggregates, but rather he is explicitly criticizing the *misleading pretentious* purchasing power parity *doctrine*. One interpretation of the use of the Samuelson quotation by M-R is that the authors are unaware that the purchasing power

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[2] Why does GDP enter into climate models of the type that Manne and Richels estimate? Presumably as a measure of productivity and associated pollution. Clearly GDP is precisely the type of volume measure for which PPPs are the appropriate conversion factor.

parity doctrine and PPPs are not the same thing, a not uncommon confusion. But the use of Samuelson's criticism of the *misleading pretentious doctrine* appears to be the only intellectual basis provided by M-R for using MERs for conversion in preference to PPPs. In fact the quotation criticizing the doctrine is tantamount to criticism of what Manne and Richels do when using MERs.

M-R also reference the seminal article of Bela Balassa (1964) that was also criticizing the *misleading pretentious doctrine*. The Balassa-Samuelson effect is precisely that PPPs depart systematically from MERs, and Balassa was arguing that economic research should take this into account. The treatment of Cassel by M-R does little to give the reader confidence about the remainder the paper.

A. <u>Some Substantive Criticisms of M-R Findings</u>

In this section we take up two substantive questions about the M-R paper, the first dealing with their comparison of results using the MERs and PPPs. The second question raises concerns about what the past can tell us of the future, like convergence, one of the subjects of this workshop. A question of terminology needs to be raised before moving on to the above two points.

An exchange rate or purchasing power parity is expressed as a ratio to some reference currency, like Japanese yen per US dollar or Italian lira per Euro. In the PPP literature it is conventional to refer to PPP for an aggregate like Gross Domestic Product, or Investment. These aggregate PPPs are built up from individual parities for basic headings that in turn use individual item price comparisons as a starting point. The ratio of an MER to the PPP was in the 1970s termed the *exchange rate deviation index*. But the inverse of this ratio, expressed as a percentage, following OECD practice, is more common. It is:

NPL(National Price Level) = (PPP/MER)*100,

where it is understood that the comparison is over GDP. One might also refer to the price level of investment or consumption; in the case of consumption it is intended to avoid confusion with the CPI (Consumers Price Index) that measures changes in consumer prices over time, rather than across space. This point of language is mentioned because in Equation 1 and on the horizontal axis of Figure 1, M-R the variable PPP/MER is used.

What they mean is clearly (GDP/PPP)/GDP/MER) or MER/PPP, the *exchange rate deviation index*.[3]

The Nature of the M-R Comparison

In equation (1) of their paper M-R use the exchange rate deviation index for the world, a value of 1.25, or a *world price level* (WPL) of 80 (100/1.25) for 2000 as a parameter as follows:

100/NPL = 1 + (1.25/GDP per capita)

It is not stated whether GDP is at MERs or PPPs, but probably the former. The curious curve that M-R fit does not permit estimation of any NPL above 100. This in effect assumes convergence to the US price level, a convenient assumption for which there is no empirical support from the experience of the last 30 years.

The curve fitted by M-R seems like a way of smoothing a rough world, but it is not a very satisfactory way of substituting the PPP for the MER in their comparison. The authors say that the differences they find are not great. These differences, even using their approach, do not appear trivial to me; but let me not belabor that point. The main criticism is that an appropriate comparison of PPP and MER would substitute PPP for MER at every point in the scenario where it occurs. This is important because the distribution of NPLs is not closely approximated by the curve they fit to the groups of countries examined by M-R.[4]

Another point about the way the factor 1.25 for 2000 is used by M-R. As noted above, the inverse of this number is the price level of the world (WPL) where the US dollar is the numeraire. The interpretation of this number is that on average the rest of the world had prices that in 2000 were 80% of those in United States over GDP. The WPL is basically a weighted average of the NPLs of all countries. In the world we live in,

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[3] I do not know if the M-R usage is common among those at this Workshop. What I want to make clear is that for those immersed in PPPs, the usual term for PPP/MER as a percentage is NPL, and that is used in this paper. As a bit a background, in PPP estimation thousands of individual price comparisons across space are made, a process in which some inspiration and a great deal of perspiration are involved The discussion in Part C provides a number of illustrations of why it is important to keep in mind that PPPs are driven by price differences across space, from which quantity comparisons can be derived.

