

## Developing a Back Series of Monthly and Quarterly National Income Estimates for India: 1983Q1 – 1999Q4 (1993-94 = 100)

*In this study we present estimates of monthly and quarterly GDP for India starting 1983-84. Following the recommendations of the CSO (KK, 2000) we interpolate annual GDP by economic activity using appropriate physical indicators as the basis. Results are compared against the estimates provided by CSO for the years 1996-97 onwards.*

### **I. Introduction**

Subscription to the IMF's Special Data Dissemination Standards (SDDS) requires the member nations to publish quarterly estimates of the national income (GDP) with the timeliness of one quarter. India subscribed to the SDDS in January 1997 and the Central Statistical Organization (CSO) has been publishing the quarterly estimates of GDP (QGDP) since 1998-99. To maintain consistency with the time series of annual estimates (released independently of quarterly estimates) CSO has also provided estimates of the back series of the QGDP starting 1996-97. However, as things stand, this data cannot be used for analysing most macroeconomic phenomena of interest because the available sample is still quite small.

The objective of this study is to construct a back series of GDP at factor cost by economic activity at monthly and quarterly frequency starting 1983-84 using the methodology of CSO as described by Kulshreshtha and Kohli (2000) (referred to as KK hereafter). Although there have been a few studies<sup>1</sup> which have attempted estimating GDP with frequency of a quarter they all pertain to the period prior to 1991 and that at 1980-81 prices.

The headings under which the CSO provides the QGDP estimates are:

1. Agriculture, Forestry and Fishing
2. Mining and Quarrying
3. Manufacturing
4. Electricity, Gas and Water Supply

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<sup>1</sup> See KK for the complete list

5. Construction
6. Trade, Hotels, Transport and Communication
7. Financing, Insurance, Real Estate and Business Services
8. Community, Social and Personal Services

As one would notice, the quarterly estimates provided by the CSO are aggregated at the sector/heading level. For example, for the heading “Agriculture, Forestry and Fishing,” it does not provide estimates of QGDP from Agriculture, Forestry and Fishing individually. We do away with such aggregation and provide the estimates in almost<sup>2</sup> the same format as *Statement # 10* (Annual GDP by Economic Activity) of the National Account Statistics (NAS) published annually by the CSO (see **Annexure 1** for the template used).

Estimates provided in the study are ‘based’ on the back series of Annual GDP by Economic Activity - Revised Estimates (RE)<sup>3</sup> (1993-94 prices) available from NAS<sup>4</sup>.

## **II. Approach for Developing the Back Series**

Before we describe our methodology we would like to acknowledge that estimates from our exercise are expected to be *ad hoc* at best. National Income Accounting is a humongous task on its own and agencies like CSO spend considerable amount of resources in estimating income from various sectors of the economy. It is not expected that estimates provided here would be as “accurate” and/or as informed as given by the CSO. It is an attempt to provide a back-series of national income which contains more information than the traditionally used Index of Industrial Production (IIP) in most Indian econometric studies.

In the section that follows, we point out the ‘physical indicators’ used for apportioning the annual estimates. The details and rationale for the selected indicators can be found in

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<sup>2</sup> The level of disaggregation in our format is greater. Also note that though not same in form as Statement # 10 it covers all the subheadings, and the way we use it, the consistency is maintained with the form of the table used by the CSO for providing QGDP estimates

<sup>3</sup> Alternatives to using the REs are Quick Estimates (QEs) and Advance Estimates (AEs) but except the former all are subsequently revised

<sup>4</sup> In 2001, CSO provided a back series of GDP at Factor Cost by Economic Activity at 1993-94 prices starting 1950-51, including select disaggregate statements

KK. For all the headings and sub-headings we stick to the indicators suggested by KK except for Fishing and Trade (for which data for physical indicators required to arrive at monthly estimates could not be found in the public domain<sup>5</sup>)

Data on physical indicators for all the other headings and sub-headings are available – the key sources being the CSO *Monthly Abstract of Statistics* (MAS), the CSO annuals NAS and the *Statistical Abstracts of the Indian Economy*, and CMIE’s electronic database *Business Beacon*. In the circumstances where the monthly estimates provided by the MAS do not match the annual estimates of the NAS we work with the MAS data<sup>6</sup> ensuring that sum of the interpolated estimates match the annual.

While data for all the variables used in the study are available at 1993-94 prices, consistent series for various indices are not available at 1993-94 prices. We use growth rate in the 1980-81 series (which is available till 1996-97 from the MAS) for splicing. Throughout the study all the variables have been used at 1993-94 prices.

Barring agriculture, we derive monthly and quarterly estimates on the basis of the regression of annual output from various sectors/headings on the indicators as described in the next section.<sup>7</sup> Since the objective is only interpolation (the sample for which lies “within” the sample used for estimating the regression equation) and not forecasting or explanation, we neither correct for multicollinearity<sup>8</sup> nor detrend the variables. Most important criterion for our purpose is the goodness of fit which we measure by the Adjusted R<sup>2</sup>.

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<sup>5</sup> By public domain we mean the information made available by the CSO, CMIE and the Department of Statistics of the various ministries

<sup>6</sup> The discrepancy, found in quite a few physical indicators, was limited to  $\pm 3\%$

<sup>7</sup> Since monthly estimates are based on the regression equations, they had to be pro rata adjusted by the ratio of the actual annual GDP and predicted annual GDP to ensure that the sum of the monthly estimates match with the annual

<sup>8</sup> Quite prevalent in the present study (and “micronumerosity” in some regressions, to use the term coined by Arthur S. Goldberger)

### III. Basis of Apportionment and Regression Estimates

#### 3.1 Agriculture, Forestry and Fishing

Heading	Basis of Apportionment (KK)	This Study
Agriculture	State-wise, crop-wise harvesting pattern for the crops for which the data is available	State-wise, crop-wise harvesting pattern for the crops for which the data is available
Forestry	Equally	Equally
Fishing	Quarterly data on Inland and Marine Fish Production	Equally (Disaggregated data on quarterly Fish Production could not be located)

#### Agriculture

Agriculture is one area of national accounts which is probably the toughest to estimate even for the CSO<sup>9</sup>. Developing a back series is more so, because the data on all the physical indicators (harvesting seasons of crops in case of agriculture<sup>10</sup>) required for apportioning the annual output from agriculture and livestock is not available.

**Table 1** shows the template used by the CSO for giving the statement (*Statement # 55*, NAS) of output from agriculture. We use the same disaggregation level as used in *Statement # 55*. **Table 2** gives the list of crops for which the harvesting calendar is available (covering roughly 73% of total output from agriculture). Items comprising the other 27% are listed in **Table 3** – corresponding mostly to miscellaneous items, possibly comprising crops/horticulture products too insignificant to be considered individually. Whatever the reason, we don't have the information in any further detail. We treat all such items under the heading "Others".

In all, thus we have **46** items listed in **Table 2** to interpolate. Out of these, for the following **20** crops listed in **Table 4**, state-wise crop calendar is available from the official publication of the Directorate of Economics and Statistics, Ministry of Agriculture.<sup>11</sup>

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<sup>9</sup> Recently one whole issue of the Indian Journal of Income and Wealth (January 2000) was devoted to understanding the problems associated with estimating GDP from agriculture

<sup>10</sup> As per the recommendation of IMF (see KK)

<sup>11</sup> Area and Production of Principal Crops in India, 1997-98

Table 1

<b>1</b>	<b>Cereals</b>	<b>5.3</b>	Sannhemp
1.1	Rice	5.4	Mesta
1.2	Wheat	5.5	Others
1.3	Jowar	<b>6</b>	<b>Indigo, Dyes &amp; Tanning</b>
1.4	Bajra	<b>7</b>	<b>Drugs &amp; Narcotics</b>
1.5	Barley	7.1	Tea
1.6	Maize	7.2	Coffee
1.7	Ragi	7.3	Tobacco
1.8	Small Millets and Others	7.4	Others
<b>2</b>	<b>Pulses</b>	<b>8</b>	<b>Condiments &amp; Spices</b>
2.1	Gram	8.1	Cardamom
2.2	Arhar	8.2	Chillies
2.3	Urd	8.3	Black Pepper
2.4	Moong	8.4	Dry Ginger
2.5	Masoor	8.5	Turmeric
2.6	Horse Gram	8.6	Arecanut
2.7	Others	8.7	Garlic
<b>3</b>	<b>Oilseeds</b>	8.8	Coriander
3.1	Linseed	8.9	Others
3.2	Sesamum	<b>9</b>	<b>Fruits &amp; Vegetables</b>
3.3	Groundnut	9.1	Banana
3.4	Rapeseed and Mustard	9.2	Cashewnut
3.5	Castor	9.3	Potato
3.6	Coconut	9.4	Sweet Potato
3.7	Niger Seed	9.5	Tapioca
3.8	Safflower	9.6	Onion
3.9	Sunflower	9.7	Other Horticulture Crops
3.10	Soyabean	9.8	Floriculture
3.11	Others	<b>10</b>	<b>Other Crops</b>
<b>4</b>	<b>Sugars</b>	10.1	Rubber
4.1	Sugarcane	10.2	Guar Seed
4.2	Others	10.3	Miscellaneous Crops
<b>5</b>	<b>Fibres</b>	<b>11</b>	<b>By Products</b>
5.1	Cotton	<b>12</b>	<b>Kitchen Garden</b>
5.2	Jute	<b>13</b>	<b>Total Output for Agriculture</b>

