REVIEW OF COUNTRY PRACTICES ON REBASING AND LINKING NATIONAL ACCOUNTS SERIES

1. Introduction:

National accounts aggregates at constant prices provide important indicators for measuring growth in the activity or economy. All countries are compiling national accounts aggregates at current and constant prices. They also update the base year periodically. Constant price estimates use the price relatives of a particular year to weight together the volume components. Each base year gives a different perspective resulting from those weights. While constant price data have the advantage of being additive, over time the pattern of relative prices in the base period tends to become progressively less relevant. Therefore it is necessary to update the base period to adopt weights that are more consistent with current conditions. To present consistent time series the old series is required to be linked to the series based on the new base year, resulting in a set of chain linked time series.

It is a matter of fact that structural change does take place in production structure in the economy over a period of time. Also structural changes do take place in relative prices of various products in the economy over a period of time. Besides on account of continuous developments and innovations a lot of new products appear in the market. On the other hand due to obsoleteness many old products disappear from the market. Larger quality changes also result in the non-comparability of goods and services between far apart periods. Furthermore on the final demand side as well structural changes do appear in the consumption patterns and utilisation and acquisition of capital goods. All these factors justify that it is absolutely desirable to rebase the national accounts series periodically. As the changes in structure of production or consumption appear almost continuously, it is all the more further desirable to do more frequent rebasing. Rebasing on annual basis is the most ideal proposition as recommended by the 1993 System of national Accounts (SNA).

2. Rebasing of National Accounts Series:

Rebasing of National Accounts Series means replacing the old base year used for compiling the constant price estimates to a new/ more recent base year for computing constant price estimates. In principle, a change of base year in the national accounts implies (a) changing the price and quantity base for the individual price and quantity relatives, and (b) updating the weights used in aggregating the individual quantity relatives into sub-indices and to aggregate these sub-indices into more aggregated indices. It may be mentioned that re-basing Paasche price indices do not involve any change in the weights (being a weighted harmonic average of price relatives, where the weights are the shares in the current period); only a change in the base period for the price relatives is required. However, in practice it is not possible to construct a set of Paasche price indices and Laspeyres volume indices from observed micro data, and aggregated using appropriated current (for the price indices) and bases period (for the volume indices) weights. Thus the national accountants are forced to

construct *approximate Paasche price indices* and *approximate Laspeyres volume indices* for the national accounts aggregates, by making the compilations at a possible detailed level, and performing the aggregation from this detailed level to the main national accounts aggregates.

In short rebasing of the national accounts in practice means (at the detailed compilation level) (i) changing the reference period for the individual price and volume indices used from being equal to the old base year to being equal to the new base year, and (ii) performing the aggregation from this detailed compilation level to obtain the national accounts aggregates.

As an illustration for rebasing a national accounts series with existing base year of 1980 to a new base year 1990 in practice at the detailed compilation level the following steps are involved:

(1) For the economic activities or aggregates for which the constant price estimates are obtained by *revaluation*, a change of base year involves replacing the 1980 prices currently used with 1990 prices for the same items (that is replace $Q_{80,t} = \sum_i p_{i,80} \cdot q_{i,t}$ with $Q_{90,t} = \sum_i p_{i,90} \cdot q_{i,t}$).

(2) For the economic activities or aggregates for which the constant price estimates are obtained through *deflation*, a change of base year involves changing the reference period from 1980 to 1990 for the deflators used at the most detailed level. Change of reference period is made by simply dividing the original index with it's level in 1990, ($Q_{90,t} = V_t / (P_{0,t} / P_{0,90})$.

(3) For the economic activities or aggregates for which the constant price estimates are obtained through *volume extrapolation*, a change of base year involves changing the period from which the level are being extrapolated. Volume extrapolation is commonly done either by:

(i) Multiplying the current price value in the base period with a volume index (with the base period as reference period) showing the change from base period ($Q_{80,t} = V_{80} * I_{80,t}$), or
(ii) Multiplying the constant price estimate for the previous year with a volume indicator showing the change from the previous year ($Q_{80,t} = Q_{80,t-1} * I_{t-1,t}$).

