

Report of the Working Group
on
Workforce Estimation
for
Compilation of National Accounts Statistics
with
Base Year 1999-2000



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Statistics with Base Year 1999-2000

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Dear Prof. Tendulkar,

On behalf of the Working Group, I have great pleasure in submitting its report on workforce estimation for national accounts compilation. We convey our sincere thanks for the confidence reposed in us and the extension of time granted to complete the assigned task.

I am indeed indebted to all Members of the Group for their deep involvement and valuable contributions in shaping the ideas and framing the recommendations contained in the report. I am particularly thankful to Prof. K. Sundaram, for his analytical reasoning that enriched our understanding immensely, and Sh. Paul Jacob, for his valuable observations on employment data that helped us greatly in sifting through the available alternatives. Sh. Raj Gautam Mitra of the Office of the RGI provided the much-needed inputs relating to employment data based on Population Census. I also greatly appreciate the painstaking efforts put in by the Member Secretary Sh. Alope Kar, who carried out the work of the group with great initiative and competence.

I would also like to place on record the gratitude and appreciation of the Group for the technical and informative inputs provided by a large number of officials of the CSO and NSSO in different meetings of the group. It is indeed difficult to list every name. First and foremost, we are thankful to Dr. Vaskar Saha, Dr. A.C. Kulshreshtha, Dr. Gulab Singh and Sh. B.K. Giri, who contributed significantly during the deliberations of the Group. We thank Sh. Ramesh Kolli, who headed an Internal Working Group of the National Accounts Division - results of whose work have been a source of useful input. In addition, we thank Sh. S. Mullick and Ms. A. Sinha Ray for the arduous analysis of survey data carried out by them. Finally, we highly appreciate the committed and efficient support rendered by Sh. T. Baskaran, Sh. Vidya Prakash and Sh. A.K. Gupta. The report would not have taken shape without the dedicated and untiring efforts put forth by them.

With warm regards,

Yours sincerely,

(Grace Majumdar)

Prof. S.D. Tendulkar
Chairman
Advisory Committee on National Accounts.

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Abbreviations

ASI	Annual Survey of Industries
CSO	Central Statistical Organisation
DGE&T	Directorate General of Employment and Training
EMI	Employment Market Information
ES	Enterprise Survey
EUS	Employment and Unemployment Survey
GDP	Gross Domestic Product
GVA	Gross Value Added
IWG	Internal Working Group
LIM	Labour Input Method
MWOW	Main Worker with Other Work
NAD	National Accounts Division
NAS	National Accounts Statistics
NDP	Net Domestic Product
NIC	National Industrial Classification
NSSO	National Sample Survey Organisation
PC	Population Census
RBI	Reserve Bank of India
RGI	Registrar General of India
RSE	Relative Standard Error
SDP	State Domestic Product
SDRD	Survey Design and Research Division
SNA	System of National Accounts
SSMI	Sample Survey of Manufacturing Industries
UT	Union Territory
VAPW	Value Added Per Worker
WG	Working Group
WPR	Workforce Participation Rate

Chapter I: Introduction and the Task

1.1 Introduction

1.1.1 In India, the methodology used for compilation of National Accounts Statistics (NAS) and the sources of data are periodically reviewed in detail to effect improvements in their coverage and reliability on the one hand and to adopt the recent developments in the theory and practice of national accounting on the other. As a result, the NAS undergo thorough revision from time to time. These revisions of the series of NAS are always accompanied by shifting the base year to a more recent year.

1.1.2 Since its first official compilation with base year 1948-49, the NAS series have so far been revised four times – mostly decennially. The first official series of NAS, also called the “Conventional Series”, was revised by the Central Statistical Organisation (CSO) in 1967 when the base year was shifted from 1948-49 to 1960-61. The next revision of the NAS series was accompanied with its re-basing to 1970-71, followed by the revision effecting change of base year to 1980-81. The last revision of the NAS resulted in introduction of the current series with base year 1993-94. Following the common practice, each of the revised series is referred to by its respective base year in this report.

1.1.3 To capture the underlying changes in organised and un-organised modes of production, including those brought about by internal liberalisation and globalisation, the sources and methods of national accounting require more frequent reviewing and revision. The need for this has been greater in recent years, which have seen definite tendencies of breaking away from the past trends in certain segments of the economy. Accordingly, revision of NAS series once every five years has been under consideration for some time. The next revision of the NAS series is proposed to be undertaken with revised base as 1999-2000.

1.1.4 Over the years, sustained efforts at methodological improvements in compilation of NAS, collection of primary data and use of more appropriate alternative databases have enhanced the quality of the NAS considerably. Yet, constrained by the absence of regular current data, particularly in respect of the unorganised segment of the economy, national account statisticians are even now obliged to depend on benchmark

estimates and indicators for compilation of annual estimates. In the current (1993-94) series of NAS, compilation of one-third of the estimate of domestic product, pertaining mostly to the unorganised segment of non-agricultural production, is not founded on direct current data. *Appendix 1.1* of this chapter gives the share of unorganised segment in the Net Domestic Product (NDP) by industry in 1993-94 and 1999-2000. It is seen that more than one-third of the domestic product from manufacturing originates from the activities carried out in the unorganised segment, which constitutes over 5 per cent of the total NDP. More importantly, the production of services in the un-organised segment of the economy (items 6.1 to 9.2 of *Appendix 1.1*) constitutes over one-fifth of the total NDP. Such being the importance of the unorganised segment, the estimates of workforce assume significance in compilation of NAS, as the contribution of this segment in the domestic product is measured as a function of *labour input*, i.e. workforce adjusted for multiple employment, engaged in the respective activities.

1.2 Constitution of the Working Group

1.2.1 The Advisory Committee on National Accounts, under the Chairmanship of Prof. S.D. Tendulkar, in its second meeting held on 23rd September 2002, discussed the problem of estimating *labour input* for NAS compilation and recommended formation of a Working Group (WG) to formulate and suggest a detailed methodology of estimating the workforce. The methodology and the source data recommended by the WG are expected to provide the workforce estimates required for compilation of NAS with the base year 1999-2000.

1.2.2 The present WG, formed at the recommendation of the Advisory Committee, was constituted with the following members: Ms. Grace Majumdar, Chairperson, Prof. K. Sundaram, Sh. Paul Jacob, Sh. Raj Gautam Mitra of the office of the Registrar General of India (RGI) and Sh. Alope Kar (Member Secretary) of CSO by the office order placed at *Annex A*.

1.2.3 The Advisory Committee was of the view that all the issues involved in working out estimates of workforce, which are essential for NAS compilation, need a thorough review. The present WG is thus expected to

- (i) examine the data and method used for workforce estimation in the past as well as for the current series (base year 1993-94) of the NAS,
- (ii) explore the alternative sources of data and
- (iii) devise and recommend a method of workforce estimation that could be used for the proposed revised series of the NAS, with base year 1999-2000.

1.3 Meetings of the WG

1.3.1 The WG met on three occasions. The first meeting of the WG was held on 25th March, 2003 at New Delhi and discussed the following items:

- (i). Background Note on Estimation of Workforce for Compilation of NAS,
- (ii). Issues relating to Correspondence Between Household-based and Enterprise-based Estimates of *Labour Input*,
- (iii). A Note on the data on Economic Questions canvassed in Census 2001, and
- (iv). A Proposed Method of Estimating Workforce for Compilation of NAS.

1.3.2 The second meeting of the WG was held on 7th June, 2003 at Kolkata and discussed the following items:

- (i). Report of the Internal Working Group (IWG) of National Accounts Division for re-grouping the economic activities, and
- (ii). Issues identified in the First Meeting.

1.3.3 The third meeting of the WG was held on 17th November, 2003 at New Delhi and discussed the following items:

- (i) Between-round Variation in Estimates of Relative Standard Errors (RSEs) of Workforce Participation Rate (WPR) Estimates based on Employment and Unemployment Surveys (EUSs) of the National Sample Survey Organisation (NSSO) – A Comparison of 50th and 55th Rounds,
- (ii) Netting out the Workforce engaged in Organised Segment of Economy,
- (iii) Distributing aggregate estimates of Workforce over different activity groups, and
- (iv) Estimating Workforce for State Domestic Product (SDP) Compilation.

1.4 Organisation of the Report

1.4.1 The report, in addition to this chapter, contains four more chapters. Chapter II discusses the need for workforce estimates for the compilation of NAS and also critically examines the available data sources. Chapter III highlights the problems associated with the use of *Labour Input Method* (LIM) for estimating *value added* and output from un-

organised part of various economic activities / activity groups. Chapter IV discusses in detail the method of estimating *Labour Input*. This chapter also discusses the background of workforce estimation for the earlier series of NAS, as well as the issue of adjustment for multiple jobs. Chapter V lists the recommendations of the WG for estimating *labour input* at the aggregate level as well as its distribution among various economic activities / activity groups for the proposed new series of NAS with base year 1999-2000.

**Percentage Share of Unorganised Segment in NDP by Industry
- 1993-94 and 1999-2000**

Industry	% Share in respective industry		% Share in total NDP	
	1993-94	1999-2000	1993-94	1999-2000
1. Agriculture	96.5	96.9	31.75	26.84
2. Mining & quarrying	7.3	8.4	0.15	0.17
3. Manufacturing	36.6	39.2	5.45	5.21
4. Electricity, gas & water supply	7.2	6.2	0.09	0.08
5. Construction	51.1	58.2	2.86	3.72
6.1 Trade	89.7	81.9	11.75	12.45
6.2 Hotels & Restaurants	71.9	58.8	0.58	0.59
7.1 Railways	0	0	0	0
7.2 Transport by other means	68.9	77.4	2.27	3.17
7.3 Storage	58.9	50.4	0.59	0.50
7.4 Communication	8.1	8.6	0.09	0.11
8.1 Banking & insurance	6.8	9.5	0.39	0.68
8.2 Real estate, ownership of dwelling & business services	94.2	81.4	5.46	4.40
9.1 Public administration & defence	0	0	0	0
9.2 Other services	34.3	29.6	2.37	2.49
10 NDP at Factor cost	63.1	59.2	63.1	59.2

Source: NAS 2003.

Chapter II: Need for Workforce Estimates and Data Sources

2.1 Need for Workforce Estimates in NAS Compilation

2.1.1 From the perspective of collection of data required for estimating national income and related macro-economic aggregates, the economy can broadly be divided into three segments, viz. public, private organised (comprising mainly joint stock companies, registered factories and cooperatives) and unorganised. Generally speaking, the contribution of the public and private organised segments (constituting the 'organised' segment of the economy) is measured directly using current data available from official sources and annual surveys. Coverage of the 'organised' segment in Indian National Accounts is indicated in *Table 2.1*. Complete information required for estimating the macro-economic aggregates for the public sector is obtained from the budget documents and annual accounts of the public sector enterprises. The information relating to the private organised segment is available annually from the sources like Annual Survey of Industries (ASI) and the Reserve Bank of India (RBI) for each year.

2.1.2 It is the unorganised non-agricultural segment of the economy for which there is no regular flow of current data, either from official sources or through annual surveys, and adoption of production approach for measuring the *value added* is not feasible for want of requisite information on output and intermediate inputs. The estimates of macro-economic aggregates representing production, income generation etc. in the unorganised segments of the manufacturing and service-producing activities for the base year are now arrived at by, what is called, the *labour input method*. The estimates for the subsequent years are derived by moving the base-year estimates with the help of appropriate indicators of production and prices. The economic activities for which LIM is used for estimating *value added* are unregistered manufacturing, and unorganised segments of wholesale & retail trade, hotels & restaurants, transport by means other than railways, storage not elsewhere classified, communication, business services, legal services, sanitary services, research and scientific services, religious and other community services, personal services etc.

Table 2.1: Coverage of ‘Organised’ Segment in Indian National Accounts

Industry	Coverage of organised segment in the activities
Agriculture	Government irrigation system, non-departmental enterprises and crop production in plantation crops of tea, coffee and rubber covered in private corporate sector.
Forestry	Recorded production of industrial and fuel wood
Fishing	Non-departmental enterprises
Mining & Quarrying	Major minerals
Manufacturing	Factories Registered under Factories Act, 1948
Electricity, gas and water supply	Total activity of electricity & gas, public sector part of water supply
Construction	Construction works in the public sector and private corporate sector
Trade, hotels & restaurants	Public and private corporate sector and co-operatives
Railways	Complete
Transport by other means	Public sector, private air and shipping companies and road transport under the private corporate sector.
Storage	Warehousing corporation in public sector, cold storage covered under Factories Act, 1948.
Communication	Public sector.
Banking and insurance	Total activity except the commission agents attached to Life Insurance Corporation of India and unorganised non-banking financial undertakings including professional moneylenders and pawn-brokers.
Real estate and business & legal services	Accounting, book-keeping & auditing services, Data processing & software development, Business & management consultancy and Architectural & engineering services.
Public administration and defence	Complete
Other services	Public sector medical, education and sanitary services, TV and radio broadcasting and recognised educational institutions in the private sector.

2.1.3 The *labour input method* (LIM) of estimating *value added* and output for an economic activity or a group of economic activities consists of:

- obtaining an estimate of *labour input* (workforce adjusted for multiple employment) for a particular economic activity or a group of economic activities from Population Census (PC) and / or Labour Force Survey like the Employment & Unemployment Survey of the NSSO;

- obtaining estimates of *value added* or output per unit of *labour input* for the same economic activity or group of economic activities from Enterprise Survey (like the follow-up surveys of Economic Census) conducted by the NSSO; and
- multiplying the estimate of *labour input* by the estimate of per unit *value added* or output to arrive at an aggregate estimate of *value added* or output for the economic activity or the group of economic activities.

2.1.4 Measuring the value of production of goods and services by LIM, therefore, demands a fair degree of precision in the estimates of *labour input* as well as *value added / output per unit of labour* engaged in different economic activities.

2.1.5 The scheme called “Economic Census & Follow-up Surveys” was instituted by the CSO in 1976, for collection of data on economic activities carried out in the unorganised non-agricultural segment of the economy whose contribution to Gross Domestic Product (GDP) is calculated by LIM. As per the scheme, the Economic Census was to provide an *areal* sampling frame for the follow-up surveys, planned to be conducted by area sampling. The Follow-Up Surveys, also called Enterprise Surveys (ESs), produce estimates on a large number of parameters relating to production, inputs, employment, factor income, capital formation, etc. Besides the estimates of *Gross Value Added (GVA)* per worker, the ES results relating to factor income and employment are also used extensively, directly or indirectly, in estimating GDP and related macro-economic aggregates.

2.1.6 The ESs on unorganised manufacturing covers manufacturing enterprises that are not registered under sections 2m(i) & 2m(ii) of the Factories Act, 1948. For the other economic activities, viz. trade, transport, hotels & restaurant, storage & warehousing and services, the ESs cover all the private enterprises, i.e., private corporate and unincorporated enterprises.

2.1.7 The estimates of workforce are required for measuring contributions of these economic activities, carried out in the unorganised segment of the economy, in the GDP of the country. In fact, what is required for this purpose are the estimates of

quantum of *labour input* in the process of production separately for each of these activities.

2.2 Data Sources

2.2.1 The two main data sources on workers and their distribution over economic activities in India are the decennial Population Census and the Employment & Unemployment Surveys (EUS) of the NSSO. These sources provide information on the entire workforce of the country. Besides these, there are other sources that provide workforce estimates, but their coverage is not complete. The data available from such sources are also useful for compilation of NAS. Different sources from which workforce data are available for use in NAS compilation are briefly discussed below:

(a) *Decennial Population Census*

2.2.2 Population Censuses (PCs) are being conducted in India decennially since 1881. These censuses produce a large volume of demographic and socio-economic data for the entire population of the country. Among other information, the census publications provide 'Economic Tables', containing detailed data on economic activity of the population, employment status, composition of the workforce, rural-urban distribution, industrial and occupational composition. In the 1981 Census, a three-fold classification of main workers, marginal workers and non-workers was adopted. For identifying a main worker, the time criterion of engagement in work for the major part of the year, i.e., at least 183 days, was adopted while those who worked for some time during the preceding year but not for the major part were treated as marginal workers. Those who had never worked during the preceding year were non-workers. In addition, information was also collected on secondary work of main workers. Such of the main workers having secondary work were referred to as 'Main Workers with Other Work' (MWOW). The same concept of work was adopted for the 1991 Census too.

2.2.3 In 2001 Census, though there has been no change in the three-fold classification of main, marginal and non-workers, information on secondary work was not collected. As a result, the estimates of MWOW would not be available from PC

2001. As regards the definition of economic activities, its scope was expanded as follows:

- (i) 'Cultivation' now included all crops except five plantation crops namely, tea, coffee, rubber, coconut and betel nut. In 1991 Census, cultivation included only a few crops. Cultivating crop for self-consumption, as in the past census, was considered to be economic activity.
- (ii) Production of milk for self-consumption was included within the boundaries of economic activity.

2.2.4 Although the overall figures of workforce from PC 2001 are available, their distribution over various economic activities is not yet available. Because of this constraint, the WG was handicapped and could not consider PC 2001 as an alternative source of data for the present study.

(b) *Employment & Unemployment Surveys of NSSO*

2.2.5 The first survey on employment and unemployment was carried out by the NSSO in its 9th round (1955). From the 32nd Round (1977-78), the survey on employment-unemployment has become a part of the quinquennial programme of NSS surveys, with an identical approach being followed in the measurement of employment and unemployment parameters.

2.2.6 In addition to the quinquennially conducted EUSs (called quinquennial EUSs), the NSSO also collects data on employment every year from a smaller sample size of households distributed over the same number of first stage units as the normal NSSO socio-economic surveys. However, in the NSSO's rounds in which quinquennial EUS is not conducted, particularly those meant for ESs, the selection procedure of first stage units is designed to produce efficient estimates of enterprise-related parameters or other household and individual characteristics. As a result, the workforce estimates based on the data collected in these rounds are not only subject to higher sampling error but are also suspected to be biased owing the lesser attention paid to the employment-unemployment component of the survey. Nevertheless, from the data collected in these rounds, it is possible to generate distribution of workers over the activity-groups that deserve to be considered, albeit critically, for use for NAS compilation.

2.2.7 The quinquennial EUSs of NSSO aim to measure the extent of 'employment' and 'unemployment' in quantitative terms disaggregated by various household and population characteristics. The persons surveyed are classified into various activity categories on the basis of the activities pursued by them during certain specified reference periods. Three reference periods are used in these surveys. These are (i) one year, (ii) one week and (iii) each day of the week. Based on these three periods three different measures are arrived at, of which the one with 365 days reference period, called workforce according to 'usual status' approach, is widely used.

2.2.8 The usual activity status¹ relates to the activity status of a person during the reference period of 365 days preceding the date of survey. The activity status on which a person spent relatively longer time (major time criterion) during the 365 days preceding the date of survey is considered the *principal usual activity status* of the person. In this approach, a person is first categorised as belonging to the labour force² or not, according to *major time criterion*. For the persons belonging to the labour force, the broad activity status of either 'working' or 'not working but seeking and/or available for work' is then assigned on the basis of the relatively longer time spent in the labour force during the 365 days preceding the date of survey. If a person – whether or not a worker in the *principal* status - pursues some economic activity more or less regularly for a relatively shorter period during the reference period, he / she is treated to have pursued the economic activity in *subsidiary capacity*.

(c) *Employment Market Information Programme of the Ministry of Labour*

2.2.9 Under the Employment Market Information (EMI) Programme, the Directorate General of Employment & Training (DGE&T), Ministry of Labour, publishes data on employment and unemployment in organised part of the economy. The EMI programme, first taken up on a pilot basis during the second Five Year Plan, was strengthened by the provisions of the Employment Exchanges (Compulsory

¹ It is the activity situation in which a person is found during a reference period that relates to the person's participation in economic and non-economic activities.

Notification of Vacancies) Act, 1959. The programme covers all establishments in the public sector (except the defence establishments and armed forces) and those establishments in the private sector that employ 25 or more persons on the last day of the quarter under reference. Apart from this, since 1966, the establishments employing 10 to 24 persons are also covered on a voluntary basis. The information is collected, *inter alia*, on number of persons employed, classified by industry and sex, at the end of each quarter. What is important to note is that the EMI data do not cover self-employed, part time employees, agricultural and allied operations in the private sector, household establishments employing less than ten workers in the private sector, defence forces and small establishments employing 10 to 24 persons in private sector in the metropolitan areas of Greater Bombay and Calcutta. Besides, coverage of employment in construction, particularly private construction, is inadequate and the frame of establishments is also not comprehensive.

(d) Annual Survey of Industries

2.2.10 The Annual Survey of Industries (ASI), conducted every year by the CSO is another source of employment data. Its coverage is restricted only to the establishments registered as factories under Sections 2m(i) and 2m(ii) of the Indian Factories Act, 1948. However, Departmental units such as Railway workshops, Road Transport Corporation Workshops, Government Mint, Sanitary, water supply, gas, storage etc. are kept out of the coverage, though they may be registered under the Factories Act. Some of these activities when carried out in private factory establishments like cold storage, water supply, gas production and distribution, motion picture production, laundry services, repair of motor vehicles and of other consumer durables are covered under the survey. Until 1997-98, all electricity undertakings engaged in the generation, transmission and distribution of electricity registered with the Central Electricity Authority were also covered under ASI irrespective of their employment size.

² Persons, who are either 'working' (or employed) or 'seeking or available for work' (or unemployed) constitute the labour force. Persons who are neither 'working' nor 'seeking or available for work' for various reasons during the reference period are considered as 'out of labour force'.

Chapter III: Problems Associated with *Labour Input Method*

3.1 *Labour Input Method*

3.1.1 The *Labour Input Method* (LIM) of estimating *value added* and output for an economic activity or a group of economic activities is founded on the precept that all production, with the exception of the housing services provided by owner-occupied dwellings, require input of labour. LIM is adopted in those economic activities where data on quantities and values of output and input are not available. In this method, aggregate estimate of *value added* for an economic activity or a group of economic activities is arrived at by multiplying an estimate of *labour input* going into the process of production and an estimate of *value added per unit of labour input* for the respective economic activity or the group of economic activities.

3.1.2 The estimates of *labour input* are usually obtained from PCs and / or Labour Force Survey and those of *output* or *value added per unit of labour input* from ESs. What is important to note is that an estimate of *labour input* is also generated in the ESs, *inter alia* for the purpose of working out an estimate of *value added per unit of labour input*. The estimates of *labour input* obtained from the PCs and Labour Force Surveys are essentially based on household data and those from the ESs on data collected from enterprises. Thus, apart from the quality of the estimates of *labour input* and *value added / output per unit of labour input*, effectiveness of the LIM depends on how closely the measures of *labour input* obtained from the supply side (based on household data) and the use side (based on enterprise data) correspond to each other. With appropriate allowances for differences in coverage, these two measures of *labour input* are ideally required to be the same. It is, therefore, necessary to examine the comparability of the measures of *labour input* defined on the observations taken from the two distinct perspectives of households and enterprises, with particular reference to the sources of *labour input* estimates used for compilation of national accounts in India.