Table 2

Sr.	Crop	Sr.	Crop	Sr.	Crop
1	Rice	16	Groundnut	31	Cardamom
2	Wheat	17	Rapeseed/Mustard	32	Chillies
3	Jowar	18	Castor	33	Black Pepper
4	Bajra	19	Coconut	34	Dry Ginger
5	Barley	20	Niger Seed	35	Turmeric
6	Maize	21	Safflower	36	Arecanut
7	Ragi	22	Sunflower	37	Garlic
8	Gram	23	Soyabean	38	Coriander
9	Arhar	24	Sugarcane	39	Banana
10	Urd	25	Cotton	40	Cashewnut
11	Moong	26	Jute	41	Potato
12	Masoor	27	Mesta	42	Sweet Potato
13	Horse Gram	28	Tea	43	Tapioca
14	Linseed	29	Coffee	44	Onion
15	Sesamum	30	Tobacco	45	Rubber
				46	Guar Seed

Table 3

Sub-heading	Item	% of Total Agriculture Output
Cereals	Small Millets and Others	0.17%
Pulses	Others	0.59%
Oilseed	Others	0.07%
Sugars	Others	0.01%
Fibres	Sannhemp	0.01%
Fibres	Others	0.01%
Indigos, Dyes & Tanning		0.00%
Drugs and Narcotics	Others	0.20%
Condiments & Spices	Others	0.55%
Fruits & Vegetables	Other Horticulture Crops	14.31%
Fruits & Vegetables	Floriculture	0.46%
Other Crops	Miscellaneous Crops	2.22%
By Products		7.62%
Kitchen Garden		0.73%
<b>Total</b>		<b>26.95%</b>

Table 4

Sr.	Crop	Sr.	Crop
1	Rice	11	Sugarcane
2	Wheat	12	Tobacco
3	Jowar	13	Groundnut
4	Bajra	14	Castor
5	Barley	15	Sesamum
6	Maize	16	Rapeseed and Mustard
7	Ragi	17	Linseed
8	Gram	18	Cotton
9	Arhar	19	Jute
10	Potato	20	Mesta

The calendars for all the crops listed in **Table 4** are available in the form of sowing and the harvesting seasons. An example of format of crop calendar is shown in **Annexure 2**. For Rice, Jowar and Potato calendar is further split season-wise and treatment of these needs some explanation.

#### *Rice*

For Rice, the state-wise calendar is different for autumn, winter and summer. The distribution of output, however, is available only on the Kharif-Rabi basis. To enable apportionment we combine the harvest in winter and summer with equal weights and set it equal to the Rabi output. Output in autumn is taken to be occurring in Kharif. For the states in which the crop is harvested in both Kharif (autumn) and Rabi (winter and summer)<sup>12</sup>, we assume that the percentage distribution is same as that for the entire year (7:1, Kharif to Rabi)

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<sup>12</sup> If for a state harvesting is only done in winter and not in summer, we apportion the Rabi part of that completely to winter.

### *Jowar*

The state-wise calendar is available separately for both Kharif and Rabi. For Jowar also we work with the restrictive assumption that if for a particular state, the harvest takes place in both the Kharif and the Rabi season, the distribution is same as that for all states combined.

### *Potato*

For potato the harvesting calendar is given for the winter and the summer seasons for hills and plains separately. We have the distribution of output between plains and hills (6:1 approximately). To get the total harvest in plains/hills we combine the harvest occurring in winter and summer with equal weights. We further assume that for all producing states the division between plains and hills is same as overall.

For the remaining **26** crops, the information was gathered from four main sources, namely, *Indian Agriculture* (official publication of the Indian Economic Data Research Center), *Handbook of Agriculture* (a publication of the Indian Council of Agriculture Research), *Horticulture Statistics* (compiled by National Horticulture Board, Ministry of Agriculture), and <http://www.agroindia.org> (official website of the Agribusiness Information Center, Federation of Indian Chamber of Commerce and Industry). In the **Table 5** below we list the harvesting pattern of these crops.



Table 5

Sr.	Crop	Harvesting
1	Moong (Green Gram)	Kharif (Aug-Oct); Rabi (Nov-Jan) <sup>13</sup> for all producing states
2	Urd (Black Gram)	Same as that of Green Gram
3	Masoor (Lentil)	Jan-Mar for all producing states
4	Horse Gram	Kharif <sup>14</sup> (Sept-Oct); Rabi <sup>15</sup> (Oct-Nov)
5	Coconut	1/3 <sup>rd</sup> in Mar-Apr-May; 2/3 <sup>rd</sup> in Other Months (all producing states)
6	Niger Seed	Nov-Dec (for all producing states)
7	Safflower	Jan-Mar (for all producing states)
8	Sunflower	Throughout the year for all producing states
9	Soyabean	Based on Crushing Statistics available from SOPA <sup>16</sup>
10	Tea	Apr-Dec (North); Throughout the year <sup>17</sup> (South)
11	Coffee	Arabica blend (Mar-May); Robusta blend (Feb-May) <sup>18</sup>
12	Cardamom	Large Cardamom: Sept-Oct for all producing states; Small Cardamom: Kerala (Aug-Nov), T.N. (Aug-Nov), Karnataka (July-Jan) <sup>19</sup>
13	Chillies	Oct-Jan (winter produce); May-July (summer produce) <sup>20</sup>
14	Black Pepper	Nov-Feb (plains); Jan-Mar (hills) <sup>21</sup>
15	Dry Ginger	Dec-Jan for all producing states
16	Turmeric	Nov-Apr for all producing states
17	Arecanut	Karnataka (Nov-Feb); Kerala (Nov-Feb); Assam (Jan-Feb)
18	Garlic	Dec-Mar for all producing states
19	Coriander	Nov-Mar, July-Aug for all producing states
20	Banana	Assam, A.P., Bihar, Maharashtra, Mizoram, Orissa, T.N., W.B. (All year); Gujarat, Karnataka (Jun-Oct); Kerala (Jul-Oct); M.P. (Feb-Apr); Manipur (Apr-Dec); Meghalya (Aug-Sept)
21	Cashewnut	Mar-May for all producing states
22	Sweet Potato	Sept-Jan (North); Jan-May (South)
23	Tapioca	Oct-Nov, Jun-Aug for all producing states
24	Onion	Kharif (Oct-Nov); Late-Kharif (Dec-Jan); Rabi (Mar-Apr) <sup>22</sup>
25	Rubber	A plantation crop, "tapping" is done all year long
26	Guar Seed	Mar-Nov (concentrated more in the middle months; least in Mar & Nov)

<sup>13</sup> Distribution of output between Kharif and Rabi available

<sup>14</sup> Bihar, H.P. and J&K

<sup>15</sup> Remaining States

<sup>16</sup> Soybean Processors Association of India, <http://www.sopa.org>

<sup>17</sup> Highest in Feb-May, Average in Sept-Oct; Low in others

<sup>18</sup> State-wise distribution of output between Arabica and Robusta is available

<sup>19</sup> Distribution of annual output between Large Cardamom and Small Cardamom is available

<sup>20</sup> Assumption: Equal percentage occurring in winter and summer for all producing states

<sup>21</sup> Assumption: Equal percentage occurring in plains and hills for all producing states

<sup>22</sup> Primarily a Rabi crop; distribution of output between Kharif, Late Kharif and Rabi is available

Having obtained the harvesting season of crops, the next step is apportionment.