A change of base year involves changing the reference period of the volume index from 1980 to 1990, and multiplying the re-referenced volume index with the current price level in 1990 ($Q_{90,t} = V_{90} * (I_{80,t} / I_{80,90})$.

For obtaining an estimate for 1991 at 1990 prices one would be required to extrapolate the 1990 current price value ($Q_{90,91} = V_{90} * I_{90,91}$). The constant prices estimates for the later years can then be obtained by multiplying the constant price estimate for the previous year with an volume indicator showing the change from the previous year ($Q_{90,t} = Q_{90,t-1} * I_{t-1,t}$).

Rebasing of national accounts series is desirable for several reasons, as mentioned earlier, including for capturing the structural changes in the economy and thus for reaching near to truth. An important question is how often the base period should be changed. Practices in this respect vary considerably, with some countries keeping the same base period for as many as 10 years or 5 years, and some changing the base period every year. It is desirable to change base periods frequently, especially in times of large changes in relative prices and rapid economic development.

Practices followed by various countries in the Asian region for rebasing and linking their national income series were discussed at the inception workshop under RETA 5874 organised by the ADB and ESCAP in March 2000. The following recommendations were made to the countries for the rebasing exercises of their national income series.

1. As regards the choice of the base year, the individual countries may decide it for themselves based on the availability of required data. It is not worth pegging conduct of the rebasing exercise on the choice of a “normal” year.

2. Rebasing exercise should be done at most disaggregated level as possible as this technique will reduce formula error (on account of using Laspeyres price index for deflation instead of Paasche price index) in compiling the constant price estimates.

3. Depending upon the availability of required data and situation of specific sector the countries may adopt one of the appropriate methods (revaluation, deflation, or volume extrapolation) for obtaining the constant price estimates. Theoretically price deflation technique is preferred.

4. Rebasing and benchmarking exercises may be undertaken separately in their own right. The two exercises however need to be coordinated to avoid confusion among users.

5. Rebasing can be done more frequently. A minimum of five-year interval is advisable for rebasing. If rebasing were done separately from benchmarking exercise, it would be possible for countries to undertake more frequent rebasing without demanding detailed data or substantial resources. Ideally speaking, countries will plan on using annual rebasing and chain volume indices as recommended by SNA93.

6. Countries may plan their next base year as a common one for the region, year 2000 is recommended as new base year.

7. Countries should work with a plan of timely release of rebased national accounts series, preferably within 1-3 years after reference base year. For the combined or benchmarking exercise, the time lag of rebased and linked series should not exceed 4-6 years.

8. Besides making recommendations on good practices mentioned above, the workshop considered other related issues like better coordination mechanisms among agencies responsible for compiling various statistics required for the compilation of national accounts in the countries, more timely release of national accounts statistics, maintaining

designated statistics including calendar of release of statistics, develop necessary software to facilitate compilation process, and strengthen linkages with users.

The current status of the practices of rebasing national accounts series by the countries in the Asian region is summarized below giving the past base years of their national accounts series, periodicity of rebasing, present base year of their national accounts series, and the proposed next base year.

PRACTICES OF REBASING NATIONAL ACCOUNTS SERIES OF ASIAN COUNTRIES

Country	**Past Base years**	**Present Base year**	**Next Base year**	**Periodicity (in years)**
Bangladesh	1972-73,1984-85	1995-96	2000-01	10+
Bhutan	1980	1980	1995, 2000	
Cambodia	-	1993	1995, 2000	
China	-	1993	2000	earlier period MPS linked
Hong Kong, China	1960,1970,1980	1990	2000	10
India	1948-49,1960-61, 1970-71,1980-81	1993-94	1999-2000	10, 5 now on
Indonesia	1960,1973,1983	1993	2000	10
Macau, China	1989	1996	2000	5
Malaysia	1970,1978,1983	1987	2000	5 (IOTT year)
Nepal	1964-65,1976-77,1984-85	1994-95	2000	10
Pakistan	1949-50,1959-60	1980-81	1995-96, 2000-01	10+
Philippines	1955,1967,1972	1985	1994	5,10
Republic of Korea	1965,1970,1975,1980,1985, 1990	1995	2000	5
Singapore	1965,1970,1975,1980,1985	1990	2000	5
Sri Lanka	1958,1963,1975	1990	2000	10+
Thailand	1954,1962,1972	1988	2000	10+
Viet Nam	1960.1970,1980	1994	2000	earlier period MPS linked

