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Rebasing of National Income Accounts in Pakistan

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The objective of this note is to discuss the rebasing of national income accounts in Pakistan, mainly according to 1999-2000 prices and coverage. While using the information provided in the Federal Bureau of Statistics publication, this note outlines and analyzes the different techniques used in rebasing constant price estimates, decomposition of change in constant estimates due to rebasing (using 1999-2000 prices) and new coverage, implications of rebasing on sectoral GDP estimates, and their growth rates. The note uses the data from 1999-2000 to 2002-03 for the analyses on both old and new base.[1]

National income accounts constitute a formal framework for the classification of information about the economic performance of a country. It serves as a powerful tool for policy formulation and economic analysis. The data provided in these accounts shows the behavioral trends of various macroeconomic indicators. However, to get a real picture of the economy, it is imperative that from time to time these accounts are revised. This is usually achieved through a methodology, broadly and simply known as "rebasing," that takes into account those factors, such as price increase and structural changes, which over time might under- or over-estimate the national income accounts.

For example, growth rates of some important indicators are not reported exactly and might cause confusion. In Pakistan, for instance, the real GDP growth rates according to the rebased series of GDP (base 1999-2000) in the years from 2000-01 to 2002-03 are less than that of old series (base 1980-81; Table 1 (a)). In 2000-01, growth rate of real GDP according to old series was 2.2 percent but according to new base and enhanced coverage it was 1.8 percent.

Moreover, some important ratios, such as budget deficit to GDP ratio and M2 to GDP ratio, with which fiscal and monetary policies are related, are not stated

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[1] Unless mentioned otherwise, all the data is from Economic Survey of Pakistan (2003 – 2005) and Annual Reports (2000 – 2003) of the State Bank of Pakistan.

Table 1 (a). Real GDP Growth

	Target	Old Series[1]	New Series[2]
2000-01	5.0	2.2	1.8
2001-02	4.0	3.4	3.1
2002-03	4.5	5.1[P]	4.8

[1] Base 1980-81

[2] Base 1999-2000 (with enhanced coverage)

[P] Provisional

accurately. Hence, the policies based on these indicators can confuse the realization of desired targets. For example, in 2002-03 the budget target was 4.4 percent of GDP and the realization 4.6 percent (Table 1 (b)). But, according to new coverage, the budget deficit is 3.7 percent of GDP, which is less than the target; actually suggesting a contractionary fiscal policy stance when compared to the target. Other macroeconomic indicators may exhibit similar dichotomy. Hence, it is extremely important to rebase the national income accounts more frequently, let us say, once in five years.

In particular, periodic rebasing of national income accounts is essential due to the following major reasons: (i) over time, the structure of the economy changes in terms of production and consumption patterns; (ii) introduction of new products due to technological innovations and developments; (iii) alteration in the relative prices of commodities; (iv) product wise improvements in the variety of products and services; and (v) changes in the pattern and classification of sectors/sub-sectors and their regrouping due to the adoption of latest System of National Accounts (SNA) of the United Nations (UN), currently SNA-1993.[2]

Table 1 (b). Old and New Series (as percent of current market prices GDP)

	Total Government									Private sector Credit		M2	
	Revenue			Expenditure			Budget Deficit						
	Target [B]	O[1]	N[2]	Target [B]	O	N	Target [B]	O	N	O[3]	N	O	N
1999-00	16.8	16.3	13.5	20.2	22.5	18.7	3.3	6.6	5.4	0.6	0.5	44.5	36.9
2000-01	17.3	16.2	13.3	22	21	17.2	4.6	5.2	4.3	1.4	1.2	44.6	36.7
2001-02	17.3	17.2	14.2	22.3	22.8	18.8	4.9	5.2	4.3	1.5	1.2	48.5	40
2002-03	17.7	17.6	14.9	22.1	22.2	18.6	4.4	4.6	3.7	4.2	3.5	49.3*	43.1

[B] Budget

[1] Old series (Actual) i.e. with GDP in denominator at 1980-81 coverage

[2] New Series (Actual) i.e. with GDP in denominator at 1999-2000 coverage.

[3] Values are computed by using the private credit data given in Economic Survey 2004-05,

[*] July -March

[2] In general, most of the Asian countries, including Bangladesh, China, India, Indonesia, Malaysia, Hong Kong, Philippines, Sri Lanka, Thailand, and Vietnam have followed the practice of rebasing their accounts every 10 years or so; while Korea and Singapore revise their base year after every 5 years. Developed countries undertake rebasing even more frequently. On the other hand, Bhutan and Pakistan on average took 20 and 17 years respectively [Asian Development Bank (2002)].