[4] My colleague, Robert Summers, has been in correspondence with Alan Manne on this point. Neither Summers nor I are familiar enough with the models to say that substituting the PPP for the MER at every point where the MER is now used will change the results in a particular direction, only that this is a more appropriate way to make the comparison.

there is little tendency for the WPL to be stable over time. For the 50 years that we have examined the WPL, it has moved cyclically from about 69 in the 1960s to as high as 98 in 1995, back to 80 in 2000 and still lower in 2003. This greatly reduces the confidence that the way in which the WPL is used by M-R in their estimated relationship is a good basis for seeing if MER and PPP results would produce similar results in the future. And note further that this World Price Level moves around, not because of unstable movements in the numerators, the PPPs, but rather the unpredictability of the denominators, the MERs.

What has been developed above and further discussed below is that no supporting evidence exists for the assumption that prices and incomes of countries converge at some future date. There is still a more fundamental point about such convergence models. **What should converge to what?** In Cassel's world, exchange rates converge to PPPs, not PPPs to exchange rates. Likewise, if incomes converge they are PPP based incomes not incomes based upon MER conversions. So even granting the assumptions of the Manne-Richels paper, they have not applied their assumptions in their empirical work.

The Law of One Price

As noted above the law of one price was an offshoot of the purchasing power parity doctrine and has long been an assumption in theoretical models because of its simplicity and plausibility. For example, as the world became integrated in the 16th century, the ratio of the price of silver to the price of gold in Europe rose from 9:1 to 15:1 as New and Old World monetary stocks merged. But during the same period trade was increasing between Asia and Europe where the ratio of the price of silver to price of gold was 9:1. The law of one price is a convenient model for thinking about the arbitrage incentives that will drive the price of gold in terms of silver to the same level around the world. The time it took 400 years ago for this arbitrage was nearly a century while today, because of development of IT and improved financial markets, it would take place in seconds. It is tempting to believe that this is a good model for other prices in the world of today. Tempting, but not true.

The partial title of this note, *The Flaw of One Price*, is taken from an article in the *Economist* (October 18, 2003, p. 73) reporting on the Euro-price of a number of items in Euro-area countries. Clearly the expectation was that one price should prevail, but in fact

very significant discrepancies remain four years after the Euro was introduced. The percentage difference between high and low prices across the countries was 160% for a cinema ticket and 100% for a cup of coffee(non-tradables), and 100% for bottled water, 75% for milk and jeans and over 50% for Pampers and Nurofen, some particular tradables. The consistent message of empirical studies is that the law of one price does not even prevail for tradable goods.

But is the experience today a good predictor of what will happen in the future? Is there a tendency for prices in the world to come together? Here it is important to distinguish between the national price level (NPL) of a country (the PPP/MER expressed as a percentage), and the price structure of a country. Cassel thought that the NPL should tend to be 100 for all countries. However, all studies of the UN International Comparison Programme (ICP), of Eurostat for the EU, and for the OECD, have found this not to be the case. Further these studies have found no tendency for NPLs to necessarily converge, even though some countries have moved up the relative income scale. For example in 1960 the per capita GDP of Japan was 38% of the United States while the NPL was about 44. Since then its relative income has moved up to as high as 89% of the US and was 73 in 2000. And as expected Japan's NPL also rose but not towards the US level but way beyond to as high as 184! By 2000 it was 145 not much closer to the US than 40 years earlier, and today is again over 150.

Since the NPLs are not equal across countries, it is clear that the law of one price would not hold if the price of a food or clothing item were converted into a common currency at the MER. Would the law of one price hold if converted at PPPs? The answer is again, no, because the price structures of countries are usually different. This is partly an empirical observation based on over 200 bench mark ICP comparisons for over 100 countries, rich and poor, between 1970 and 2000. There is also a theoretical basis for this expectation, namely the Balassa-Samuelson effect discussed above (Also see symposium in the *International Economic Review*, 1994). The essential argument is that a systematic variation in the price structures between rich and poor countries exists; and also in the long period economic histories of countries. In fact NPLs differ in part because the price structures of countries differ.