### **Apportionment**

Along with the harvesting seasons, the aforementioned publications also provide the state-wise distribution of output for each crop. Available are the latest 3-4 years output figures for all the major producing states<sup>23</sup>. We take the average over the period and use that to allocate the annual output for a crop among the producing states.

Since for each state we have the harvesting season and the percentage output, it is straight forward to apportion the output in the months the harvesting takes place.

#### *On the use of Harvesting Pattern for Apportioning Output*

We noticed from the sources that the harvesting normally follows a pattern. For most crops harvesting starts at the beginning of the season, reaches a peak around the middle (of the harvesting season) and then falls again. We use this pattern for all the crops across states. For example if harvesting takes place for 3 months in a year, we divide the output from that state in the ratio 1:2:1 in *those* three months. If harvesting takes place for 5 months, we divide in the ratio of 1:2:2:1 (see **Annexure 2** for an example). One could adopt a more “continuous” scheme but since the output is to be divided only monthly, this discrete way seems reasonable. After allocating each state’s output, month-wise output for the crops can be aggregated ‘vertically’<sup>24</sup>.

This leaves us with interpolating the value of output from Livestock sector.

### **Livestock**

Output from this sector is divided into the milk group, meat group, eggs, wool & hair, dung, and silk worm cocoons & honey. Out of all, output from milk products accounts for roughly 65% of the total. Except for milk disaggregated data on indicators to interpolate the output from livestock and its components could not be found. We settle with the

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<sup>23</sup> The percentage covered varied from 90-100%. We scaled the numbers to 100% (for only 3-5 crops was the percentage less than 95%)

<sup>24</sup> See **Exhibit 9** for results

apportionment of milk which we divide on the basis of the breeding pattern of buffaloes (available from Sharma et al, 2002). The graph and the percentage distribution are shown in **Exhibit 1**<sup>25</sup>.

For the remaining (35%) of the livestock output we combine that with the “Others” of the agriculture output. This implies that the percentage output under heading “Others” becomes roughly 30% of the total agriculture and livestock output.

### **Domestic Product from Agriculture**

To get the GDP from agriculture data on output is not sufficient. We need the value of inputs used too in the production. In line with what CSO does (see Kulshreshtha, Kohli and Singh, 2000), we use the same input-output ratio (I/O) as that for the entire year. From *Statement # 54* of the NAS we know I/O for the entire year. Using the same ratio for all months enables us to get GDP from agriculture for all months for the 70% of the output. We apply the same I/O for the item “Others” too.

### **Treatment of “Others”**

For apportioning the item “Others”<sup>26</sup> we have many options. We could divide equally over the entire year; extrapolate the pattern that we notice over the other 70%; use splines or any other mathematical interpolation techniques. The list is probably endless.

At the risk of losing information for validation later on, we impose the restriction that on an average *for the four years* that we have the CSO data, distribution of agriculture output across four quarters should match our estimates *for those four years*.

From the 70% on which we could interpolate the data, we got the following distribution on an average (comparable to the CSO figures given below):

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<sup>25</sup> **Exhibit 9** lists exact percentages

<sup>26</sup> Also included at this stage in “Others” is GDP from Operation of Government Irrigation System (a separate entry in *Statement # 54*)

Q1	Q2	Q3	Q4
22%	19%	33%	26%

We have the following average distribution of output from agriculture for the years 1996-97 to 1999-2000 from CSO<sup>27</sup> as:

Q1	Q2	Q3	Q4
23%	16.5%	34%	26.5%

Since we have the distribution for the 70% and the 100%, given our restriction, the distribution for the remaining 30% follows as the residual:

Q1	Q2	Q3	Q4
27.6%	9.6%	36%	26.8%

Having obtained the quarterly allocation for “Others”, we divide it equally over the 3 months making the quarter. We use this allocation scheme for the entire 17 years.

It may appear that the way we have gone about apportioning the output from “Others” limits us from validating it against the actual CSO estimates (though our restriction is applied *only for four years* that we have the comparative estimates, and not the entire sample period), but any method we use for allocating a component which is an aggregation of miscellaneous items across categories would have to be necessarily arbitrary. In that sense, it is the validation of *distribution of total output* across the four quarters that is more important. The objective here is not to better the CSO estimates but to provide a back series that reasonably proxies national income.

The resulting quarterly series for Agriculture (including the comparative CSO year-by-year figures) is presented in **Exhibit 2**.

Now we come to the description of allocation of other components of national income.

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<sup>27</sup> CSO gives agriculture output estimate including Forestry and Fishing; these allocations are after excluding the Forestry and Fishing estimates

As suggested earlier, we use regression to interpolate the output from these. Since data used for estimating the regressions is with the frequency of a year, the coefficients of the regression equation were adjusted for getting the monthly<sup>28</sup> estimates. The variable *time* (*t*) is adjusted to take the value  $\tau/12$  for  $t = \tau - 1$  to  $\tau$  where  $\tau = 1, 2, 3 \dots n$ <sup>29</sup>

### 3.2 Mining and Quarrying

Heading	Basis of Apportionment (KK)	This Study
Mining & Quarrying	Coal Production, Petroleum (Crude) Production and the Index of Mining	Coal Production, Crude Production, Index of Mining and Time

$$y_{Mining} = 3383.013 + 0.006643x_{COAL} - 0.01034x_{CRUDE} + 89.68165x_{IIP-MINING} + 615.3009t$$

Adj.  $R^2 = 0.988$

### 3.3 Manufacturing

Heading	Basis of Apportionment (KK)	This Study
Registered Mfg.	IIP – Mfg.	IIP – Mfg. and Time
Unregistered Mfg.	IIP – Mfg.	IIP – Mfg. and Time

#### 3.3.1 Registered Manufacturing

$$y_{REGD.} = -10092.8 + 1020.123x_{IIP-MFG.} - 980.365t \quad ; \text{Adj. } R^2 = 0.978$$

#### 3.3.2 Unregistered Manufacturing

$$y_{UN-REGD.} = -1475.55 + 567.9441x_{IIP-MFG.} - 1080.74t \quad ; \text{Adj. } R^2 = 0.99$$

### 3.4 Electricity, Gas and Water Supply

Heading	Basis of Apportionment (KK)	This Study
Electricity	IIP – Electricity	IIP – Electricity and Time
Gas	Index of the group relating to Petroleum Products	Index of the group relating to Petroleum Products and Time
Water Supply	Equally	Equally

<sup>28</sup> Data on all 'physical indicators' are available with a monthly frequency

<sup>29</sup> Our sample of annual data consists of  $n = 17$  observations from 1983-84 to 1999-2000

### 3.4.1 Electricity

$$y_{ELEC.} = 3510.249 + 81.523x_{IIP-ELEC.} + 484.393t ; \text{Adj. } R^2 = 0.996$$

### 3.4.2 Gas

Since output from *Gas* showed kinks (See **Exhibit 3**) for the purpose of interpolation we divided the original sample into two parts and estimated them independently

$$y_{GAS1} = -10.1725 + 0.969829x_{IIP-PETRO} + 28.31216t ; \text{Adj. } R^2 = 0.969$$

$$y_{GAS2} = -1295.82 + 16.24547x_{IIP-PETRO} + 75.10599t ; \text{Adj. } R^2 = 0.979$$

## 3.5 Construction

Heading	Basis of Apportionment (KK)	This Study
Construction	Coal Production, Cement Production, Steel Production, and IIP – Wood and Wooden Fixtures	Coal Production, Cement Production, IIP – Basic Metal and Alloys <sup>30</sup> , IIP – Wood and Wooden Fixtures and Time

$$y_{CON} = 15106.74 + 0.395x_{CEMENT} + 0.0053x_{COAL} - 55.084x_{IIP-META} - 1.361x_{IIP-WOOD} + 637.53t$$

$$\text{Adj. } R^2 = 0.987$$

## 3.6 Trade, Hotels, Transport and Communication

Heading	Basis of Apportionment (KK)	This Study
<i>Trade etc.</i>	Specially prepared indices of purchases and sales from various sectors of the economy	Output from Agriculture, Mining and Quarrying, and Manufacturing and Time ( <b>see Section 3.9</b> )
<i>Railways</i>	Total Passenger KMs and Total Net Tonne KMs	Total Passenger KMs, Total Net Tonne KMs and Time
<i>Road Transport</i>	Production of Commercial Vehicles	Production of Commercial Vehicles and Time
<i>Water Transport</i>	Cargo Handled at Major Ports	Cargo Cleared at Major Ports (Both Foreign and Coasting) and Time
<i>Air Transport</i>	Equally	KMs Flown (Both Domestic and International) and Time
<i>Services Incidental to Transport</i>	Equally	Equally