1. Rebasing in Pakistan

Pakistan currently follows the SNA[3] as put forward by the UN in 1993[4] to have an internationally comparable mechanism in place. National income accounts maintain data at both current and constant prices. Constant price data is used to obtain a compatible analysis in different periods, as the inflation factor is eliminated. Data at constant prices employs fixed prices pertaining to a specific year, called the base year, to obtain monetary values of the different sectors of the economy, and hence of the GDP. As a result, it reflects the actual economic performance and growth of the economy.

Pakistan, since 1949-50, has been compiling national income accounts both on constant and current prices.[5] In 1961-62 the country revised its base for national income accounts for the first time, from the average of five years 1949-53, used as base, to year 1959-60. The framework and methodology provided by the UN's SNA 1953 was followed in rebasing at that time, to make economic and statistical information more accurate, useful, and internationally comparable. In 1987-88, the long overdue rebasing exercise was done for the second time. The base year was changed from 1959-60 to 1980-81 according to the UN SNA 1968 structure. Pakistan changed its base year for the third time in 2004, declaring 1999-2000 as the new base, by implementing the concepts and classifications of SNA 1993.

2. Comparative Analysis of New and Old Series and Impacts of Rebasing

A comparative analysis of the GDP series, both at constant and current prices of 1980-81 and 1999-2000 base presents the difference in absolute estimates and in their growth rates, along with the factors responsible for causing this variation. The explicit impact of rebasing is that it has increased the absolute figures of GDP significantly (Figure 1). Annual Average Percentage Difference (AAPD)[6] between old and new series at current price is 21.3 percent and at constant prices 440.8 percent (Table 2). Due to rebasing, along side enhanced coverage of the real GDP,

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[3] SNA is given by UN's Statistics Division to keep the national accounts in a comparable and standardized form across the world.

[4] National accounts estimates were prepared for the first time in 1949; for more details, see Federal Bureau of Statistics (2004).

[5] Technical notes of revaluation of constant price data are given in Appendix 1.

[6] $AAPD = \sum_{i=1}^{n}(1/n)[(E_{NS} - E_{OS})/E_{OS}]*100$. Where, E_{NS} is the estimate of sector/sub-sector according to new series, E_{OS} is estimate of sector/sub-sector according to old series, and n is the number of observations.

Figure 1. Gross Domestic Product (GDP)

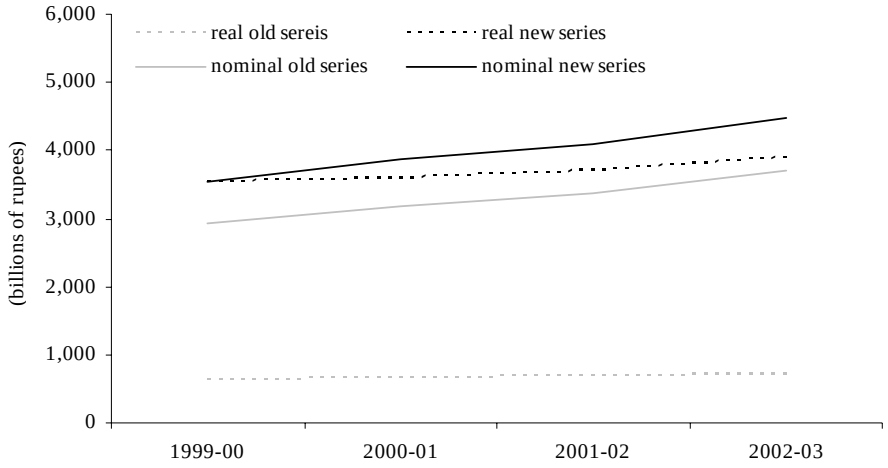
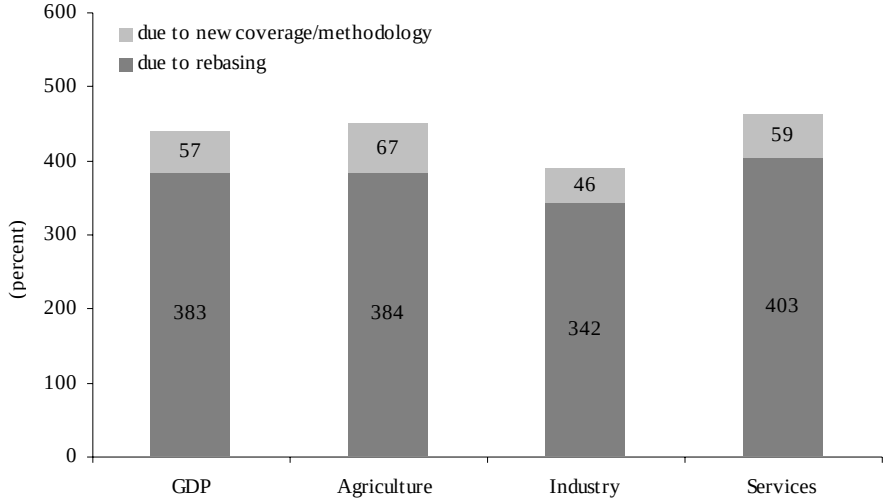


