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IMPLICATIONS OF THE ASIAN CRISIS ON ESTIMATING INTERNATIONALLY COMPARABLE NATIONAL INCOME

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Foreword

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INTRODUCTION

The importance and use of internationally comparable national income accounts are well recognized. The Bank and other international organizations require internationally comparable macroeconomic data for their decision-making process and operations. International development organizations use gross national product (GNP) as a key criterion in determining the development status of member countries that often governs eligibility for concessional treatment in aid matters, such as soft loans, and in trading arrangements. At the same time, international rating agencies, financial institutions, and banks use internationally comparable GNP as an important factor to determine sovereign risk, credit risk, and other risk ratings of countries and their financial papers. The ratings are instrumental in determining the borrowing rate from the international market and the interest rate on financial paper. Furthermore, comparable GNP figures are useful to academicians, multinational corporations, and investors. One important use of GNP figures by the Bank is to classify member countries into distinct groups based on GNP and debt repayment capacity. This classification governs the eligibility of member countries for soft loans. One of the major implications of the financial crisis is that some of the crisis-affected countries could be reclassified.

Poverty reduction remains a formidable challenge to governments and international multilateral organizations. The purchasing power parity (PPP) method can be used to produce PPP exchange rates, which in turn can generate internationally comparable GNP. These PPP exchange rates are also used to construct meaningful and internationally comparable poverty estimates based on a common poverty line having the same real value across the countries.

The PPP could also be very useful to governments as a cross-sectional deflator for comparing income and other economic indicators of different regions within a country by equalizing prices

across countries. These estimates can be used to measure regional disparity within a country and can shed light on the incidence of poverty.

Some multilateral organizations, particularly the International Monetary Fund (IMF), use the individual country's GNP as a share of world, regional, or group GNP (representing the relative economic sizes of countries), to aggregate income growth and other economic indicators for individual countries into world, region, or group aggregates. The IMF has used the PPP-based GNP weights since 1993 to aggregate income growth and other economic indicators. Prior to 1993, the IMF used market exchange rates to convert individual countries' GNPs into United States (US) dollars (IMF 1993).

The United Nations (UN) System of National Accounts (SNA) establishes uniform concepts and methods of compiling macroeconomic aggregates. Since these are valued in the countries' respective currencies, these are not internationally comparable. There are conceptual problems as well as practical consequences with using an exchange rate for converting national currency estimates of GNP to US dollars. The simple conversion method brings distortions to GNP data.

Due to the financial crisis in several emerging market economies and the significant depreciation of their currencies against the US dollar, the estimates of the affected countries' GNPs will be significantly lower in terms of US dollars. Therefore, the crisis has heightened the distortion in GNP estimates based on the simple conversion method. One of the key challenges for multilateral organizations, including the Bank, is to come up with internationally comparable and meaningful GNP estimates by an appropriate method.

This note critically reviews methodologies available for income estimation together with empirical estimates and recommends an appropriate method that will produce realistic and internationally comparable estimates. At the same time, the note illustrates empirically the distortion in the GNP figures of some crisis-affected developing member countries (DMCs) when the simple conversion method is used. Finally, it discusses a framework for improving and implementing the recommended method for estimating national income of DMCs.

METHODS FOR INCOME ESTIMATION

The existing methods for GNP estimation are the official exchange rate or simple conversion method, World Bank Atlas method, and purchasing power parity (PPP) method.

Official Exchange Rate or Simple Conversion Method

This is a straightforward method, i.e., GNP in national currency is divided by the average official exchange for the same reference period.

World Bank Atlas Method

The World Bank developed the so-called Atlas method, which uses a three-year moving average of exchange rates to convert national currency GNP to US dollars. The Atlas conversion factor for any year is the average of a country's exchange rate for that year and its exchange rates for the two preceding years, after adjustment for differences between the inflation rate in the country and the inflation rate in the G-5 countries (France, Germany, Japan, United Kingdom, and US), which are the top five exporters of goods and services. The purpose of this three-year averaging is to reduce the impact of exchange rate fluctuations by smoothing annual fluctuations in prices and exchange rates for each country.