<sup>30</sup> Data on steel production is not available in aggregate form. The time series of IIP - Basic Metal & Alloys is available consistently from 1980-81 onwards and the component of Iron and Steel in IIP is ~ 70%

<i>Postal-Related Communication</i>	Revenue from Postal Services	Revenue from Sale of Stamps and Time
<i>Telecom-Related Communication</i>	Revenue from Telecom Services	Revenue from Telecom Services and Time

### 3.6.1 Trade etc

$$y_{TRADE} = 8659.07 - 0.00044x_{AGRI} - 1.592x_{MINING} + 0.883x_{MFG.} + 1292.78t ; \text{Adj. } R^2 = 0.975$$

### 3.6.2 Railways

$$y_{RLYS.} = -1370.35 + 0.0094x_{PSNGR-KMS} + 0.034x_{TONNE-KMS} - 30.923t ; \text{Adj. } R^2 = 0.994$$

### 3.6.3 Road

Like in the case of *Gas*, for *Road* also we have divided the sample in two parts (See **Exhibit 4**)

$$y_{ROAD1} = 8531.73 + 0.02x_{CVS} + 827.99t ; \text{Adj. } R^2 = 0.992$$

$$y_{ROAD2} = 18066.84 + 0.000286x_{CVS} + 2161.432t ; \text{Adj. } R^2 = 0.998$$

### 3.6.4 Water

For *Water* we divide the sample period into three parts. (See **Exhibit 5**)

$$y_{WATER1} = 1691.176 - 0.00495x_{CARGO} + 94.77t ; \text{Adj. } R^2 = 0.907;$$

$$y_{WATER2} = 2010.632 - 0.0038x_{CARGO} - 35.017t ; \text{Adj. } R^2 = 0.999;$$

$$y_{WATER3} = 2039.654 + 0.00264x_{CARGO} + 45.81t ; \text{Adj. } R^2 = 0.16;$$

### 3.6.5 Postal-Related Communication

$$y_{POSTAL} = 799.0139 + 0.0148x_{REV.-STAMPS} + 33.631t ; \text{Adj. } R^2 = 0.948;$$

### 3.6.6 Telecom Related Communication

$$y_{TELECOM} = 2823.73 + 0.0129x_{REV.-TELECOM} - 190.864t ; \text{Adj. } R^2 = 0.97;$$

### 3.7 Financing, Insurance, Real Estate and Business Services

Heading	Basis of Apportionment (KK)	This Study
<i>Banking</i>	Aggregate Deposits deflated by WPI	Aggregate Deposits deflated by WPI – All Commodities and Time
<i>Insurance</i>	Equally	Equally
<i>Real Estate etc.</i>	Equally	Equally

#### *Banking*

$$y_{BANKING} = -9533.22 + 0.0107x_{DEPOSITS/WPI(93-94)} + 842.94t ; \text{Adj. } R^2 = 0.988$$

### 3.8 Community, Social and Personal Services

Heading	Basis of Apportionment (KK)	This Study
<i>Net Domestic Product (NDP) from Public Administration<sup>31</sup></i>	Revenue Expenditure of the GoI	Revenue Expenditure of the GoI and Time
<i>Consumption of Fixed Capital</i>	Equally	Equally
<i>Other Services</i>	Equally	Equally

$$y_{SALRAIES} = 21215.36 + 0.0914x_{REV.-EXP.} + 448.8194t ; \text{Adj. } R^2 = 0.988$$

Now we discuss how we arrive at the estimates of GDP for *Trade* and *Fishing*.

### 3.9 Trade

CSO, according to KK, uses specially prepared quantum indices of purchases and sales for getting the quarterly estimates from organized and unorganized sectors. Since that data could not be located publicly we use the methodology used by Kulshreshtha, Narain and Kohli (1994) for computing the advance estimates as the basis. In line with their study we estimate quarterly estimates of GDP from Trade on the basis of output from agriculture, mining and quarrying and manufacturing. The rationale being: greater the output, greater the trade (see sub-section 3.6.1).

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<sup>31</sup> A component comprising mostly of salaries public sector employees



### 3.10 Fishing

The basis for apportioning the annual GDP from fishing into four quarters, according to KK, is the quarterly production of inland and marine fish production. Since this data could not be found we split the annual estimate equally into the twelve months.

This completes estimation of equations for interpolation for all the sub-headings for GDP by Economic Activity.

The **final monthly and quarterly GDP series** for the entire period, 1983-84 to 1999-2000 (including comparative CSO estimates) are presented in **Exhibits 6 and 7** respectively. The difference with the CSO estimates is only of the order of  $\pm 3\%$ <sup>32</sup>.

Plot of both monthly (from April 1983 to Mar 2000) and the quarterly series (for the period 1983Q1 to 2001Q4) are shown in **Exhibit 8**.

The objective of the study is to provide not just the ‘total’ monthly and quarterly GDP, but to give the estimates by economic activity in line with *Statement # 10* of the NAS. As an illustration the quarterly GDP estimates by Economic Activity for the year 1999-2000 are presented in **Exhibit 9**. Monthly and Quarterly results for all years - not presented here for space considerations – can be made available on request from the author.

As an upshot of the study, we are also in the position to provide monthly apportionment of output from various crops listed in *Table 2* (using the methodology as suggested in the section “Domestic Product from Agriculture”). See **Exhibit 10** for results.

## IV. On Splicing of Indices – Disaggregated IIP and WPI

In this section we list the variables for which we provide data at 1993-94 prices starting 1983-84. Even though CMIE (Business Beacon) provides data on some of indicators listed below, high frequency (monthly) data is only available after April 1990. Splicing (at the point where data for the series was available at both 1981-82 and 1993-94 prices)

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<sup>32</sup> Our estimates systematically over/under estimates the CSO numbers across the four quarters, which could be an offshoot of the way the weights were selected for apportionment of ‘Others’.

was used to construct data series at 1993-94 prices. See **Exhibit 11** for the list with the splicing year indicated.

Splicing Factor ( $S_{FM}$ ) can be defined as the ratio  $\frac{I_{NEW-M}}{I_{OLD-M}}$  where  $I_{NEW-M}$  is the index value at the new base for the common month  $M$  for which the data is available at the old base. Clearly, the selection of the month would have a bearing on the ‘accuracy’ of the splicing factor. To be as ‘correct’ in our splicing method, we use a different splicing factor for each month.

In the year 2000, in keeping with the changes in the structure of the economy, the base year for reporting WPI was shifted from 1981-82 to 1993-94. However, a long back series of the WPI at the new base year is still not available from any of the official sources (including CMIE, CSO, OEA and RBI). Farthest back the monthly disaggregate series is available from any official source is starting April 1990 from the Business Beacon Electronic Database of the CMIE. The series with the old base is available till the end of 1996 from the Monthly Abstract of Statistics, published by the CSO. This enables splicing of the index to arrive at a series with a common base. As far as level of disaggregation goes, we are constrained by the level till which the data is available at 1993-94 prices, which is ‘Level 1’ (see **Exhibit 12** for the list).

For splicing the price data, we have used the average of the splicing factors for the years 1990, 1991 and 1992 (corresponding to the period Apr - 1990 to Mar - 1993) to arrive at the final splicing factor, i.e. our Splicing Factor for month  $M$  is derived as

$$S_{FM} = \frac{1}{3} \left[ \frac{I_{NEW-M-1991}}{I_{OLD-M-1991}} + \frac{I_{NEW-M-1992}}{I_{OLD-M-1992}} + \frac{I_{NEW-M-1993}}{I_{OLD-M-1993}} \right]$$

Further, an issue often ignored is the treatment of the monthly index values *for the base year*. If we leave the value of the index numbers to 100 for all months for the base year, it creates a distortion in the month-to-month changes in the price index for that year. We use the information available from the 1981-82 base year to get around that problem. We ‘re-base’ the monthly values to ensure consistency with the month-to-month inflation from the old-base data, while leaving the ‘year’ base value at 100.

## **V. Conclusion**

In this study we have attempted to provide a back series of quarterly estimates of national income by economic activity using the CSO methodology as described by KK. Though our estimates may not probably be as “accurate” as the ones provided by the CSO, they do compare favorably with the CSO estimates (error for quarters  $\sim \pm 3\%$ ) For studies that need to use quarterly (or monthly) data prior to 1996-97, these estimates provide a better indicator of the economic activity than the popularly used Index of Industrial Production (IIP) in most Indian econometric studies, for the simple reason that they use more information than that contained in the IIP.