But what about price structures over time? Will they not tend to converge? At present, theory would suggest yes; but empirical evidence would again suggest, no. One measure of price structure across countries is the price similarity index.[5] When these are examined for successive ICP benchmarks, prices are more similar for countries at similar levels of economic development. However, price similarity measures do not necessarily decrease over time even between countries like Japan or Korea compared to the United States, even though their income levels have become closer over time. (Heston and Summers, 1993)

What has been learned from extensive studies of prices around the world is that there is no tendency for the law of one price to prevail so that this is not a promising assumption on which to build long term models. Further there is no tendency for the MER and the PPP to converge. Models of convergence are convenient devices but they do not have any empirical support from evidence of the last 50 years.

C. Issues in Using PPPs, MERs and Associated Growth Rates

There are many contexts in which the MER is an appropriate measure for converting economic magnitudes. For example, when the debt of a country is to be repaid in foreign currency, the MER is the appropriate conversion factor. However, as indicated below, comparisons of debt to GDP ratios is much less clear.   A mixed situation involves the contributions (or subventions) countries should make to (receive from) international organizations. A country's capacity to contribute is most appropriately measured by converting its per capita GDP or Gross National Income at PPPs. But if a country is making a contribution in, in say, US$, the MER is the number relevant for its budget officials. On the receiving end, if contributions to the country primarily take the form of imports financed by contributing countries, then the appropriate conversion is the exchange rate. But if the contributions are, say, US dollars to finance local expenditures on education, then the PPP of the country will be more appropriate. Needless to say, most recipient countries prefer receiving contributions that are not tied to specific imports from one contributing country.

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[5] There are different ways of measuring price similarity. The above discussion is based on a measure defined as the weighted raw correlation coefficient between all possible pairs of countries of the relative prices of about 150 headings of expenditures on GDP. For a definition see Kravis, Heston and Summers (1982).

The above discussion refers to appropriate conversion factors between countries and it should be made clear that the same issues arise within countries or currency areas. For example the United States poverty line, stated as a US dollar figure, is applied to all parts of the United States. Yet it is widely recognized that this overstates the number in poverty in the South and the Dakotas and understates it in high cost areas like New York or San Francisco. To illustrate, in 1987 the poverty bundle of goods in New York cost about 120% of the national average and in the Dakotas about 20% less (Aten, 1996, based on Kokoski, et al, 1994). (If you are wondering why we still retain a national poverty line, consider the political-economic reality that any change now would mean more federal transfers to New England and less transfers to Southern States.) Similarly, establishment of the Euro currency area does not eliminate the need for estimating PPPs for those countries adopting the Euro.

Comparisons of Ratios in National and International Prices

In the illustrations below the point is made that PPPs for GDP are generated by converting expenditures on various categories of GDP at parities derived from detailed price comparisons. The bottom of line of ICP benchmark comparisons is a PPP at the level of GDP that is in turn built up by using purchasing power parities for about 150 basic headings that allow the measure of quantities of goods and services at a disaggregated level such as rice, non-alcoholic beverages or residential construction. While a PPP for GDP is generated by this process, the motivation of the ICP was to obtain real quantity comparisons across countries at a detailed as well as aggregate level, something for which the MER is inappropriate.

Comparisons of the ratio of investment to GDP in different countries are typically computed in national currencies.   If the MER is used to put all currency magnitudes in US dollars, the ratio would not change because both the numerator and denominator are divided by the by the same number (MER). This is a case where the use of the MER basically gets the comparison wrong. Why? Because the relative prices of investment goods are higher in poor countries than in rich countries as a result of trade restrictions and higher shipping costs and the lower prices of other goods. For example, in the late 1980s for a country like Pakistan, the percent of investment to GDP in rupees (=MER) was 25% and only 12% in international dollars (=PPP). Use of the MER in this

context is quite misleading because it would imply that Pakistan was much more inefficient in its use of new investment than in fact it was.