A country's rate of inflation is measured by its GNP deflator. The inflation rate for the G-5 countries is measured by changes in the deflator for the SDR (special drawing right, the IMF's unit of account). The SDR deflator is calculated as a weighted average of the G-5 countries' GNP deflators in SDR terms. The GNP deflator of each country is calculated by dividing the value of GNP at current values by the value of GNP at constant values, both in national currency. The weights are determined by the amount of each currency included in one SDR unit. Weights vary over time both because the IMF changes the composition of the SDR and because the SDR exchange rate for each currency changes. The SDR deflator is calculated in SDR terms first and then converted to US dollars

using the SDR to dollar Atlas conversion factor. Details of the formulas for the computation are given in the appendix.

Purchasing Power Parity Method

The use of official exchange rates to convert national currency figures to US dollars does not reflect the relative domestic purchasing power of currencies. The UN International Comparison Program (ICP) had developed measures of real GNP on an internationally comparable scale, using the concept of PPP. The PPP method largely eliminates the inconsistencies inherent in market exchange rate conversions, which are volatile and are unable to reflect significant differences in price levels across countries.

In this method, estimates are calculated by converting GNP in national currency to US dollars using PPP rates instead of official exchange rates as conversion factors. The PPP rate of conversion can be defined as the number of units of a country's currency needed to purchase the same amounts of goods and services in the country as one US dollar would buy in the US. The resulting estimates are expressed in international dollars, a unit of account that has the same purchasing power over total GNP as the US dollar in a given year. Therefore, this method produces, through the process of equalizing prices among countries, an estimate of relative GNP that is based on what constitutes real income—the volume of goods and services embodied in national income. PPP rates are estimated from statistical survey data by calculating price ratios of comparable items and aggregating them by their corresponding weights in GNP.

The comparable income of nations can be computed by PPP theory based on two analytical versions. The strong version of PPP theory relies in the law of "one price" in an integrated and competitive market where the exchange rate between two currencies equals the ratio of the costs of a standard basket of goods and services in their countries. On the other hand, the weak version of the theory states that the exchange rate moves with changes in relative price levels. This version presumes that an equilibrium relationship and an adjustment mechanism assuming a high degree of substitution in the world exist between PPP and the exchange rate at some point in time, not necessarily based on identical goods and services. How-

ever, in real life, such assumptions about the law of one price, the equilibrium relationship between PPP and the exchange rate, and the fast acting adjustment mechanism in international trade would not hold (Ahmad 1998).

Relative prices of goods and services not traded on international markets tend to vary substantially from one country to another, leading to large differences in the relative purchasing power of currencies and thus in welfare as measured by GNP per capita. The use of PPP conversion factors corrects for these differences and may therefore provide a better comparison of average income or consumption among economies.

The source of PPP data is the ICP, coordinated by the UN Statistics Division. The ICP survey was conducted in 64 participating countries in 1985 and 30 in 1990. The participating countries are also called benchmark countries, and the data collected from them, benchmark data. The survey started in 1970 covering 10 countries and the latest available estimators cover 90 countries for the year 1990. The World Bank collects detailed ICP benchmark data from regional sources (benchmark countries), establishes global consistency across the regional data sets, and computes regression-based estimates for nonbenchmark countries (Ahmad 1998). The benchmark data or estimates of PPP-based numbers concentrate on the expenditure side of GNP. PPP estimates are derived by calculating price ratios of a large number (2,000 items or more) of comparable items of final expenditure and aggregating them by corresponding GNP expenditure weights.

The ICP price surveys are conducted more or less regularly and completely for the industrialized countries but are largely incomplete, discontinuous, and uncertain in developing countries. The results from the actual surveys conducted in 1993 are not yet available for all the countries. The detailed information on the regional sources and compilation of benchmark data is provided in the World Development Report of the World Bank. Actual PPP surveys are conducted at about five years interval. As ICP figures are available every five years or so and some countries had not participated in some of the benchmark years, estimates are extrapolated to other years and to other countries by the real growth rates of the respective countries and adjusted for real inflation. However PPP estimates

of one benchmark year estimated through extrapolation from another benchmark year will not match the benchmark results as prices are held constant for growth rate computation (Ahmad 1993).