3.1.3 The data from households like those collected in PC and EUS of the NSSO are usually in terms of employment of persons. What is important to note here is that the

data from enterprises, collected in the ESs, are usually in terms of jobs. The measure of employment and that of jobs are evidently different. A person can pursue one job alongside another. It is the count of jobs that is relevant for measuring *labour input*, particularly because the measure of productivity of labour, i.e. *value added per worker (VAPW)*, obtained from the ESs is, in principle, defined in terms of jobs rather than workers. It is, therefore, necessary to take a closer look at the definitions and methods used for collecting household-based data, as in PC and EUS, and those for collecting enterprise-based data from ESs to examine how reconcilable are the measures obtained from the two approaches.

3.2 Estimating *Labour Input* from Enterprise-Based Data

3.2.1 In the ESs (for instance in the one conducted in the 57th Round (2001-02) of the NSSO), a worker is defined as one (male or female) who participates in the activities of the enterprise on full- or part-time basis on a fairly regular basis either in primary or supervisory capacity with or without salary/wages. Full-time workers are those workers who work for more than half of the period of normal working hours of the enterprise on a fairly regular basis. Persons working for less than or equal to half of the normal working hours of the enterprise on a fairly regular basis are considered as part-time workers. In calculating the number of workers under full- and part-time categories, persons falling under each category are considered separately. **Two part-time workers are counted as 2 and not as 1.**

3.2.2 The working proprietors, apprentices (paid or unpaid), unpaid helpers and part-time workers, as long as they are engaged on fairly regular basis, are treated as workers. In fact, 'worker' in ESs refers to a position or a 'job'. It does not mean that the same person is required to be engaged continuously for a particular regular job. The positions or jobs for which persons are not hired for regular work are not counted as workers in the ESs. The wages paid to such workers are treated as other operating expenses. The measure of *labour input* based on ES data is, therefore, defined as the count of all positions or jobs meant for carrying out regular work of all the enterprises.

3.3 Estimating *Labour Input* from Household-Based Data

3.3.1 The PC and the EUS of the NSSO provide estimates of workforce that broadly represent the population that was economically active at some time during the reference period of one year. The term ‘workforce’ refers to the number of persons (employees, employers and self-employed) engaged wholly or partly in the production of goods and/ or services.

Estimates of Workforce from EUS of NSSO

3.3.2 The estimate of workforce according to ‘*usual status*’ approach has been used as the base for obtaining a measure of *labour input* for compilation of base year estimates of 1993-94 series of NAS. The estimate of workforce according to ‘*usual status*’ approach represents the number of persons engaged in some economic activity, in either *principal* or *subsidiary* capacity, or both, during the 365 days preceding the date of survey. A persons engaged in some economic activity ‘more or less regularly’ for a relatively shorter period during the reference 365 days is treated as having a *subsidiary-capacity* work. Engagement in work in *subsidiary* capacity arises out of the following two situations:

- (i) a person may be engaged for a relatively longer period during the last 365 days in economic/non-economic activity and for a relatively shorter period in another economic activity and
- (ii) a person may be pursuing one economic / non-economic activity almost throughout the year in the *principal usual activity* status and also pursuing along side another economic activity for a relatively shorter period in a *subsidiary* capacity.

Estimates of Workforce from Population Census

3.3.3 As noted earlier, in population censuses since 1981, a person who had worked for the major part of the year (i.e.183 days or more) was treated as ‘main worker’. A ‘marginal worker’ was one who had worked for some time, less than 183 days, during the reference year. Data on marginal workers as well as MWOW were collected. In 2001 Census, data on marginal workers were collected, but not on secondary work of main workers.

3.3.4 The questions on economic aspects were so designed till Census 1991 as to identify all the workers – main, marginal and non-workers – with the reference period of last 365 days prior to the date of enumeration. It may be noted in this context that a person engaged in some economic activity, who at the same time also attended school, was treated as a ‘worker’.

3.3.5 Though the definition of marginal workers in PC is somewhat more liberal than the definition of *subsidiary* status workers in EUS of NSSO, those of ‘main’ workers of PC and ‘*usual principal capacity*’ workers of EUS are, in principal, quite comparable. More significantly, the main and marginal workers obtained from the PC should be close to, or exceed, the usual *principal* and *subsidiary* status workers obtained from the EUS of the NSSO.

3.4 Comparability of Measures of *Labour Input* from Two Perspectives

3.4.1 The ES estimates of *labour input* used for deriving VAPW engaged for an activity in fact represent the average number of workers engaged in carrying out regular work in that activity on a typical day of the reference year of the survey, counting both full-time and part-time workers with equal weights. However, there is a departure from this in case of seasonal enterprises. The workers engaged in seasonally operated enterprises get the same weight as the other enterprises, and not the weights of $m/12$, where m is the number of months of operation of the seasonal enterprise. Thus a person engaged in two different seasonal enterprises in two different parts of the year would be counted twice in the ES estimate of *labour input*. The estimate of *value added* in the seasonal enterprises is, however, adjusted by a factor of $m/12$. Thus, the estimate of annual *value added* by a worker engaged in two different seasonal enterprises in two different parts of the year is accounted for appropriately, without omission or duplication.

3.4.2 Thus for compilation of national accounts using LIM, what is required is not the estimate of workforce based on household data, which is merely a head count of economically active persons, but a measure of total *labour input* going into production activities of the economy. In view of multiple economic activities carried out by a part of the working population, the count of all jobs pursued by each member of the working

population is taken as a more representative measure of *labour input*. For arriving at such a measure, the number of workers engaged in multiple economic activities, i.e. the category of workers called MWOW in the publications of Registrar General of India, has been added to the estimate of workforce.

3.4.3 The method adopted in the 1993-94 series for arriving at an estimate of *labour input* from household data implicitly admits of only one case of disagreement between household-based and enterprise-based estimates of workforce, viz. a person pursuing more than one job simultaneously. No doubt, there are other perceivable situations leading to disagreement between the two measures. For instance, more than one person may be engaged in a particular job in different parts of the reference period of one year. The possible cases of disagreement between the two measures of *labour input* are examined in the following paragraphs:

- (i) First, it is to be noted that in the ESs, the estimate of worker used for deriving VAPW represents only those who are engaged for carrying out regular work. The workers employed casually are not included in the denominator of the estimate of VAPW¹. With the denominator of workers engaged in regular work in the estimate of VAPW, a valid estimate of aggregate *value added* for an economic activity can be obtained by multiplying it by the estimated number of all workers engaged in the economic activity only if the *value added* by the ‘regular workers’ and ‘casual workers’ are assumed to be the same.
- (ii) Restricting our attention to regular jobs, the following cases of lack of correspondence deserve special consideration:
 - a. Two regular jobs pursued side-by-side or in different parts of the year – one in *principal* capacity and the other in *subsidiary* capacity: Including the ‘other work’ or ‘*subsidiary work*’ of the main/ *principal-capacity* workers in the estimate of *labour input* takes care of this case. Since the ES estimates of VAPW takes the count of jobs in the denominator, the measure of *labour input* based on household

¹ The workers engaged for casual work has been explicitly excluded from the estimate of workers in the 57th Round. In the earlier ESs though they were not excluded by any explicit instruction, they seem to have been left out owing to the clause ‘more or less regularly’ in the definition of workers of an enterprise.

data should also include both the jobs. It is, therefore appropriate to include the ‘other work’ or ‘*subsidiary work*’ of the main workers in the estimate of *labour input*, as being done at present.

- b. More than one person employed in a regular job: In this case the household-data based measure of *labour input* would in principle be on the higher side, as it includes employment (whether in *subsidiary* or *principal* capacity) of all of them. Note that for the ES estimate of *labour input*, the regular job is counted only once.

3.4.4 While using LIM, it is important to pay adequate attention not only to the estimates of workforce but also to those of *values added per worker* (VAPW). The consistency between the denominator in the VAPW and the workforce needs to be ensured. If the numerator, i.e. the *value added*, excludes the wages of casual workers and the denominator excludes the casual workers, the estimate of VAPW would broadly relate to regular workers. In that case, the VAPW would be over stated, as the contribution of the casual workers over and above the wages they are paid would still be included in the numerator (wages would be excluded from the compensation of employees and included in the operating expenses). As the EUS includes the casual workers in the workforce, there would be a problem of matching between the estimates of workforce obtained from the EUSs and ESs, if the latter are not designed to capture casual workers.

3.4.5 While formulating the method recommended in the following chapter, the WG considered the available alternatives to resolve these issues. Its efforts were however met with partial success. The WG could devise a reasonably satisfactory solution to the problem of reckoning multiple employment, but it had to refrain from recommending a solution to the other issues discussed in this chapter. Instead, the WG wishes to put on record that it could not provide adequate solutions to particularly two problems with the source data available at present. The first does not seem to be a serious problem. It relates to the situation when more than one person are employed in a regular job during the reference period, discussed in sub-paragraph 3.4.3 (ii) b. The other problem concerns the lack of consistency in treatment of casual workers in the EUSs and ESs, discussed in sub-paragraph 3.4.3 (i).

Chapter IV: Method of Estimating *Labour input*

4.1 Issues Involved

4.1.1 The present statistical system has resorted to indirect method of compiling the estimates of domestic product and related macro-economic aggregates for a number of economic activities carried out in the unorganised segment of the economy, using LIM. This is mainly due to the system's inability to generate reliable current data on value of production and other parameters like value of output and intermediate consumption for these economic activities. Nor are these data expected to be available annually in the foreseeable future. In this context, the LIM assumes importance, particularly for the unorganised segment of the economy. The method requires estimates of *labour input* in unorganised production of goods and services, separately for each activity or activity-group for the base year as well as for the subsequent years. Estimates of workforce and *labour input* for other segments of the economy are also required for national accounting, especially to ensure exhaustive coverage of all productive activities in compilation of NAS.

4.1.2 Thus, in the context of national accounting, estimating *labour input* requires estimates of workforce (number of workers) in the base year separately for the organised and unorganised segments of the economy and its distribution over economic activities or groups of economic activities. The workforce is then to be adjusted for multiple jobs in respect of each activity or activity-group so as to measure the *labour input*. These base-year estimates are required to be projected to the subsequent years too. Further, to arrive at the unorganised *labour input*, the organised *labour input* should be appropriately netted out from that of the economy. As the LIM is also used for the estimation of the State Domestic Product (SDP), it is necessary that method of estimating *labour input* comprises estimating *labour input* for SDP compilation as well.

4.1.3 The problem of estimating *labour input* can thus be decomposed into six distinct but related issues. These are as follows:

- (i) Estimating workforce aggregates for the base year,
- (ii) Adjusting for multiple jobs to derive the *labour input*,
- (iii) Distribution of workforce / *labour input* by economic activity,

- (iv) Projecting estimates of *labour input* to subsequent years,
- (v) Netting out the workforce engaged in organised segment of the economy from the estimates of total *labour input*,
- (vi) Estimating workforce / *labour input* for compilation of SDP.

4.1.4 The above issues have been dealt with differently in the various series of the NAS. From the conventional series to the 1980-81 series, the estimates of workforce used for NAS compilation have been mainly based on PC data. A significant departure was made for the current (1993-94) series. The alternative source of data was used for obtaining the aggregate estimates of workforce for the first time in Indian national accounting. In fact, for the current series, the CSO has used composite estimates of workforce based on the estimates of EUS of the 50th Round (1993-94) of the NSSO and the data of PC 1991. As mentioned earlier, for compilation of NAS, what matters is not the size of the working population but the amount of labour put in by it in the process of production of goods and services. Thus, what is required is not just the estimate of workforce, which is merely the head count of economically active persons, but a measure of total *labour input* going into production activities of the economy. The use of LIM for estimating *value added* requires reliable estimates of *labour input*, measured as workforce adjusted for multiple employment. The industrial classification used for this purpose, the method of estimating the workforce by industrial classification, and the method of adjusting these estimates to obtain *labour input* have varied from one NAS series to the other. Moreover, in the absence of annual data for estimation of the *value added*, the base year estimates are required to be carried forward to the subsequent years using physical indicators. When more appropriate indicators are not available, the estimates are projected using growth rates of workforce. While the earlier series used the inter-censal growth rates of workforce for this purpose, the 1993-94 series uses the growth rates observed between 43rd (1987-88) and 50th (1993-94) Round EUSs. Different series of the NAS have generally been using the DGE&T data on the employment to net out the organised *labour input* from that of the economy. Though there are problems with estimating the *labour input* for the compilation of SDP in view of high sampling errors associated with the estimates for different economic activities, *labour input* estimates have been generated for the same groups of economic activities as those at the national level. The methodology adopted for estimating the *labour input* in different NAS series and the data used are presented in *Annex B*. However, *Table 4.1* given below

presents, in a nutshell, an overall picture of how the six issues stated above had been dealt with in these series:

Table 4.1 : Workforce/ Labour input Estimation in Indian System of National Accounts

Issue	Conventional Series	1970-71 series	1980-81 series	1993-94 series
(i) Estimating base year workforce aggregates	Population Census 1941 and 1951	PC 1961 and 1971, adjusted by results of the sample survey conducted by the RGI for assessing the impact of different definitions adopted in the two PCs.	PC 1971 and 1981 – applying compound inter-censal growth rate of <i>main</i> workers on <i>total workers</i> , separately at 1-digit level of NIC 1970.	Applying EUS estimates at 1-digit level of 50 th Round of NSSO on the PC-based population projection.
(ii) Adjusting for multiple jobs to derive the <i>labour input</i>	Not found necessary	Not considered necessary	Total <i>labour input</i> = sum of main and marginal workers and <i>subsidiary work</i> .	Using MWOW rates obtained from the PC 1991.
(iii) Distribution of workforce/ <i>labour input</i> by economic activity	Occupational tables of PC 1941 and 1951	Regrouping the 3-digit (NIC 1970) level figures of workforce available from the PC 1970 into 13 industrial categories and sub-categories	1-digit level PC figures of <i>subsidiary</i> and marginal workers distributed to 2- and 3-digit levels using EUS of the 38 th Round of NSSO. These were added to the PC figures of main workers at 3-digit level.	The estimates at 1-digit level of NIC 1987 were distributed over 2- and 3-digit levels using the distribution of main and marginal workers obtained from PC 1991.
(iv) Projecting estimates of <i>labour input</i> to subsequent years	Inter-censal growth rate	Inter-censal growth rate separately for the 13 industrial categories and sub-categories.	Inter-censal growth rate separately for the compilation categories used for the series.	Growth rate derived from the estimates based on EUS separately for the compilation categories.
(v) Netting out the organised workforce	SSMI estimates for manufacture and railways for transport	ASI estimates for manufacturing.	ASI estimates for manufacturing and EMI data of DGE&T for the other industries.	ASI estimates for manufacturing and EMI data of DGE&T for the other industries.
(vi) Estimating workforce / <i>labour input</i> for SDP compilation.	—	Same as that for the national-level estimates.	Same as that for the national-level estimates.	Same as that for the national-level estimates.

4.2 Estimating Workforce Aggregates for the Base Year

4.2.1 The method adopted for estimating workforce for the 1993-94 series was unique in the sense that it involved a synthesis of the data available from the EUS (1993-94) and the PC 1991, in an attempt to obviate the deficiencies the individual sources suffer from. However, as the revision of the base year from 1993-94 to 1999-2000 is now being contemplated, it is necessary to take a fresh look at the workforce data available from different sources and adopt a suitable method for using them for estimating *labour input*. The NSSO has released the results of its EUS of the 55th Round in May 2001. The RGI has recently released the number of workers (main and marginal) enumerated in the PC 2001 at the aggregate level, distributed by a four-fold classification of workers – (i) Cultivators, (ii) Agricultural Labourers, (iii) Household Industry workers and (iv) Other Workers. The results relating to workforce obtained from the PC 2001 and EUS 1999-2000 are compared in *Table 4.2*.

Table 4.2: Estimated number of Workers and Population from the EUS of the 55th Round of NSSO and PC 2001

Item / area	PC 2001					EUS 55 th Round (1999-2000)				
	Total population	Total workers	Main workers	Marginal workers	non-workers	Total population	Total workers	principal workers	subsidiary workers	non-workers
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
<i>1. Population and number of workers and non-workers(in millions)</i>										
1.1 Rural	740	311	230	81	430	687	287	261	26	400
1.2 Urban	285	92	84	8	193	234	79	76	3	155
1.3 Total	1025	403	314	89	623	921	365	337	29	556
<i>2. Percentage shares of workers and non-workers in total population</i>										
2.1 Rural	100.00	41.97	31.03	10.94	58.03	100.00	41.72	37.97	3.75	58.28
2.2 Urban	100.00	32.23	29.30	2.93	67.77	100.00	33.67	32.38	1.30	66.33
2.3 Total	100.00	39.26	30.55	8.71	60.74	100.00	39.67	36.55	3.12	60.33
<i>3. Percentage shares in total working population</i>										
3.1 Rural		100.00	73.93	26.07			100.00	91.02	8.98	
3.2 Urban		100.00	90.90	9.10			100.00	96.15	3.85	
3.3 Total		100.00	77.80	22.20			100.00	92.13	7.87	

4.2.2 Though the overall participation rates are quite close – 39.26 for PC 2001 and 39.67 for EUS 55th Round - there are considerable differences in the rates of main (*principal*) and marginal (*subsidiary*) workers between the two sources. This is due to the

fact that the marginal workers, particularly the female, were captured in larger proportion in PC 2001 than in earlier census, resulting in higher WPR for the female population of both the rural and urban areas as may be seen from *Table 4.3*. The improvement in the coverage of marginal workers noticed in PC 2001 was a result of special efforts made during enumeration. This could be one of the reasons for the increase in marginal workers and thus higher WPR in PC 2001 than the earlier PCs.

**Table 4.3: Usual Status Workforce Participation Rates (WPRs per 1000 persons)
- in EUS of 43rd, 50th & 55th Rounds and Population Censuses 1991 & 2001**

EUS/ PC	Rural			Urban			Combined		
	Male	Female	Person	Male	Female	Person	Male	Female	Person
<i>'Main' or 'Usual Principal status' workers</i>									
EUS 43 rd Round (1987-88)	517	245	385	496	118	315	512	217	369
Census 1991	513	191	357	484	86	296	505	164	341
EUS 50 th Round (1993-94)	538	234	390	513	121	327	532	206	375
EUS 55 th Round (1999-2000)	522	231	379	513	117	324	520	203	365
Census 2001	445	168	310	475	91	293	453	147	305
<i>Marginal or subsidiary-capacity workers</i>									
EUS 43 rd Round (1987-88)	22	78	49	10	34	22	19	68	43
Census 1991	11	80	44	6	11	9	10	63	35
EUS 50 th Round (1993-94)	15	93	54	8	34	20	12	80	45
EUS 55 th Round (1999-2000)	9	68	38	5	22	13	7	56	32
Census 2001	79	142	110	33	24	29	66	110	88
<i>'Main+ Marginal' or 'principal & subsidiary' workers</i>									
EUS 43 rd Round (1987-88)	539	323	434	506	152	337	531	285	412
Census 1991	524	271	401	490	97	305	515	227	376
EUS 50 th Round (1993-94)	553	327	444	521	155	347	544	286	420
EUS 55 th Round (1999-2000)	531	299	417	518	139	337	527	259	397
Census 2001	524	310	420	508	115	322	519	257	393

4.2.3 There are reasons to be uncomfortable about the results of last two PCs and EUSs, particularly when the directions of change in WPR (for all workers, i.e., 'Main + Marginal'/'Principal & Subsidiary' workers) indicated by the two sources are compared. While PC figures reflect a rise in WPR for all workers during 1991 to 2001, the EUS estimates indicate a fall during 1993-94 to 1999-2000. Moreover, PC indicated a substantial rise in the WPR of marginal workers and a fall in that of main workers, while EUS results indicated a marginal decline in that for both secondary workers and *principal* workers. As the details of workforce data from PC 2001 are not available, these divergences could not be examined further.

4.2.4 It was decided, therefore, to continue with the method of estimating aggregate workforce followed for the 1993-94 series of the NAS. The WG, therefore, recommends that the estimates of WPRs obtained from the EUS of the 55th Round (1999-2000) of NSSO, be applied on the population projections (as on 1st October, 1999) based on PC to obtain the estimate of total workforce for the mid-accounting year 1999-2000. The estimates, of course, have to be first worked out separately for the four population segments (obtained from cross-classifying rural-urban and male-female populations) and then added to arrive at the estimate of aggregate workforce.

4.3 Adjusting for Multiple Jobs

4.3.1 In view of multiple economic activities carried out by a part of the working population, the System of National Accounts (SNA) 1993 considers the count of jobs as a superior measure of *labour input*. In the 1993 SNA, a “job” is defined as an implicit or explicit contract between a person and an institutional unit (including proprietors of unincorporated enterprises) to perform work in return for compensation or mixed income during a defined period or until further notice [see *Annex C*]. The 1993 SNA goes on further to argue that output per job would be an excessively crude measure of productivity and total hours worked would be a better measure of *labour input*. It also considers the inferior alternative of measuring the *labour input* in terms of full-time equivalent work years.

4.3.2 The possibilities of collecting data on hours worked was reviewed by the Expert Committee on Unemployment Estimates (also known as *Dantwala Committee*) in the early seventies. The committee was of the view that going by the past experience of data collection on employment it would not be feasible to collect interpretable data on hours worked. Instead, it recommended the procedure of collecting information on work intensity by half-days for the EUSs of the NSSO.

4.3.3 The 1993 SNA also recognises that the establishment surveys can provide data only relating to number of jobs. The households surveys can however be designed to provide data on both number of workers and number of jobs. Since the LIM requires estimates from household surveys as well as enterprise surveys, it is essential that the measure of *labour input* be defined on data that can be obtained from both the kinds of

surveys. Thus, given the constraints of collecting data on hours worked, a practical solution is to measure productivity as well as *labour input* in terms of number of jobs.

4.3.4 For the compilation of the NAS in India too, the count of all ‘jobs’ pursued by each member of the workforce, engaged either in *main* work or *secondary* work or both, has, in principle, been regarded as a more representative measure of *labour input* in the past. Apart from the count of ‘main’ and ‘marginal’ workers, the PC 1991 also provided count of MWOW, i.e. main workers who were engaged in an economic activity other than the ‘main’ work. For estimating *labour input* for the current series of national accounts a ratio, called ‘MWOW ratio’, was used, separately for male and female segments of rural and urban areas. The MWOW ratio was defined as the ratio of MWOW to total workforce (‘main’ workers *plus* ‘marginal’ workers). The *labour input* was then derived, separately for male and female segments of rural and urban areas, by inflating the estimated workforce of these segments with the respective MWOW ratios.

4.3.5 It is important to note that for the estimates of *labour input* in 1993-94, the MWOW ratios could not be worked out separately for the activity groups, as the counts of MWOW were available only by broad industrial category of nine-fold classification used for tabulation of PC results. Instead, the MWOW ratios for the male and female workforce of rural and urban areas of the economy as a whole were used to arrive at the estimates of *labour input*. These ratios were worked out from the results of PC 1991, under the assumption that they had remained unchanged between 1991 and 1993-94, the base year of the current series of national accounts.

4.3.6 As stated above, in the method adopted for the 1993-94 series, the MWOW ratios had been applied on the estimated workforce, separately for the male and female population of rural and urban areas, uniformly over all the activity groups to arrive at the estimates of *labour input* for the respective segments of the population. It implicitly assumed that all the ‘other work’ of the ‘main’ workers were performed in the same activity category as that of the respective ‘main work’ of the ‘main’ workers.