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## Annexure 1

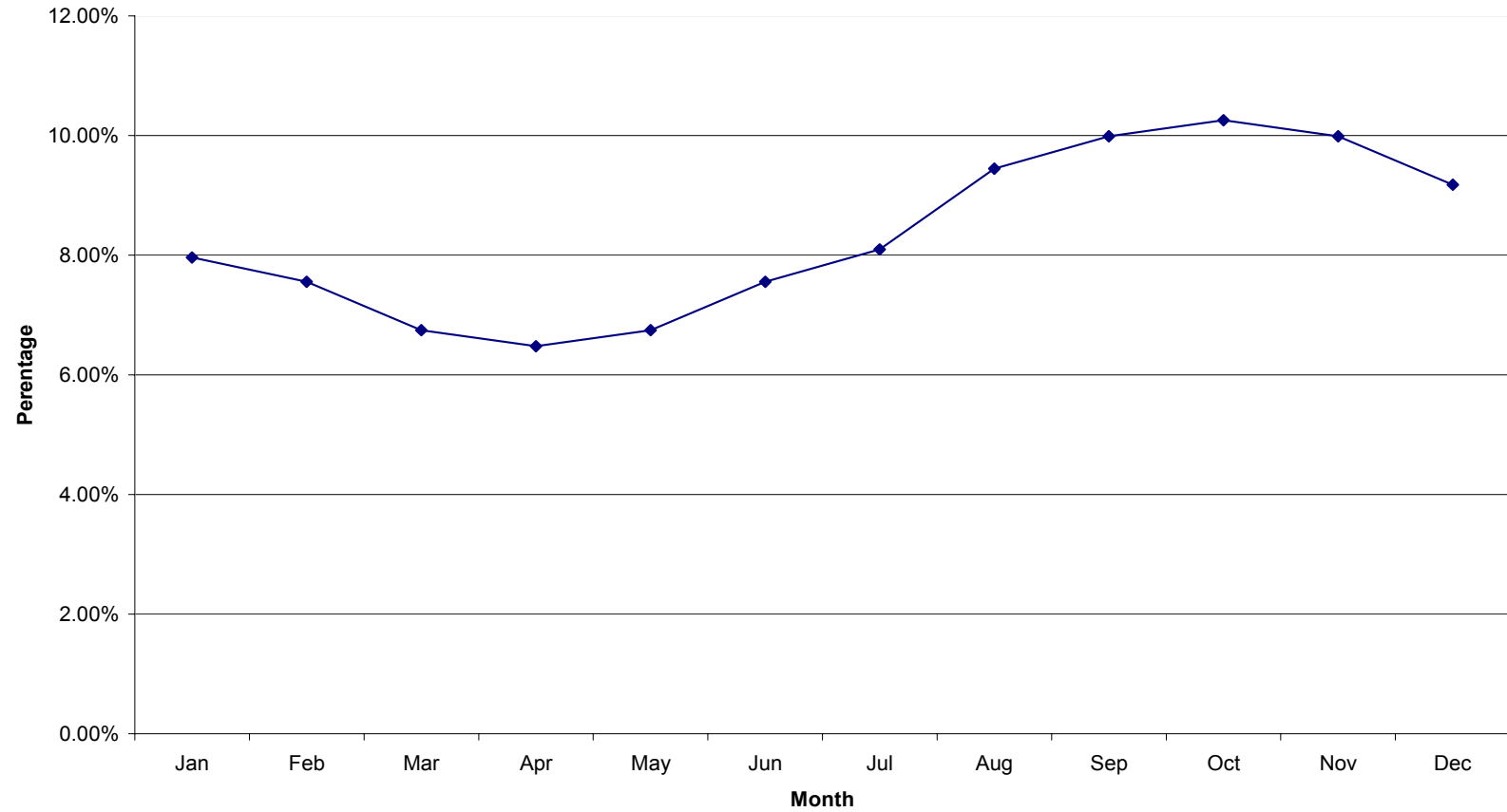
*Template Used in the Study for Reporting National Income by Economic Activity*

<b>Industry</b>
<b>1. Agriculture, Forestry and Fishing</b>
1.1 Agriculture
1.2 Forestry
1.3 Fishing
<b>2. Mining and Quarrying</b>
<b>3. Manufacturing</b>
3.1 Registered
3.2 Unregistered
<b>4. Electricity, Gas and Water Supply</b>
4.1 Electricity
4.2 Gas
4.3 Water Supply
<b>5. Construction</b>
<b>6. Trade, Hotels, Transport and Communication</b>
<i>6.1 Trade, Hotels and Restaurants</i>
6.1.1 Trade
6.1.2 Hotels and Restaurants
<i>6.2 Transport, Storage and Communication</i>
6.2.1 Transport
6.2.1.1 Railways
6.2.1.2 Transport by Other Means
6.2.1.2.1 Road
6.2.1.2.2 Water
6.2.1.2.3 Air
6.2.1.2.4 Services Incidental to Transport
6.2.2 Storage
6.2.3 Communication
<b>7. Financing, Insurance, Real Estate etc.</b>
<i>7.1 Banking and Insurance</i>
7.1.1 Banking
7.1.2 Insurance
<i>7.2 Real Estate, Ownership of Dwellings etc.</i>
<b>8. Community, Social and Personal Services</b>
<i>8.1 Public Administration</i>
8.1.1 NDP from Public Administration
8.1.2 CFC
<i>8.2 Other Services</i>
<b>9. Total GDP at Factor Cost</b>



### Exhibit 1

Milk Production

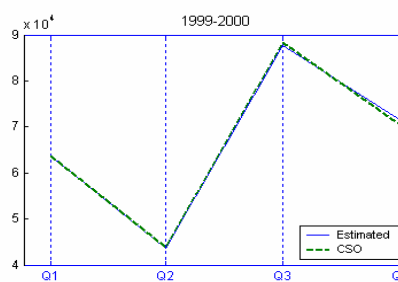
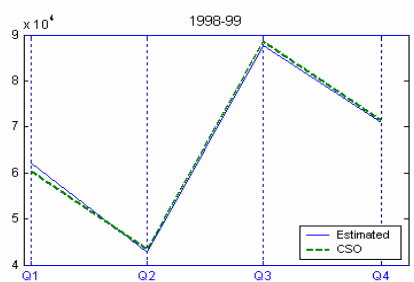
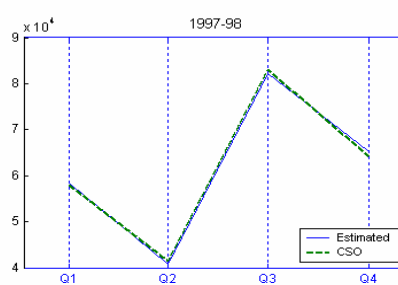
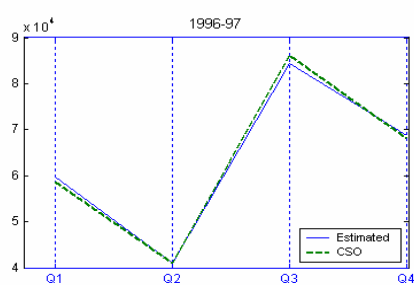


The above plot refers to the breeding pattern of Kohlapur buffaloes in North India.; *Source: Sharma et al (2000)*