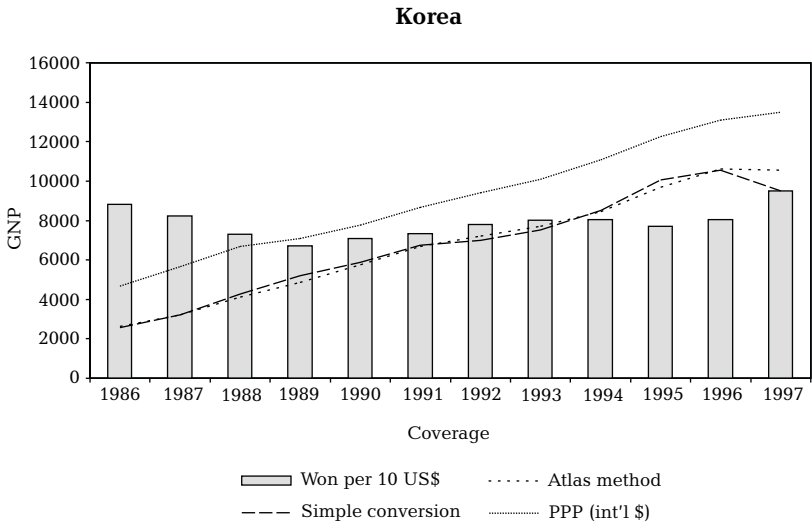
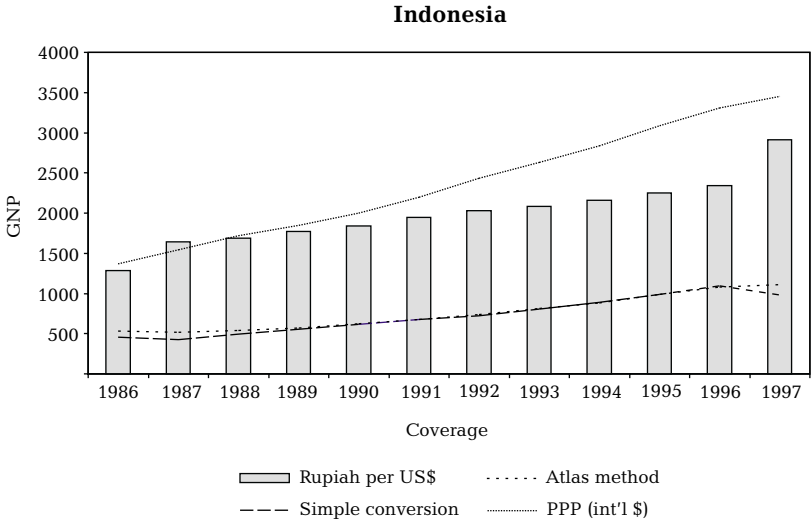
EMPIRICAL ESTIMATES BY ATLAS, PPP, AND SIMPLE CONVERSION METHODS: A COMPARISON

This section compares empirical estimates obtained using the simple conversion method, Atlas, and PPP methods, for five Asian countries in crisis: Indonesia, Korea, Malaysia, Philippines, and Thailand. The analysis is done for 1986 through 1997. At the same time, the distortion of GNP of these countries as a result of sharp falls in exchange rates during the financial crisis is demonstrated.

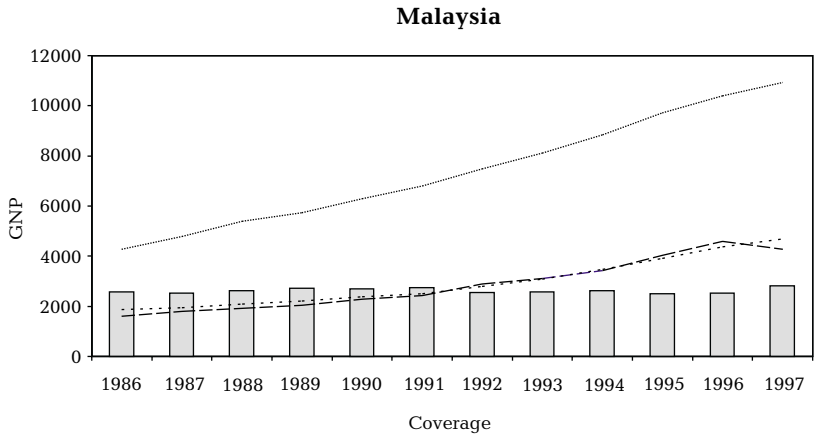
The estimate of GNP by the simple conversion method is obtained by dividing the GNP estimate in local currency by the annual average exchange rate in US dollars. The PPP and Atlas method estimates are obtained from World Bank's *World Development Indicators* (1998).