4.3.7 As mentioned earlier, the data required for deriving MWOW ratio would not be available from PC 2001, as no information on secondary work was collected. In view of

the non-availability of the MWOW ratios – at the aggregate level or at the disaggregated level – from the PC 2001, it has now become essential to explore alternative sources of data for deriving the MWOW ratios or their equivalent. An alternative measure of all ‘jobs’ for GVA estimation in the unorganised segments of the economy can be obtained from the EUS of the 55th Round of the NSSO. The approach involves estimating the number of ‘usual status’ workers in *principal*- and those in *subsidiary-capacity* separately for each activity-group from the data collected in the EUS. The estimated count of all ‘jobs’ for each activity-group is then obtained as the *sum* of estimated number of workers in *principal* capacity and that of workers in *subsidiary* capacity separately for each identified category of economic activities to be used for national accounting.

Table 4.4: Percentage Distribution of Usual-status Workers by principal capacity and subsidiary capacity of usual status
55th Round of NSSO (1999-2000)

<i>Principal capacity</i>	<i>Subsidiary capacity</i>			total
	agriculture	non-agriculture	none	
(1)	(2)	(3)	(4)	(5)
1. Agriculture	18.25	3.08	47.01	68.34
2. Non-Agriculture	5.22	0.50	16.97	22.69
3. none	8.00	1.00	--	8.97
4. total	31.47	4.58	63.95	100.00

Not: Workers in this table refers to all those whose ‘usual status’ were that of employed either in *principal* capacity or *subsidiary* capacity or both.

Source: Derived from Table no. 55 of *Employment and Unemployment Situation in India, 1999-2000*, Part – II, NSS Report no. 458(55/10/2), May 2001.

4.3.8 *Table 4.4* provides the estimates of workers pursuing multiple activities as percentage to total workers in usual status as obtained from the NSSO 55th Round. It is seen that over 27 per cent (sum of the figures of the four cells within the dotted lines) of the total workforce was engaged in both *principal* and *subsidiary* capacities. Clearly, this represents the MWOW ratio and may be used for obtaining a measure of *labour input* for compilation of NAS. It is important to note here that the MWOW ratio for the non-agricultural activities, as derived from these estimates, would be much less. The *labour input* estimated for the non-agricultural activities would be just over 15 per cent (3.58, i.e. sum of entries against item 1 & 2 of col. 3, as percentage of 23.69, i.e. sum of entries against item 2 of col. 5 and item 3 of col. 3) more than the estimated workforce in non-agricultural activities.

4.3.9 It is important to note the degree of divergence between the estimates of MWOW ratios obtained from the PC and the EUS, which are given in *Table 4.5*. While the MWOW ratio obtained from the PC 1991 was only about 8.46 per cent for the total workforce, that obtained from the 50th Round EUS (1993-94) was as high as 24.95 per cent. It is clearly seen from this *table* that the MWOW ratio from the PC is considerably lower than that obtained from EUS for both rural and urban areas. This could be due to the inability of the PC 1991 to capture fully the information on secondary economic activities of main workers.

Table 4.5: Comparison between MWOW ratios (%) based on PC 1991 and EUS 1993-94

Source	Rural	Urban	Combined
(1)	(2)	(3)	(4)
1. PC 1991	10.34	1.26	8.46
2. EUS 1993-94	29.18	5.98	24.95

Note : The ratios worked out from the EUS are design-based estimates of the ratio of all (*principal* and *subsidiary*) 'work' to workforce (including *subsidiary* capacity workers).

4.3.10 The estimated count of all 'jobs', henceforth referred to as *labour input*, derived using the EUS estimates of *principal*- and *subsidiary-capacity* employment, is obtained as the sum of estimated number of workers in *principal* capacity and that of workers in *subsidiary* capacity () separately for each activity category relevant for compilation of NAS. In the process, each reported 'job', both in *principal* and *subsidiary* capacity, of all the workers gets counted, subject to a maximum of two per worker. By definition, this is equivalent to the MWOW-adjusted workforce estimate, and thus is a measure of *labour input* of the economy.

4.3.11 The main advantage of using this method of deriving a measure of *labour input* from the EUS data is that the distribution of the additional work of the individual workers by activity categories are also generated in the process. Thus, it is neither necessary to use a uniform rate of MWOW for all the activities or activity-groups nor look for additional data to distribute workers with the secondary jobs.

4.3.12 It is also important to note in this context that the proportions of *subsidiary* work in the *labour input*, thus defined, and that of part-time workers in the total workers

estimated in the ESs compare fairly well. It is seen from *Table 4.6* that the ratio of secondary work in *labour input* estimated from the 55th round EUS are generally of the same order as the estimates of proportion of part-time workers from the respective ESs except for the activity of trade. As no separate weights are used for part-time and full-time workers in the ESs while estimating the VAPW, the close agreement between the estimated proportions provides additional justification in favour of the method of estimating *labour input* proposed above. The WG, therefore, recommends that the estimates of *labour input* for each activity group should be obtained as the sum of estimated number of workers in *principal* capacity and that of workers in *subsidiary* capacity, separately for each identified category of economic activities to be used for national accounting, based on the estimates of usual status workers in the 55th Round EUS.

Table 4.6: Percentage of subsidiary-capacity workers and work respectively to workforce and labour input (from EUS of the 55th Round) and percentage of part-time workers to total workers from Enterprise surveys

Activity	Percentage of Subsidiary Workers / Work from EUS to						Part-time Workers to Total Workers (%) from ESs		
	Workforce			Labour input			Rural	Urban	Total
	Rural	Urban	Total	Rural	Urban	Total			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1. Manufacturing*	8.64	4.28	6.65	20.00	6.25	14.10	19.08	9.56	15.71
2. Services**	3.83	4.23	4.03	13.30	7.48	10.43	17.99	10.13	13.6
3. Trade***	2.89	3.55	3.28	16.09	8.04	11.50	7.94	5.36	6.77

* Unregistered manufacturing only. It is assumed that *Secondary capacity* workers reported in EUS are all engaged in unregistered manufacturing.

** Constituted of Tabulation Category K,M,N,O,P of NIC-98.

*** The data of part time workers from ES corresponds to NDTE and OATE.

Sources: 1. Manufacturing: Enterprise Survey: 56th round.

2. Services: Enterprise Survey 1990-91

Trade (NDTE+OATE): NSS 53rd round 1997.

4.3.13 The estimates of rate of *labour input* – defined as *labour input* per thousand population – could be applied on the population projections (as on 1st October, 1999) based on PC to obtain the estimate of total *labour input* for the mid-accounting year 1999-2000. But as the estimated population from the EUS are known to be subject to differential rates of underestimation in rural and urban areas and possibly for male and female population as well, it is necessary to work out the estimates of *labour input* separately for the four population segments (obtained from cross-classifying rural-urban and male-female populations) and then add to arrive at the estimate of aggregate *labour input*. *Table 4.7* gives the activity specific *labour input* rate and workforce participation rates (WPRs) –

defined as workforce engaged in the activity per thousand population. It demonstrates that the estimates of rate of *labour input* for the entire population obtained directly (i.e. by using NSS population estimates as weights) from the EUS differ, though marginally, from those obtained as weighted average of the rates for the four segments of the population, with the counts from PC as the weights. As for the *labour input* rates for the tabulation categories, the difference between the two estimates is substantial only for the combined tabulation categories of 'A & B', i.e. agriculture. For the rest of the tabulation categories, there is hardly any difference between the two rates for the entire population.

4.3.14 The WG therefore recommends that rates of *labour input* should be worked out separately for the four population segments (obtained from cross-classifying rural-urban and male-female populations) and applied on the corresponding population projections as on 1st October, 1999 to arrive at the estimate of total *labour input* for the mid-accounting year 1999-2000.

Table 4.7: Labour input per Thousand Population and WPR

(from EUS of the 50th and 55th Rounds)

Tabulation category (NIC 98)	1993-94			1999-2000		
	WPR	<i>Labour input with weights</i>		WPR	<i>Labour input with weights</i>	
		NSS population estimates*	Projected Population		NSS population estimates*	Projected Population
(1)	(2)	(3)	(4)	(5)	(6)	(7)
A+B	271	360	353	245	320	313
C	3	3	3	2	2	2
D	44	48	49	42	46	47
E	2	2	2	1	1	1
F	13	16	16	17	20	21
G	31	35	36	34	38	39
H	4	4	4	4	5	5
I	12	13	13	14	15	15
J	2	2	3	2	2	2
K	1	2	2	2	3	3
L	11	11	12	10	10	10
M	7	7	8	8	8	9
N	2	2	2	3	3	3
O	12	13	14	10	11	11
P	3	3	3	2	2	2
Q	0	0	0	0	0	0
All India	417	525	523	397	485	483

* Note that the weighted averages of rates of *labour input*, with EUS population estimates as the weights, are the same as the estimated rates obtained directly from the EUS.

4.4 Distribution of Workforce by Economic Activity

4.4.1 Having decided the method of obtaining the aggregate *labour input* through the EUSs, it is necessary to explore the possibility of distributing the workforce over the different economic activities. The main limitation of applying LIM by using NSSO estimates is that the estimates of workforce as well as that of *value added per worker* (VAPW), at disaggregated levels of National Industrial Classification (NIC), are subject to high sampling errors. A possible way of overcoming the problem of sampling error, that the survey estimates suffer from, is through appropriate regrouping of those activities whose workforce and/ or VAPW estimates are subject to high sampling error.

4.4.2 An Internal Working Group (IWG) of the National Accounts Division (NAD), formed in February 2002, undertook an exercise for devising a classification scheme of economic activities that could be adopted for estimation of GDP and the other macro-economic aggregates based on the NIC 1998. The report of the IWG on Regrouping of Economic Activities not only proposes a regrouping but also provides the objective basis on which the regrouping is founded. The regrouping has been made by the IWG in a manner that would enable compilation of the main macro-economic aggregates for the broad industry categories that are presented in the NAS, at present. These categories correspond to the one-digit level classes of the NIC 1987, called 'industry sections'. The industry-section 9 of NIC 1987 represents all 'community, social and personal services'. This industry-section was further broken up into three tabulation categories in the NIC 1998, with 'education' and 'health' recognised as two separate tabulation categories. For the regrouping exercise, the tabulation categories, as identified in the NIC 1998, have been considered by the IWG, as such without any attempt to merge them back to the activity-group that corresponds to NIC 1987 section 9. These are henceforth referred to as 'presentation categories' in this report. The description of the broad industry categories forming the classification scheme proposed to be followed for presentation of the main aggregates of the next series of NAS and the corresponding activity codes according to the NIC 1987 and 1998 are given in *Table 4.8*. These, as can be noted, correspond closely to the tabulation categories of the NIC 1998, with little deviations.

Table 4.8: Non-agricultural Activity Categories (other than ‘mining’, ‘electricity, gas & water supply’ and ‘construction’) for which the main NAS Aggregates are Proposed to be Published

Activity category	NIC 1987	NIC 1998
1. Manufacturing	2 & 3	D + 01405
2. Trade	60 – 68, 84 & 890	G + 74991
3. Hotels & Restaurant	69	H
4. Transport - railways	701	601
5. Transport - other than railways	702 – 709, 71 – 73	602 + 603 + 61 + 62 + 63 (-) 6302
6. Storage	74	6302
7. Communication	75	64
8. Banking & insurance	81	
9. Real estate and business activity	82 – 89	K (-) 74991
10. Education	92	M
11. Medical & Health	93	N
12. Public administration & defence	90 – 91	L
13. Other community, social and personal services	94 – 99	O, P & Q

4.4.3 The regrouping proposed by the IWG has been done in a way that the sampling error of the redefined groups is kept within acceptable limits and, to the extent possible, the grouped activities are homogenous in terms of average earning per worker. The idea is to identify the appropriate level of disaggregation, i.e. the most detailed grouping of economic activities that keeps the sampling error within acceptable limits.

4.4.4 Assuming that the estimates of workforce for an activity group would be obtained by applying the activity-specific WPRs from the 55th Round EUS on the population figures based on the PC, the GVA estimates were obtained by the IWG as follows:

$$GVA = P * WPR * VAPW / 1000,$$

where P represents the population figure from the Census and VAPW the estimate of

VAPW from the ESs. Then, assuming¹ no (stochastic) error associated with the figure P, the IWG has obtained the first-order approximation of RSE of the GVA estimate as follows:

$$\text{RSE(GVA)} \approx [\text{RSE(WPR)}^2 + \text{RSE(VAPW)}^2]^{1/2}$$

The IWG had the following considerations in mind while proposing the grouping of the activities:

- The RSE(GVA) is within the set limit of 15 %.
- The share of the proposed activity group in the non-agricultural workforce is not too small.
- Comparability of the activity-group level GVA estimates with those of the earlier series is retained.
- The activities with very different productivity (in terms of VAPW) or those growing at uneven pace are not combined. Particularly, the emerging or fast-growing industries are kept separate from other activities.
- For compatibility with the index of industrial production, which, it is assumed, would be producing indices at the 3-digit level of NIC-98, the activity groups of manufacturing are so formed that they do not cut across 3-digit level activity categories of the NIC-98.

4.4.5 The exercise done by the IWG relies heavily on the estimates of RSEs of the WPR estimates and GVAPW estimates from NSSO survey. Since the RSE estimates are themselves subject to high sampling fluctuations, the WG felt that it was necessary to examine the round-to-round variation of the RSE estimates.

4.4.6 To examine the reliability, in fact robustness, of the RSE estimates of WPRs of different activity-groups, the WG undertook a study to compare the RSE estimates of WPRs of the 50th and 55th rounds of EUS for comparable groups of economic activities. It is important to note that the data on economic activity collected in the EUS of the 50th round were according to the NIC 1987, while those collected in the EUS of the 55th round were according to the NIC 1998. As a result, the study of round-to-round change in RSE estimates was constrained by the lack of exact concordance existing between NIC 1987 and NIC 1998.

¹ This assumption is of course not a valid one, as population projections, that are used, are also subject to errors. For the present exercise this is ignored since the magnitude of this error component is not expected to be high going by the deviation of the 2001 population count from the corresponding projected figure, which is less than 2%.

4.4.7 The study was, therefore, restricted to comparison of the RSEs of a total of 91 individual/ group of non-agricultural activities. It was found that in most cases the RSE estimates of the two rounds varied little, and wherever they varied substantially it was either due to rarity or change in the WPR of the economic activity in question. A brief account of the study and its findings are included in *Annex D*. In view of these, the present WG accepted the regrouping proposed by the IWG, though with some modifications. The recommended regrouping of economic activities as per NIC 1998 for compilation of NAS at the national level is given in *Appendix 4.1*. The distributions of workers and GVA over the proposed compilation categories are given in *Appendix 4.2*.

4.4.8 The PC results, being free from sampling errors, can be used for very detailed disaggregated levels. But, these would be available only once in ten years, and thus would not support the data requirements for NAS revisions proposed to be undertaken every five years. Moreover, since the activity-specific MWOW data are not available from the PC, use of workforce data from PC would require use of data from some other source for deriving the estimates of *labour input*. These apart, the very idea of using the NSSO results instead of the PC results, owing to the downward bias inherent in workforce figures of the PC in the past, is defeated if the latter are used for distributing the workforce over detailed economic activities. That amounts to presuming that the downward bias is uniformly distributed over all the activity-groups. However, *Table 4.9*, which gives a comparison between the percentage shares of compilation categories of economic activities used for the 1993-94 series in the 1-digit level (NIC 1987) workforce, reveals that the two data sets vary little in this respect.

4.4.9 It is seen that of the 63 activity-groups included in *Table 4.9*, only in 15 cases the figures from the two sources differ by more than 2 percentage points. In 8 such cases, the share according to the PC is more than that of EUS, and in the rest of the cases to the contrary. The share according to PC is noticeably higher than that according to EUS for the activities of ‘auctioneering’ (890), postal services (750), ‘miscellaneous manufacturing’ (38), ‘services n.e.c.’ (99) and ‘education’ (92).

Table 4.9: Percentage Distribution of Workers over Compilation Categories in Manufacturing and Services within Broad Industry Section

NIC 1987	% distribution within 1-digit level		NIC 1987	% distribution within 1-digit level	
	PC1991	EUS 1993-94		PC1991	EUS 1993-94
(1)	(2)	(3)	(1)	(2)	(3)
Manufacturing			Transport, Storage & Communication		
2&3 and 97	100	100	7	100	100
20+21	9.01	11.45	700	16.44	14.82
22	8.79	10.29	701	12.91	9.7
23	12.86	9.5	702	14.86	15.44
24	1.93	4.16	703	17.94	18.49
25	1.62	1.86	704 to 706 & 709	20.06	28.16
26	4.78	8.41	707	0.04	0.02
27	9.99	10.15	708 & 73	2.13	2.58
28	2.61	2.2	71	2.76	2.06
29	2.24	1.81	72	0.97	0.72
30	3.49	3.77	74	1.29	1.29
31	1.89	1.97	750	6.88	3.79
32	7.18	7.55	751	0.16	0.64
33	2.68	2.39	752	3.26	2.12
34	5.37	4.03	759	0.3	0.16
35	2.55	2.78	Trade, Hotels & Restaurants		
36	2.03	2.03	6	100	100
37	2.16	1.38	60 to 68	89.16	88.36
38	10.7	5.09	69	10.84	11.64
39	2.03	1.59	Other Services		
97	6.09	7.6	9 (-) 97	100	100
Real Estate, Business services			90 (-) 903	31.34	28.19
8	100	100	903	1.6	2.33
80	51.27	52.7	91	1.03	1.54
81	8.94	9.14	92	23.4	20.4
82	3.12	3.4	93	7.37	6.06
83	10.11	11.22	94	4.3	3.68
84	2.18	1.99	95 (-) 954	1.75	2.36
85	4.05	4.10	954	0.10	0.08
890	8.03	0.26	96	23.04	32.96
891	2.26	5.33	960	3.79	7.28
892	0.46	1.69	961	3.33	5.67
893	1.16	1.14	962	3.03	4.46
894	0.43	0.82	963 + 969	3.55	4.32
895 to 899	8.01	8.21	964	9.35	11.24
			98	0.18	0.04
			99	5.89	2.36

4.4.10 To sum up, PC data on distribution of workers over activity groups do not fulfil the requirements fully for compilation of the NAS. First, the WPRs based on PC have

been suspected to be on lower side in the past, though there is some improvement in the PC 2001 data. Second, the data on MWOW have not been collected in the PC 2001. Third and most important, revision of NAS is envisaged every five years whose data needs evidently cannot be supported by the PC data. In addition, the PC 2001 data on workers by activity category are not expected before June 2004. In view of these, the WG recommends that for estimating the domestic product of the unorganised segment of the economy, the EUS estimates be used for distributing the estimated aggregate *labour input* over the compilation categories identified in *Appendix 4.1*.

4.5 Projecting Workforce Estimates to Subsequent Years

4.5.1 In case of the activities for which direct current data on production are not available, the annual estimates of *value added* for the years subsequent to the base year are obtained by carrying forward the benchmark estimates by quantity and price indicators. Such activities include unregistered manufacturing, trade, hotels & restaurants, and some of the transport & storage activities and business & other services. Use of physical indicators other than workforce is preferred for this purpose. But, in absence of appropriate physical indicators for many of the activity groups of transport & storage services and business & other services, estimates of workforce are used for extrapolating the base-year estimates.

4.5.2 There are two distinct elements relating to the problem of estimating workforce for subsequent years, viz. (i) estimating the base-year workforce and its distribution over activity groups used for compilation of NAS; (ii) rate of increase in workforce in each activity group. The PC or the EUS provide industry-wise workforce distribution once in ten or five years that can be used for estimation of workforce for the base year. But, using these data for estimating year-to-year changes requires supplementing by annual data on employment situation in the country.

4.5.3 No annual data on employment has so far been used in any of the NAS series for supplementing the benchmark estimates of workforce. In all the NAS series up to the 1980-81 series, the inter-censal growth rates of workforce in different activity-groups were used for projecting the base year estimates to the subsequent years. For the 1993-94 series, however, the growth rates in the workforce in different activity-groups observed in the estimates of the 43rd round (1987-88) and 50th round (1993-94) EUSs are used for this purpose.

4.5.4 Another question that remains to be answered is that why can't the estimates compiled from the annual rounds of EUS be used for compilation of NAS. The WG, for this purpose attempted to review the main findings contained in "Technical Note on Feasibility of Generating Quarterly Estimates of Employment & Unemployment based on NSS data", by the SDRD, NSSO, [Excerpts from Chapter 4 is given in *Annex E*]. The technical note contains a comprehensive study of the variation of the estimates of participation rates and their sampling errors, based on the data collected in the EUSs conducted during late 1980s and early 1990s. The findings contained in the note help in forming an objective view on suitability of the estimates of workforce available from the annual rounds as a measure of year-to-year change in participation rates. The findings of the study are not found encouraging, as the survey estimates failed to project a definite pattern of seasonal variation and leads to the conclusion that measuring seasonal or annual change possibly required a different kind of survey design than generally adopted now. This apart, the industrial composition of the workforce as well as the structure of employment are seen to change considerably from round to round. The sampling errors associated with the estimates of workforce for some of the rounds were also large. Thus, the WG concluded that it would not be advisable to use estimates of annual rounds for NAS compilation. The WG, therefore, recommends that the present practice of using the growth rate observed between the two latest quinquennial EUSs for projection of activity-group-wise *labour input* estimates to subsequent years should be continued, in absence of a dependable physical indicator or other reliable source data on annual change in employment.

4.6 Netting out the Workforce Engaged in Organised Segment of the Economy

4.6.1 The PC and the EUS generate workforce estimates of the economy as a whole. But the LIM is applied only to activities carried out in the unorganised segment of economy. It is therefore necessary to net out the *labour input* engaged in the organised segment of the economy for each of the activity-group considered for NAS compilation. This is at present being done using the data on employment in public and private organised sectors for the service-producing activity-groups as available from the DGE&T, and the employment data from ASI on factories for the manufacturing activity-groups. The employment data from DGE&T and ASI give estimate of number of jobs, which is the measure of *labour input*.

Table 4.10: Broad Industry-Level Labour input ('000) in Organised Segment Estimated from EUS 55th Round and DGE&T (1999-2000)

NIC 1987 Section code	NIC98 Tabulation Categories	Organised segment Labour input		Col.(4) – Col.(3) as percentage to unorganised WF
		EUS 55 th Round	DGET	
(1)	(2)	(3)	(4)	(5)
1	C	623	1005	24.78
2&3	D+725	6088	6616	1.40
4	E	929	987	30.35
5	F	1683	1148	-3.40
6	G&H-502-50404-52591-526	780	493	-1.39
7	I	3219	3146	-0.65
8	J&K-725+52591-73	1725	1653	-2.41
9	L,M,N,O,P,Q+502+50404+526+ 73	16805	11493	-15.05
Total	Total	31852	26541	-1.46

Note: 1. Figures given in Col.(3) are derived by applying the ratio of organised sector *labour input* to total population estimated from the EUS 55th Round on the population projection based on PC 2001.
2. The estimates of unorganised workforce used for deriving the figures in col.(5) are obtained in a similar way as the figures in col.(3) from the EUS 55th Round.