Figure 2. Decomposition of Total Change in Real Estimates



there is a magnification of about 441 percent; out of which, 57 percentage points is due to enhanced coverage and 383 percentage points is due to the use of 1999-2000 prices (Figure 2).[7] The core rationale for this increase is discussed in the subsequent subsections of GDP.

2.1. Gross Value Added (GVA) by Economic Activity[8]

This section presents a comparison of the levels and growth rates of the sub sectors of the GDP taking into account the data for two base years. Broadly, the main sectors are (a) agriculture, (b) industry, and (c) services.

2.1.1. Agriculture

The AAPD between the old and the new series at current prices is 20.6 percent (Table 3 and Figure 2). The difference at current prices can be explained as a result of enhanced coverage in 1999-2000 in the sector and improved reworking methodology. Some new items, absent in the old base, have been added in the estimation of the agriculture sub-sectors' output. These items are strawberry, mushroom, betel leaves, tea, henna (myrtle), condiments, oilseeds, and some non-reported crops. In year 1999-2000, tea, strawberry, henna, betel leaves, and falsa leaves added 80.8, 21.2, 19.4, 12.3, and 10.4 million rupees respectively to the minor crops category.[9]

Table 2. GDP at Factor Cost

Years	at constant prices			at current prices		
	Old Series	New Series	Percent Difference	Old Series	New Series	Percent Difference
	(billion of rupees)			(billion of rupees)		
1999-00	649.656	3529.345	443.3	2921.988	3529.345	20.8
2000-01	664.048	3594.124	441.2	3166.954	3876.025	22.4
2001-02	686.382	3705.718	439.9	3377.098	4095.212	21.3
2002-03	721.251	3884.952	438.6	3709.67	4481.412	20.8
Annual Average			440.8			21.3

[7] The respective formulae of decomposition are given in Appendix 2.

[8] Source of the data according to old base year (1980-81) is Economic Survey of Pakistan 2002-2003 and 2004-05. For 2003-2004 old base year data is not available, due to which the comparison presented is up to 2002-03.

[9] The values of the increased items included in national income accounts, due to enlarged coverage, is available only for the year 1999-2000.

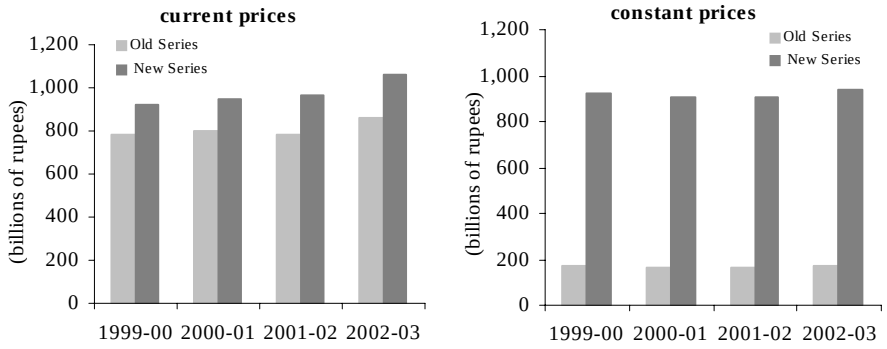
Table 3. Agriculture Output

Years	at current prices		Percent Difference	at constant prices		Percent Difference
	Old Series	New Series		Old Series	New Series	
	(millions of rupees)			(millions of rupees)		
1999-00	779,692	923,609	18.5	168,459	923,609	448.3
2000-01	800,854	945,301	18.0	163,845	903,499	451.4
2001-02	783,723	968,291	23.6	163,731	904,433	452.4
2002-03	864,828	1,059,316	22.5	170,523	941,942	452.4
Annual Average			20.6			451.1