Two MER-PPP Energy Examples

Often the ratio of energy consumption per unit of GDP is used in cross country comparisons to gauge energy efficiency, or in projections of future energy use. If GDP is converted at PPPs then the volume of production in each country will be commensurate and a meaningful ratio can be formed. But if GDP is converted at MERs very misleading comparisons result. While neither China nor India were very efficient in energy use circa 1990, neither was as bad as would be indicated if energy consumption per unit GDP was done at exchange rates, which overstated use by a factor of four. This is well illustrated with somewhat different PPPs in Figure 5 of M-R.

A related example is the common comparison at MER of gasoline prices at the pump in different countries. When the MER is used to convert gas prices into US dollars it certainly has a clear interpretation that everyone can understand. However, it conveys little about the burden these prices are to those purchasing the gas in different countries. For example, in India the price of petrol at the pump in 2000 was at exchange rates about $2.62 a gallon (Rs 25 per liter). If we compare this with US prices then of $1.77 a gallon, we would say that Indian consumers paid 48% more for petrol than US consumers. But if we take into account that in India the PPP was roughly Rs 5/$, then to the Indian consumer the price of petrol is more like $13 a gallon compared to other goods and services purchased by the average Indian consumer.

GDP Levels at MERs and PPPs

To summarize the previous paragraphs, at any given time PPPs are appropriate to convert expenditures in national currencies to make quantity comparisons for the simple reason that between two countries for any level of aggregation:

$$\mathbf{Q_A/ Q_B = (E_A/ E_B)/ (P_A/ P_B)}$$

Where E is the expenditure of a country on GDP or component category, Q is the volume index or quantity, and P is the parity for that component category or total GDP (PPP). What about over time?

Here the weakness of MERs in the short-run is well known. For example, since January 1, 2002 the Euro has risen against the dollar by almost 40%, from about $ 0.90 to over $1.25 per Euro. For tourists planning trips to the US or to Euro countries or to U.S. manufacturing firms or importers, the decline in the dollar will clearly have important effects. But using the MER to compare the overall volume of production over time of different countries is terribly misleading. For example, during the past year the growth of the US economy on a per capita basis has been equal to or higher than the Euro economies while in China it has been much higher, at least 8% a year. Yet conversion of per capita GDPs by MERs in the two years would indicate that per capita income of the United States and China (where the exchange rate to the $ has been constant) has deteriorated by 40% in two years.   Clearly no one believes this but that does not stop a number of people in the media and elsewhere, all of whom who should know better, from using MERs for such purposes.

Is There a Difference Between Growth Rates Involving MERs vs. PPPs?

The answer to this question depends on the actual method used. As applied to total or per capita GDP, some common methods are described for the interested reader in a Note at the end of the paper. The basic point is that because the spread of world incomes across countries is much greater using MERs than when using PPPs, growth rates required to equally reduce country income inequalities, will be higher using MERs than PPPs.

D. The Use of MERs and PPPs by National and International Organizations

This paper argues that when you want to compare quantities across countries at the GDP or more detailed level, you should use PPPs for conversion of national expenditures. National and international agencies sometimes appear to use the MER in contexts where the PPP would be appropriate. This is often confusing to users and taken as support for the use of the MER in a context where it is not the appropriate conversion factor. In this concluding section some historical background is provided to explain better where we are today, followed by a discussion of some issues faced by organizations like the United Nations that make it difficult to change the status quo.

Some Background

The Bretton Woods agreement established the International Monetary Fund and a system of fixed exchange rates that ruled from 1947 to 1971. Many at the time realized that those MERs established were much further from PPPs than at the time Cassel was writing in 1918. This was because there were more barriers to the free flow of trade, capital and people than after World War I. In addition, most countries instituted foreign exchange controls during World War II that remained in effect long after the IMF was established. But comparisons among countries were needed to make assessments to the various parts of the United Nations (FAO, WHO, and the like), for quotas for the IMF and World Bank (then known only as the International Bank for Reconstruction and Development).