4.6.2 The data of DGE&T are collected under the Employment Market Information (EMI) Programme. Owing to the voluntary basis of reporting of the small establishments (employing less than 25 workers), the DGE&T data are subject to large non-response. Thus, for data on the organised segment, the DGE&T does not seem to be an appropriate source.

4.6.3 *Table 4.10* compares the estimates of *labour input* in the organised segment from the EUS of the 55th Round and the figures available from the DGE&T for the year 1999-2000 separately at broad industry level (1-digit level of NIC 1987). It is observed that the EUS estimates are dimensionally in fairly good agreement with the figures obtained from the DGE&T in most cases, though the latter appear to be subject to under-reporting. But, the differences between DGE&T and EUS estimates expressed as the percentage of unorganised workforce, in respect of the NIC 1998 tabulation categories C (Mining), E (Electricity, Gas and Water Supply) and the combined category of L, M, N, O, P, Q, 502, 526 and 50404 are rather high. However, the difference for the tabulation categories C and E would not affect the estimates of national accounts, as the workforce estimates are not used for their compilation. But the difference observed for the combined group of services

sector would definitely influence the estimates of GVA, if EUS estimates of organised workforce are used in place of DGE&T's.

4.6.4 The DGE&T is the official agency responsible for collecting the organised employment data. Thus, though the quality and coverage of the data of the DGE&T are subject to criticism, the WG took a view that the estimates of organised employment should be taken only from them. The WG therefore recommends that the CSO should continue with the present practice of using the DGE&T data for netting out *labour input* in the organised segment from the estimates of entire *labour input* in respective service-producing activities, and the ASI estimates of *labour input* for the manufacturing activities. Recognising that there were problems with the DGE&T data, the WG recommends that appropriate steps should be taken to overcome the problems by suitably taking up the issue with the DGE&T.

4.7 Estimating Workforce for SDP Compilation

4.7.1 The main problem of applying the LIM for compilation of NAS is that the estimates of workforce as well as that of VAPW based on sample survey are subject to high sampling errors at detailed levels of disaggregation of NIC. This is particularly serious in the context of estimation of SDP. Consequently, the estimation of SDP generally requires adoption of much broader groups of economic activities for applying the LIM than those adopted for compilation of domestic product at the national level. Rational regrouping of economic activities for SDP compilation has so far not been attempted and deserves much greater attention.

4.7.2 Accordingly, an exercise to develop a rational regrouping of the economic activities classified in the NIC 1998 for use in compilation of macro-economic aggregates at the State level was taken up, adopting the same criterion as the one adopted by the IWG for regrouping the activities at the national-level. The exercise of identifying the appropriate State-level regroupings of NIC'98 activity groups was restricted to the activity-groups identified as *compilation categories*² for the national-level compilation. The possibility of disaggregating these compilation categories further was not explored, as the State-level

estimates of WPRs as well as those of VAPW were found to be subject to higher sampling errors. Instead, the groups were merged to form broader activity categories.

4.7.3 For each State and *UT*, the RSE estimates of WPR and VAPW as well as that of GVA for each activity category under consideration were examined. The observations on activity-wise RSE estimates for the major States are summarised in *Table 4.11*. For each of these States, the activity categories having high RSE (more than 15%, with some relaxation) associated with their WPR estimates are marked with the symbol ‘N’ in the corresponding cells of the *table*. For the rest of the activity groups, the symbol ‘AA’ is used for those having acceptable RSEs for both WPR and VAPW or acceptable RSE for the GVA estimate. The activity groups with acceptable RSE for the WPR and high RSE for VAPW are marked with symbol ‘AN’.

Table 4.11: Summary Findings on Sampling Errors associated with WPR, VAPW and GVA estimates for Preliminary Grouping for Large States

Activity category (NIC 1998)	Andhra Pradesh	Assam	Bihar	Gujarat	Haryana	Himachal Pradesh	Jammu & Kashmir	Karnataka	Kerala	Madhya Pradesh	Maharashtra	Orissa	Punjab	Rajasthan	Tamil Nadu	Uttar Pradesh	West Bengal
Manufacture: D (+) 01405	AA	AA	AA	AA	N	AN	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA
151+152+153+154	AA	N	AA	AA	N	N	N	N	AN	AA	AN	N	N	AA	AA	AA	AA
155+16	AN	N	N	N	N	N	N	N	N	N	N	N	N	N	AA	N	N
171+01405+172+173+181	N	N	N	AN	N	N	N	N	AA	N	N	N	N	N	AA	AA	AN
182+19	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
20+361	AA	N	AA	N	N	AA	N	N	AA	N	AA	AA	AA	N	AA	AA	N
21+22	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
23+25	N	N	N	N	N	N	N	N	N	N	N	N	N	N	AN	N	N
24	N	N	N	N	N	N	N	N	N	N	AN	N	N	N	AA	N	N
26	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	AA	N
27	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
371+372	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
28-2813	AA	N	N	N	N	N	N	N	N	N	N	N	AA	N	N	N	N
2813+29+30+31+32	N	N	N	N	N	N	N	N	N	N	AN	N	N	N	AA	N	AN
33+369	N	N	N	N	N	N	N	N	AN	N	AA	N	N	N	AA	N	N
34+35	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Trade: G (+) 74991	AA	AA	AA	AN	AA	AN	AA	AN	AA	AA	AA	AA	AA	AA	AA	AA	AA
50+51+74991	AA	N	AN	AN	N	N	N	AN	AN	AN	AN	N	AN	AA	AN	AN	AA
50	N	N	N	AN	N	N	AN	N	AA	AA	AN	N	AN	AN	N	N	N
502	N	N	N	N	N	N	N	N	AN	N	AN	N	N	N	N	N	N

² The term ‘Compilation categories’ used in this report means the activity-groups at which national accounts statistics are proposed to be compiled in the next series. At present, however, the estimates are published for more aggregated levels of economic activity.

Table 4.11: Summary Findings on Sampling Errors associated with WPR, VAPW and GVA estimates for Preliminary Grouping for Large States (contd.)

Activity category (NIC 1998)	Andhra Pradesh	Assam	Bihar	Gujarat	Haryana	Himachal Pradesh	Jammu & Kashmir	Karnataka	Kerala	Madhya Pradesh	Maharashtra	Orissa	Punjab	Rajasthan	Tamil Nadu	Uttar Pradesh	West Bengal
50 (-)502	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
51 (+) 74991	AA	N	N	AN	N	N	N	N	AN	AN	AN	N	AN	N	AN	AN	AA
52	AA	AA	AA	AA	AA	AN	AA	AA	AA	AN	AA	AA	AA	AA	AA	AA	AA
526	N	N	AA	N	AN	N	N	AN	N	AA	AA	N	AA	AA	AA	AA	AA
52(-) 526	AA	AA	AA	AA	AA	AA	AA	AA	AA	AN	AA	AA	AA	N	AA	AA	AA
Hotel: H i.e. 55	AA	N	AA	N	N	N	N	AA	AA	N	AA	AA	N	N	AA	AA	AA
551	N	N	N	AN	N	N	N	N	N	N	N	N	N	N	N	N	N
552	AA	N	AA	N	N	N	N	AA	AA	N	AA	AA	N	N	AA	AA	AA
Transport, storage & communication: I																	
601	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
602	AA	N	AA	AA	N	AN	N	AA	AA	AA	AA	AA	AA	AA	AA	AA	AA
6021 (+) 6022	AA	AA	AA	AA	N	N	N	AA	AA	AN	AA	N	AA	AA	AA	AA	AA
6021	N	N	AN	N	N	N	N	AA	AN	N	N	N	N	N	N	N	AN
6022	AA	AA	AA	N	N	N	N	AA	AA	N	AA	N	AA	AA	AA	AA	AA
60221	AA	N	N	N	N	N	N	AA	AA	N	AA	N	AA	AA	AA	AA	AN
60222	AA	N	N	N	N	N	N	N	N	N	N	N	N	N	N	AA	AA
6023	AA	N	AA	N	N	AA	N	AN	N	AN	AN	N	AA	AA	AA	AA	AA
60231	AA	N	N	AA	N	N	N	AN	N	AN	AN	N	AA	AA	AA	N	N
60232	N	N	AA	N	N	N	N	N	N	N	N	N	N	N	N	AA	AA
603	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
61	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
611	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
612	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
62	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
6302	N	N	N	N	N	N	N	N	N	N	N	N	N	AN	N	N	N
63 (-) 6302	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
64	N	N	N	N	N	N	N	N	N	N	N	N	AA	N	N	N	N
6411	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
64 (-) 6411	N	N	N	N	N	N	N	N	N	N	N	N	AA	N	N	N	N
6412	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
642	N	N	N	N	N	N	N	N	N	N	N	N	AA	N	N	N	N
64204	N	N	N	N	N	N	N	N	N	N	AN	N	N	N	N	N	N
642 (-) 64204	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Business Services: K (-) 74991																	
K(-) 74991 (-) [72 (-) 725]	AN	AA	N	N	N	N	N	N	AA	N	AA	N	N	AA	AN	AA	AN
70	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
71	N	N	N	N	N	N	N	N	AN	N	N	N	N	N	AA	N	N
72	N	N	N	N	N	N	N	AA	N	N	AN	N	N	N	N	N	N
725	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
72 (-) 725	N	N	N	N	N	N	N	AA	N	N	AN	N	N	N	N	N	N
7411 (+) 7412	N	N	N	N	N	N	N	N	N	N	AA	N	N	AA	N	N	N
7411	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

Table 4.11: Summary Findings on Sampling Errors associated with WPR, VAPW and GVA estimates for Preliminary Grouping for Large States (contd.)

Activity category (NIC 1998)	Andhra Pradesh	Assam	Bihar	Gujarat	Haryana	Himachal Pradesh	Jammu & Kashmir	Karnataka	Kerala	Madhya Pradesh	Maharashtra	Orissa	Punjab	Rajasthan	Tamil Nadu	Uttar Pradesh	West Bengal
7412	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
73+7413+7414+742+743+749(-)74991	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Education: M																	
801+802+803+80901+80902	AN	AN	AA	AN	N	N	N	AN	AN	AA	AN	AN	AN	AN	AA	AA	AN
80903+80904	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	AN
Health & social work: N - 853	AA	AA	AA	AA	N	N	N	N	AN	N	AN	N	AA	AA	AA	N	N
Other services: O																	
90	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
91 + 853	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
92	N	N	N	N	N	N	N	N	N	N	AN	N	N	N	AN	N	N
93	AA	AA	AA	AN	N	N	N	N	AA	AA	AA	AA	AA	N	AA	AA	AA
9301	AA	N	AA	N	N	N	N	N	N	N	N	N	N	N	N	N	N
9302	N	N	AA	N	N	N	N	N	N	N	N	N	N	N	N	AA	N
9303 (+) 9309	N	AA	N	N	N	N	N	N	AN	AN	N	N	N	N	N	N	N

4.7.4 It is seen from *Table 4.11* that apart from the presentation categories, only for very few activity categories the RSE estimates of WPRs and VAPW are within acceptable limits in respect of a majority of the States. These activity groups are as under:

151+152+153+154	20+361	52	526
52-526	552	6021+6022	6022
60221	6023	801+802+803+80901+80902	93

Thus, strictly adhering to the principle laid down in the report of the IWG, the use of LIM can at best be recommended only for these activities. However, even for these activity groups, the RSE estimates are within acceptable limits only for a majority of the large States, and not so for all the large States. This clearly establishes that using WPR estimates of EUS for State-level compilation at the disaggregated levels of activity groups is not feasible at all. The WG thus recommends that the use of EUS estimates of WPR for the State-level compilation should be restricted to 10 to 15 activity groups and that the CSO

should review further disaggregation of these activities when the PC 2001 data on main workers by activity groups become available from the Office of the RGI.

4.8 Method of Estimating *Labour input* at the National Level

4.8.1 To sum up the recommendations for estimation at the national level made in the preceding sections, a comprehensive step-wise account of the method recommended for estimating the *labour input* in the organised and unorganised production of goods and services at the national level is given in the following paragraphs. The method outlined below also specifies the procedure of estimating the *labour input* for each activity or activity-group for the base year as well as the subsequent years.

4.8.2 The WG recommends that the CSO should continue to use the data available from the following sources for estimating *labour input* at the national level:

- (i) PC;
- (ii) EUS of the NSSO;
- (iii) EMI data of the DGE&T; and
- (iv) ASI.

For manufacturing and services, the recommended method also specifies the levels at which compilation of national accounts should be attempted – the corresponding activity-groups recommended for this purpose are called compilation categories in this report. The method described below is meant for restricted application only to the segments of the economy comprising the manufacturing and service-producing activities. The following is a step-wise description of the recommended method:

- (i) Obtain the mid-year population from the PC for the four segments of the population, viz. rural male, rural female, urban male and urban female.
- (ii) Obtain the activity-specific rates of *labour input* as the *labour input* per thousand population estimated from EUS for each identified compilation category. The survey-based estimate of *Labour input* would be arrived at as the sum of EUS estimates of (a) persons reporting *principal-capacity* employment, and (b) persons reporting *subsidiary-capacity* employment (usual status) in the respective manufacturing or service-producing activities, separately for the four population segments.
- (iii) Apply the rates of *labour input*, as obtained in Step (ii), on the male and female populations of rural and urban areas, as obtained in Step (i), to get the required

estimates of *labour input* in each of the four segments of the population, separately for each of the compilation categories.

- (iv) Obtain the base year estimates of *labour input* for each of the compilation categories as the sum of the respective estimates of *labour input* in the four population segments.
- (v) Extrapolate the base-year estimate of *labour input* for each compilation category using the respective growth rate in *labour input* observed between the two most recent EUSs to arrive at estimated *labour input* for the subsequent years.
- (vi) Finally, for the base year as well as the subsequent years, obtain the estimates of unorganised segment *labour input* in the identified compilation categories using the EMI data of the DGE&T of the respective years.

4.9 National-level Estimates of *Labour input*

4.9.1 The national-level estimates of total *labour input* for the recommended compilation categories obtained by applying steps (i) to (iv) mentioned above are given in *Appendix 4.3*. The *appendix* contains estimates of *labour input* for the mid-financial years of 1993-94 and 1999-2000, based respectively on the EUS of the 50th and 55th rounds of the NSSO and PC-based population projections. The annual compound growth rates derived from these estimates for the compilation categories are also provided in the *Appendix*.

4.9.2 The annual growth rates for different activities given in the *table* appear to be consistent in most cases with the general perception of developments during the 1990s. For the activities falling in the emerging areas of information and communication industries, the growth rates are found to be as high 20 to 30 per cent. For the public sector activities of railways and conventional postal services the growth rates work out to be either negative or very low. These are consistent with the EMI data of the DGE&T.

4.9.3 For some of the activities, however, the growth rates appear to be doubtful. For instance, the growth rate in the activity of selling motor vehicles indicates a decline, which is contrary to the known fact of rapid growth of the automobile industry during the 1990s. The estimated growth rate in the activity of wholesale trade except motor vehicles too appears to be doubtful. For some of the manufacturing activities relating to textile industry and food processing as well, the growth rates are found to be negative. However,

the ASI data also reflect a decline or marginal growth in these manufacturing activities. The activity of food processing (in the category of '154' of NIC 1998) shows very low growth (0.4 % per annum) during the period according to the ASI. The ASI data also indicate a decline in the textile industry.

4.9.4 Misclassification of the workers and lack of exact concordance between NIC 1987 and NIC 1998 appear to be the main reasons for most of the other doubtful cases. The estimates of *labour input* derived by the recommended method have to be scrutinised closely before putting them to use, either for base year estimation or for extrapolation to subsequent years. In particular, the estimates indicating decline in wholesale trading activities needs further examination and validation from other sources. The WG strongly recommends external validation of the *labour input* estimates of all the compilation categories in general and the doubtful cases in particular, using data from other sources like PC 2001 and the contemporary ESs whenever these become available.

Appendix 4.1

**Proposed Categories of Non-agricultural Activities for
Compilation of National Accounts Statistics, 1999-2000 Base Year Series**

Activity category (NIC 1998)	Observations
01405 Cotton ginning, cleaning and baling	This activity was classified under manufacturing in NIC 1987 (NIC-87) as well as NIC 1970 and has now been put under agriculture in NIC 1998. However, this activity has been covered in the Enterprise Survey (ES) on un-organised manufacturing in the 56 th Round of NSSO as well as in ASI. Thus, this may at present be kept as such. Whether it should be covered under Agriculture (as done in NIC-87) or Manufacturing in the NAS may be decided later.
151 Production, processing and preservation of meat, fish, fruit, vegetables, oils and fats (10/16/18)	This corresponds to a part of the combined group of activities represented by NIC-87 2-digit codes '20' & '21'. Though not within the set limits, the RSE(GVA) is not very high. Separate estimates for this category may be generated using labour input method with estimate of VAPW obtained from an ES, if found reliable or from special study on the un-registered enterprises pursuing the activity or derived from the results of ASI.
152 Manufacture of dairy product (10/10/15)	Forms part of the combined activity group of NIC-87 codes '20' & '21'. RSE (GVA) is within the set limit.
153 Manufacture of grain mill products and animal feeds (5/13/14)	Same as for NIC-98 code '152'.
154 Manufacture of other food products (6/5/8)	Same as for NIC-98 code '152'. Moreover, the RSE (VAPW) is also found to be low.
155 Manufacture of beverages (11/18/21)	This corresponds to a part of activity represented by NIC-87 code '22'. The RSE (GVA) is not within the set limit. For between-series comparability, estimates for the combined group of NIC-98 codes '155' and '16' are required. But, considering that the activities falling in code '155' are mostly in the registered segment whereas the activities falling in code '16' are mostly in the un-registered segment and the dissimilar nature of the activities falling in NIC-98 codes '155' and '16', these are proposed to be kept separate.

Note: Figures in parentheses give the RSE (WPR), RSE (VAPW) and RSE (GVA) respectively.

**Proposed Categories of Non-agricultural Activities for
Compilation of National Accounts Statistics, 1999-2000 Base Year Series (contd.)**

Activity category (NIC 1998)	Observations
16 Manufacture of tobacco products (8/8/11)	Same as for NIC-98 code '155'. Moreover, the RSE (GVA) is also found to be low.
171 + 172 + 173 Spinning, weaving and finishing of textile+ Other textiles+ Knitted and crocheted fabrics and articles 171: (6/10/11)* 172: (7/6/9) 173: (21/54/58)	NIC-98 Code '171' corresponds to the combined group of activities represented by NIC-87 codes '23', '24' & '25'. The combined activity group of NIC-98 codes '172' & '173' forms a part of the NIC-87 2-digit code '26'. Clubbing of these activities into one is proposed in view of the fact that all these activities relate to cloth making and the RSE (GVA) for the individual activity of NIC-98 code '173' is very high.
181 (-) 18105 Wearing apparel, except fur apparel (excluding custom tailoring, which is treated as a part of the services sector) (7/5/8)**	This forms a part of the NIC-87 2-digit code '26'. The RSE (GVA) is within the set limit. Separate estimates for this category would help between-series comparability.
182 + 19 Dressing and dyeing of fur; manufacture of articles of fur & Tanning and dressing of leather; manufacture of luggage, handbags saddlery, harness and footwear (11/8/14)	The RSE (GVA) for code '182' is rather high. The codes '182' and '19' were parts of the NIC-87 code '29' and the RSEs for the combined group are within the set limits. It is, therefore, decided to keep these together.
20 Manufacture of wood and of products of wood and cork, except furniture, manufacture of articles of straw and plating materials (5/5/6)	This forms a part of the NIC-87 code '27'. The RSE (GVA) is within the set limit. Separate estimates for this category would help between-series comparability. Individual groups of NIC-98 codes '201' and '202' are proposed to be merged as both of them relate to manufacture of wood products, in spite of the fact that the RSE (GVA) for the individual groups are within the set limit.

* The RSEs for the combined group of '171+172+173' were not computed.

** The RSEs for code '181' have been indicated.

**Proposed Categories of Non-agricultural Activities for
Compilation of National Accounts Statistics, 1999-2000 Base Year Series (contd.)**

Activity category (NIC 1998)	Observations
361 Manufacture of furniture (9/7/11)	This forms a part of the NIC-87 2-digit codes of '27' & '34'. RSE (GVA) is within the set limit. Separate estimates for this category would help between-series comparability.
21 + 22 Manufacture of Paper and Paper Products & Publishing, printing and reproduction of recorded media (8/26/28)	'21' and '22' form a part of the NIC-87 2-digit code '28'. The RSEs (GVA) for individual activities are very high. It is, therefore, decided to keep these activities together in spite of the fact that RSE (GVA) is still high for the combined group also.
23 + 25 Manufacture of coke, refined petroleum products and nuclear fuel & Manufacture of rubber products & Manufacture of plastic products (10/13/16)	The RSEs (GVA) for the individual codes are very high. The codes '23' and '25' were parts of the NIC-87 code '31' and the RSE (GVA) for the combined group is very close to the set limit. It is, therefore, decided to keep these together.
24 Manufacture of basic chemicals + other chemical products & Manufacture of man-made fibers (7/19/20)	The 2-digit code '24' of NIC-98 corresponds to code '30' of NIC-87. The RSEs (GVA) is high, but since these activities are carried out mostly in the organised segment of the economy, <i>labour input method</i> may be required for a small part of these industries.

**Proposed Categories of Non-agricultural Activities for
Compilation of National Accounts Statistics, 1999-2000 Base Year Series (contd.)**

Activity category (NIC 1998)	Observations
26 Manufacture of other non-metallic mineral products (5/6/8)	This activity corresponds to NIC-87 2-digit code '32'. RSE (GVA) is within the set limit.
271 + 2731 Manufacture of Basic Iron & Steel+ Casting of iron and steel 271: (12/10/16)	Code '271' of NIC-98 corresponds to NIC-87 2-digit code '33'. The NIC-98 activity code 273 (i.e. casting of metals) may be bifurcated into 2731 (casting of iron & steels) and 2732 (casting of non-ferrous metals) and they may be merged with their respective basic manufacturing process i.e. 2731 with 271 and 2732 with 272. Since these activities are expected to be carried out mostly in the factory sector, <i>labour input method</i> may not be required for the major part of these industries.
272 + 2732 Manufacture of basic precious and non-ferrous metals+ Casting of non-ferrous metals 272: (17/14/22)	Same as for the group '271+2731'.
371 + 372 Recycling of metal waste and scrap+ non-metal waste and scrap (47/41/62)	These are new introductions in the NIC and represent activities of recycling. May be kept separate at present and the estimates of GVA for these activities are required to be estimated in a different way.
28 Manufacture of fabricated metal products, except machinery and equipments (7/7/10)*	This corresponds to NIC-87 code '34'.

* RSEs for the NIC code '28 (-) 2813' are quoted for this activity group, since the RSEs for the group '28' were not computed.