Moreover, the value of flowers and leaves (horticulture) have also been estimated for the very first time and included in the crops category. Their total value was Rs. 988.23 million with major share of roses (Rs 300 million), Gladiolus (Rs 280 million) Tube Rose (Rs 181 million), and Rose budded (Rs 110 million) in 1999-2000. An example of a change in the methodology of estimation is that in the previous base year, harvest prices were extrapolated using WPI due to the non-availability of any reliable data for major crops, but in the 1999-2000 data, harvest prices have been used.[10]

The difference in the valuation techniques of intermediate inputs, such as seeds, fertilizer, pesticides, and insecticides leads to a variance in the levels of agriculture production on current prices between the two base periods. The changes in the

Figure 3. Agriculture Output



[10] For details, see Federal Bureau of Statistics (2004). The book does not provide exhaustive list of new items and their data to know the exact details of increase in nominal GDP due to new coverage and revised methodology; for instance, one is unable to find the complete information and data about the increase in nominal GDP (Rs 607,357 million) in year 1999-2000 according to new coverage.

inputs in the new series are also the result of their redistribution among major and minor crops. This increase in the new series is offset, albeit slightly, by the reclassification of slaughtering from livestock to the manufacturing sector.

In comparison, the annual average percentage difference at constant prices between the two series is 451 percent. This difference is due to two main reasons: the enhanced coverage and reworking methodology and due to change of base year from 1980-81 to 1999-2000. Since the old base year prices were much lower than that of the new base year, this change resulted in higher AAPD. Figure 3 shows the decomposition of the total change in the real estimates of the agriculture, industry and services sector respectively.

Disaggregating the causes of this increase, it is found that 384 percent of the AAPD of the agriculture sector is attributed to the rebasing effect. This effect shows the increase in agriculture estimates due to the difference in prices of the new base year and the old base year. On the other hand, 67 percent of the increase in AAPD is because of enhanced coverage and the new classification, reworking, or estimation methodology.

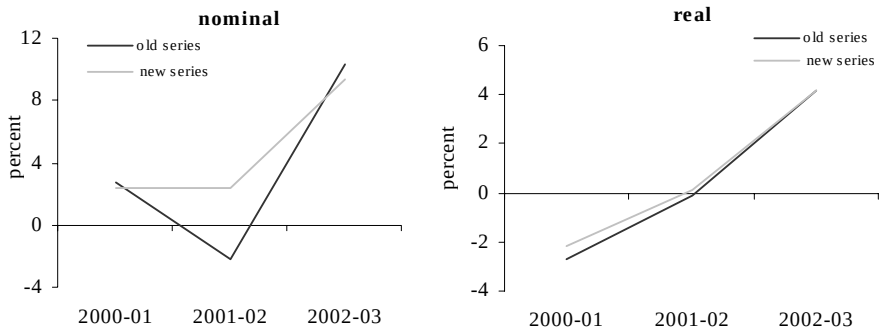
Annual Average Percentage Point Difference (AAPPD)[11] of growth rates at constant prices between the two series is 0.24 (Table 4 and Figure 4). This shows that the new data series has grown faster than the old series, albeit insignificantly, at less than one percent point over these four years. At current prices, likewise, the annual percentage point difference is about 1.1 showing relatively faster growth than the old series. In 2000-01 and 2002-03 the new series has lower growth rates than that of the old series, contrary to 2001-02.

Table 4. Agriculture Growth Rates

Years	at current prices			at constant prices		
	Old Series	New Series	% point difference	Old Series	New Series	% point difference
	(percent)			(percent)		
2000-01	2.71	2.35	-0.37	-2.74	-2.18	0.56
2001-02	-2.14	2.43	4.57	-0.07	0.10	0.17
2002-03	10.35	9.40	-0.95	4.15	4.15	0.00
Annual Average			1.09			0.24

[11] $AAPD = \sum_{i=1}^{n}(1/n)[(G_{NS} - G_{OS})$. Where, G_{NS} is the growth of sector/sub-sector according to new series, G_{OS} is growth of sector/sub-sector according to old series, and n is the number of observations.