Basically the MER was the only wheel in town circa 1947. Economists had earlier recognized the deficiency of the MER for quantity comparisons. Colin Clark (1940) was the first to attempt PPP comparisons for a wide variety of countries which he was to expand and improve in a 1957 edition of *The Conditions of Economic* Progress. It should also be remembered that the systematic preparation of national accounts was only beginning in the 1930s.

The first international organization to become involved in PPP work was the predecessor of the OECD, the Organization for European Economic Cooperation (OEEC) in Paris.[6] Because MERs among their member countries were often artificially maintained, the OEEC commissioned binary comparisons between the United States and Italy, the UK, France, Belgium and Germany in the early 1950s. This study was published (Gilbert and Kravis, 1954) and many involved, like Angus Maddison and Irving Kravis were to continue this type of study.[7]

. The first benchmark results of the ICP were known circa 1973 and were published in 1975. The Committee on Assessments at the United Nations began to ask early on whether they should be using PPPs instead of MERs as a basis for determining contributions of member countries. To my knowledge the Committee still meets and still

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[6] There were other comparisons begun in the 1960s. These included the Eastern bloc countries under COMECON, and comparisons in Latin America under the auspices of the Economic Commission for Latin America.

[7] In 1968, Kravis, based at the University of Pennsylvania became the first director of the United Nations International Comparison Project (now Programme) with Zoltan Kenessey of the UN Statistical Office.

asks the same questions, but operationally the system is little changed. The reasons are clear and instructive. If PPPs were used, two things would happen. First, the world income distribution would be compressed, so in order to distribute the assessment burden as it was under MERs, a new algorithm relating assessment to income would need to be negotiated, never an easy process. Second, even if a new assessment schedule could be established, the ranking of some countries would change. There would be winners, but there would also be losers who would protest any change in approach.

This story could be repeated for the World Bank and its criteria for loans to developing countries and other organizations. The research side of international organizations began to use PPPs while the operational side stayed with MERs. Changing the basis of any system of assessment or assistance from MERs to PPPs is likely to be contentious, so the persistence of this dual status of MERs and PPPs is not difficult to understand. As was discussed earlier for the United States poverty line, the same issues arise within countries or currency areas. The purchasing power of the dollar is not the same in all parts of the United States nor is the PPP the same throughout the Euro area.

Another dimension of official use also deserves mention. When numbers are used to distribute money or to make an assessment, it pays to be poor. Because PPP conversions tend to raise incomes in poor countries compared to the MER scaling, it was in a country's interest to not participate in PPP work, the case in China, or to submit prices from doubtful outlets, as was the case of India in 1985. For this reason, those interested in high quality estimates of PPPs were not necessarily supportive of their use for operational purposes.

The Heavy Hand of the Past

Both the World Bank and the IMF tended use MERs for operational purposes and also in widely distributed annual publications like the Bank Atlas and the IMF's World Economic Outlook (WEO). These uses continued even when other parts of these organizations were estimating alternative research series the publication of which, was much lower profile. Those of us toiling in the PPP trenches, though often discouraged by

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Maddison, in addition to his historical studies using PPPs, established a unit in the 1980s at the University of Groningen in Holland to put together PPP comparisons from the production side.

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slow official acceptance, were gratified by the speed at which PPPs entered academic research and basic economic textbooks.

Several factors tended to push national and international organizations to use PPPs more extensively. Certainly the demise of the Bretton Woods system in the early 1970s decreased the stability of GDP comparisons based on annual MERs. Another surprising effect of freeing up exchange rates was that a number of countries for the first time had NPLs greater than 100, which was contrary to expectations.

There were two developments in the late 1980s that tended to push international organizations more heavily into PPPs. In the late 1980s, the WEO was finding that world output growth was very slow. This appeared true even in Asia, where China was reporting growth rates of 8% a year, and the financial media were supportive of these claims. The problem was clear. The IMF weighted the growth in each country by the GDP converted at its MER. When done this way, the high growth in China got little weight, and the slow to negative growth in Japan in that period got a high weight. What to do? At least for the WEO, Cassel and the MER had to go. Once the IMF conceded on this point, the World Bank began to offer as an alternative GDP numbers based upon PPPs.