**Proposed Categories of Non-agricultural Activities for
Compilation of National Accounts Statistics, 1999-2000 Base Year Series (contd.)**

Activity category (NIC 1998)	Observations
29 (+) 30 Manufacture of machinery and equipment n.e.c. + Manufacture of office, accounting and computing machinery +	The NIC-98 codes '29, 30, 31 and 32' together correspond to the combined group of activities represented by NIC-87 2-digit codes '35', '36' & '39' and the 3-digit code '388' (manufacturing of solar energy based equipment). The activities covered by each of the NIC-98 codes of this category do not correspond to a single NIC-87 2-digit code. The RSEs (GVA) for the individual codes (except for code '29') are higher than the set limits. But clubbing of all these activities would lead to a very large group, therefore it is decided to break it into two groups.
31 (+) 32 Manufacture of electrical machinery and apparatus n.e.c. + Manufacture of radio, television and communication equipment and apparatus	-do-
33 (+) 369 Manufacture of medical, precision and optical instruments, watches and clocks+ Manufacturing n.e.c (7/11/13)	These NIC-98 codes together correspond to NIC-87 2-digit codes '38', except '388'. The RSE(GVA) for this category is within the set limit, but that for NIC-98 code '33' is much higher.
34 (+) 35 Manufacture of motor vehicles, trailers and semi-trailers + manufacture of other transport equipment (16/10/19)	These NIC-98 codes together correspond to NIC-87 2-digit codes '37'. The RSE (GVA) for this category is not within the set limit, still it is proposed to keep these separate, as these activities are mostly carried out in registered manufacturing. Clubbing of these activities into one is proposed since RSEs for the individual NIC-98 codes '34' and '35' are much higher.
502 (+) 50404 Maintenance & repair of motor vehicles + Maintenance & repair of motor cycles etc.) 502: (7/6/9)	RSE (GVA) is within the set limit.

**Proposed Categories of Non-agricultural Activities for
Compilation of National Accounts Statistics, 1999-2000 Base Year Series (contd.)**

Activity category (NIC 1998)	Observations
50 (-) 502 (-) 50404 Sale of motor vehicles etc. 50 (-) 502: (8/23/24)	The RSE (GVA) is not within permissible limits. Using the <i>labour input method</i> for this category is not desirable. Instead, efforts should be made to estimate output and GVA for this activity category using alternative data like yearly data on sales of motor vehicles and commission rates etc..
51 + 74991 Whole sale trade except of motor vehicles + Auctioning activities (4/11/12)	May be merged, since 74991 (i.e. auctioning activities) are covered under "Trade". RSE (GVA) for this category is within the set limit.
526 Repair of personal and household goods (5/4/6)	The RSE (GVA) is well within the set limit. Separate estimates for this category would help between-series comparison.
52 (-) 526 Retail trade (except motor vehicles and motor cycles) (2/3/3)	RSE (GVA) is low and well within the set limit. Separate estimates for this category would help between-series comparison.
551 Hotels; camping sites etc. (12/10/16)	The activity code '55' of NIC 1998 corresponds to '69' of NIC-87. Code '551' represents 'hotels'. The RSE (GVA) is just above the set limit.
552 Restaurants, bars and canteens (4/3/5)	The RSE (GVA) is well within the set limit.
601 Transport via railways	Activity code 601 is not required to be covered in enterprise surveys as the activity is wholly in the organised segment of the economy and the data for GVA estimation are obtained from the administrative sources.

**Proposed Categories of Non-agricultural Activities for
Compilation of National Accounts Statistics, 1999-2000 Base Year Series (contd.)**

Activity category (NIC 1998)	Observations
6021 Scheduled passenger land transport (7/11/13)	This forms a part of the NIC-87 2-digit code of '70', i.e. road transport. The RSE GVA) is within the set limit. Separate estimates for this category would help between-series comparability.
60221 Non-scheduled passenger land transport by motor vehicles (4/4/6)	-do-
60222 Other non-scheduled passenger land transport (6/3/7)	- do -
60231 Freight transport by motor vehicles (4/7/8)	- do -
60232 Freight transport other than by motor vehicles (5/3/6)	- do -
603 Transport via pipelines	Activity code 603 is not required to be covered in enterprise surveys as the activity is wholly organized and the data source for GVA estimation is the administrative data.
61 Sea and coastal water transport & Inland water transport (19/14/24)	The estimates from the organized parts are separately available for NIC codes '611' and '612'. As RSEs for individual codes are much higher than the set limits, it is decided to combine these two activities together in spite of the fact that RSE (GVA) is still high for the combined group also.

**Proposed Categories of Non-agricultural Activities for
Compilation of National Accounts Statistics, 1999-2000 Base Year Series (contd.)**

Activity category (NIC 1998)	Observations
62 Air transport (43/64/78)	Activity code 62 is not required to be covered in enterprise surveys as the activity is wholly in the organised segment of the economy and the data for GVA estimation are obtained from the administrative sources.
6302 Storage and warehousing (21/34/40)	This activity corresponds to NIC-87 code '74'. The RSE (GVA) for this activity is found to be too high to make use of ES results desirable. The RSE (WPR) is also high. Yet this is required to be kept separate, as at present the NAS provides separate estimate for this activity group.
63 (-) 6302 Supporting & auxiliary transport activities (11/24/26)	For this activity group too the <i>labour input method</i> may be used with GVAPW estimated from alternative sources like administrative records or case studies.
6411 National post activities (8/45/46)	This activity is entirely in the public sector. The data for required GVA estimation are obtained from the administrative sources.
6412 Courier activities (20/16/26)	This is a rapidly growing activity. Thus, it is necessary to keep it separate from other communication services. The RSE (GVA) is outside the set limit, thus it is desirable to explore alternative sources rather than relying on the <i>labour input method</i> .
64204 Cable operator (18/13/22)	This activity is undergoing rapid changes. Thus, it is necessary to keep it separate from other communication services although the RSE (GVA) is not within the set limit. Alternative method needs to be explored.
642 (-) 64204 Other communication (8/4/9)	This activity relates to all forms of telecommunication – a rapidly growing area of business. Thus it is kept separate. The RSE (GVA) is within the set limit.
70 Real Estate Activities (16/13/21)	This activity corresponds to '82' of NIC-87. The RSE (GVA) is rather high but still this is to be kept separate for comparability.

**Proposed Categories of Non-agricultural Activities for
Compilation of National Accounts Statistics, 1999-2000 Base Year Series (contd.)**

Activity category (NIC 1998)	Observations
71 Renting of machinery & equipment without operator, personal / household goods (9/6/11)	This activity corresponds to '85' of NIC-87. The RSE (GVA) is within the set limit.
72 Computer & related activity (8/21/23)	This is an emerging activity and needs to be kept separate from other activities.
7411 Legal activities (8/8/12)	These activities correspond to '83' of NIC-87. The RSE (GVA) is within the set limit.
7412 Accounting, book-keeping (11/9/14)	These activities form a part of the activity group '89' of NIC-87. The RSE (GVA) is within the set limit.
73 + 7413 + 7414 + 742 + 743 + 749 (-) 74991 Research and development+ market research and public opinion polling+ business and management consultancy + architectural, engineering and other technical activities+ advertising+business activities n.e.c (-) auctioning activities (7/8/11)*	The activities covered in these groups are often carried out in same establishments. Thus these activity groups may be merged into one group. The RSE (GVA) of the combined group is expected to be within the set limit, as that of the sub-group '742 + 743 + 749 (-) 74991' – constituting over 85% of the workforce of the group – is about 10 %.
80903 + 80904 Coaching centres (+) Activities of the individuals providing tuition (7/6/9)	The RSE (GVA) of the combined group is within the set limit. Thus these may be merged into one group and kept separate from the rest of the Tabulation Category M (Education).

* RSEs indicated relate to code '742+743+749 (-) 74991'.

**Proposed Categories of Non-agricultural Activities for
Compilation of National Accounts Statistics, 1999-2000 Base Year Series (contd.)**

Activity category (NIC 1998)	Observations
80 (-) 80903 (-) 80904 Education (-) [Coaching centers (+) Activities of the individuals providing tuition] (3/9/9)	See the observations for “80903+80904”.
851+852 Human health activities+ Veterinary activities 851: (4/7/8) 852: (16/20/26)*	These activities correspond to NIC-87 code ‘93’.
90 Sewage And Refuse Disposal, Sanitation And Similar Activities (13/10/17)	This activity corresponds to the NIC-87 2-digit code of ‘91’. The RSE (GVA) is just outside the set limit.
91 + 853 Activities Of Membership Organisations n.e.c. + Social work with accommodation (8/6/10)**	This corresponds to the NIC-87 2-digit code ‘94’. The RSE (GVA) for the combined group of ‘91’ & ‘853’ has not been worked out, but since the RSE (GVA) for ‘91’ is just around 10 %, it is expected that that for the combined group too would be within the set limit. Separate estimates for this category would help between-series comparability.
92 Recreational, cultural and sporting activities (7/8/11)	Activity group ‘92’ may be covered as a whole.
9301 Washing and cleaning of textile and fur products (8/3/9)	The activity group ‘93’ covers a wide range of activities. It is seen that the RSE (GVA) for the individual groups are well within the set limits. Thus this group has been further divided into ‘9301’, ‘9302’ and ‘9303 + 9309’.

* RSEs for the combined group ‘851+852’ were not computed.

** RSEs indicated relate to code ‘91’. The share of code ‘853’ in the workforce of codes
‘91 + 853’ is insignificant.

**Proposed Categories of Non-agricultural Activities for
Compilation of National Accounts Statistics, 1999-2000 Base Year Series (contd.)**

Activity category (NIC 1998)	Observations
9302 Hair dressing and other beauty treatment (7/3/7)	See the observations for '9301'.
18105 Custom tailoring	This corresponds to NIC-87 code '964' and has to be kept separately for comparability between the two series. The code '18105' was initially not there in NIC-98. Hence data was not collected separately for this category in 55 th Round of NSS. However, it was later included in NIC-98 on special request of NAD and the data on it was collected in 57 th Round of NSS. For estimating workforce for this category for 1999-2000, some allocation method has to be resorted to.
9303+9309 Funeral and related activities + Other service activities n.e.c. (4/6/7)	See the observations for '9301'.
95 Private Households With Employed Persons	This group is not being covered presently in the Enterprise surveys, apparently on account of definitional and coverage problems. It was felt that this activity group and its productivity could be better captured through the household surveys like Employment and Un-employment survey.
99 Extra Territorial Organizations and Bodies	For the group, alternative approach of using administrative data should be explored instead of relying on the estimates of workers/GVA per worker available from any other source presently available.

Appendix 4.2

Distributions of Workers and Gross Value Added over the Proposed Compilation Categories - 1999-2000

Sl. No.	Recommended regrouping			Workforce (EUS 55th Rnd and PC-based population projection)		GDP at constant price (Rs. Crore)	% share in GDP***	Remarks for Columns 6 & 7 (NIC codes relate to NIC-87)
	NIC-98	NIC-87	Description	Number	% Share ***			
	1	2	3	4	5	6	7	8
1	01405	230	Cotton ginning, cleaning and baling	81587	0.07			included in Sl. No.8
2	151	200+202+203+ 210 to 212	Production, processing and preservation of meat, fish, fruit vegetables, oils and fats	721795	0.59			
3	152	201	Manufacture of dairy product	252210	0.21			
4	153	204+217+218	Manufacture of grain mill products, etc. and animal feeds	2268899	1.85			
5	154	205 to 207+ 209+213 to 215+219	Manufacture of other food products	2270520	1.85			
	Sub Total (2 to 5)			5513423	4.50	6301	1.46	includes 208 & 216
6	155	216+220 to 224	Manufacture of beverages	379002	0.31			
7	16	225 to 229	Manufacture of tobacco products	4354855	3.56			
	Sub Total (6 & 7)			4733857	3.87	4923	1.14	excludes 216
8	171+172+173	231 to 236+240 to 248 +250 to 264 + 267 to 269	Spinning, weaving and finishing of textile+ Other textiles+ Knitted and crocheted fabrics and articles	7763464	6.34			

Sl. No.	Recommended regrouping			Workforce (EUS 55th Rnd and PC-based population projection)		GDP at constant price (Rs. Crore)	% share in GDP***	Remarks for Columns 6 & 7 (NIC codes relate to NIC-87)
	NIC-98	NIC-87	Description	Number	% Share ***			
	1	2	3	4	5	6	7	8
9	181-18105	265+266+292	Wearing apparel, except fur apparel and tailoring	2456925	2.01			
	Sub Total (8 & 9)			10220389	8.35	11091	2.57	includes 230 & excludes 292
10	182+19	290+293+299+ 291+311+294+ 295+296	Dressing and dyeing of fur; manufacture of articles of fur and tanning and dressing of leather; manufacture of luggage, handbags saddlery, harness and footwear	1140235	0.93	1825	0.42	includes 292 & excludes 311
11	20	270 to 275+279	manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plating materials	4517119	3.69			
12	361	276+277+342	Manufacture of furniture	801945	0.65			
	Sub Total (11 & 12)			5319064	4.34	4841	1.12	includes 342
13	21+22 *	28	Manufacture Of Paper And Paper Products and publishing, printing and reproduction of recorded media	1261250	1.03	3109	0.72	
14	23+25	310+312 to 319	Manufacture of coke, refined petroleum products and nuclear fuel and rubber and plastic products	1191079	0.97	1688	0.39	includes 311

Sl. No.	Recommended regrouping			Workforce (EUS 55th Rnd and PC-based population projection)		GDP at constant price (Rs. Crore)	% share in GDP***	Remarks for Columns 6 & 7 (NIC codes relate to NIC-87)
	NIC-98	NIC-87	Description	Number	% Share ***			
	1	2	3	4	5	6	7	8
15	24	30+208	Manufacture of chemical and chemical products	1814497	1.48	3903	0.90	excludes 208
16	26	32	manufacture of other non-metallic mineral products	3386797	2.77	4642	1.07	
17	271+2731	-	Manufacture of Basic Iron & Steel+ Casting of iron and steel	752579	0.61			
18	272+2732	-	Manufacture of basic precious and non-ferrous metals+ Casting of non-ferrous metals	379213	0.31			
	271+272+2731+2732	33		1131792	0.92	2371	0.55	
19	371+372	not defined in NIC-87	Recycling of metal waste and scrap+ non-metal waste and scrap	20799	0.02	0	0.00	Estimates not prepared
20	28	-	Manufacture of fabricated metal products, except machinery and equipments	2336798	1.91			
21	29+30	-	Manufacture of machinery and equipment n.e.c + office, accounting and computing machinery	1287312	1.05			
	28+29+30	340+341+343 to 346+349+350 to 359+364+367+ 388+390 to 393+397+399		3624110	2.96	9535	2.21	includes 342,394,395,396,398 excludes 364,367, 388

Sl. No.	Recommended regrouping			Workforce (EUS 55th Rnd and PC-based population projection)		GDP at constant price (Rs. Crore)	% share in GDP***	Remarks for Columns 6 & 7 (NIC codes relate to NIC-87)
	NIC-98	NIC-87	Description	Number	% Share ***			
	1	2	3	4	5	6	7	8
22	31+32	360 to 363+ 365+366+368+369+395+396	Electrical machinery and apparatus n.e.c.+ radio, television and communication equipment and apparatus	1132078	0.92	3051	0.71	includes 364,3677 excludes 395,396
23	33+369	380 to 387 +389	Manufacture of medical, precision and optical instruments, watches and clocks+ Manufacturing n.e.c	2458701	2.01	5982	1.38	includes 388
24	34+35	37	Manufacture of motor vehicles, trailers and semi-trailers+ manufacture of other transport equipment	609128	0.50	1622	0.38	
25	502	398+974	Maintenance and repair of motor vehicles	1632522	1.33			398 included in item 21(a) & 974 included in Sri. No.28
26	50-502	623+682+686	Sale of motor vehicles	376553	0.31			
27	51+74991	60+61+ 620 to 622+63+64+684+685+840+890	Whole sale trade except of motor vehicles + Auctioning activities	3480148	2.84			
28	52-526 **	65+66+67+680+ 681+683+687 to 689+841	Retail trade (except motor vehicle)	27498885	22.46			
	Sub Total (26 to 28)			31355585	25.61	162003	37.47	
29	526	970 to 973+975+979	Repair of personal and household goods	3043831	2.49	5275	1.22	includes 974
30	551	691	Hotels; camping sites etc.	372381	0.30			

Sl. No.	Recommended regrouping			Workforce (EUS 55th Rnd and PC-based population projection)		GDP at constant price (Rs. Crore)	% share in GDP***	Remarks for Columns 6 & 7 (NIC codes relate to NIC-87)
	NIC-98	NIC-87	Description	Number	% Share ***			
	1	2	3	4	5			
31	552	690	Restaurants, bars and canteens	4173243	3.41			
	Sub Total (30 & 31)			4545624	3.71	11584	2.68	
32	601	700	Transport via railways	1114943	0.91	13513	3.13	
33	6021	701	Scheduled passenger land transport	1448769	1.18	9966	2.30	
34	60221	702	Non-scheduled passenger land transport by motor vehicles	2822520	2.31	9258	2.14	
35	60231	703	Freight transport by motor vehicles	3558188	2.91	13271	3.07	
36	60222	-	Other non-scheduled passenger land transport	409679	0.33			
37	60232	-	Freight transport other than by motor vehicles	1907686	1.56			
	60222 + 60232	704 to 706+709		2317365	1.89	3408	0.79	
38	603	707	Transport via pipelines	19246	0.02			Estimates not prepared separately
39	61	710+711	Water Transport	193688	0.16	7442	1.72	includes 712
40	62	720	Air transport	81786	0.07	2482	0.57	includes 721
41	6302	740+741+749	Storage and warehousing	129148	0.11	715	0.17	
42	63-6302	730 to 732 +708+712+721+737 to 739	Supporting & auxiliary transport activities	409679	0.33	3482	0.81	includes 712 & 721
43	6411	750	National post activities	428684	0.35			
44	6412	751	Courier activities	98692	0.08			

Sl. No.	Recommended regrouping			Workforce (EUS 55th Rnd and PC-based population projection)		GDP at constant price (Rs. Crore)	% share in GDP***	Remarks for Columns 6 & 7 (NIC codes relate to NIC-87)
	NIC-98	NIC-87	Description	Number	% Share ***			
	1	2	3	4	5	6	7	8
45	64204	-	Cable operator	49805	0.04			
	642-64204	-	other communication	692420	0.57			
	642	752+759		742225	0.61	25698	5.94	Courier services Rs. 657 (crore)
46	70	820	Real Estate Activities	171577	0.14	437	0.10	
47	71	733 to 736+850 to 854	Renting of machinery & equipment without operator, personal / household goods	308721	0.25			Estimates not prepared
48	72	892+394	Computer and Related activities	312278	0.26	8971	2.07	excludes 394
49	7411	830	Legal activities	124654	0.10	2204	0.51	
50	7412	891	Accounting, book-keeping	288452	0.24	1244	0.29	
51	73+7413+7414+742+743+749-74991	922+963+893 to 896+898+899	Research and development+ market research and public opinion polling+ business and management consultancy activities+ architectural, engineering and other technical activities+ advertising+ business activities n.e.c (-) auctioning activities	1036165	0.85	6421	1.49	excludes 963 includes 897
52	80903 + 80904	-	Coaching centres,(+) Activities of the individuals providing tuition	876008	0.72			
53	80-80903-80904	-	Education-(Coaching centres,(+) Activities of the individuals providing tuition	7470777	6.10			

Sl. No.	Recommended regrouping			Workforce (EUS 55th Rnd and PC-based population projection)		GDP at constant price (Rs. Crore)	% share in GDP***	Remarks for Columns 6 & 7 (NIC codes relate to NIC-87)
	NIC-98	NIC-87	Description	Number	% Share ***			
	1	2	3	4	5	6	7	8
	80	920+921		8346785	6.82	43878	10.15	
54	851+852	930+931	Human health activities+ Veterinary activities	2562854	2.09	13618	3.15	
55	90	910	Sewage And Refuse Disposal, Sanitation And Similar Activities	480422	0.39	2431	0.56	
56	91+853	94	Activities Of Membership Organisations n.e.c.+ Social work with accommodation	1127344	0.92	1087	0.25	
57	92	897+950 to 959	Recreational, cultural and sporting activities	759770	0.62	684	0.16	excludes 897
58	9301	961	Washing and cleaning of textile and fur products	2288075	1.87	1450	0.34	
59	9302	962	Hair dressing and other beauty treatment	1753673	1.43	1255	0.29	
60	18105	964	Tailoring	0	0.00	5338	1.23	
61	9303+9309	969+990	Funeral and related activities	3497645	2.86	5751	1.33	includes 963
62	95	960	Private Households With Employed Persons	1778654	1.45	2502	0.58	
63	99	98	Extra Territorial Organizations And Bodies	18114	0.01	2134	0.49	
	Total			122436463	100.00	432386	100.00	

* '2213' (Publishing of recorded media) and '2230' (Reproduction of recorded media) of NIC-98 were not defined in NIC-87.