It is seen that the majority of the countries, namely Bangladesh, Hong Kong China, India, Nepal, Philippines, Sri Lanka and Thailand undertake their rebasing exercise at a gap of 10 years; Macau China, Malaysia, Republic of Korea and Singapore undertake their rebasing exercise at a gap of 5 years, Bhutan and Cambodia are in the developing stage of their

rebasing exercises, and China and Viet Nam, which were following earlier MPS system have now shifted to SNA and that their earlier system numbers have been linked to the System of National Accounts. India is now going to rebase its national accounts series every 5 years. The important thing to be noted about the choice of the next base year is that almost all countries are planning to keep year 2000 as the next base year, as was suggested by the inception workshop.

Common problems faced by the countries in the Asian region on the data requirements for undertaking their rebasing exercises have been noticed as: Price indices usually are Laspeyres indices, Base year for volume and price indices differ from the base year for national accounts, Not all volume and price indices have similar base period, Coverage of activity in the national accounts and in the volume and price indices differ, Coverage of volume and price indices also change over time, For many activities, no volume and price indices are available, and Data on value and/or quantity and/or price are incomplete. Practical guidance which could be provided to the national accountants for overcoming common problems would be that they should undertake rebasing exercises by compiling their estimates at more disaggregate level, use all the possible methods, make comparative analysis of results, and choose the best, make thorough analysis of coverage and compilation methods for source statistics, and adjust them to yield estimates consistent with SNA coverage and definitions. Of course, there is no single recommendation, which could be given to all national accountants; much depends on compiler's capability to tackle intelligently different situations.

3. Linking of National Accounts Series

It is important to note that change of base year has an impact on the growth rates of GDP. Normally relative prices tend to change in a way that is inversely related to changes in relative volumes (i.e. the commodities for which prices become cheaper tend to have a higher volume growth). As a result, the overall measure of growth based on a Laspeyres fixed-base formula will tend to overstate the growth in years after the base year compared with the growth rate which would be calculated if a more up-to-date set of relative prices were used. Thus when constant price estimates are rebased, the growth rates observed for major aggregates will change from those, which were based on, earlier base year and previously published. Sometimes the changes can be very significant, which can lead to problems for national accountants in trying to explain why the constant price GDP growth rates have been "revised" compared with those previously published. The SNA, 1993 has recommended compilation of chain volume indices[1] to overcome this problem. However, most countries in the Asian region are still using system of fixed base years on which they compute their constant price growth rates. Generally the base years are changed after 5 years or 10 years and the estimates for earlier years are obtained by chaining growth rates expressed in terms of previously used base years on to the front of the latest set of estimates. To form consistent time series the old series need to be linked to the series based on the new base year, resulting in a set of chain-linked time series1.

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1 Chain linking means to construct a volume index series by multiplying together the indices with different base and reference periods. For example, let $I_{2,3}$ be a Laspeyres volume index measuring the volume change from period 2 to period 3 with weights from period 2, then an annual chain-linked Laspeyres index series from period 0 to period t can be constructed as $I_{0,t} = I_{0,1} * I_{1,2} * I_{2,3} * I_{3,4} .... I_{t-1,t} = \prod_{\tau=1}^{t} I_{\tau-1,\tau}$

At the inception workshop on RETA 5874 organised by the ADB and ESCAP in March 2000 it was noted that in the Asian region several countries had breaks in their national accounts series resulting from the changes in base year. These breaks in the series have resulted in incomparability of the series based on different base years and therefore the users of the data found difficulties in measuring growth or improvements of output over a period of time covering more than one base year. The resulting breaks in the constant price series significantly reduce the usefulness of the data to analysis. The practices adopted for linking national accounts series by various countries in the Asian region including the status of their linked series prevailing in March, 2000 was as under:

STATUS OF LINKED NATIONAL ACCOUNTS SERIES OF ASIAN COUNTRIES, as on March, 2000

Country	**Linked Series Approach**	**Length of latest Link Series**	**Base Year of Linked Series**	**Present Base Year**
Bangladesh	not compiled	not compiled	not compiled	1984-85
Bhutan	not compiled	not compiled	not compiled	1980
Cambodia	not compiled	not compiled	not compiled	1993
China	not compiled	not compiled	not compiled	1990
Hong Kong, China	Splicing	back to 1961	1990	1990
India	Reworking/ Splicing	back to 1950-51	1980-81	1993-94
Indonesia	Reworking/ Splicing	1978-1993	1983	1993
Macau, China	Splicing	1982-1998	1996	1996
Malaysia	not compiled	not compiled	not compiled	1987
Nepal	Splicing	1974-75 to1993-94	1974-75	1984-85
Pakistan	Reworking/ Splicing	back to 1959-60	1980-81	1980-81
Philippines	Reworking/ Splicing	back to 1946	1985	1985
Republic of Korea	Extrapolation/ Splicing	back to 1970	1995	1995
Singapore	Splicing	back to 1960	1990	1990
Sri Lanka	not compiled	not compiled	not compiled	1990
Thailand	Splicing	back to 1951	1988	1988
Viet Nam	Splicing	1989-1999	1994	1994

The recommendations made by the inception workshop to countries for linking their national accounts series were the following:

1. Like rebasing exercise, linking exercise is also advised to be undertaken at most disaggregated level as possible. The linking of the national accounts series may be done for at least 10 years backdate for the benefit of the users.

2. When benchmarking is done, the countries undertake back casting of the estimates for some years which may result in change of growth rates. To link the series, the workshop groups' consensus was to apply splicing that is, maintaining the growth rates of GDP and its components to backtrack estimates and allow for residuals or balancing item.

3. The workshop reiterated and strongly recommended countries to explore chain based volume series at their earliest convenience.

While pronouncing general recommendations on linking national income series mentioned above, the workshop did note that generally the national accountants while revising the base also simultaneously attempt the following:

(i) Review the methodologies adopted;

(ii) Review the existing database and make choices of data sets

(iii) Review the coverage of the various aggregates to reckon with the emergence of new economic activities in the economy and to incorporate changes on account of possible omissions or duplications and

(iv) Adopt new International Standards (e.g., New SNA)

When all this is done a simple chain linking of the series may not give the correct picture of the economy measured for the past years. Therefore each component need to be considered carefully to provide, to the extent possible, the real picture of the economy in the recent past. This need to be done in situations where coverage in the new series gets revised or a new activity comes up in a particular year. However for the prior years beyond recent past, recommendation made was for resorting to linking by splicing at disaggregated level.

The countries that had not linked their past national income series were encouraged to undertake special exercises utilising the financial assistance available in RETA5874, if needed, keeping the general guidance and recommendations made by the workshop in view. The countries made their plan of work for linking their national income series, some of the countries also made use of the financial support, and in the meanwhile the plans have been implemented. As a result of the opportunity facilitated by the inception workshop and special efforts made by the countries the situation has now improved and the countries namely, Bangladesh, Indonesia, Nepal, Sri Lanka, Thailand, and Viet Nam, have linked their national accounts series as indicated in the following table.

STATUS OF LINKED NATIONAL ACCOUNTS SERIES OF ASIAN COUNTRIES, as on Feb., 2001

Country	Linked Series Approach	Length of latest Link Series	Base Year of Linked Series	Present Base Year
Bangladesh	Reworking/ Splicing	back to 1980-81	1995-96	1995-96
Bhutan	not compiled	not compiled	not compiled	1980
Cambodia	not compiled	not compiled	not compiled	1993
China	not compiled	not compiled	not compiled	1990
Hong Kong, China	Splicing	back to 1961	1990	1990
India	Reworking/ Splicing	back to 1950-51	1993-94	1993-94
Indonesia	Reworking/ Splicing	Back to 1978	Annual chain base	1993
Macau, China	Splicing	1982-1998	1996	1996
Malaysia	not compiled	not compiled	not compiled	1987
Nepal	Splicing	back to 1984-85	1994-95	1994-95
Pakistan	Reworking/ Splicing	back to 1959-60	1980-81	1980-81
Philippines	Reworking/ Splicing	back to 1946	1985	1985
Republic of Korea	Extrapolation/ Splicing	back to 1970	1995	1995
Singapore	Splicing	back to 1960	1990	1990
Sri Lanka	Splicing	Back to 1975	1990	1990
Thailand	Splicing	back to 1951	1988	1988
Viet Nam	Splicing	Back to 1986	1994	1994