Figures 1 to 3 and Table 1 present the empirical estimates of per capita income by simple conversion, Atlas, and PPP methods for the crisis-affected Asian countries. A comparison among estimates for 1996 and 1997 (when the crisis started) shows that the effect of the crisis (or exchange rate fluctuation) appears least severe in PPP estimates and most severe on simple conversion estimates. The gaps between PPP and Atlas and simple conversion estimates tend to diverge over time except for Korea, where these tend to remain constant over time (Figure 1). The main reason behind the divergence is the depreciation of local currency rates over time. Therefore, the growth rates of per capita GNP based on PPP for Indonesia, Malaysia, Philippines, and Thailand would be higher than those based on other methods. In Korea, the growth rate tends to remain the same based on all the estimates. The selection of an appropriate method may depend on the particular use of the national income estimates. The above analysis, however, shows that the PPP estimates are least influenced by the crisis and, therefore, are most appropriate for producing internationally comparable income estimates of countries in crisis, particularly for measuring per capita national income and poverty incidences.

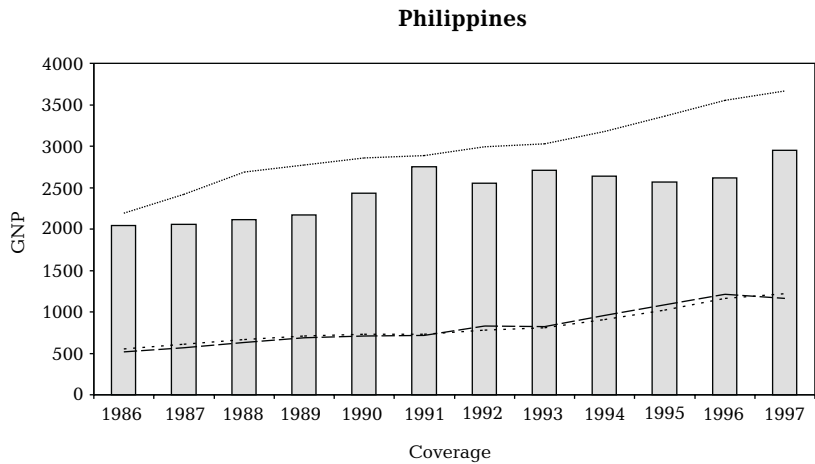
**Figure 1: GNP Per Capita at Current Prices and Exchange Rate:
Indonesia and Korea**



**Figure 2: GNP Per Capita at Current Prices and Exchange Rate:
Malaysia and Philippines**



Ringgit per 1000 US\$ ····· Atlas method
 - - - Simple conversion ····· PPP (int'l \$)



Peso per 100 US\$ ····· Atlas method
 - - - Simple conversion ····· PPP (int'l \$)

**Figure 3. GNP Per Capita at Current Prices and Exchange Rate:
Thailand**

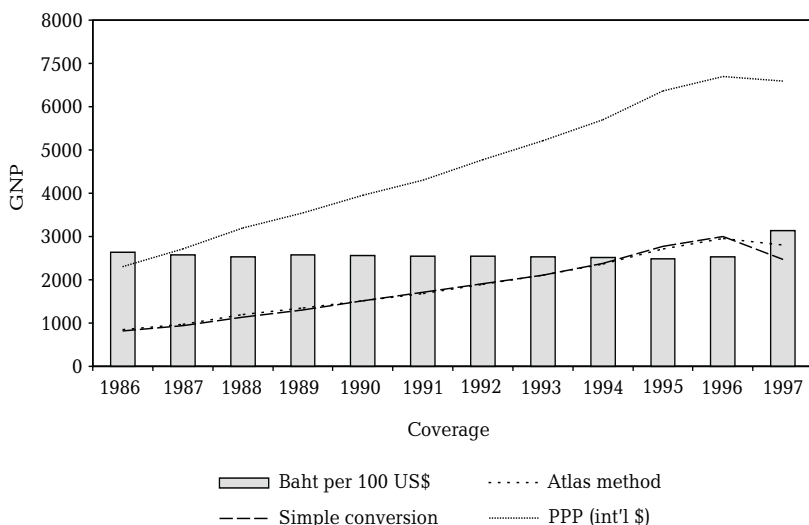


Table 2 demonstrates the effect of the financial crisis on the estimation of national income by the simple conversion method for crisis-affected countries. The analysis shows that the GNP estimates for all five crisis-affected countries suffered from distortions of varying degrees depending on the magnitude of the depreciation of their currencies. This clearly shows that the simple conversion method fails to produce meaningful and realistic estimates of national income for crisis-affected countries.