## Exhibit 2

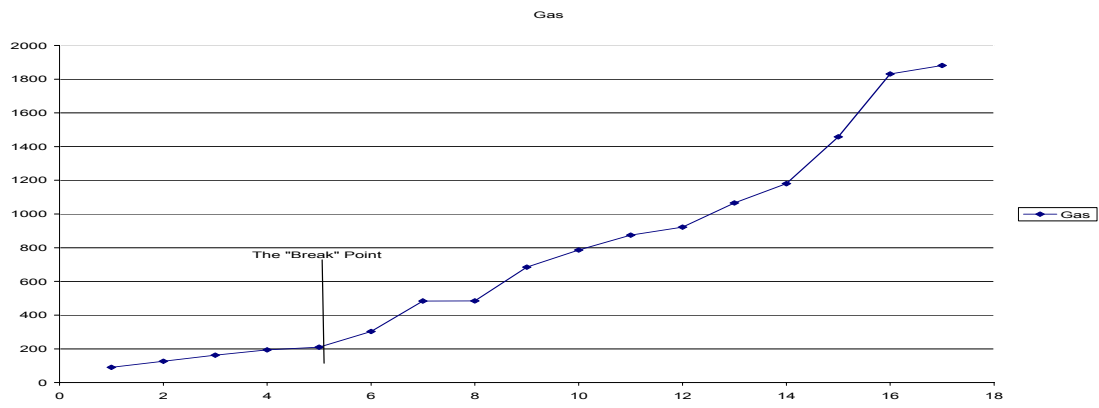
### Quarterly GDP from Agriculture

Sr.	Year	Q1	Q2	Q3	Q4				
1	1983-84	38690	27209	56870	43424				
2	1984-85	39312	27268	57257	44758				
3	1985-86	39841	27796	57057	45054				
4	1986-87	39652	27648	57044	44365				
5	1987-88	39310	26961	55798	44284				
6	1988-89	45360	31967	66115	50875				
7	1989-90	44286	32792	67375	51302				
8	1990-91	47256	33863	68924	54380				
9	1991-92	46747	33232	67157	53496				
10	1992-93	49361	35285	72542	55916				
11	1993-94	51566	36926	74478	58865				
12	1994-95	54959	38154	77287	62699				
13	1995-96	54021	37511	76595	62342	<b>CSO Estimates</b>			
14	1996-97	59613	40945	84423	68770	58570	40885	86178	68117
15	1997-98	58332	40809	82221	65236	58031	41395	83128	64044
16	1998-99	62158	42668	87679	71034	60399	43326	88462	71352
17	1999-00	63597	43552	87713	71430	63673	43884	88406	70328

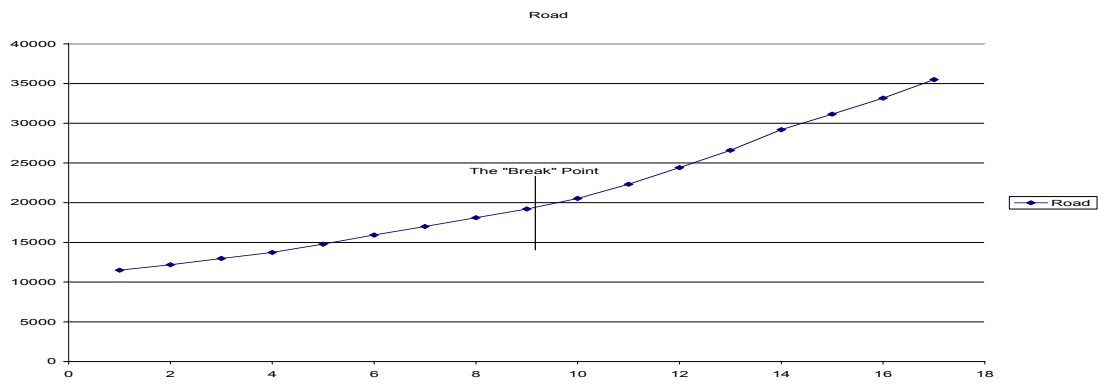




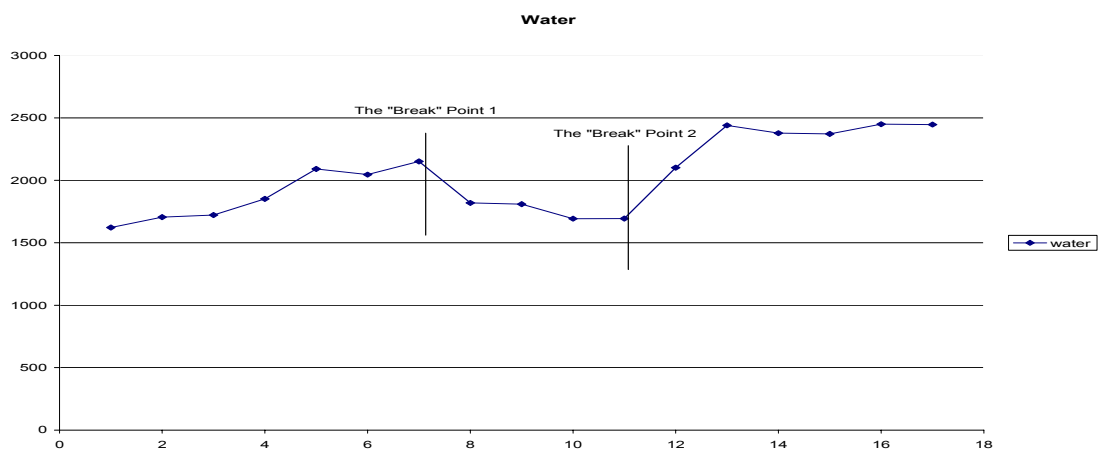
### Exhibit 3



### Exhibit 4



### Exhibit 5



## Exhibit 6

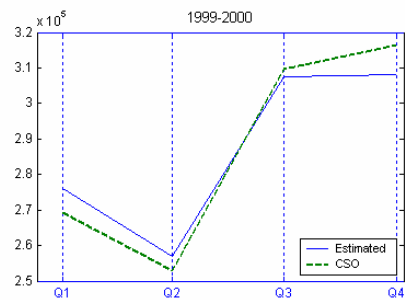
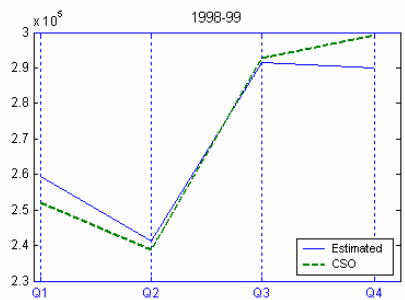
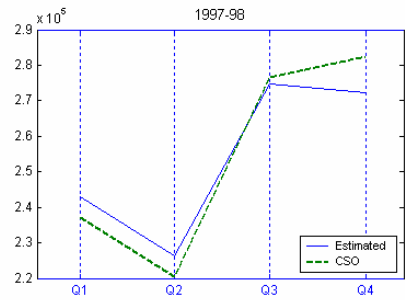
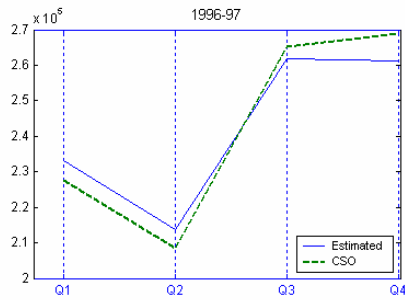
### Monthly GDP

Sr.	Year	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
1	1983-84	43059	38461	34411	31725	32088	38161	47071	44533	41563	38559	40617	41493
2	1984-85	43807	39696	36571	34055	34455	39758	47825	46296	43151	40368	42515	43582
3	1985-86	46036	42026	38586	35784	36019	41476	50356	48105	45816	41508	43400	44875
4	1986-87	47190	43078	39878	37317	37431	43362	51918	49696	46442	45246	46988	47740
5	1987-88	50264	44694	42369	40760	40157	44693	52183	51639	47878	44998	48029	49113
6	1988-89	56033	51134	47311	42715	42769	50053	59397	57508	53234	49446	51776	53725
7	1989-90	57352	52051	48584	45103	45807	53008	62514	61709	57251	54914	56438	61598
8	1990-91	61725	56858	52581	49124	49408	55733	64881	62948	59295	56097	59057	65166
9	1991-92	62132	57347	52385	50362	49858	56805	66382	63147	59579	58527	60613	64726
10	1992-93	66335	60783	55718	52266	52162	60821	70484	68066	62629	59711	61686	67128
11	1993-94	68568	63502	58202	55545	56323	63748	74397	71699	67761	64472	66496	70632
12	1994-95	71486	66022	60467	57675	58791	66568	77951	76557	74906	72545	73380	81684
13	1995-96	76277	70872	64868	63281	63936	72024	81968	81414	80617	78309	79117	86881
14	1996-97	83972	78776	70513	67434	69052	77210	89263	86462	86136	82391	84316	94557
15	1997-98	86661	81460	74978	72283	72882	81288	93603	91146	89898	85909	87562	98730
16	1998-99	92227	86914	80302	76686	78145	86574	97275	97882	96465	92794	93542	103666
17	1999-00	98071	92685	85153	81912	83077	91989	103127	101933	102431	97853	100372	109899