On the academic front, the availability of PPP based GDP numbers for selected years and some extensions of these numbers involving considerable hubris made available for research the cross-section time series data set, immodestly titled Penn World Tables. This data set for the first time permitted a cottage industry of growth studies using a panel of PPP based numbers, pioneered by Barro, Rohmer, Salai-i- Martin and others. As these convergence studies multiplied, it was quite clear that the world was not behaving in the very simple way that neo-classical economics suggested.

But schizophrenia remains in the MER-PPP usage. For example, the World Bank is now the global manager of the ICP involving new PPP estimates for perhaps 150 countries for 2004-2005, supported by IMF and a number of national governments. At the same time other parts of the Bank will use the MER appropriately in some contexts such as financial transactions, but inappropriately in other contexts. The Human Development Report of UNDP was roundly criticized, and rightly so, for measuring the

gap between poor and rich countries on the basis of MERs, while at the same time using the PPP based GDPs as one of the inputs into its Human Development Index.

Conclusion

What is political in the MER-PPP debate, like the use of established metrics based on MERs for purposes of concessions, assessments, or loans will remain political. However, the future should be clear. When one wants to compare quantities across countries, money measures should be converted at PPPs, because even if there are substantial errors in the estimated PPPs, they will produce more credible results than MERs. The fact that some governments or international organizations still use MERs for some purposes is not a valid reason for their use in future research. Similarly, the fact that past studies based on MER conversions would not have produced very different results than if they had been based on PPPs, is not a justification for using MERs in the future projections. And as we have argued these models are based on the assumption that prices and incomes in the future will converge to a world of one price, an assumption for which the past 50 years provides no support. But even accepting that assumption, MERs should converge to PPPs, and PPP based incomes to PPP based incomes, which in that never-never world will also be MER based incomes. Manne and Richels and others, however, do it backwards starting with MER numbers.

When Cassel submitted his seminal article in 1918, the editor of the *Economic Journal* who accepted it for publication was Keynes. If Cassel had lived after WWII, it is a very good bet that he would have greatly modified his own doctrine. Keynes is well known for his response to a journalist who asked why his position today was not consistent with what he had said several years back. Keynes retorted to the effect, "When confronted with new information I change my mind. What do you do, sir?" PPPs based GDP numbers were not available most countries until the 1980s. Certainly, prior to the 1980s, this was a plausible reason to engage in projections for the future based on MERs. But we now know from over 35 years of experience that there is no tendency for PPPs and MERs to converge, even for countries at the same levels of economic development. And even if they were, it is MERs that should converge to PPPs, and not visa versa, and is the case in most projections. Where PPPs are the appropriate

conversion measure for GDP and similar measures of output, the only plausible case for the use of MERs is political, not economic.

Note on Growth Rates and the MER-PPP Question

As noted in the text, the question of what difference there is between growth rates involving MERs or PPPs depends on the actual method of applying national growth rates. Before turning to methods, one aspect of PPP benchmark studies should be noted. Between two benchmark ICP comparisons there is an implied change in the economic levels between countries. If Korea in benchmark comparisons is 20% of the United States in 1970 and 40% in1990 then these two benchmarks imply that economic growth of Korea between 1970 and 1990 was much more rapid than in the United States. It would be nice if the per growth rate in Korea were 3.5% a year greater than in the United States because that would produce findings consistent with the two benchmarks. But the implied changes over even a 5 year period are usually not consistent with the relative growth rates between any pair of countries. There are conceptual and empirical reasons for this that need not be discussed here.   These inconsistencies have led the EU countries to move to annual PPP estimates, and the OECD countries to move to 3 year benchmarks with the goal of going annual. However the magnitude of these inconsistencies do not approach the difference between MERs and PPPs.