CRITICAL REVIEW

The simple conversion method produces highly distorted estimates and inconsistent results if exchange rates change significantly. For example, if countries X and Y have the same GNP in dollar terms in 1997 and X's GNP increases by 4 percent from 1997 to 1998 and there is no growth for Y, then the GNP of country X in 1998 will be 4 percent higher than that of country Y. However, over the same period, if the currency of X depreciates by 4 percent and that of country Y does not depreciate, then contrary to common

Table 1: GNP Per Capita at Current Prices Estimated by Simple Conversion, Atlas, and PPP Methods

Country	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Indonesia												
GNP per capita at current prices (US\$)												
Simple conversion	458	425	492	553	613	676	720	810	892	992	1098	981
Atlas method	530	520	540	570	620	680	740	810	880	990	1080	1110
PPP (int'l \$)	1370	1540	1720	1850	2000	2200	2430	2630	2840	3090	3310	3450
Rupiah per US\$	1,282.56	1,643.85	1,685.70	1,770.06	1,842.81	1,950.32	2,029.92	2087.10	2160.75	2248.60	2342.30	2909.40
Korea												
GNP per capita at current prices (US\$)												
Simple conversion	2559	3209	4279	5199	5875	6752	7003	7508	8505	10056	10553	9509
Atlas method	2620	3230	4120	4860	5770	6670	7220	7720	8460	9680	10610	10550
PPP (int'l \$)	4670	5670	6680	7080	7780	8660	9410	10100	11070	12250	13080	13500
Won per 10 US\$	8814.54	8225.67	7314.68	6714.56	7077.64	7333.53	7806.51	8026.71	8034.50	7712.70	8044.50	9512.9
Malaysia												
GNP per capita at current prices (US\$)												
Simple conversion	1607	1792	1928	2047	2286	2432	2903	3105	3419	4021	4596	4283
Atlas method	1860	1940	2100	2220	2370	2490	2790	3090	3470	3900	4370	4680
PPP (int'l \$)	4280	4780	5390	5730	6300	6800	7470	8110	8830	9720	10390	10920
Ringgit per 1000 US\$	2581.40	2519.60	2618.80	2708.80	2704.90	2750.10	2547.40	2574.10	2624.30	2504.40	2515.90	2813.20
Philippines												
GNP per capita at current prices (US\$)												
Simple conversion	520	564	632	691	712	719	829	825	958	1085	1212	1166
Atlas method	550	610	670	710	730	730	780	810	910	1020	1160	1220
PPP (int'l \$)	2190	2420	2690	2770	2860	2890	2990	3030	3180	3360	3550	3670
Peso per 100 US\$	2040.00	2060.00	2110.00	2170.00	2430.00	2750.00	2550.00	2710.00	2640.00	2570.00	2620.00	2947.10
Thailand												
GNP per capita at current prices (US\$)												
Simple conversion	813	941	1131	1306	1522	1711	1902	2105	2383	2776	3006	2463
Atlas method	850	970	1190	1350	1520	1680	1900	2110	2360	2710	2960	2800
PPP (int'l \$)	2310	2710	3200	3550	3950	4300	4770	5210	5700	6360	6700	6590
Baht per 100 US\$	2629.90	2572.30	2529.37	2570.20	2558.50	2551.70	2540.00	2531.90	2515.00	2491.50	2534.26	3136.40

Sources: For 1986-1996, *World Development Indicators 1998* (World Bank 1998).For 1997, World Bank official communication; *International Financial Statistics* (IMF 1998).

**Table 2: Effect of the Currency Crisis on Estimation of National Income at Current Prices (GNP)
by Simple Conversion Method**

Country	GNP in NCU ^a			GNP in Million US\$			GNP in Million US\$ (at 1996 exchange rate)			Exchange Rate, NCU/US\$ (average of period)		
	1996	1997	gr(96-97) ^b	1996	1997	gr(96-97)	1996	1997	gr(96-97)	1996	1,997.0	gr(96-97)
Indonesia	2,574,000	2,851,800	10.8	1,100	980	(10.9)	1,100	1,219	10.8	2,340.0	2,910.0	24.4
Korea	8,482,200	9,044,010	6.6	10,550	9,510	(9.9)	10,550	11,249	6.6	804.0	951.0	18.3
Malaysia	11,592	12,027	3.8	4,600	4,280	(7.0)	4,600	4,773	3.8	2.5	2.8	11.5
Philippines	31,702	34,515	8.9	1,210	1,170	(3.3)	1,210	1,317	8.9	26.2	29.5	12.6
Thailand	76,153	77,244	1.4	3,010	2,460	(18.3)	3,010	3,053	1.4	25.3	31.4	24.1

^anational currency unit (Indonesia in rupiah, Korea in won, Malaysia in ringgit, Philippines in peso, Thailand in baht).