Figure 4. Agriculture Growth



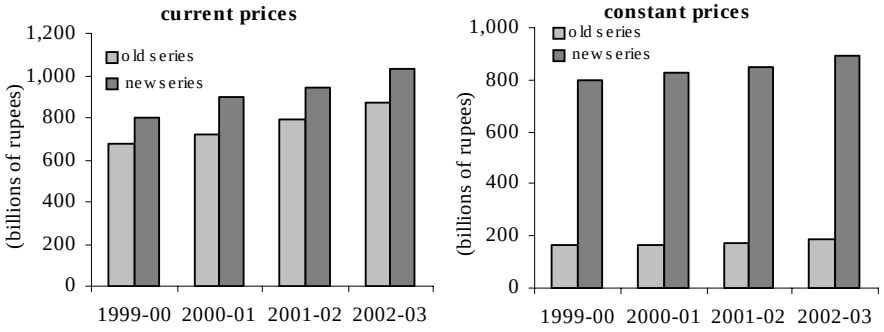
The difference in the growth rates between the old and the new series at current prices has arisen due to variation in the volumes of items added in new coverage and of their yearly respective prices over 1999-2000 to 2002-03. On the other hand, in the case of constant prices this difference is only due to the change in quantities of increased items in the new coverage of base year 1999-2000. Consequently, the fluctuations in new series at current prices which is causing the difference between the old and the new series, is higher than that of the series at constant prices. Figure 3 shows this fact through higher gap between the old and new series at current prices as compared to constant prices.

2.1.2. Industry

In line with SNA-93, the industrial sector has gone through several changes in terms of coverage and estimation methodology. In addition, sub sectors have also been reclassified according to the prescribed guidelines. Consequently, the estimates of industry according to the new base are higher than the previous base.

AAPD on current prices is, coincidentally, again 20.2 percent, which shows increase in the industry estimates owing to the enhanced coverage and changed estimation methodology. Slaughtering, which was part of livestock category, has been re-categorized as a sub sector of manufacturing in the revised classification. In the mining and quarrying sub sector surface minerals, allied services and mineral exploration establishments categories, which were entirely missing in the 1980-81 base, have been included in the revised estimation. Surface minerals and

Figure 5. Industrial Output



allied services mineral exploration jointly augmented Rs 3,128 million value addition to the sector.

Moreover, in industry's gas sub-sectors Compress Natural Gas (CNG) and water supply, absent in old coverage, contributed Rs 282 and Rs 16,978 million respectively, according to new coverage. Similarly, instead of deducting a lump sum 20 percent fixed input cost from the total gross output of this sub sector, as done previously under the income/cost approach, separate input cost ratios have been calculated in the 1999-2000 base. Similar changes have been made in the categories of construction and electricity and gas distribution. These changes have collectively altered the volume of industry as compared to the old base.

AAPD on constant prices between the new and old series is about 390 (Table 5 and Figure 4). As explained earlier for Agriculture output, this difference is due to the price hike from 1980-81 to 1999-2000, enhanced coverage, and revised estimation methodology. The break up of AAPD shows that out of 388 percent, 342 percent increase in industrial estimates is due to the change in base year and the remaining is attributed to the modification in coverage and methodology. At current prices, only the change in coverage and methodology has affected the data.

Table 5. Industry Output

Years	at current prices			at constant prices		
	Old Series	New Series	Percent Difference	Old Series	New Series	Percent Difference
	(millions of rupees)			(millions of rupees)		
1999-00	676,369	798,190	18.0	162,457	798,190	391.3
2000-01	721,426	895,044	24.1	166,447	827,229	397.0
2001-02	787,018	938,394	19.2	175,377	849,139	384.2
2002-03	871,250	1,031,404	18.4	184,913	889,031	380.8
Annual Average			19.9			388.3

Table 6. Industry Growth Rates

Years	at current prices			at constant prices		
	Old Series	New Series	% point difference	Old Series	New Series	% point difference
	(percent)			(percent)		
2000-01	6.66	12.13	5.47	2.46	3.64	1.18
2001-02	9.09	4.84	-4.25	5.37	2.65	-2.72
2002-03	10.70	9.91	-0.79	5.44	4.70	-0.74
Annual Average			0.14			-0.76

The growth rate of industry has also changed in the revised estimates of the new base (Table 6 and Figure 6). There is also a difference in the AAPD between the new and old series, at both current and constant price data. The growth rate of new series, at current prices, is higher than that of the old series in fiscal year 2001 and 2003, contrary to 2002. However, AAPD is about 0.14 percent, which is insignificant. These percentage point differences are the result of both changes in the volumes and prices of the increased items at current price estimates. On the other hand, using constant price data, the average growth rates of the new series are less than the old series. The core reason of this outcome is the variation in the relative quantities of increased items between any two years in the new coverage.