** '5240' (Retail sale of second-hand goods in stores) of NIC-98 was not included in NIC-87

*** % shares of workforce and GDP relate only to the activities included in the table

**National-level estimates of Total Labour Input
from the 50th and 55th Rounds of EUS for the compilation categories**

Sl. No.	Industry Code		Industry Description	Estimates of Labour Input		Annual Growth Rate (%)
	NIC 98	NIC 87		55 th Round	50 th Round	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	01405	230	Cotton ginning, cleaning and baling	89730	181235	-11.06
2	151	200 + 202 + 203 + 210 to 212	Production, processing and preservation of meat, fish, fruit vegetables, oils and fats	802725	594811	5.12
3	152	201	Manufacture of dairy product	272514	205490	4.82
4	153	204 + 217 + 218	Manufacture of grain mill products, etc. and animal feeds	2760601	1603452	9.48
5	154	205 to 207 + 209 + 213 to 215 + 219	Manufacture of other food products	2486186	2938131	-2.75
6	155	216 + 220 to 224	Manufacture of beverages	455419	438579	0.63
7	16	225 to 229	Manufacture of tobacco products	4635640	4404066	0.86
8	171 + 172 + 173	231 to 236 + 240 to 248 + 250 to 264 + 267 to 269	Spinning, weaving and finishing of textile+ Other textiles+ Knitted and crocheted fabrics and articles	8021979	9529942	-2.83
9	181-18105	265 + 266 + 292	Wearing apparel, except fur apparel and tailoring	2584668	1205356	13.56
10	182 + 19	290 + 293 + 299 + 291 + 311 + 294 + 295 + 296	Dressing and dyeing of fur; manufacture of articles of fur and tanning and dressing of leather; manufacture of luggage, handbags saddlery, harness and footwear	1190030	870893	5.34
11	20	270 to 275 + 279	manufacture of wood and of products of wood and cork except furniture, manufacture of articles of straw and plating materials	5334786	4077628	4.58
12	361	276 + 277 + 342	Manufacture of furniture	854054	1271867	-6.42

Sl. No.	Industry Code		Industry Description	Estimates of Labour Input		Annual Growth Rate (%)
	NIC 98	NIC 87		55 th Round	50 th Round	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
13	21 + 22 *	28	Manufacture Of Paper And Paper Products and publishing, printing and reproduction of recorded media	1289544	983388	4.62
14	23 + 25	310 + 312 to 319	Manufacture of coke, refined petroleum products and nuclear fuel and rubber and plastic products	1218254	814591	6.94
15	24	30 + 208	Manufacture of chemical and chemical products	1904312	1799071	0.95
16	26	32	manufacture of other non-metallic mineral products	4008775	3742609	1.15
17	271 + 2731	-	Manufacture of Basic Iron & Steel+ Casting of iron and steel	760133	-	-
18	272 + 2732	-	Manufacture of basic precious and non-ferrous metals+ Casting of non-ferrous metals	388675	-	-
	271 + 272 + 2731 + 2732	33		1148808	1059645	1.36
19	371 + 372 **	-	Recycling of metal waste and scrap+ non-metal waste and scrap	20799	-	-
20	28	-	Manufacture of fabricated metal products, except machinery and equipments	2406132	-	-
21	29 + 30	-	Manufacture of machinery and equipment n.e.c + office, accounting and computing machinery	1332868	-	-
	28 + 29 + 30	340 + 341 + 343 to 346 + 349 + 350 to 359 + 364 + 367 + 388 + 390 to 393 + 397 + 399		3739000	3505658	1.08
22	31 + 32	360 to 363 + 365 + 366 + 368 + 369 + 395 + 396	Electrical machinery and apparatus n.e.c.+ radio, television and communication equipment and apparatus	1147288	783654	6.56

Sl. No.	Industry Code		Industry Description	Estimates of Labour Input		Annual Growth Rate (%)
	NIC 98	NIC 87		55 th Round	50 th Round	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
23	33 + 369	380 to 387 + 389	Manufacture of medical, precision and optical instruments, watches and clocks+ Manufacturing n.e.c	2705017	2333487	2.49
24	34 + 35	37	Manufacture of motor vehicles, trailers and semi-trailers+ manufacture of other transport equipment	618226	616967	0.03
25	502 + 50404	398 + 974	Maintenance and repair of motor vehicles	1688229	1115910	7.14
26	50-502-50404	623 + 682 + 686	Sale of motor vehicles	388668	437596	-1.96
27	51 + 74991	60 + 61 + 620 to 622 + 63 + 64 + 684 + 685 + 840 + 890	Whole sale trade except of motor vehicles + Auctioning activities	3791647	3990919	-0.85
28	526	970 to 973 + 975 + 979	Repair of personal and household goods	3373966	2747534	3.48
29	52-526 ***	65 + 66 + 67 + 680 + 681 + 683 + 687 to 689 + 841	Retail trade (except motor vehicle)	30039860	23580558	4.12
30	551	691	Hotels; camping sites etc.	375390	283864	4.77
31	552	690	Restaurants, bars and canteens	4442200	3182474	5.72
32	601	700	Transport via railways	1116998	1598868	-5.80
33	6021	701	Scheduled passenger land transport	1472464	1039058	5.98
34	60221	702	Non-scheduled passenger land transport by motor vehicles	2938835	1689665	9.66
35	60231	703	Freight transport by motor vehicles	3825074	2109707	10.43
36	60222	-	Other non-scheduled passenger land transport	1587523	-	-
37	60232	-	Freight transport other than by motor vehicles	2149205	-	-
	60222 + 60232	704 to 706 + 709		3736727	3563219	0.96
38	603	707	Transport via pipelines	22801	1757	53.29
39	61	710 + 711	Water Transport	200910	130977	7.39
40	62	720	Air transport	83656	66476	3.91

Sl. No.	Industry Code		Industry Description	Estimates of Labour Input		Annual Growth Rate (%)
	NIC 98	NIC 87		55 th Round	50 th Round	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
41	6302	740 + 741 + 749	Storage and warehousing	137753	144478	-0.79
42	63-6302	730 to 732 + 708 + 712 + 721 + 737 to 739	Supporting & auxiliary transport activities	422494	389150	1.38
43	6411	750	National post activities	446080	412057	1.33
44	6412	751	Courier activities	98775	71745	5.47
45	64204	-	Cable operator	65067	-	-
46	642-64204	-	other communication	723870	-	-
	642	752 + 759		788937	250570	21.07
47	70	820	Real Estate Activities	191934	146663	4.59
48	71	733 to 736 + 850 to 854	Renting of machinery & equipment without operator, personal / household goods	370595	192625	11.52
49	72	892 + 394	Computer and Related activities	322983	63513	31.14
50	7411	830	Legal activities	500190	403276	3.65
51	7412	891	Accounting, book-keeping	291698	196842	6.77
52	73 + 7413 + 7414 + 742 + 743 + 749-74991	922 + 963 + 893 to 896 + 898 + 899	Research and development+ market research and public opinion polling+ business and management consultancy activities+ architectural, engineering and other technical activities+ advertising+ business activities n.e.c (-) auctioning activities	1077508	578392	10.93
53	80903 + 80904	-	Coaching centres,(+) Activities of the individuals providing tuition	991446	-	-
54	80-80903-80904	-	Education-(Coaching centres,(+) Activities of the individuals providing tuition	7594915	-	-
	80	920 + 921		8586361	6640500	4.38
55	851 + 852	930 + 931	Human health activities+ Veterinary activities	2738635	2092550	4.59
56	90	910	Sewage And Refuse Disposal, Sanitation And Similar Activities	493688	522784	-0.95
57	91 + 853	94	Activities Of Membership Organisations n.e.c.+ Social work with accommodation	1285237	1388336	-1.28

Sl. No.	Industry Code		Industry Description	Estimates of Labour Input		Annual Growth Rate (%)
	NIC 98	NIC 87		55 th Round	50 th Round	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
58	92	897 + 950 to 959	Recreational, cultural and sporting activities	977701	999771	-0.37
59	9301	961	Washing and cleaning of textile and fur products	2480359	1956931	4.03
60	9302	962	Hair dressing and other beauty treatment	1916130	1601504	3.03
61	18105	964	Tailoring	-	3933651	-
62	9303 + 9309	969 + 990	Funeral and related activities	3909391	2266123	9.51
63	95	960	Private Households With Employed Persons	1817945	2465441	-4.95
64	99	98	Extra Territorial Organizations And Bodies	18114	12963	5.73

** '371' and '372' of NIC-98 were not defined in NIC-87.

*** '5240' of NIC-98, i.e. retail sale of second-hand goods in stores [includes the pawn shops] was not included in NIC-87

Chapter V: Recommendations

5.1.1 The Working Group after deliberating various issues relating to the estimation of the labour input for the purposes of the estimation of the value added made a number of recommendations. These recommendations have been consolidated and presented in this chapter for easy and quick reference.

1. The estimates of Workforce Participation Rates obtained from the Employment and Unemployment Survey of the 55th Round (1999-2000) of NSSO, should be applied on the population projections (as on 1st October, 1999) based on Population Census to obtain the estimate of total workforce for the mid-accounting year 1999-2000. The estimates, of course, have to be first worked out separately for the four population segments (obtained from cross-classifying rural-urban and male-female populations) and then added to arrive at the estimate of aggregate workforce.
2. The estimates of *labour input* for each activity group should be obtained as the sum of estimated number of workers in principal capacity and that of workers in subsidiary capacity, separately for each identified category of economic activities to be used for national accounting, based on the usual status workers in the 55th Round Employment and Unemployment Survey.
3. The rates of labour input should be worked out separately for the four population segments (obtained from cross-classifying rural-urban and male-female populations) and applied on the corresponding population projections as on 1st October, 1999 to arrive at the estimate of total labour input for the mid-accounting year 1999-2000.
4. For estimating the domestic product of the unorganised segment of the economy, the EUS estimates should be used for distributing the estimated aggregate labour input over the compilation categories identified in *Appendix 4.1*.

5. The present practice of using the growth rate observed between the two latest quinquennial Employment and Unemployment Surveys for projection of activity-group-wise labour input estimates to subsequent years should be continued, in absence of a dependable physical indicator or other reliable source data on annual change in employment.
6. The Central Statistical Organisation should continue with the present practice of using the Directorate General of Employment and Training data for netting out the organised employment from the estimates of entire *labour input* in respective service-producing activities and the Annual Survey of Industries estimates of workers for the manufacturing activities.
7. Appropriate steps should be taken to overcome the problems with the Directorate General of Employment and Training data by suitably taking up the issue with the Directorate General of Employment and Training.
8. The use of Employment and Unemployment Survey estimates of Workforce Participation Rates for the State-level compilation should be restricted to 10 to 15 activity groups and the further disaggregation of these activities should be reviewed by Central Statistical Organisation when the Population Census 2001 data on workers by activity groups becomes available from the Office of the Registrar General of India.
9. External validation of the labour input estimates of all the compilation categories in general and the doubtful cases in particular, using data from other sources like Population Census 2001 and the contemporary Enterprise Surveys, should be resorted to whenever they become available.

**No.M-12015/1/2002-NAD-9
Government of India
Ministry of Statistics & P.I.
Central Statistical Organisation**

**Sardar Patel Bhawan, Sansad Marg,
New Delhi-1, dated: 10th December, 2002**

OFFICE MEMORANDUM

Subject: Formation of a Working Group to look into various problems of estimation of Workforce for 1999-2000 series of National Accounts as decided by the Advisory Committee on National Accounts

The Advisory Committee on National Accounts in its meeting held on 23rd September, 2002 has decided to form a Working Group to look into various aspects of estimation of the workforce for 1999-2000 series of National Accounts. Accordingly, a Working Group is hereby constituted with the following terms of reference :

- (i) To evolve an appropriate methodology for estimation of workforce for use in the National Accounts, keeping in view the data availability.
- (ii) Any other matter, deemed fit by the Committee, related to workforce.

2. The composition of the Committee shall be :-

- | | | |
|----|--|------------------|
| 1. | Mrs. Grace Majumdar,
Member Advisory Committee,
44, Anupam Apartments,
M.B. Road, New Delhi | Chairperson |
| 2. | Prof. K. Sundaram,
Delhi School of Economics, Delhi | Member |
| 3. | Mr. Paul Jacob
Kollinal House
Arakkunnam.P.O.
(Dist.Ernakulam)
Kerala-682313 | Member |
| 4. | Representative of the Registrar General
of India | Member |
| 5. | Representative of NAD, CSO | Member Secretary |

3. The Group shall submit its report, to the Advisory Committee on National Accounts, within three months time from the date of holding its first meeting.

4. Official Members of the Committee at serial numbers 4 & 5 will draw their TA/DA for attending the meetings from their respective Organisations, the non-official members will draw their TA/DA in accordance with the relevant rules and order in force and the expenditure will be met within the Budget Grant of the CSO, Ministry of Statistics & PI.

5. This issues with the approval of Secretary (MOS&PI).

Sd/-
(S.C.Das)
Senior Analyst

To

1. All Members of the Working Group
2. ADG/DDG(NAD)
3. Admn.I, General Section, Coordination, B&F (MOS&PI) w.r.t. Dy.No.821/B&F/02 dated 5.12.2002

Copy for information to :

1. PPS to Secretary (MOS&PI)
2. Mrs. Grace Majumdar, 44, Anupam Apartment, M.B. Road, New Delhi, Chairperson of the Working Group.

Methodology adopted for Estimating *Labour Input* in different Series of National Accounts Statistics and the Data used

The methodology adopted for estimation of workforce for the purpose of national accounting has undergone several changes from one series to another. To get a clear view of the different methodologies, why and what changes were made in the different series are brought out in the following paragraphs. The discussion includes how the following six issues have been dealt in different series: (i) Estimating workforce aggregates for the base year, (ii) Adjusting for multiple jobs to derive the *labour input*, (iii) Distribution of workforce / *labour input* by economic activity, (iv) Projecting estimates of *labour input* to subsequent years, (v) Netting out the organised workforce and (vi) Estimating workforce / *labour input* for compilation of State Domestic Product (SDP).

Conventional Series (1950-51) of NAS

The estimates of workforce in this series were entirely based on PC. In the PC 1951, the data on workers were collected on the basis of gainful employment approach classifying the population in three categories, viz. (i) self-supporting, (ii) earning dependent and (iii) non-earning dependent. In the earlier census of 1941, the classification of persons was broadly the same, only instead of the term 'earning dependent', a different term – 'partly dependent' – was used for the same category. Thus, the 'self-supporting' persons and 'partly dependents' of PC 1941 were taken to constitute workforce as on 1.3.1941 and the 'self-supporting' persons and 'earning dependents' of PC 1951 were taken to constitute the workforce as on 1.3.1951. For the Conventional series, first, the workforce for 1.3.1941 and 1.3.1951 was estimated in five control groups of (i) all agricultural classes, (ii) (Goods) production other than cultivation, (iii) Commerce, (iv) Transport, and (v) Other services and miscellaneous sources. Since the NAS for the base year of the conventional series pertained to the financial year 1950-51, the estimates of workforce for the base year in each control group were arrived at separately using the inter-censal compound growth rates as the projected workforce for the mid-financial year.

As stated above, the mid-financial year workforce estimates were first obtained for the five control groups. The control group totals of workforce for the accounting year were distributed to each 1951 Census sub-division of occupation in the proportion of 'self-supporting' persons in the sub-division to the total number of self-supporting persons in the control group as given by the 1951 Census occupational tables. The entire workforce was reallocated to occupational subdivisions in this way since the detailed occupational tables for earning dependants were not available.

As the sub-divisions in each livelihood class of the Population Census did not correspond to the classification of economic activity adopted for compilation of NAS by industry of origin, the occupational sub-divisions of 1951 Census

economic classification was appropriately regrouped to obtain the workforce estimates by the required industrial classification.

Inter-censal compound growth rates were used for projecting base year workforce estimates to subsequent years for the conventional series. As regards netting out the organised workforce, data on factory employment from Sample Survey of Manufacturing Industries (SSMI) and employment in railways was used for compilation of NAS. Estimating State-level workforce was not required as compilation of SDP was not attempted during that time.

Methodology used in 1970-71 Series of NAS

The estimates of workforce for the 1970-71 series of NAS were obtained from the workforce figure of Censuses of 1961 and 1971, using the inter-censal growth rate. But the population census results used in the absence of any other information suffered from limitations arising out of changes in concepts. The reference periods employed for determining the working status of the persons were different in the two censuses. Moreover, in 1961 there was a simple dichotomous classification for persons into 'worker' and 'non-worker', whereas in 1971 a person was classified in either of the two categories according as the type of the main activity mostly pursued. As a result, many persons who were workers only marginally might have been counted as workers in 1961 and as 'non-workers' in 1971. During the 1961 census, data on secondary activity (or work) of the persons were not collected while in 1971, data on 'secondary' work were collected in respect of both 'workers' and 'non-workers'.

To determine the possible extent of the effect on the results of differences in 1971 and 1961 census concepts, the Registrar General of India (RGI) conducted a sample survey over the period between December 1971 and July 1972 canvassing both the sets of census questions. From this survey, an estimate of the effect of conceptual difference between 1971 and 1961 census participation rates were obtained. The actual figures of 1961 census for each category of workers (cultivator, agriculture Labour and other workers) were multiplied by the ratio of the adjusted figure (according to 1961 census) to actual 1971 figure to obtain the corresponding estimates of 1961 according to 1971 concept. These ratios were worked out separately for three categories of main activities sub-classified further by sex separately for rural and urban areas.

The information on persons employed collected in various rounds of the NSS had not been found satisfactory for estimating the size and rate of growth of workforce. This was mainly because such surveys were not carried out at regular intervals and the results were affected due to differing reference period, and change in the concept of employment adopted in different rounds.

Assuming that the estimated effect of conceptual difference in the participation rates were fairly stable and uniform in the different industry-groups falling within each main activity, the revised estimates of workers by activity-groups separately for rural and urban areas for 1961 were worked out adopting the 1971 Population Census concept. The classification at the industry level adopted

for the purpose was NIC-1970 at three-digit level. The workforce estimates at 3-digit level of NIC were then regrouped into 13 industrial categories and sub-categories adopted for measuring domestic product by industry of origin.

For projecting workforce estimates to subsequent years in the 1970-71 series of the NAS too, inter-censal compound growth rates were used separately for the 13 industrial categories and sub-categories. The estimates of workforce required for SDP compilation was obtained using the same method as for the national-level estimates. For netting out the organised segment workforce in manufacturing, the ASI estimates of workforce were used.

Methodology used in 1980-81 Series of NAS

The estimates of workforce in the 1980-81 series were based on 1971 and 1981 population censuses. Inter-censal growth rates were used for preparing annual estimates of workforce. This required adjusting the census data collected at different points of time appropriately for making the results comparable.

In 1981 census, 'main workers' were those who worked for 183 days or more during the year. While comparing the workers data of PC 1981 with those of PC 1971, the RGI states ".....the main workers of 1981 census can be expected to correspond to the workers of 1971.....". The estimates of secondary workers in addition to main workers are necessary for compilation of the domestic product. The main workers of 1981 Census can be expected to correspond to the workers of 1971 and the main workers and marginal workers of 1981 together correspond to the workers and non-workers with secondary work of 1971. For the 1980-81 series of NAS, the method of estimating the total workforce, at the aggregate level, consisted of working out estimates of *main* and *marginal* workers using the compound inter-censal growth rate of main workers on the estimates of 'total workers', separately for each activity category at one-digit level of NIC 1970.

Again, the employment data collected in various rounds of the NSS were not found satisfactory for estimating the rate of growth of workforce. The NSS in its various rounds had collected data on employment and unemployment, but only in the 38th round these had been compiled at three-digit level of NIC separately for main and marginal workers. Since information for earlier rounds were not available in such details, it was not possible to make use of these data for adjustment of 1981 census workforce for working out the inter-censal or post-censal estimates.

In 1971 population census, data on secondary work of the main workers and non-workers were published by RGI only by broad groups of cultivators, agricultural labour, household industry and a combined group of non-household industries consisting of trade, business and service. In 1981 population census, the tabulation in respect of non-household industry of the secondary work of the main workers was further disaggregated into a few more industry groups, but only at one-digit level of NIC. On the other hand, in respect of marginal workers, the data had been published at the two-digit level. The estimate of *labour input* for the NAS 1980-81 was obtained as the sum of main workers, marginal workers and the main workers with *subsidiary* work.

The number of main workers with *subsidiary* work should ideally be worked out separately for each activity group and added to corresponding workforce engaged in the activity. This was done by distributing the *subsidiary* work (as well as the marginal workers) over the activity-groups adopted for compilation of NAS using the distribution of *subsidiary* workers over the activity-groups based on the results of the EUS of the 38th Round (1982) of NSSO.

In 1971 and 1981 censuses, secondary and marginal workers were tabulated only by broad groups. In fact, the comparability of total workforce available from the two censuses was not feasible and was restricted only to main workers. The estimates of workforce by detailed categories required for compilation of NAS were available only for main workers. Thus, adjustment in respect of main workers was done on the basis of average annual compound growth rate observed between 1971 and 1981 population censuses.

In addition to the estimates of main workers, the estimates of *subsidiary* workers and marginal workers at two-digit level and three-digit level of NIC-1970 were required for compilation of NAS. The NSSO Report on Employment and Unemployment of the 38th round (1983) provided the distribution of *principal-capacity* and *subsidiary-capacity* workers separately at two/three-digit level of NIC for rural and urban areas. With the help of these proportions, census *subsidiary* and marginal workers available at one-digit level were distributed to the two and three-digit levels and added to census main workers as on 1.10.1980 to obtain the total estimates of *labour input*.

For projecting workforce estimates to subsequent years in the 1980-81 series of the NAS too, inter-censal compound growth rates were used separately for the compilation categories. The estimates of workforce required for SDP compilation was obtained using the same method as for the national-level estimates. For netting out the organised segment workforce, the ASI estimates of workforce and the EMI data of the DGE&T were used respectively for the manufacturing and other activities.

Methodology used in 1993-94 Series of NAS

For the 1993-94 series, estimates of workforce from the alternative source of the EUS of the NSSO were used for the first time. The use of the EUS data for this purpose was prompted by the observations made in a validation exercise¹ that the PC does not capture all the economic activities, particularly those of women, adequately. Results revealed that the estimate of total workforce based on the EUS was higher than those obtained from PC 1991 count by 10.86 per cent and, more significantly, the estimate of female workforce based on the EUS was higher by 28.24 per cent than the corresponding PC 1991 count. It was argued that since the Population Census did not capture all the economic activities, the estimates of workforce for the series of National Accounts Statistics with base year 1993-94 should not be based only on the Population Census. The estimates of

¹ Visaria, P (1998): Employment and Workforce in India: Implication for National income estimates. Paper presented at the Golden Jubilee Seminar on 'Data base of the Indian Economy', Indian Association for Research in National Income & Wealth held at Institute of Economic Growth, New Delhi.

workforce eventually used for national accounting were worked out in a synthetic way using (i) WPRs and the distribution of workers at 1-digit level of NIC 1987 estimated from the EUS of 50th Round (1993-94) of the NSSO and (ii) population projections and distribution of workforce (at 3-digit level of NIC 1987) in different economic activities as obtained from the results of full-count tabulation of Population Census 1991 from the RGI. The methodology of estimating workforce for the 1993-94 series of NAS estimates was approved by the Advisory Committee in its meeting held on 6th November 1998.

Table B1: Projected Population, Workforce Participation Rates and Estimated Workforce for 1st October, 1993

Item / area	Male	Female	Total
(1)	(2)	(3)	(4)
<i>1. Population Projections for 1st October, 1993 based on Population Census</i>			
1.1 Rural	331,916,618	322,623,998	654,540,616
1.2 Urban	131,374,768	104,725,618	236,100,386
1.3 Total	463,291,385	427,349,617	890,641,002
<i>2. Workforce Participation Rates (per 1000) according to Principal- or Subsidiary-Capacity from 50th Round, NSSO (1993-94)</i>			
2.1 Rural	553	328	444
2.2 Urban	521	155	347
2.3 Total	545	286	420
<i>3. Estimates of Total Workers (Principal & Subsidiary) for 1st October, 1993</i>			
3.1 Rural	183,549,890	105,820,671	289,370,561
3.2 Urban	68,446,254	16,232,471	84,678,725
3.3 Total	251,996,144	122,053,142	374,049,286

Sources: (i) Office of the RGI

(ii) NSSO Report No. 409 on Employment & Unemployment-50th Round

The national-level projected population, WPRs used for estimating workforce and the estimates of workforce, separately for the male and female populations of the rural and urban areas, are given in *Table B1*. The estimates of WPRs from the EUS were applied on the population projections to obtain the estimate of total workforce for the mid-accounting year 1993-94 (as on 01st October, 1993). The estimates of workers in the numerators of the WPRs used for this purpose were the number of persons who were employed in the *usual-status*, either in the *principal-capacity* or *subsidiary-capacity* or both.

For compilation of 1993-94 series of NAS, the number of workers under the category *Main Workers with Other Work (MWOW)* from the PC 1991 was used for working out measures of *labour input* in different activity-groups. The PC 1991

provided data on number of main workers with *subsidiary* work at the aggregate level for All-India & States. It was assumed that the ratio of total number of MWOW (as available from the Census, 1991) to the total workforce observed in 1991 would be valid for 1993-94 too. The details of the method of working out a measure of aggregate *labour input* for the 1993-93 series of NAS are indicated in *Table B2*. The MWOW ratios given against item 3 of the *table* were obtained from the respective figures of number of main & marginal workers given against item 1 and MWOW given in item 2. These ratios were applied on the respective estimates workforce given against item 3 of *Table B1* to obtain the estimates of *labour input* given in item 4 of *Table B2*.