4. Practices on Rebasing and Linking National Accounts Series Adopted by Asian Countries

Specific comments on the practices adopted for the rebasing and linking of national accounts series by individual countries are discussed below

Bangladesh: Bangladesh had two series of national accounts with base year 1973-74 and 1984-85. Bangladesh have now updated the base year from 1984-85 to 1995-96. Bangladesh have also linked their National Income Series upto 1980-81. The linking exercise has been done in the form of rebasing following mixed approach i.e. for primary sectors revaluation

has been resorted to; for secondary sectors, current price estimates have been deflated utilising the appropriate price deflator and for services sectors, either deflation or volume extrapolation approach has been resorted to depending upon the availability of appropriate physical indicator and price deflators. In respect of manufacturing sectors, Bangladesh has tried five exercises by utilsing the alternate approaches and alternate sets of data relating to census of manufacturing industries, annual index of industrial production and producer price index. In one of the exercises splicing method has also been tried. Somehow Bangladesh have preferred the method of revaluation, price deflation and volume extrapolation in different sectors rather than splicing. This has resulted in change of growth rates in the new base linked series. In most cases the difference in growth rates are small but in some cases these are quite large. For backward linking of GDP of expenditure categories, Bangladesh have basically followed the approach of price deflation making use of appropriate deflators.

Bhutan: The National Income Series of Bhutan is at present having base as 1980. They're planning to revise their base to the year to 2000. In short, Bhutan is not having a case for linking the National Income Series as they have just one series.

Cambodia: For Cambodia the current national accounts series(1993-1998) has not been rebased. Cambodia proposes to rebase its national accounts series to a more recent base year 1995. Linking exercise would be undertaken after rebasing.

China: For China the present series of GDP has the base year 1990. So far there are five base years in the National Accounts Series of China, i.e., 1952, 1957, 1970, 1980 and 1990. Year 2000 is the proposed new base year. Linking of GDP has not been undertaken so far. National Bureau of Statistics, P.R. China (NBS) proposes to link the time series of GDP at constant prices, in every time of rebasing, not only by the new base year constant prices, but also by the previous base year constant prices.

Hong kong China: Hongkong China compiles constant price expenditure based GDP. The series, which begins from 1961, has been revised four times, in 1966, 1973, 1980 and 1990. The latest round of rebasing was conducted in 1994 with base year of the constant price GDP updated from 1980 to 1990. The linked year adopted is 1986. The constant price series from 1986 onwards were repeated at disaggregated levels according to the relative price of the new base year of 1990. For the data series prior to 1986, the constant price estimated compiled on the earlier base year at both aggregate and component levels were linked by simple splicing and referenced to the new base year of 1990. When the constant price GDP is rebased, estimates of past periods are linked to the new base year through splicing. This has preserved the real growth rates of the past but additivity between total GDP and its component no longer holds.

India: India has undertaken rebasing exercise four times revising base year from 1948-49 to 1960-61, 1970-71, 1980-81 and latest 1993-94. On all occasions of re-basing in India the earlier series have been linked back upto 1950-51 forming a consistent series to meet the requirements of research workers who use such data primarily for modeling purposes. As regards methodology of linking, in case of changes in coverage, attempt is made to account for the changed coverage to, as far back in the past as the data is available. In absence of

desired information either the splicing technique is adopted or the growth rate as observed in the past series is maintained.

Indonesia: Indonesia has four national income series of benchmark years; that is base year 1960 for the series of GDP 1960-1973; base year 1973 for the series of GDP 1973-1983; base year 1983 for the series of GDP 1983-1993; and finally the base year 1993 for the series of GDP 1993-2000. The last two series of GDP have incorporated improvements in the scope and coverage of activities through utilization of I-O tables. The linked series is available for the period 1978-93 with the base year 1983. The linked series was obtained by adopting extrapolation of volume indices and splicing techniques. The linking has not been done as yet for new base year 1993. Indonesia is now in the process of compiling annual chain base indices

Macau, China: Macau, China have adopted fixed-based constant price estimates as volume measurement and all constant price estimates in the national accounts of Macau are made by the price deflation method. Currently, 1996 prices are used for constant price estimates on the expenditure accounts and the previous base year was 1989. For the years before 1993, in order to ensure a continuous time series, the estimates of different components that form the GDP were compiled by the "splicing" method.