2.1.3. Services Sector

This sector consists of transport, storage and communication, wholesale and retail trade, insurance, ownership of dwellings, public administration and defense, community, social, and personal services. It is mainly the services sector in which many structural developments and changes have taken place in the last two decades. In order to incorporate all these structural changes it was all the more

Figure 6. Growth Rates

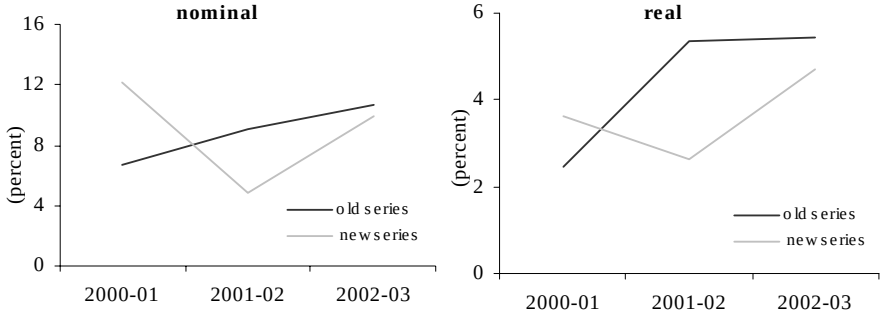


Table 7. Services Output

Years	At current prices		Percent Difference	At constant prices		Percent Difference
	Old Series	New Series		Old Series	New Series	
	(millions of rupees)			(millions of rupees)		
1999-00	1,465,927	1,807,546	23	318,740	1,807,546	467
2000-01	1,644,674	2,035,680	24	333,756	1,863,396	458
2001-02	1,806,357	2,188,527	21	347,274	1,952,146	462
2002-03	1,973,592	2,390,988	21	365,815	2,053,979	461
Annual Average			22			462

important to rebase the national income accounts.

Special study was made to incorporate the estimates of travel agencies, courier services, tour operators, and inland water transport. The coverage in this sector has also been broadened through the inclusion of mobile phone, internet, and courier services. The value of courier services and mobile phone services were Rs 5,797 and Rs 4,717 million in the year 1999-2000. In addition, the estimation methodology of the services sector has also been improved. Data on non-mechanized transport, trade margins in wholesale and retail trade and finance and insurance has also been readjusted and reclassified.

In the revised base, data on investment companies (Rs 271 million) and exchange companies (168), discount and guarantee houses (69), venture capital and insurance companies (15), and Postal Life Insurance has been compiled for the first time along with the change in methodology to estimate the insurance and pension funds. Consequently, all these factors have contributed to the increase in the volume of the services sector as compared to the old base data (Table 7 and

Figure 7. Services Output

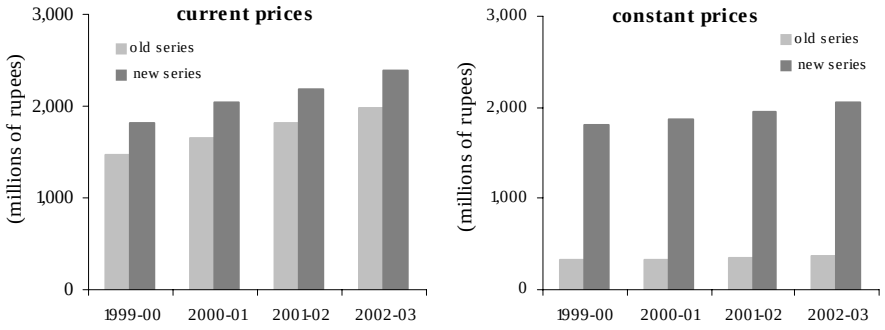


Table 8. Services Growth Rates

Years	At current prices			At constant prices		
	Old Series	New Series	% Point difference	Old Series	New Series	% Point difference
	(percent)			(percent)		
2000-01	12.19	12.62	0.43	4.71	3.09	-1.62
2001-02	9.83	7.51	-2.32	4.05	4.76	0.71
2002-03[P]	9.26	9.33	0.07	5.34	5.30	-0.04
Annual Average			-0.61			-0.32

Figure 7). The AAPD is 22.4 percent and 462.4 percent at current and constant prices respectively between the new and old series. AAPD at constant factor cost is 403 percent due to rebasing, and 59 percent because of enhanced coverage and new methodology.