^bpercent growth rate from 1996 to 1997.

Sources: For 1996, *World Development Indicators 1998* (World Bank 1998); For 1997, World Bank official communication; *International Financial Statistics 1998* (IMF 1998).

expectation, the GNP estimated by simple conversion would not exhibit any growth in X's per capita income relative to Y.

Market exchange rates do not measure the price level of a country. Furthermore, the exchange rates do not necessarily move with the price levels. Market exchange rates may be affected by speculative bubbles, exchange market intervention, asymmetric speed of adjustment in goods and asset markets, or other shocks. Due to these factors, the exchange rate may exhibit short deviations or long swings away from the corresponding PPP values. The deviation of PPP from the exchange rate is not uniform for all kinds of goods. Therefore, the exchange rate comparisons among countries may distort certain kinds of structural comparisons. The exchange rate is influenced by various factors such as exchange market interventions, speculation, capital transfer, and prices of traded goods and services. The exchange rate, being a price for buying foreign currency, is relevant for actual transfer across international borders, but is not so relevant for the portion of GNP that does not enter international trade or goods and services that are not internationally tradable (Ahmad 1998). The exchange rate, being a single number per country, should be applied to total GNP and its component regardless of their relative price characteristics.

In view of the above, the simple conversion method can be misleading for most countries, particularly for crisis-affected Asian countries. Its main advantages are simplicity and minimal data requirement.

Major disadvantages of the simple conversion method include the following:

- (i) the yield comparison using exchange rate converted GNP values is frequently inconsistent with actual developments in the growth of real GNP in the countries being compared,
- (ii) the method produces highly volatile estimates when the exchange rate fluctuates considerably,
- (iii) the estimates may not be all internationally comparable, and

- (iv) the method does not take care of the price factor or price fluctuation.

Meanwhile, the Atlas method, which uses a measure of central tendency (such as moving average) to reduce the impact of exchange rate fluctuation, is desirable in terms of time and cost effectiveness. This method produces more realistic estimates than does the simple conversion when exchange rates fluctuate moderately. However, the method does not readily lend itself to meaningful economic interpretation. At the same time, an average over three periods may not be able to smooth a wide range of fluctuation in exchange rates. The continuity of this moving average series could not be maintained as the next three-year series cannot be linked easily to the estimates of the previous series.

If we measure the per capita GNP of the People's Republic of China (PRC) by the Atlas method, it would be almost constant at around 2.2% of that of the US between 1985 and 1995, whereas the real per capita gross domestic product (GDP) of the PRC grew over five times faster (8.7% per annum) than that of the US (1.6% per annum) over the same period. The main reason behind this was the depreciation of the Chinese currency almost in proportion to its relative rate of growth. However, the per capita GNP estimated by the PPP method followed the path of the relative rate of real growth for both the PRC and US (Ahmad 1998).

The major disadvantages of Atlas method include the following:

- (i) the estimates depend on past data,
- (ii) it is difficult to extract meaningful economic analysis from the estimates,
- (iii) the outcome depends on the choice of the period of moving average and the basis for the deflator used to adjust the inflation rate,¹

¹Initially, the US inflation rate was used as the deflator for adjustment and since 1995 the inflation rates of G-5 countries were used.

- (iv) the smoothing technique using uniform three-year periods may not be appropriate for all countries and may not smooth exchange rate and price fluctuations adequately, and
- (v) the estimates would still be distorted if a country suffers from significant fluctuations in exchange rate and inflation for three years as a moving average of a three-year period is used.