Malaysia: Malaysia produced for 1955 to 1969 only current price estimates of GDP. Thereafter constant price series were made for period 1970 to 1983 at base year 1970, and 1978 to 1998 with base year 1978. Malaysian GDP has been rebased only when Input Output Tables have been generated. The latest IOTT and base year is 1987. Malaysia has not linked data on earlier bases.

Nepal: The Central Bureau of Statistics (CBS), Nepal is publishing national income aggregates since 1964-65 on a regular basis. The base year was shifted to 1976-77 and then to 1974-75 and 1984-85. The base has since bee revised to 1994-95 and linked series for the period 1984-85 to 1990-2000 compiled at base year 1994-95.

Pakistan: Pakistan has been compiling national accounts from 1949-50. In 1961-62, it adopted estimates for period 1949-50 to 1961-62 with base year 1959-60. Base year revision exercises were undertaken to change base year to 1964-65, 1969-70 and 1975-76 but the same could not be adopted. The base year was changed to 1980-81 in 1987-88 and now Pakistan proposes to revise the base year from 1980-81 to 1999-2000 by June 2002. The exercises for obtaining linked series backward unto 1980-81 will be taken up for the proposed new base year.

Philippines: The Philippines System of National Accounts (PSNA) has undergone four rebasings/revisions. In general, rebasing of the PSNA is done simultaneously with the overall revision of the accounts. To estimate the rebased-revised PSNA series for the period prior to 1980 at current prices, estimates from 1946 to 1980 (1972=100) were linked to the 1980-1990 revised series (1985=100) by splicing. The splicing is implemented by applying/assuming the growth rates for the period for which new backward estimates are to be made. This is done by applying the 1979-1980-growth rate on the 1980 estimate to derive the backward estimate for

1979, and so on. The 1946-1980 revised current price estimates are deflated using price deflators for said period. These price deflators are the results of linking by splicing the 1946 to 1980 price deflators with the revised 1980-1990 price deflators. The current estimates are simply divided by the price deflators to come up with the revised 1946-1980 revised constant price estimates.

Republic of Korea: Korean national accounts series have been rebased eight times in all, the first rebasing having been carried out in 1964. The latest rebasing was completed in1999. The base year is simply rebased every five years. The results of the rebasing of the production index and price indices are reflected in the rebasing of the national accounts.

Linking exercise in Republic of Korea was done in two steps. In the first step, the series between 1990 and 1997 was linked. This lasted from March 1998 until March 1999. For the series after the base year, i.e. 1996 and 1997, each year's final results were reworked by applying all the changes that resulted from rebasing the base year to them. For the series from 1990 to 1994, the interpolation method was used. The difference between the rebased results and the original compilation results of 1995 was interpolated through the series from 1990 to 1994. In the second step, the series from 1970 to 1989 was extrapolated. The second step started on March 1999 and ended on December 1999. In extrapolating the series before 1990, the contents and coverage of the base year and the growth rates of the old series were tried to maintain.

Singapore: Singapore compiles GDP estimates by all the three approaches namely, output, expenditure and income. Historical series of annual real and nominal GDP estimates are available from 1960. Rebasing exercise is undertaken every five years. The procedure adopted for rebasing depends upon the methods used to compile the constant price GDP estimates. The three approaches to GDP are reconciled through an input-output table during the rebasing exercise. Singapore has adopted chain-linked indices with the linking performed each time the national accounts are rebased. This method prefers the growth rates associated with the previous base year. However, the components in the linked series for the past years do not add to the total.