Similarly, growth rate of this sector in different years has changed that result in the difference in percentage points of growth between new and old series both at current and constant prices (Table 8 and Figure 8).Growth rate of the new series is slower than that of the old series both at current and constant prices. AAPD levels are negative 0.61 percent and negative 0.32 percent at current and constant prices respectively. These differences are not substantial, as they are lower than one percentage point. The rationale for these differences in growth rates is the change in estimation methodology, enhanced coverage, and rebasing from previous base year to new base year.

Figure 8. Services Growth Rates

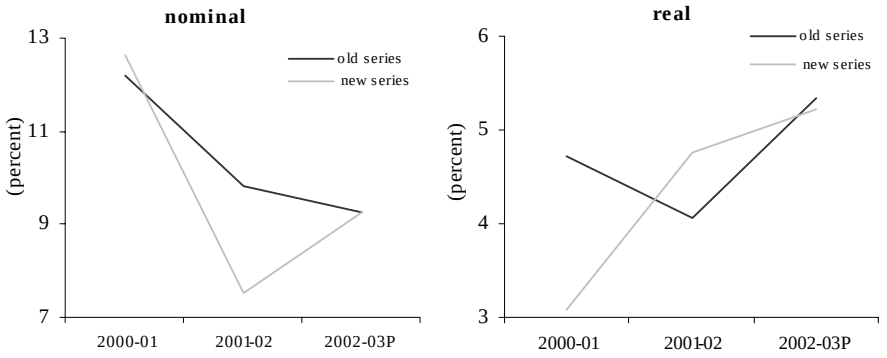
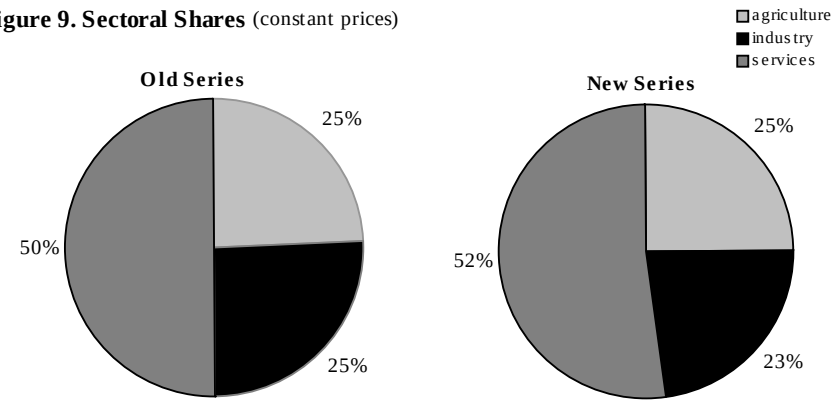


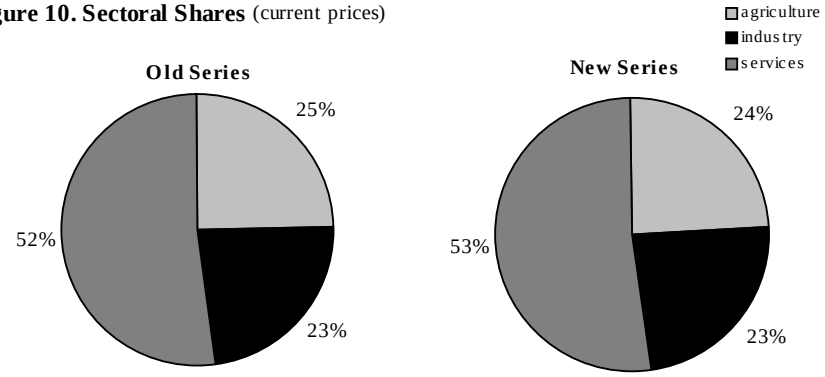
Figure 9. Sectoral Shares (constant prices)



2.2. Sectoral Shares

By looking at the sectoral shares of agriculture, industry, and services in GDP, it can be seen that the share of agriculture has increased in the new series at constant prices as compared to the old series on average from year 2000 to 2003. It is due to the comparatively more increased coverage than industrial sector (Figure 9). On the other hand, its share has decreased at current price series. This decrease can be explained on the basis of the non availability of harvest prices in the old series (Figure 10). Therefore, WPI that was higher than the harvest price was used for major crops. The share of the services sector according to the new series is greater than that of the old series both at current and constant basis as a whole due to

Figure 10. Sectoral Shares (current prices)



comparatively more increased coverage than industrial sector. On the other hand, share of the industry sector of the new series is less than that of the old series both at current and constant prices.