## Exhibit 7

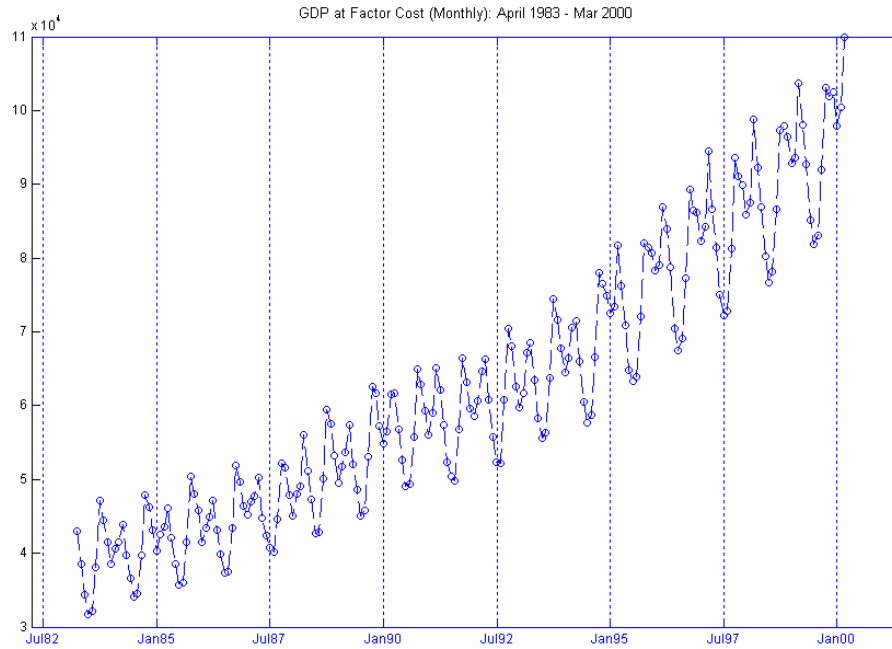
### Quarterly GDP

Sr.	Year	Q1	Q2	Q3	Q4				
1	<b>1983-84</b>	115931	101975	133168	120669				
2	<b>1984-85</b>	120074	108267	137272	126465				
3	<b>1985-86</b>	126649	113280	144278	129783				
4	<b>1986-87</b>	130147	118110	148056	139975				
5	<b>1987-88</b>	137326	125610	151700	142140				
6	<b>1988-89</b>	154478	135538	170139	154946				
7	<b>1989-90</b>	157987	143918	181475	172950				
8	<b>1990-91</b>	171164	154265	187124	180320				
9	<b>1991-92</b>	171864	157025	189107	183866				
10	<b>1992-93</b>	182836	165249	201180	188525				
11	<b>1993-94</b>	190272	175616	213858	201600				
12	<b>1994-95</b>	197975	183034	229414	227610				
13	<b>1995-96</b>	212017	199241	243999	244308	<b>CSO Estimates</b>			
14	<b>1996-97</b>	233261	213696	261861	261264	227679	208392	265113	268898
15	<b>1997-98</b>	243098	226453	274648	272200	237042	220498	276433	282425
16	<b>1998-99</b>	259443	241404	291622	290002	251972	238683	292829	298988
17	<b>1999-00</b>	275908	256977	307491	308125	269688	252301	310150	316361

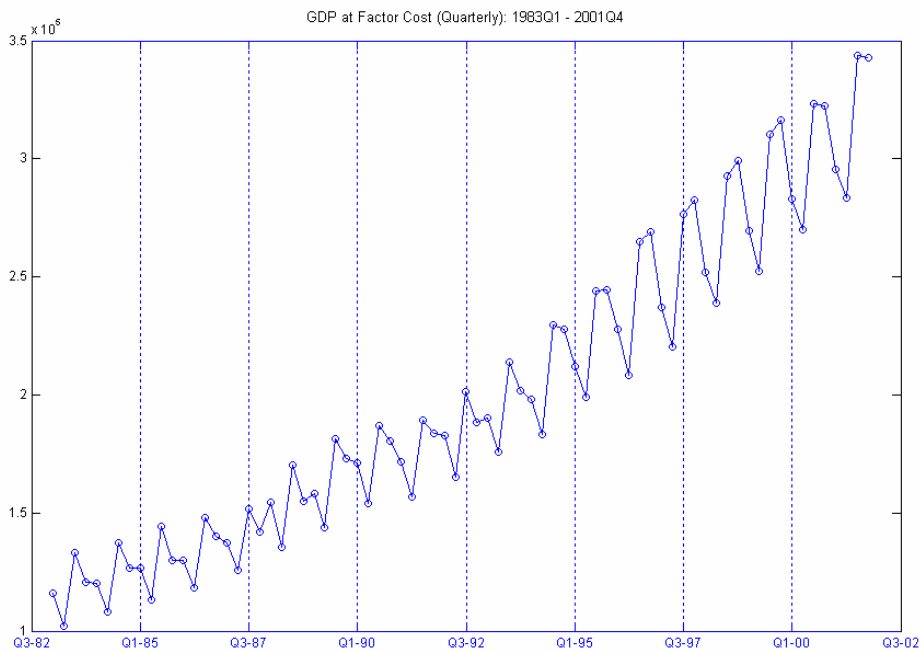


## Exhibit 8

### Monthly Series



### Quarterly Series



## Exhibit 9

GDP at Factor Cost by Economic Activity by Quarter for the year 1999-2000 (1993-94 = 100)

Industry/Quarter	Q1	Q2	Q3	Q4	Total
<b>1. Agriculture, Forestry and Fishing</b>	69485	49440	93601	77318	289843
<i>1.1 Agriculture</i>	63597	43552	87713	71430	266293
<i>1.2 Forestry</i>	3140	3140	3140	3140	12558
<i>1.3 Fishing</i>	2748	2748	2748	2748	10992
<b>2. Mining and Quarrying</b>	6513	6562	6776	7057	26908
<b>3. Manufacturing</b>	45480	46119	48165	52640	192404
<i>3.1 Registered</i>	29588	29993	31289	34124	124993
<i>3.2 Unregistered</i>	15892	16126	16876	18516	67411
<b>4. Electricity, Gas and Water Supply</b>	7084	7179	7073	7301	28637
<i>4.1 Electricity</i>	5908	6012	5947	6120	23988
<i>4.2 Gas</i>	484	474	434	489	1881
<i>4.3 Water Supply</i>	692	692	692	692	2768
<b>5. Construction</b>	15179	13793	14360	15483	58815
<b>6. Trade, Hotels, Transport and Communication</b>	60158	61038	63526	68784	253506
<i>6.1 Trade, Hotels and Restaurants</i>	39982	40512	42057	45809	168360
<i>6.1.1 Trade</i>	37232	37725	39164	42658	156780
<i>6.1.2 Hotels and Restaurants</i>	2750	2786	2893	3151	11580
<i>6.2 Transport, Storage and Communication</i>	20176	20526	21470	22975	85146
<i>6.2.1 Transport</i>	15205	15207	15350	15613	61375
<i>6.2.1.1 Railways</i>	3033	3031	3148	3409	12620
<i>6.2.1.2 Transport by Other Means</i>	12172	12176	12202	12205	48755
<i>6.2.1.2.1 Road</i>	8871	8872	8874	8876	35493
<i>6.2.1.2.2 Water</i>	603	604	620	619	2446
<i>6.2.1.2.3 Air</i>	1832	1835	1842	1844	7354
<i>6.2.1.2.4 Services incidental to Transport</i>	866	866	866	866	3462
<i>6.2.2 Storage</i>	176	176	176	176	704
<i>6.2.3 Communication</i>	4795	5143	5944	7185	23067
<i>6.2.3.1 Postal Related</i>	698	744	706	781	2928
<i>6.2.3.2 Telecom Related</i>	4097	4399	5238	6404	20139
<b>7. Financing, Insurance, Real Estate etc.</b>	35503	35738	36490	38134	145865
<i>7.1 Banking and Insurance</i>	19030	19265	20016	21660	79971
<i>7.1.1 Banking</i>	17157	17392	18143	19787	72479
<i>7.1.2 Insurance</i>	1873	1873	1873	1873	7492
<i>7.2 Real Estate, Ownership of Dwellings etc.</i>	16474	16474	16474	16474	65894
<b>8. Community, Social and Personal Services</b>	36506	37109	37499	41410	152523
<i>8.1 Public Administration</i>	15774	16377	16767	20678	69596
<i>8.1.1 NDP from Public Administration</i>	14288	14891	15281	19192	63653
<i>8.1.2 CFC</i>	1486	1486	1486	1486	5943
<i>8.2 Other Services</i>	20732	20732	20732	20732	82927
<b>9. Total</b>	<b>275908</b>	<b>256977</b>	<b>307490</b>	<b>308125</b>	<b>1148501</b>