In theory, the PPP concept is an ideal measure for estimating internationally comparable national income, especially when there is high volatility in exchange rates. But the estimates must be computed accurately. The estimates are particularly useful for multilateral agencies responsible for making comparisons across countries. However, caution should be exercised in interpreting PPP-based indicators. An analysis of past data using PPP and Atlas methods shows that results from the PPP method tend to be higher for developing or lower-income countries and lower than those derived from the Atlas method for developed or higher-income countries. Due to differences in the relative prices of traded and nontraded outputs, market exchange rates of developing countries may deviate significantly from their PPP values.² In general the prices of services in developing countries are very low in US dollar terms, and hence, there is a negative bias in living standard estimates that are based on the market exchange rate (IMF 1993). PPP estimates employ price comparisons of comparable items, but not all items can be matched perfectly in quality across countries and over time. Services are particularly difficult to compare, in part because of differences in productivity. Many services—for example, government services—are not sold in markets in all countries, so they are compared using input prices (mostly wages). Because this

²According to the Balassa-Samuelson thesis of biased productivity growth, the exchange rates of developing countries are undervalued compared to their PPP equivalents due to productivity differences in the tradable and nontradable sectors and due to larger nontradable sectors relative to industrial countries (Gulde and Schulze-Ghattas 1992).

approach ignores productivity differences, it may inflate estimates of real quantities in lower-income countries.

The disadvantages of PPP method include the following:

- (i) it is a complex and time-and-labor consuming process and, therefore, estimates cannot be produced annually or quarterly based on actual PPP price surveys. Timeliness is a problem, e.g., the actual comparable data for most countries are available only up to 1990.
- (ii) The cost of generation is very high, especially for statistical activities at national, regional, and international levels.
- (iii) The method tends to overestimate data in developing countries as it may inflate estimates of real quantities in lower-income countries.
- (iv) Comparison among countries can produce different outcomes depending on the number of countries included in the comparisons; that is, if they are undertaken in a bilateral or in some multilateral (regional, continental, worldwide) context.
- (v) The method depends on the choice and definitions of goods (tradable) across countries.
- (vi) The method depends on the way items of goods and services are aggregated.
- (vii) The method depends on the choice of the index formula used in computing basic parities.
- (viii) A degree of incompatibility may be introduced if some countries do not properly follow the principles of the methodology in reclassifying national data across ICP expenditure groups.

- (ix) For some important expenditure categories, particularly for services, the quality differences across countries may not always be captured.
- (x) A narrow range of comparable groups is available for pricing between two very different economies belonging to the same region (such as Turkey and Sweden in the Organization for Economic Co-operation and Development, or Japan and India in the United Nations Economic and Social Commission for Asia and the Pacific; and
- (xi) Data may be unreliable due to significant differences in consumption habits, expenditure patterns, and institutional arrangements among countries that belong to different geographical areas or have reached very different levels of economic development.

In view of the above disadvantages, particularly high cost and time-intensive production and inflated estimates for developing or low-income countries, some developing countries are reluctant to continue to cooperate in ICP surveys. Some countries find ICP expensive and not beneficial in terms of their policy formulation. Furthermore, some developing countries have expressed apprehension over losing preferential treatment from lending and aid organizations if PPP numbers (which are always higher than Atlas estimates for low-income countries) are used as the criteria for eligibility.

PROGRAM FOR IMPLEMENTING THE PPP METHOD

A critical review of various existing methodologies for estimating comparable GNP shows that the PPP method is an ideal measure if it can be computed accurately. At present, the World Bank publishes the purchasing power parity data generated by the UN ICP. Being an international activity, ICP's extension to DMCs and improvement of quality and timeliness of data require more substantive

support of international organizations. However, the present program faces several problems. Some countries that initially joined the program have withdrawn. ICP surveys are more or less complete for industrialized countries, but largely incomplete, discontinuous, and uncertain in developing regions. Therefore, data is lacking for several countries in the time series. The methodology is very complicated and the data requirement is very heavy for the participating countries. At the same time, the need for comprehensive price data collection for individual countries may give rise to poor quality of data. However, the effective implementation of ICP claims that it will improve quality of price data in countries.

Although the PPP method provides an appropriate solution to the problem of internationally or regionally comparable income estimation, national policymakers are yet to appreciate its usefulness at the national level. Thus, some countries are reluctant to cooperate in the ICP because they do not consider the program as part of their own activities. Yet, the success of the ICP program depends on convincing countries to include collection of the needed price data in their regular activities. Furthermore, the following factors require urgent attention in order to improve the compilation of PPP estimates:

- (i) uniform definition of goods (tradable) across countries;
- (ii) incorporation of quality assurance techniques in data collection;
- (iii) construction of better weighting factors for national-level or summary statistics; and
- (iv) better coordination among countries in implementing PPP price surveys (ADB 1998).