Sri Lanka: Sri Lanka has National Income Series from 1950 to 1999. For constant price estimates the base years have been revised from 1958 to 1963, 1975 and 1990. The constant price series are available for the period 1958 to 1975 with base year 1963, second series for period 1975 to 1991 with base year 1975 and the third (latest) data series is from 1990 onwards with base year 1990. The linking of GDP series at constant prices was not undertaken previously by Sri Lanka. Sri Lanka has made first attempt, utilising the ADB RETA5874 financial support, to compile linked GDP series for 25 years from 1975 to 1999, linking the two series with base years 1975 and 1990. Sri Lanka undertook alternative exercises for linking the series and found that for GDP by economic activity, splicing at disaggregated level and at aggregate level gave large discrepancy. Therefore, it has adopted an alternative approach of making use of Implicit Price Indicators (ratio of constant price and current price estimates) in the two series with base years 1975 and 1990 separately. The two sets of implicit indicators have been linked utilsing the information from common year 1990 where estimates of GDP were available at both 1975 prices and 1990 prices. Having obtained

linked implicit deflators (indicators); the estimates of GDP at 1990 prices for the series (1975 to 1999) have been obtained. Adopting this alternate method of making use of implicit indicators at disaggegated level and at aggregate level has resulted in showing lower discrepancy (of the order of 5 per cent) as compared to higher discrepancy observed in the exercise when the simple splicing technique is adopted.

For linking the expenditure aggregates of GDP, Sri Lanka tried to link by implicit indicator method but found that discrepancy of the totals of the components and the total GDP was very high. Thus, Sri Lanka has adopted an alternative method comprising of the combination of growth rates and percentage shares of GDP, i.e., maintaining the growth rates at total GDP level and deriving the expenditure components by maintaining the percentage shares as observed in the original series.

Thailand: Thailand had four series of national income (i) 1951-1953 with base year 1954, (ii) 1960-75 with base year 1962, (iii) 1970-1990 with base year 1972 and (iv) 1980-onwards with base 1988. Thailand has considered the alternative of constructing relative prices i.e. Implicit Price Deflator (IPD) of each item for rebasing the series. The IPD have been used to deflate the value at current prices to obtain the value at constant prices. The problems faced by Thailand in linking the four series have been on account of the differences in the four sub-series in terms of definitions, coverage, classification and compilation techniques adopted. Newer series are usually considered better and simply joining the four sub-series may not provide regional continuity. Also, as IPD of each commodity is different from one series to another. There are differences in commodity representative and the weighted structure. Thailand have linked their National Income Series considering the following guidelines undertaking the exercise on the production side at the 11 sectoral level. Constructing IPD for each producing sector in the four series by dividing the value added at current prices by value added at constant prices of the same sector in the same year and multiplying by 100. Connecting the series of IPD by joining them together with their rates of growth. The GDP at constant prices of each sector in the four series have been connected to one long series at 1988 prices.

Viet Nam: In Viet Nam, long time back, National Income indicator (in MPS) was estimated at 1960, 1970 and 1980 prices. For the period of 1989 - 1994, base year of 1989 was chosen to estimate GDP at constant price and base year of 1994 for the period of 1995 onward. Viet Nam has now linked its GDP series from expenditure side for the period 1986 to 1999 at base year price of 1994.

5. Issues For Discussions

Having noted the specific problems faced by various countries in linking their series, the following important issues needs attention for discussion and evolving a best practice which could be recommended for the linking exercises of National Income Series by economic activities or by expenditure aggregates:

1. For immediate past years if there are reasons for change in coverage, alternate data sets availability, adoption of new standards, then should the linked series be obtained suitably by re-working, deflating prices or extrapolating with volume indicators?

2. For the past years, only simple splicing be resorted to at all levels, maintaining the growth rates at disaggegated level as also at aggregate level.

3. Should certain important relationships of the national accounts aggregates like (i) Net Domestic Product as the difference of Gross Domestic Product and Consumption of Fixed Capital Formation (CFC), (ii) Net Domestic Capital Formation as the difference of Gross Domestic Capital Formation and CFC, (iii) Gross Domestic Capital Formation as the sum of Gross Fixed Capital Formation and change in stocks etc. be maintained in the linked series?

4. As linking of the specific components separately destroys the additivity and so the economic relationship of the aggregates, should it not be desirable to link only main aggregates and derive the other related aggregates utilising the relationship in the linked series instead of obtaining them independently by splicing?