Some of the different methods of applying growth rates to MER and PPP converted GDP levels include:

    a. Applying national growth rates to GDP converted at MERs for a given year, as described in the previous paragraph.

    b. Applying national growth rates to GDP converted at PPPs for a given year. This is the method that was used by the OECD from 1980 to 1993 and is the approach employed by Maddison (2001) in his many long and very long run economic studies.

    c. Using PPP based international price weights for successive years or a given year to apply to national GDP component growth rates to obtain chain or Laspeyeres growth rates for aggregate GDP. Typically this will produce

somewhat lower growth rates for low income countries than method b. These

are the growth measures in the Penn World Table (PWT) that can be obtained

from http://pwt.econ.upenn.edu or http://datacentre.chass.utoronto.ca/pwt/)

d. The position of each country using PPPs relative to: the world average; to a

single country like the United States; or in a world income distribution can be

derived in current international prices for the period 1950-2000 in PWT. This

last measure has been used in studies of the world income distribution in a

number of studies.

With respect to methods a. and b. above, there is no difference in the growth rates

used; they are simply GDP constant price growth rates from the national accounts of each

country. And since national accounts growth rates for the major components of GDP are

used in method c., the differences in assumed growth will not greatly differ from methods

a. and b.

However, for long term studies it is often projected that the spread of incomes per

capita across countries will be substantially reduced by some future date. Because the

spread of incomes assumed under method a is much greater than under b., c. or d. above

then the growth rates needed to reduce the spread will be different. It is in this sense that

projected growth rate requirements to achieve the same goal of reducing income

inequalities, will be higher using MERs than PPPs.

However, in the area of long run comparisons, there is much less certainty about

the differences in methods b. and d.[8] In fact there is a substantial debate on the question

of the relative levels of per capita GDP of the UK and the US circa 1900. (Devereau and

Ward, and comment by Broadberry, 2003). In particular, method b.used by Maddison

(2001) puts the UK at least 10% above the US a century ago, while method d. as

implemented by Ward and Devereux and some others independently have the US

comfortably above the UK in per capita income by 1900. The implications of these

differences for the interpretation of the economic history of the 19th century are

significant. The jury is still out on the question of whether method b. or d. is preferable

for long run studies.

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[8] Method c. is not considered here because it depends on the level of aggregation that is used to weight the
growth rates of the components of GDP.

References

Aten, Bettina (1986), "Some Poverty Lines are More Equal Than Others," Presented to the Western Regional Science Association, February. Discussion Paper of the Center for International Comparisons at the University of Pennsylvania, *CICUP* 95-5.

Balassa, Bela (1964), "The Purchasing Power Parity Doctrine; A Reappraisal, *Journal of Political Economy*, December.

Broadberry, Stephen (2003), "Relative Per Capita Income Levels in the United Kingdom and the United States since 1870: Reconciling Time-Series Projections and Direct-Benchmark Estimates," *Journal of Economic History*, September.

Cassel, G. (1918), "Abnormal deviations in international exchanges", *Economic Journal* 28.

Clark, Colin (1940), *The conditions of economic progress*, London, Macmillan and Co.

EE (2003), A series of exchanges between Ian Castles and David Henderson

Editor(1994), Special Issue on the Balassa Samuelson *Review of International Economics*, October

A, Heston and R. Summers (1993),"What can be Learned from Successive ICP Benchmark Estimates?," in A. Szirmai and D. Pilat ed., *Explaining Economic Growth; Essays in Honour of Angus Maddison*, North Holland, Amsterdam..

Kokosky, M., B. Moulton and D. Zieschang (1999), "Interarea Price Comparisons for Heterogeneous Goods and Several Levels of Aggregation," in *International and Interarea Comparisons of Income, Output and Prices*, A. Heston and R. Lipsey editors, NBER, Studies in Income and Wealth Volume 61, U of Chicago Press.

I.B. Kravis, A. Heston and R. Summers (1982) ,*World Product and Income: International Comparisons of Real GDP*, Johns Hopkins University Press, May .

Maddison, Angus (2001) *The world economy : a millennial perspective*, Development Centre of the Organisation for Economic Co-operation and Development, Paris, France.

Manne, Alan and David Richels, "Market Exchange Rates or Purchasing Power Parity; Does the Choice Make a Difference for the Climate Debate?"*,

Samuelson, Paul (1964), "Theoretical Notes on Trade Problems," *Review of Economics and Statistics*, May.

Ward, Marianne and John Devereux (2003), "Measuring British Decline: Direct versus Long-span Income Measures," *Journal of Economic History*, September.