In view of the above and the budget constraints, multilateral organizations and governments need to maximize coordination to implement the year 2000 round of PPP price surveys for the Asian and Pacific region in the most synergetic and effective manner. Efforts should be made to improve the methodology and the choice of

goods and services on which to base the comparison. Integrating PPP surveys in the regular price surveys of the participating countries is another challenge facing multilateral organizations.

CONCLUSION

One of the major implications that the recent financial crisis has for internationally comparable macroeconomic data is that the simple conversion method and the World Bank Atlas method produce distorted data for many DMCs, particularly those affected by the crisis as a result of a significant devaluation/depreciation in their currencies against the US dollar. Therefore, a major challenge is to come up with an appropriate method for estimating comparable per capita national income. As PPP estimates are least affected by the crisis, the PPP method is often the most appropriate and ideal method to compare countries' GNP estimates. However, several obstacles to the implementation of this method on a worldwide basis need to be addressed.

The ICP structure needs to be simplified and adjusted to the countries' data collection capabilities and practices. An appropriate statistical system is needed for producing PPP estimates taking into consideration what data are realistic and feasible to collect. At the same time, PPP estimates on a regional or subregional basis would be more meaningful and achievable than a full worldwide program. Furthermore, proper and stringent quality assurance procedures should be built into the statistical collection system.

Increased efforts are needed to demonstrate the policy relevance of the PPP estimates for participating countries, in order to assure continued availability of these figures for the participating countries and to increase the coverage of countries. International multilateral organizations should promote this survey in a well-coordinated manner to improve the ICP database over time.

APPENDIX

The following formulas describe the computation of the Atlas conversion factor for year t :

$$e_t^* = \frac{1}{3} \left[e_{t-2} \left(\frac{p_t}{p_{t-2}} / \frac{P_t^{S\$}}{P_{t-2}^{S\$}} \right) + e_{t-1} \left(\frac{p_t}{p_{t-1}} / \frac{P_t^{S\$}}{P_{t-1}^{S\$}} \right) + e_t \right]$$

and calculating GNP per capita in U.S. dollars for year t :

$$Y_t^{\$} = (Y_t / N_t) / e_t^*$$

where,

e_t^* is the Atlas conversion factor (national currency to the U.S. dollar) in year t ,

e_t is the average annual exchange rate (national currency to the U.S. dollar) for year t ,

p_t is the GNP deflator for year t ,

$P_t^{S\$}$ is the SDR deflator in U.S. dollar terms for year t ,

$Y_t^{\$}$ is the Atlas GNP in U.S. dollars in year t ,

Y_t is current GNP (national currency) for year t ,

N_t is the midyear population for year t .

The SDR deflator $P_t^{S\$}$ is calculated as follows:

$$P_t^{S\$} = \frac{\sum_{i=1}^5 dGNP_{gi} \times w_{gi}}{5 \sum_{i=1}^5 w_{gi}}$$

where,

$dGNP_{gi}$ = GNP deflator of the i^{th} G-5 country in SDR terms

w_{gi} = Percentage weight of the i^{th} G-5 country's currency in the unit value of SDR

For the period 1996-2000, the percentage weights of G-5 countries' currencies (as prescribed by IMF) are 39,21,18,11 and 11 for US dollar, Deutsche Mark, Yen, Franc, and the pound, respectively.

REFERENCES

- ADB, 1998. "Report of the Meeting of Heads of Statistics Offices of Asian Economies in Financial Crisis." Economics and Development Resource Center, Asian Development Bank, Manila.
- Gulde, A., and M. Schulze-Ghattas Marianne, 1992. Aggregation of Economic Indicators Across Countries: Exchange Rates Versus PPP-based GDP Weights. IMF Working Paper 92/36, International Monetary Fund, Washington, D.C.
- International Monetary Fund, 1993. *World Economic Outlook*. Washington, D.C.
- _____, 1998. *International Financial Statistics*. Washington, D.C.
- Sultan, A., 1993. Intertemporal and Interspatial Comparisons of Income: The Meaning of Relative Prices. Policy Research Working Paper No. 956, International Economic Department, World Bank.
- _____, 1998. International Comparison of Incomes: Why Should One Bother Using PPP Conversion. Working Paper Series, Development Data Group, Development Economics Department, World Bank.
- World Bank, 1998. *World Development Indicators*. Washington, D.C.

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