Table B2: Estimate of MWOW Ratio from the Population Census 1991 and Estimated Labour Input for 1993-94

Item / area	Male	Female	Total
(1)	(2)	(3)	(4)
<i>1. Main & Marginal Workers – Population Census 1991</i>			
1.1 Rural	170,495,919	81,569,284	252,065,203
1.2 Urban	56,212,523	9,437,304	65,649,827
1.3 Total	226,708,442	91,006,588	317,715,030
<i>2. Main Workers with Other Work (MWOW) – Population Census 1991</i>			
2.1 Rural	19,590,273	6,463,678	26,053,952
2.2 Urban	682,069	143,969	826,038
2.3 Total	20,272,342	6,607,647	26,879,990
<i>3. Ratio of Main Workers with Other Work to Main & Marginal Workers (MWOW ratio)</i>			
3.1 Rural	1.1149	1.0792	1.1034
3.2 Urban	1.0121	1.0153	1.0126
3.3 Total	1.0894	1.0726	1.0846
<i>4. Estimated Labour Input for mid-financial year 1993-94</i>			
4.1 Rural	204,639,772	114,201,668	318,841,440
4.2 Urban	69,274,454	16,480,828	85,755,282
4.3 Total	273,914,226	130,682,496	404,596,722

The estimates of total workforce were apportioned to the different economic categories at the one-digit level of NIC 1987, using the EUS estimates, separately for rural and urban areas and both for all India and States. Having fixed the number of workers at the one digit level for rural/urban and male/female break up at the 1-digit level of NIC, the estimates of total workers were further apportioned to two- and three-digit levels of NIC in the proportions observed in the full-count tabulation of the workforce as provided by the office of RGI.

So far, for all the NAS series, no annual data on employment had been used for supplementing the benchmark estimates of workforce. In all the NAS series up to the 1980-81 series, the inter-censal compound growth rates of workforce in different activity-groups were used for projecting the base year estimates to the subsequent years. For the 1993-94 series, however, the growth rates in the

workforce in different activity-groups relevant for NAS compilation observed in the estimates of the 43rd (1987-88) and 50th (1993-94) EUSs of the NSSO were used for this purpose.

The estimates of workforce required for SDP compilation were obtained using the same method as that for the national-level estimates. For netting out the organised segment workforce the ASI estimates of workforce and the EMI data of the DGE&T were used respectively for the manufacturing and other activities.

Excerpts from ‘Chapter XVII: Population and Labour Inputs’ of the System of National Accounts 1993

A. Introduction

17.1. The SNA requires a definition of population to express gross domestic product and consumption aggregates in per capita terms. It also requires labour input variables in order to examine productivity.

17.2. Many of the complications in the concepts described here stem from the existence of national boundaries. To facilitate exposition, consideration of these has been postponed to part C of this chapter, which thus starts off without any reference to them, as if a country without any cross-border movement of persons and with no cross-border ownership of enterprises were being considered.

B. Population and labour concepts without national boundaries

17.3. Figure 17.1 summarizes the first part of the chapter. Those concepts which are part of the SNA are in heavy boxes. The formal definition of these concepts are set out in part C of this chapter.

1. Population and employment

17.4. Population is, in principle, an annual average of frequent head counts, each of which relates to a point of time. (Censuses usually ascertain the number of people present on a specified night.) Thus population is the annual average number of people present. It includes the institutional population, though this is not covered by most labour force surveys.

17.5. The division of the number enumerated at a point in time into three categories, i.e., "employed", "unemployed" and "not in the labour force" depends upon each person's activity (or lack of it) during a reference period (usually a week) ending with the point in time to which the count relates. Employment has been defined by the International Labour Organization (ILO) in the "Resolution concerning statistics of the economically active population, employment, unemployment and underemployment", adopted by the thirteenth International Conference of Labour Statisticians. No definition is required here, but, as Figure 1 indicates, provided that the definitions of employment and of jobs match one another, the average annual number of jobs exceeds the annual average number of persons employed by the average annual number of second, third, etc., jobs. Note that the second, third, etc., jobs of a person may either successively follow one another in a reference week or, as when someone has an evening job as well as a daytime job, run in parallel.

17.6. Employed persons who have more than one job during a reference week can only be classified by industry and by status in employment through the application of some essentially arbitrary convention as to which of their jobs is the most important

one. On the practical plane, while household surveys can provide data about either or both of employment and jobs, establishment surveys only provide data about jobs, so data on jobs tend to be more plentiful than data on persons employed.

17.7. Employment does not enter into the System, but jobs do; a job is like a transaction, while an employed person is not.

2. Jobs

17.8. In daily speech, a job is used in two senses: first, as a filled post in an institutional unit, e.g., "B has a job as truck driver with XYZ Company", and, second, to signify the occupation or nature of the activity, e.g., "B's job is driving an XYZ truck". The first of these is relevant here. Thus a job is defined as an explicit or implicit contract between a person and an institutional unit to perform work in return for compensation for a defined period or until further notice. The institutional unit may be the proprietor of an unincorporated enterprise; in this case the person is described as being self-employed and earns a mixed income.

17.9. There are a number of points here which require expansion:

(a) Both employee jobs and self-employment jobs are covered. The distinction between employee and compensation of employees on the one hand, and self-employment and mixed income on the other hand, is set out in chapter VII. Chart 17.2 summarizes part of that discussion;

(b) Work means any activity which contributes to the production of goods or services within the production boundary as defined in chapter VI. The legality of the work and the age of the worker are, in principle, irrelevant;

(c) Mixed income and the compensation of employees are defined in chapter VII. Compensation differs from labour cost, as defined by the ILO "Resolution concerning statistics of labour cost", adopted by the eleventh International Conference of Labour Statisticians, only in including imputed employer contributions to unfunded social insurance schemes, and in excluding any taxes regarded as labour cost, together with the costs of training, welfare, recruitment and the provision of work clothing;

(d) The explicit or implicit contract relates to the provision of labour input, not to supplying output of a good or service, which is why it is described as for a defined period or until further notice. A bricklaying job, paid by time or according to the number of bricks laid, is an employee job, while a contract to lay a certain number of bricks for a given payment is not a job; the job is the bricklayer's notional self-employment contract. Similarly, a self-employment job of window-cleaning is regarded as an implicit contract by a person to hire himself or herself to do cleaning work. Quite separately, the person has contracts with customers to provide the service of window-cleaning;

(e) There is one minor difference between a job as defined here and the category of persons "with a job but not at work" who are considered as employed in the ILO resolution adopted by the thirteenth International Conference of Labour Statisticians which, referred to above. This is that, on the ILO definition, the employed may include persons who are not being paid but have a "formal attachment to their job"

in the form of "an assurance of return to work ... or an agreement as to the date of return". Such an understanding between an employer and a person on layoff or away on training is not counted as a job in the System.

17.10. Jobs may be classified not only as employee or self-employment, but also according to the standard activity classification.

3. Total hours worked

17.11. Output per job would be an excessively crude measure of productivity and total hours worked is the preferred measure of labour inputs for the System. The ILO "Resolution concerning statistics of hours of work", adopted by the tenth International Conference of Labour Statisticians, defines hours worked as follows:

Statistics of hours worked should include:

- (a) Hours actually worked during normal periods of work;
- (b) Time worked in addition to hours worked during normal periods of work, and generally paid at higher rates than normal rate (overtime);
- (c) Time spent at the place of work on work such as the preparation of the workplace, repairs and maintenance, preparation and cleaning of tools, and the preparation of receipts, time sheets and reports;
- (d) Time spent at the place of work waiting or standing-by for such reasons as lack of supply of work, breakdown of machinery, or accidents, or time spent at the place of work during which no work is done but for which payment is made under a guaranteed employment contract;
- (e) Time corresponding to short periods of rest at the workplace, including tea and coffee breaks.

Statistics of hours actually worked should exclude:

- (a) Hours paid for but not worked, such as paid annual leave, paid public holidays, paid sick leave;
- (b) Meal breaks;
- (c) Time spent on travel from home to work and vice versa.

17.12. Total hours worked is the aggregate number of hours actually worked during the year in employee and self-employment jobs.

17.13. The truism, for employee jobs, that hours worked equal hours paid less hours paid but not worked, plus hours worked but not paid, is a useful one, since many establishment surveys record hours paid, not hours worked, so that hours worked have to be estimated for each job group, using whatever information is available about paid leave, etc.

4. Full-time equivalence

17.14. An inferior alternative to expressing labour input in terms of total hours worked is to measure it in terms of full-time equivalent work years. Full-time equivalent

employment is the number of full-time equivalent jobs, defined as total hours worked divided by average annual hours worked in full-time jobs.

17.15. The definition does not necessarily describe how the concept is estimated. The method sometimes used, of simply counting all part-time jobs as half a full-time job, is the crudest possible way of making an estimate. Since the length of a full-time job has changed through time and differs between industries, more sophisticated methods which establish the average proportion and average hours of less than full-week full-time jobs in each job group separately are preferable.

17.16. Even if the data are good enough to permit an estimation of total hours worked, full-time equivalent employment should nevertheless also appear in the national accounts. One reason is that this facilitates international comparisons with countries which can only estimate full-time equivalent employment. The other reason is that, since the full-time annual hours of a job group vary through time, the two concepts carry a partially different message. If, for example, more sickness or annual leave is taken, both shortening average annual full-time hours and, *ceteris paribus*, reducing total hours worked, full-time equivalent employment will scarcely change, while total hours worked will fall. So if the former rather than the latter is used as the denominator in calculating productivity changes, productivity will rise less or fall more. A similar point applies to international comparisons. If, however, full-time annual hours did not exclude paid sick leave, but total hours worked continued to do so, more sickness would cause full-time equivalent employment to rise more or fall less than would an equal increase in annual leave, so that productivity would rise less or fall more. This would make good sense - sickness undesirably interferes with production, while annual leave is a desirable alternative to it. But if information on absence from work through sickness is not available for estimating full-time annual hours, it will not be available either for estimating total hours worked.

17.17. In practice, total hours worked and average annual full-time hours may have to be estimated. In many countries, especially for monthly paid employee jobs, only normal or usual hours, any paid overtime, and annual and holiday leave entitlements can be ascertained, and it may be impossible to estimate the subtraction to be made for average sickness leave from either total hours worked or annual full-time hours. This error will not affect full-time equivalent employment if sickness rates in part-time jobs are the same as in full-time jobs, so can be tolerated if it is unavoidable.

17.18. If the reference weeks used in the surveys that provide the data are not fully representative, the best available information on variations throughout the year should be used in estimating data for the year as a whole.

**Between-round Variation in Estimates of RSEs of WPR Estimates
Based on Employment & Unemployment Surveys of the NSSO
– A Comparison of 50th and 55th Rounds**

Adopting a classification scheme of economic activities for compilation of GDP and other macro-economic aggregates requires careful examination of the available data and their reliability. An Internal Working Group (IWG) of the NAD undertook an exercise to develop a rational regrouping of economic activities classified in the NIC 1998, based on the likely magnitude of sampling errors associated with the GVA estimates (obtained using *labour input method*) for different activity groups. For this purpose, the IWG examined the relative standard errors (RSEs) of the estimates of workforce participation rates (WPRs) obtained from the Employment & Unemployment Survey (EUS) of the 55th Round of the NSSO (1999-2000) and those of the estimates of *value added per worker* (VAPW) from the Informal Sector (Enterprise) Survey conducted in the same round. These were used to obtain a measure of the sampling error likely to be associated with the GVA estimates for each group of economic activities considered for the regrouping exercise.

Question naturally arises as to how reliable are the estimates of sampling error themselves. While the RSE estimates provide an idea of the magnitude of sampling error associated with the WPR estimates for different activity-groups, they are themselves subject to sampling errors. If the RSE estimates themselves are subject to high variations from one NSSO round to another, is it prudent to adopt a criterion based on such a measure for choice of groupings?

To examine the reliability, in fact robustness, of the RSE estimates of WPRs of different activity-groups, an attempt is made here to compare the RSE estimates of WPRs of the 50th and 55th rounds of Employment and Unemployment Survey for comparable groups of economic activities. It is important to note that the data on economic activity collected in the EUS of the 50th round were according to the NIC 1987, while those collected in the EUS of the 55th round were according to the NIC 1998. As a result, the present study of round-to-round change in RSE estimates is constrained by the lack of concordance between NIC 1987 and NIC 1998.

The study is, therefore, restricted to comparison of the RSEs of a total of 91 individual/ group of non-agricultural activities. These were identified from among the activity groups considered for the IWG's exercise on regrouping of NIC 1998 as the ones with which exact concordance could be established with activity classes of NIC 1987. These activities are from both manufacturing and services sectors. The activity-groups, their composition according to NIC 1987 and NIC 1998, and the WPRs estimates with their RSEs for each activity-group, as obtained from the EUSs of the 50th and 55th Rounds, are given in *Table D3* at the end of this *Annex*.

Of the 91 activities, two activities, viz. “Building and repair of ships & boats” (‘351’ of NIC 1998 and ‘370’ of NIC 1987) and “Manufacturing of nuclear fuel” (‘233’ of NIC 1998 and ‘317’ of NIC 1998), had just one worker each reported in the sample of the 55th Round. In the sample of the 50th Round too the number of persons reporting these activities were low at 46 and 9 respectively. Apart from these activities, there were six other groups of activities for which the RSE estimates were found to lie beyond 50 per cent in one or both rounds. The WPR estimates, RSEs and the number of persons captured in the sample in respect of these 6 activities are given in *Table D1*.

Table D1: Activities with RSEs of WPR Estimates more than 50 per cent

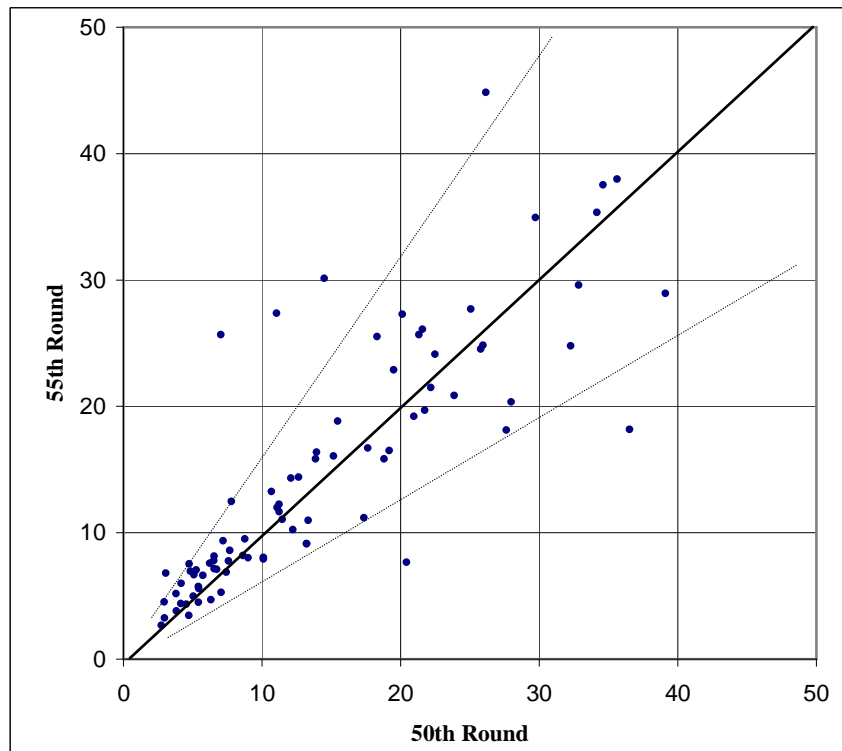
NIC		Description of activities	50 th Round			55 th Round		
1987	1998		RSE (%)	WPR	SS	RSE (%)	WPR	SS
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
294+295+296	182	Manufacturing of fur and fur products	70.96	0.03	5	25.36	0.11	62
306	243	Manufacturing of man-made fibres	65.29	0.01	5	-	0.00	2
361	313	Manufacturing of insulated wire and cable	24.86	0.09	54	53.88	0.26	71
369	319	Manufacturing of other electrical equipment n.e.c.	59.91	0.31	31	41.58	0.21	122
371+372	352	Railway and tramway locomotives and rolling stock	19.96	0.27	75	71.67	0.00	4
394	7250	Maintenance & repair of office, accounting and computing machinery	65.93	0.02	3	31.43	0.02	19

Note: “SS” stand for the number of workers reporting the activity in the sample.

The above table reveals that, for the six activity-groups, the RSE estimates between the two rounds are not only very high but also differ substantially. This *table* also indicates that, except for ‘manufacturing of other electrical equipment n.e.c.’, these activities are pursued by a very small proportion of the population. Obviously, high RSE estimates and their wide between-round-divergences are due to rarity of these activities. Needless to say, activities pursued by such small proportion of the population were not considered as candidates for the regrouping recommended by the IWG.

Thus, in the rest of the present *Annex*, the above-mentioned 8 activities have been excluded and the between-round comparison of the RSEs is confined to remaining 83 activity-groups. The RSE of the WPR estimates for these activity groups as estimated in the two rounds are plotted in the following the Graph.

Graph: Comparison of RSEs of WPR – 50th and 55th Rounds



It is seen that the points of the scatter diagram cluster around the 45-degree line with only a few outliers lying beyond the narrow diverging band indicated in the graph. Clearly, the RSE estimates of the two rounds compare closely for most of the activities. There are in all 7 out of 83 activities for which their plotting lie outside the band. *Table D2* below gives the WPRs, RSEs and the number reported in the sample for each of these 7 activities, and it clearly shows the high between-round divergence in the RSE estimates.

Table D2: Activities with wide between-round divergence in RSEs of WPR

NIC		Description of activities	50 th Round			55 th Round		
1987	1998		RSE	WPR	SS	RSE	WPR	SS
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
265+266+ 292+964	181	Manufacturing of wearing apparel except fur	3.05	4.70	3052	6.8	2.36	1465
321	261	Manufacturing of glass and glass products	7.03	0.32	145	25.68	0.17	149
368	321	electronic valves and tubes etc.	36.53	0.12	56	18.18	0.11	73
375+376+ 378+379	359	Transport equipment n.e.c.	11.05	0.27	180	27.37	0.26	106
720	62	Air Transport	26.15	0.07	52	44.85	0.08	44
892	72- 725	Computer and related activity	20.43	0.06	50	7.66	0.24	224
941	853	Social work activities	14.49	0.13	82	30.12	0.23	153

Note: “SS” stand for the number of workers reporting the activity in the sample.

It is seen that for the activity of ‘manufacturing of wearing apparel except fur’, which is a widely pursued economic activity, the increase in the RSE estimate is due to the fall in WPR during the inter-survey period. In general, it has been observed that the WPR estimates and their RSEs have a negatively-sloped relation. In the present case, three of the seven activities with plotting beyond the band, are found to follow this pattern. In the other four cases, however, the between-round divergence in RSE estimates appears to be due to sampling fluctuation.

The EUS is a large, multi-stage survey conducted at an interval of about five years, with largely the same sampling design. The sample sizes, particularly at the first stage, are also of the same order, as the field resources of the NSSO do not undergo significant change within a span of five years. Thus sampling errors associated with the WPR estimates are not expected to fluctuate much, particularly for the economic activities that are pursued by a more than insignificant proportion of the population. The results of the present exercise seem to provide evidence of this.

Table D3: Between-round Variation in Estimates of RSEs of WPR Estimates

NIC 1987 50 th Rnd.	NIC 1998 55 th Rnd.	WPR		RSE		No. of workers in the sample	
		50 th Rnd.	55 th Rnd.	50 th Rnd.	55 th Rnd.	50 th Rnd.	55 th Rnd.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
201	152	0.20	0.24	12.22	10.24	135	166
200 + 202 + 203 + 210 to 212	151	0.62	0.70	8.76	9.50	361	422
204+217+218	153	1.49	2.26	6.31	4.69	901	1401
205 to 207 + 209 + 213 to 215 + 219	154	2.99	2.21	4.17	5.99	1519	1446
216 + 220 to 229	155 + 16	4.90	4.28	4.83	6.95	2571	2283
230 to 236 + 240 to 248 + 250 to 259	171	7.48	5.06	5.41	5.74	4214	3317
260	173	0.39	0.20	22.18	21.49	229	165
261 to 264 + 267 to 269	172	2.44	2.32	7.42	6.86	1150	1523
265+266+292+964	181	4.70	2.36	3.05	6.80	3052	1465
260 to 269 + 292 + 964	172+173+181	7.98	4.92	2.95	4.52	4431	3153
270	201	0.30	0.29	11.23	12.25	213	253
271 to 275 + 279	202	3.37	4.22	5.04	4.97	1649	2296
280 to 283	21	0.42	0.38	12.64	14.39	264	287
284 to 289	22	0.67	0.80	7.19	9.36	482	610
290+293+299	191	0.29	0.29	17.36	11.18	160	181
291+311	192	0.59	0.68	13.86	15.83	336	418
290+293+299+291 +311	19 (191 + 192)	0.88	0.94	11.24	11.67	496	599
294+295+296	182	0.03	0.11	70.96	25.36	5	62
208+300 to 305 +307 to 309	24 - 243	1.85	1.73	7.04	5.27	1092	1043
306	243	0.01	0.00	65.29	--	5	2
310+312	251	0.25	0.31	21.32	25.68	143	187
313	252	0.44	0.63	12.09	14.31	229	391
314+315+316	232	0.08	0.13	25.95	24.84	58	80
317	233	0.03	0.00	85.00	--	9	1
318+319	231	0.06	0.06	29.73	34.94	40	38
314 to 319	231+232+233	0.17	0.19	20.96	19.21	107	119
320+322 to 327 + 329	269	3.23	3.22	5.44	5.57	1495	1764
321	261	0.32	0.17	7.03	25.68	145	149
330+331+332	271	0.83	0.60	7.79	12.48	591	468
333 to 336 + 338 + 339	272	0.17	0.33	19.18	16.50	108	263
337	273	0.13	0.14	17.63	16.70	77	103
340	2811	0.33	0.70	13.33	10.97	202	436
341	2812	0.12	0.17	18.31	25.53	78	122
343 to 346 + 349	289	1.31	1.31	7.58	7.76	718	754
358+367	30	0.04	0.05	22.49	24.12	35	36
361	313	0.09	0.26	24.86	53.88	54	71
362	314	0.05	0.04	34.16	35.35	27	27
363	315	0.06	0.10	32.85	29.59	34	56
365	322	0.10	0.04	39.10	28.95	55	46
366	323	0.08	0.05	27.63	18.12	41	31
368	321	0.12	0.11	36.53	18.18	56	73
369	319	0.31	0.21	59.91	41.58	34	122
350 to 369 (-)352 + 388 + 390 to 397 (-)	2813+29+30+ 31+32	2.64	2.29	6.52	7.79	1535	1430
394+399							