**Exhibit 10**

<b>Monthly Apportionment of Annual Output from Various Crops and Milk (Figures Denote Percentages)</b>													
<b>Sr.</b>	<b>Crop/Month</b>	<b>Apr</b>	<b>May</b>	<b>Jun</b>	<b>Jul</b>	<b>Aug</b>	<b>Sep</b>	<b>Oct</b>	<b>Nov</b>	<b>Dec</b>	<b>Jan</b>	<b>Feb</b>	<b>Mar</b>
1	<b>Rice</b>	1.4	1.8	3.3	7.8	6.9	22.6	27.5	17.9	6.8	1.7	1.7	0.7
2	<b>Wheat</b>	44.2	28.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.1	4.7	22.2
3	<b>Jowar</b>	3.4	1.6	0.8	0.8	0.3	6.1	15.5	28.5	19.9	10.9	6.8	5.6
4	<b>Bajra</b>	0.0	0.0	0.0	0.0	0.0	18.1	46.3	30.6	2.9	1.0	0.5	0.5
5	<b>Barley</b>	48.2	13.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	37.1
6	<b>Maize</b>	1.1	0.0	0.0	1.7	13.0	37.2	29.5	5.7	0.0	1.2	8.4	2.2
7	<b>Ragi</b>	6.8	6.8	6.8	6.8	6.8	16.2	16.2	6.8	6.8	6.8	6.8	6.8
8	<b>Gram</b>	19.3	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.8	30.5	47.6
9	<b>Arhar/Tur</b>	3.9	0.8	0.0	0.0	0.0	0.0	0.0	2.3	16.5	25.0	29.6	22.0
10	<b>Moong</b>	0.0	0.0	0.0	0.0	18.5	37.0	18.5	6.5	13.0	6.5	0.0	0.0
11	<b>Urd</b>	0.0	0.0	0.0	0.0	18.5	37.0	18.5	6.5	13.0	6.5	0.0	0.0
12	<b>Masoor</b>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	50.0	25.0
13	<b>Horse Gram</b>	0.0	0.0	0.0	0.0	0.0	0.6	50.0	49.4	0.0	0.0	0.0	0.0
14	<b>Linseed</b>	26.3	6.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	22.0	42.6
15	<b>Sesamum</b>	0.3	2.6	4.9	4.0	7.5	9.6	22.8	25.5	11.9	5.4	2.8	2.9
16	<b>Groundnut</b>	8.3	8.3	0.0	0.0	0.0	14.6	26.7	27.1	10.5	4.4	0.0	0.0
17	<b>Rapeseed/Mustard</b>	16.0	2.6	0.0	0.0	0.0	0.0	0.0	0.0	2.6	6.5	31.5	40.9
18	<b>Castor</b>	10.6	0.0	0.0	0.0	0.0	0.0	10.6	10.6	10.9	24.6	18.0	14.8
19	<b>Coconut</b>	11.1	11.1	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	11.1
20	<b>Niger Seed</b>	0.0	0.0	0.0	0.0	0.0	0.0	50.0	50.0	0.0	0.0	0.0	0.0
21	<b>Safflower</b>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	50.0	25.0
22	<b>Sunflower</b>	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3
23	<b>Soyabean</b>	4.8	3.8	3.3	3.2	2.4	1.5	14.9	17.6	15.4	13.8	11.8	7.5
24	<b>Sugarcane</b>	6.7	5.4	5.4	1.2	1.2	0.0	7.0	10.5	17.8	17.4	18.2	9.2
25	<b>Cotton</b>	6.8	3.4	0.7	0.7	0.7	3.8	10.8	14.8	13.7	17.1	16.2	11.6
26	<b>Mesta</b>	0.0	0.0	0.0	0.0	8.5	8.5	0.4	13.0	41.0	28.5	0.0	0.0
27	<b>Jute</b>	0.0	0.0	0.0	20.7	37.2	29.3	12.8	0.0	0.0	0.0	0.0	0.0
28	<b>Tea</b>	10.9	10.9	8.7	8.7	16.3	9.8	9.8	8.7	8.7	1.1	3.3	3.3
29	<b>Coffee</b>	40.7	20.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.3	29.7
30	<b>Tobacco</b>	3.0	2.7	0.0	0.0	1.1	1.1	1.1	8.9	14.4	17.0	43.4	7.0
31	<b>Cardamom</b>	0.0	0.0	0.0	1.2	6.2	41.5	42.7	6.2	1.2	1.2	0.0	0.0
32	<b>Chillies</b>	0.0	12.5	25.0	12.5	0.0	0.0	8.3	16.7	16.7	8.3	0.0	0.0
33	<b>Pepper</b>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.3	16.7	29.2	33.3	12.5
34	<b>Dry Ginger</b>	0.0	0.0	0.0	0.0	0.0	0.0	50.0	50.0	0.0	0.0	0.0	0.0
35	<b>Turmeric</b>	12.5	0.0	0.0	0.0	0.0	0.0	0.0	12.5	12.5	25.0	25.0	12.5

36	<b>Banana</b>	7.0	5.9	9.0	11.0	13.2	11.7	9.4	5.9	5.9	5.9	7.0	8.1
37	<b>Cashewnut</b>	50.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0
38	<b>Potato</b>	6.6	0.9	0.6	0.4	0.2	0.4	0.7	12.5	18.9	18.7	21.4	18.7
39	<b>Arecanut</b>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.0	26.0	37.0	24.0	0.0
40	<b>Garlic</b>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.7	33.3	33.3	16.7
41	<b>Coriander</b>	0.0	0.0	0.0	25.0	25.0	0.0	0.0	8.3	8.3	16.7	8.3	8.3
42	<b>Onion</b>	37.3	0.0	0.0	0.0	0.0	0.0	7.2	7.2	5.5	5.5	0.0	37.3
43	<b>Sweet Potato</b>	8.5	8.5	0.0	0.0	0.0	8.2	8.2	16.4	8.2	16.7	8.5	16.9
44	<b>Tapioca</b>	12.5	0.0	0.0	12.5	25.0	12.5	0.0	0.0	0.0	0.0	12.5	25.0
45	<b>Rubber</b>	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3
46	<b>Guar Seed</b>	10.5	10.5	15.8	15.8	15.8	10.5	10.5	5.3	0.0	0.0	0.0	5.3
47	<b>Milk</b>	6.5	6.7	7.6	8.1	9.4	10.0	10.3	10.0	9.2	8.0	7.6	6.7

### Exhibit 11

Sr.	Item/'Indicator'	Splicing Year
1	Index of Mining (1993-94 = 100)	1990-91
2	IIP – Mfg. (1993-94 = 100)	1990-91
3	IIP – Electricity (1993-94 = 100)	1990-91
4	Index of the group relating to Petroleum Products	1996-97
5	IIP – Basic Metal and Alloy (1993-94 = 100)	1996-97
6	IIP – Wood (1993-94 = 100)	1990-91

### Exhibit 12

Sub-components forming the Wholesale Price Index at 'Level 1' Disaggregation	
WPI – All Commodities	Sugarcane
Food Grains	Other Non-food Articles exc. Sugarcane
Cereals	Metallic Minerals
Rice	Other Minerals
Wheat	Coal Mining
Other Cereals	Mineral Oils
Pulses	Kerosene
Fruits and Vegetables	Mineral Oils exc. Kerosene
Vegetables	Electricity
Potatoes	Food Products
Vegetables exc. Potatoes	Sugar Group
Fruits	Edible Oils
Milk	Food Products exc. Edible Oils & Sugar Group
Eggs, Fish and Meat	Beverages, Tobacco and Tobacco Products
Condiments and Spices	Textiles
Tea and Coffee	Wood and Wood Products
Fibres	Paper and Paper Products
Raw Cotton	Leather and Leather Products
Fibres exc. Raw Cotton	Rubber and Pulp Products
Oilseeds	Chemicals and Chemical Products
Groundnut Seed	Non-metallic Mineral Products
Cotton Seed	Basic Metals
Oilseeds exc. Groundnut & Cotton Seeds	Machinery and Tools
Other Non-Food	Transport Equipment and Parts