3. Final Remarks

To sum up, rebasing national income accounts along with its enhanced coverage, which was long overdue, has provided reliable and accurate data incorporating many structural developments and changes in the economy's relative prices since 1980-81. Moreover, preparing national accounts according to the SNA-93 standards has made the data internationally comparable. But it is very important, as mentioned before, to rebase the national income accounts along side enhancing coverage after, at least, every five years to incorporate the structural changes that take place in the economy.

Furthermore, another primary task ahead for the Federal Bureau of Statistics is the need to link the data series of different base periods by using the reworking methodology since 1948-49. Because, linking data through splicing method does not depict the most accurate figures. Certainly this requires an uphill task and involves many practical difficulties. But once the task is done it would provide very useful information for analytical purposes. The practice has already been done in linking the data since 1960 for the base year 1980-81.

Appendix 1: Revaluation Techniques of Constant Price Data

Constant price estimates are obtained through three techniques: revaluation, deflation, and volume extrapolation.[12]

(i) Revaluation: In this method, quantity of each item is valued by employing the base-year prices: $Q_{o,t} = \sum_i p_{i,\circ} * q_{it}$. Where, p_{io} is the price of ith item in the base year and q_{it} is its quantity in period t. As a result, the estimates obtained are at constant (base) year prices.

(ii) Deflation: This method requires a deflation of each period's current price value with a suitable price index. For this, current value of each period is divided by a suitable price index: $Q_{ot} = V_t / P_{ot}$ Where V_t is $\sum_i p_{i,t} * q_{it}$. That is value in period t and P_{ot} is a price index.

[12] For details of gross value added at constant prices, see Asian Development Bank (2002).

(iii) Volume Extrapolation: In this method, base year values are revised by taking the product of the values with an appropriate volume index that yields the result as $Q_o = \sum(q_{i,t} / q_{i,o}) * p_{i,o}q_{i,o}$. Generally, constant price estimates obtained through the deflation method are considered more accurate than those derived through extrapolation given the fact that price relatives (p_t / p_o) observe less variation than quantity relatives (q_t / q_o), except in periods of hyperinflation.

Rebasing of national income accounts in Pakistan from 1980-81 to 1999-2000 has employed a combination of the following three methods:

- Using the revaluation method, a change of base year involves replacing 1980-81 prices with 1999-2000 prices for identical items; that is, replace $Q_{81,t} = \sum_i p_{i,81} * q_{it}$ with $Q_{2000,t} = \sum_i p_{i,2000} * q_{it}$.

- Items for which the constant price estimates are derived through deflation a change of base year requires changing the reference year from 1980-81 to 1999-2000 for the deflators, used at detailed level. It involves division of the original index with its level in 2000; that is, $Q_{2000,t} = V_t /(P_{o,t} / P_{o,2000})$.

- For the items and aggregates for which constant price estimates are obtained through volume extrapolation, a change in base year involves changing the reference period of the volume index from 1980-81 to 1999-2000 and multiplying the re-referenced volume index with the current price level in 1999-2000 $[Q_{2000,t} = V_{2000} * (I_{81,t} / I_{81,2000})]$.

Appendix 2: Decomposition of Total Change in Real Estimates

$$TotalChange = \frac{RE_{1999-2000} - RE_{1980-81}}{RE_{1980-81}} \text{; } \Pr iceEffect = \frac{NE_{1980-81} - RE_{1980-81}}{RE_{1980-81}} \text{;}$$

$$CoverageEffect = \frac{RE_{1999-2000} - NE_{1980-81}}{RE_{1980-81}}$$

Where, $RE_{1999-2000}$ is real estimate at 1999-2000 base, $RE_{1980-81}$ is real estimate at 1980-81 base, and $NE_{1980-81}$ is nominal estimate at 1980-81 base.

These formulae are for individual years. The average of all years has been taken for the whole period since 1999-2000 to 2002-03, as is shown in Figure 3.

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