NIC 1987 50 th Rnd.	NIC 1998 55 th Rnd.	WPR		RSE		No. of workers in the sample	
		50 th Rnd.	55 th Rnd.	50 th Rnd.	55 th Rnd.	50 th Rnd.	55 th Rnd.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
370	351	0.05	0.00	21.62	--	46	1
371+372	352	0.27	0.00	19.96	71.67	75	4
373+374	34	0.17	0.29	15.46	18.82	110	183
375+376+378+379	359	0.27	0.26	11.05	27.37	180	106
380	331	0.04	0.03	25.06	27.70	28	36
381	332	0.02	0.01	34.61	37.54	22	15
382	333	0.05	0.02	35.62	37.99	28	19
383 to 387 + 389	369	2.28	2.29	5.25	7.05	1480	1509
394	7250	0.02	0.02	65.93	31.43	3	19
398+974	502	0.97	1.02	6.54	7.14	810	756
690	552	3.25	4.02	3.83	3.80	2124	3132
691	551	0.29	0.35	11.09	12.00	210	378
700	6010	1.71	1.05	7.67	8.60	1057	805
701	6021	1.12	1.39	5.08	6.68	785	957
702+709	6022	1.91	4.13	4.71	3.45	1339	2803
703 to 708	6023	5.30	5.30	2.96	3.24	3092	3243
710	611	0.07	0.12	21.57	26.09	80	122
711	612	0.06	0.07	32.28	24.79	36	57
720	62	0.07	0.08	26.15	44.85	52	44
733 to 736& 850 to 854	71	0.16	0.29	13.21	9.12	127	264
740+741+749	6302	0.15	0.12	23.87	20.87	79	81
750	6411	0.44	0.42	9.00	8.02	270	299
751	6412	0.07	0.09	27.98	20.34	42	64
752+759	642	0.26	0.71	10.09	8.05	197	532
820	70	0.13	0.16	15.16	16.06	106	152
830	7411	0.42	0.46	8.63	8.19	356	386
850	71	0.16	0.29	13.21	9.12	127	264
890+898+899 + 963	749-74991	0.36	0.73	10.11	7.90	295	551
891	7412	0.20	0.27	11.47	11.06	153	192
892	72-725	0.06	0.24	20.43	7.66	50	224
893	7413+7414	0.04	0.07	20.12	27.29	36	48
894 to 896	742	0.07	0.07	18.80	15.83	72	47
896	7430	0.15	0.04	21.74	19.69	34	31
897+950 to 953 + 955 to 959	92-9213	0.88	6.60	6.73	7.10	579	527
910	90	0.54	0.47	10.69	13.25	337	316
920	802	1.03	2.51	5.41	4.49	841	2207
921	M	6.00	8.12	2.73	2.66	4942	6700
922	73	0.10	0.06	19.49	22.89	71	39
930	851	1.99	2.33	4.13	4.38	1692	2006
931	852	0.11	0.12	13.94	16.38	94	114
940+942+943+949	91	1.16	0.86	6.22	7.58	782	619
941	853	0.13	0.23	14.49	30.12	82	153
954	9213	0.03	0.06	25.78	24.54	32	46
960	9500	2.53	1.68	4.73	7.53	1890	1253
961	9301	1.94	2.28	6.54	8.14	964	1186
962	9302	1.37	1.74	5.73	6.62	754	864
969+990	9303+9309	1.49	3.43	4.54	4.35	1786	2570
970 to 973 +975 + 979	526	2.71	2.93	3.80	5.18	1683	1959

Excerpts from Chapter IV from “Quarterly Estimation of Labour Force: A Feasibility Study”

4.3 Reliability of Estimates: The assessment regarding the reliability of the estimates has been done by examining the magnitudes of the relative standard errors (rse) of the estimates. The rse of the estimate of any level parameter 'r' (i.e. WPR, PU or LFPR) at the all-India level has been worked out using the following formulae:

$$r = \frac{\hat{Y}}{\hat{X}}$$

$$\hat{V}(r) = \frac{1}{4\hat{X}^2} \sum_s \left[(\hat{Y}_{s1}^2 - \hat{Y}_{s2}^2)^2 - 2r(\hat{Y}_{s1} - \hat{Y}_{s2})(\hat{X}_{s1} - \hat{X}_{s2}) + r^2(\hat{X}_{s1}^2 - \hat{X}_{s2}^2)^2 \right]$$

$$rse(r) = 100 \frac{\sqrt{\hat{V}(r)}}{r}$$

where r denotes the estimate of the level parameter (i.e. WPR, PU or LFPR); \hat{Y} and \hat{X} denote the estimates of aggregates at the all-India level: s denotes the stratum/sub-stratum within the domain (i.e. all-India in this case) and suffices '1' and '2' denote sub-samples 1 and 2 respectively. The above formula has been used for obtaining the rse's of both quarterly as well as whole round estimates.

4.4.2 Usual Status (US)

(a) *Trend in Estimates:* In the US approach, as the status of activity is determined on the basis of major time spent during the period of 365 days preceding the date of survey, the estimates are supposed to be free from any seasonal effect. Thus the US estimates will reflect only the trend in the estimates, if any. The experience is that the trend in the US estimates of employment -unemployment is neither always regular nor it is so prominent, even for a relatively longer period (reference may be made to Tables 4.5 & 4.6 for evidence). Hence, it is felt appropriate to generate and study the estimates based on the whole round data only. It is worth mentioning here that the trend pattern observed for employment-unemployment indicators in CWS is also reflected in the US estimates, principal and subsidiary statuses taken together.

(b) *Reliability of the Estimates:* The whole round estimates of WPR's (principal/principal and subsidiary status) are reliable (rse less than 5 per cent) for each of the four rounds. The distinct features in the level of reliability between 46th round estimates versus the other rounds are observed for US estimates also as in CWS. As regards the PUs, the estimates of proportions are not reliable for the annual surveys (rsc: 6 to 18 per cent for males and 12 to 28 per cent for females) but are reliable for the quinquennial survey (rse within 4 per cent for males and within 6 per cent for females).

Table(4.5):Annual Estimates of WPRs, PUs and LFPRs in usual principal status and their relative standard errors:46th 50th round

Round (year)	Est. r.s.e	Male			Female			Person		
		WPR	PU	LFPR`	WPR	PU	LFPR	WPR	PU	LFPR
RURAL										
46 (90-91)	Est r.s.e.	542 2.03	7 16.25	549 1.98	242 4.48	1 21.83	243 4.47	398 2.01	4 14.51	403 1.98
47 (July- Dec.91)	Est r.s.e	532 0.72	10 8.55	548 0.20	245 1.57	3 16.60	248 1.56	396 0.69	7 8.32	403 0.67
49 (Jan- Mar.93)	Est r.s.e	533 0.59	9 8.53	541 0.50	242 1./50	2 17.18	244 1.49	392 0.66	6 8.29	398 0.65
50 (93-94)	Est r.s.e	538 0.26	11 3.50	549 0.25	233 0.79	3 5.47	237 0.78	390 0.30	7 3.11	397 0.29
URBAN										
46 (90-91)	Est r.s.e	509 0.83	25 7.57	533 0.82	123 3.74	7 12.75	130 3.61	325 1.06	16 7.00	342 1.03
47 (July- Dec.91)	Est r.s.e.	512 1.25	24 9.24	536 1.42	120 4.97	7 19.57	127 4.74	326 1.83	16 9.19	342 1.41
49 (Jan- Mar.93)	Est r.s.e	505 0.89	20 6.09	526 0.87	112 3.23	6 19.23	117 3.32	320 0.90	13 6.11	333 0.94
50 (93-94)	Est r.s.e.	513 0.41	24 2.89	538 0.37	121 1.80	11 4.97	132 1.68	327 0.49	18 2.49	345 0.47

4.4.4 Reliability of Estimates of Workers by Industry : (i) The distribution of workers by industry is obtained according to usual status (principal/principal and subsidiary) only. Again, as in the US approach, the status of activity of a person is determined on the basis of major time spent during the period of 365 days preceding the date of survey, the estimates are supposed to be free from seasonality. Hence the quarterly estimates would only reveal the trend in the estimates, if any. But as there is no definite or regular trend in the employment-unemployment estimates even over a sufficiently longer period, the distribution of workers by industry is not likely to change significantly over the quarters (sub-rounds) of a round. Thus, for this study, the said distribution has been examined only for the whole rounds.

Table (4.6): Annual estimates of WPRs, PUs and LFPRs in usual principal subsidiary status and their relative standard errors: 46th to 50th round

Round (year)	Est r.s.e.	Male			Female			Person		
		WPR	PU	LFPR	LFPR	PU	LFPR	WPR	PU	LFPR
RURAL										
46	Est	554	6	560	292	1	293	429	4	432
(90-91)	r.s.e.	2.04	18.46	2.00	4.12	28.33	4.11	2.01	16.69	1.99
47	Est	547	9	556	294	2	297	425	6	431
(July- Dec.91)	r.s.e.	0.71	9.28	0.58	1.34	18.18	1.31	0.64	9.37	0.63
49	Est	545	7	552	316	2	312	431	5	436
(Jan- Mar.93)	r.s.e.	0.59	9.93	0.58	1.18	18.26	1.17	0.60	9.52	0.60
50	Est	552	8	560	327	3	330	443	5	448
(93-94)	r.s.e.	0.25	3.83	0.25	0.61	5.58	0.61	0.29	3.33	0.28
URBAN										
46	Est.	513	24	537	142	7	148	337	16	352
(90-91)	r.s.e.	0.83	7.72	0.85	3.22	13.16	3.12	1.03	7.13	1.00
47	Est.	517	22	532	132	6	138	334	15	349
(July- Dec.91)	r.s.e.	1.23	9.73	0.40	4.79	20.02	4.57	1.55	9.63	1.42
49	Est.,	510	19	529	131	5	135	330	12	343
(Jan- Mar.93)	r.s.e.	0.88	6.30	9.83	2.98	20.43	3.06	0.90	6.39	0.93
50	Est	521	23	540	154	10	165	347	16	363
(93-94)	r.s.e.	0.40	3.10	0.36	1.48	5.13	1.40	0.48	2.60	0.45

(ii) It may be observed from Table 4.7 that in the rural sector, the estimate of proportion of workers is reliable in each of the four rounds only for agriculture (industry '0'). However, the proportions for all other industries except (a) mining & quarrying, (b) electricity, gas & water and (c) financial, insurance, real estate & business services, are found reliable in respect of 50th round (quinquennial survey) only. On the other hand, in the urban sector, the proportions are found reliable for (a) manufacturing, (b) wholesale/retail trade & restaurants and hotels and (c) financial, insurance, real estate & business services in each of the four rounds. For the 50th round, however, the proportions are also reliable for 'agriculture', 'electricity, gas & water', 'construction', 'transport, storage & communication services' and 'community, social & personal services'. From the foregoing observations, it is seen that even for the 50th round, the estimates of proportions are not reliable separately for each industry section. In order to study whether the estimates of proportions are reliable for a group of industry sections, the corresponding rse's are worked out for industry sections '1-5', '6-9' & '1-9' leaving aside the agriculture sector. For obtaining these rse's of proportion of workers, the rse's of the estimates of WPR (US - principal) for these group of industry sections are used, If R_s and

R_o respectively denote the rse's of WPR for s^{th} industry section and all industries combined, then the rse say R_s^* , of the estimate of proportion of worker in the s^{th} industry section is given by

$$R_s^* = \sqrt{R_s^2 - 2\rho_{s,o}R_sR_o + R_o^2}$$

where $\rho_{s,o}$ is the correlation coefficient between the workers engaged in the s^{th} group of industry sections and the total workers for industries combined. In a developing economy like ours, $\rho_{s,o}$ is expected to be positive for non-agricultural sectors. In such a situation, the lower and upper bounds of R_s^* will be available from the following inequality:

$$|R_s - R_o| \leq R_s^* \leq \sqrt{R_s + R_o}$$

The lower and upper bounds of R_s^* i.e the rse's of the estimates of proportion of workers for different industry sections are given in Table 4+8. From this Table, it appears that obtaining distribution of US workers by broad group of industry sections will only be meaningful instead of obtaining the same by individual industry sections.

Table(4.7):Distribution of u.s workers by industry and their relative standard errors for each sex: 46th to 50th rounds

India		Rural						
Industry (NIC code)	round	Male		female		person		
		ps	ps&ss	ps	ps&ss	ps	ps&ss	
estimates								
Agr.Etc.	(0)	46	706	711	842	849	745	756
		47	748	749	858	862	781	787
		49	747	751	862	872	781	793
		50	738	741	848	863	770	785
Mlining Etc.	(1)	46	8	8	2	1	6	6
		47	5	5	2	2	4	4
		49	6	6	3	3	5	5
		50	7	7	5	4	7	6
Mfg.	(2)	46	54	53	50	53	53	53
		47	49	19	45	47	48	48
		49	45	44	39	40	43	43
		50	44	44	62	59	49	49
Mfg.	(3)	46	29	28	16	14	25	24
		47	19	19	8	0	16	15
		49	18	18	9	9	15	15
		50	26	26	13	11	22	21
Elec.	(4)	46	5	5	0	0	4	4
		47	3	3	1	1	3	3
		49	4	4	1	1	4	3
		50	3	3	0	0	2	2
Const.	(5)	46	27	27	15	13	23	22
		47	36	36	23	21	32	31
		49	37	37	24	21	33	31
		50	32	32	10	8	26	23
Wholesale Trade etc.	(6)	46	46	45	25	26	40	39
		47	44	44	17	17	36	35
		49	52	52	23	22	44	42
		50	55	55	22	21	46	43
Transport Storage Etc.	(7)	46	22	21	1	1	16	15
		47	23	23	1	1	17	15
		49	19	19	2	1	14	13
		50	22	22	1	1	16	14
Financial Insurance Etc.	(8)	46	6	6	0	0	4	4
		47	4	4	1	1	3	3
		49	4	1	1	1	3	3
		50	4	1	1	1	3	3
Community services etc.	(9)	46	98	96	49	43	84	79
		47	69	68	43	39	61	58
		49	66	65	35	30	57	53
		50	67	66	39	33	59	54
All	(0-9)		1000	1000	1000	1000	1000	1000

Ps: principal status ss: subsidiary status

Table(4.7):Distribution of u.s workers by industry and their relative standard errors for each sex: 46th to 50th rounds

India		Urban						
Industry (NIC code)	round	Male		female		person		
		ps	ps&ss	ps	ps&ss	ps	ps&ss	
estimates								
Agr.Etc.	(0)	46	91	91	223	249	114	123
		47	95	217	217	237	116	122
		49	101	103	232	258	123	132
		50	87	90	194	247	106	123
Mlining Etc.	(1)	46	11	11	3	4	10	10
		47	8	8	2	2	7	7
		49	13	13	8	8	12	12
		50	13	13	7	6	12	11
Mfg.	(2)	46	144	144	210	212	156	158
		47	129	129	168	178	136	138
		49	127	127	201	199	139	140
		50	124	124	187	189	135	137
Mfg.	(3)	46	111	110	64	60	102	100
		47	91	91	66	62	87	85
		49	96	96	43	48	88	87
		50	113	112	49	52	101	99
Elec.	(4)	46	17	17	4	4	15	14
		47	19	19	4	4	17	16
		49	25	25	3	3	21	21
		50	12	12	3	3	11	10
Const.	(5)	46	54	54	36	36	51	50
		47	59	60	38	36	56	55
		49	84	83	51	47	78	76
		50	70	69	49	40	66	63
Wholesale Trade etc.	(6)	46	190	191	99	102	173	173
		47	212	212	121	117	196	195
		49	199	199	91	94	181	179
		50	219	219	107	100	199	194
Transport Storage Etc.	(7)	46	92	91	19	17	79	76
		47	81	81	18	16	70	69
		49	96	95	22	19	84	81
		50	98	97	15	13	84	79
Financial Insurance Etc.	(8)	46	32	32	14	12	29	28
		47	44	44	25	25	41	41
		49	39	38	24	21	36	35
		50	50	38	22	19	35	34
Community services etc.	(9)	46	259	258	328	304	271	267
		47	261	261	340	323	274	272
		49	222	221	326	302	239	236
		50	226	226	366	331	251	248
All	(0-9)		1000	1000	1000	1000	1000	1000

Ps: principal status ss: subsidiary status

Table(4.7):Distribution of u.s workers by industry and their relative standard errors for each sex: 46th to 50th rounds

India		Rural						
Industry (NIC code)	round	Male		female		person		
		ps	ps&ss	ps	ps&ss	ps	ps&ss	
			r. s. e.					
Agr.Etc.	(0)	46	2.62	2.55	1.54	1.49	1.97	187
		47	.99	.90	.81	.72	.80	.77
		49	.80	.79	.92	.76	.74	.67
		50	.44	.43	.44	.34	.38	.35
Mlining Etc.	(1)	46	.35.63	35.56	32.28	32.26	32.44	32.37
		47	21.61	21.61	30.69	28.81	21.12	20.88
		49	16.58	16.02	24.57	22.28	16.42	15.54
		50	8.21	8.24	14.04	12.98	8.36	8.26
Mfg.	(2)	46	17.80	17.73	13.26	14.66	14.16	14.18
		47	9.44	9.36	9.43	8.10	7.68	7.35
		49	6.86	6.81	8.42	8.62	6.01	6.02
		50	3.08	3.08	4.58	6.86	3.13	2.97
Mfg.	(3)	46	20.60	20.61	32.31	31.29	19.54	19.40
		47	9.82	9.75	23.76	21.02	10.44	10.21
		49	9.40	9.40	14.26	14.39	8.82	8.94
		50	4.57	4.53	8.69	7.62	4.38	4.28
Elec.	(4)	46	36.74	35.90	68.87	50.11	36.71	35.88
		47	19.77	19.42	57.27	49.97	19.17	18.55
		49	16.55	16.51	42.61	41.30	16.03	15.87
		50	8.18	8.17	29.72	27.56	8.15	8.13
Const.	(5)	46	18.08	17.92	36.33	33.40	19.01	18.56
		47	7.58	7.56	12.35	11.20	7.49	7.26
		49	8.80	8.75	26.74	24.86	12.22	11.98
		50	3.18	3.15	9.45	8.88	3.38	3.35
Wholesale Trade etc.	(6)	46	12.01	11.88	25.37	24.23	12.20	12.57
		47	6.01	5.96	12.93	11.91	5.89	5.83
		49	4.56	4.56	10.87	9.90	4.85	4.69
		50	2.30	2.12	5.02	4.26	2.07	2.04
Transport Storage Etc.	(7)	46	17.70	17.80	64.60	61.70	17.65	17.64
		47	7.60	7.61	48.01	43.43	7.52	7.52
		49	7.34	7.35	36.13	36.12	7.35	7.34
		50	2.97	3.00	26.51	24.09	2.99	3.03
Financial Insurance Etc.	(8)	46	45.60	45.61	55.77	55.59	45.74	44.76
		47	16.62	16.45	47.25	47.20	15.70	15.55
		49	14.04	14.03	57.59	45.33	15.46	15.25
		50	11.20	11.09	31.66	30.49	12.22	12.06
Community services etc.	(9)	46	14.45	14.50	13.76	13.49	12.41	12.33
		47	5.30	5.28	8.86	8.58	5.17	5.13
		49	5.04	5.02	9.61	9.17	5.13	5.05
		50	1.94	1.92	3.73	3.39	1.89	1.88
All	(0-9)	46	3.60	3.53	4.05	3.74	3.15	3.01
		47	1.08	1.08	1.60	1.41	0.97	0.94
		49	1.04	1.03	1.75	1.47	1.10	1.04
		50	0.47	0.17	0.89	0.71	0.49	0.48

Table(4.7): Distribution of u.s workers by industry and their relative standard errors for each sex: 46th to 50th rounds

India		Urban						
Industry (NIC code)	round	Male		female		person		
		ps	ps&ss	ps	ps&ss	ps	ps&ss	
		r. s. e.						
Agr.Etc.	(0)	46	6.87	6.72	7.14	6.11	5.94	5.44
		47	7.04	7	8.28	7.78	6.1	6.05
		49	5.61	5.56	6.64	5.92	5.45	5.22
		50	3.56	3.46	4.13	3.09	3.46	3.09
Mlining Etc.	(1)	46	25.63	25.64	41.72	45.37	24.68	24.16
		47	19.06	19.05	56.27	50.53	18.68	18.57
		49	11.52	11.45	29.2	34.03	11.15	12.06
		50	6.83	6.79	18.38	17.94	7.22	7.12
Mfg.	(2)	46	4.5	4.48	8.9	7.99	4.64	4.47
		47	5.76	5.98	11.59	11.31	5.37	6.12
		49	4.41	4.39	6.77	7.23	4.04	4.1
		50	2.65	2.63	3.63	3.62	2.46	2.47
Mfg.	(3)	46	4.81	4.78	16.99	15.97	5.16	5.08
		47	6.65	6.77	16.85	16.76	6.96	7.07
		49	4.29	4.3	16.35	13.77	4.51	4.48
		50	2.65	2.67	8.53	7.83	2.71	2.73
Elec.	(4)	46	10.3	10.3	35.55	35.58	10.1	10.12
		47	15.4	15.4	48.75	48.41	14.69	14.65
		49	11.86	11.79	39.2	36.04	11.63	11.63
		50	7.92	7.68	26.31	24.82	7.9	7.72
Const.	(5)	46	6.88	6.85	18.6	17.3	6.94	6.81
		47	9.01	9.11	23.02	22.67	8.98	9.03
		49	12.56	12.54	16.07	15.57	11.83	11.75
		50	4.13	4.11	9.71	9.43	4.43	4.32
Wholesale Trade etc.	(6)	46	2.95	2.92	8.83	7.91	2.77	2.74
		47	4.05	4.05	13.6	13.55	4.2	4.23
		49	3.28	3.29	10.03	9.67	3.38	3.41
		50	1.42	1.41	3.57	3.53	1.37	1.4
Transport Storage Etc.	(7)	46	4.95	4.94	36.22	35.11	5.21	5.19
		47	7.14	7.11	28.23	28.26	7.13	7.19
		49	6.31	6.32	25.13	24.67	6.34	6.33
		50	2.75	2.74	11.25	11.01	2.79	2.78
Financial Insurance Etc.	(8)	46	7.18	7.14	20.39	20.88	6.97	6.94
		47	8.94	8.96	24.6	23.1	8.79	8.83
		49	6.53	6.54	15.14	14.96	6.67	6.53
		50	3.45	3.4	8.35	8.03	3.47	3.41
Community services etc.	(9)	46	3.05	3.05	4.7	4.61	2.75	2.73
		47	2.72	2.88	5.6	5.59	2.85	2.98
		49	3.2	3.18	5.1	4.85	2.76	2.76
		50	1.75	1.73	2.29	2.24	1.45	1.42
All	(0-9)	46	1.35	1.36	3.86	3.32	1.41	1.37
		47	1.92	1.9	5.37	5.13	2.02	2.01
		49	1.75	1.73	3.36	3.25	1.65	1.68
		50	0.9	0.91	2.03	1.72	0.94	0.94

**Table 4.8: Lower & upper bounds of rse's for estimates of proportion of workers by
Broad group of industry sections (other than the '0' section)**

industry section	rural				urban			
	46th	47th	49th	50th	46th	47th	49th	50th
Male								
1-5	(8.36, 10.57)	(4.10, 4.87)	(3.69, 4.32)	(1.64, 1.92)	(1.78, 2.64)	(2.10, 3.58)	(2.53, 3.53)	(1.36, 1.82)
6-9	(6.51, 8.78)	(2.47, 3.27)	(2.55, 3.19)	(1.13, 1.41)	(0.93, 1.95)	(0.72, 2.33)	(0.83, 1.94)	(0.62, 1.11)
1-9	(4.05, 6.41)	(2.16, 2.97)	(1.84, 2.50)	(0.95, 1.24)	(0.16, 1.29)	(0.28, 1.98)	(0.21, 1.41)	(0.13, 0.68)
Female								
1-5	(7.95, 13.21)	(5.52, 7.26)	(8.11, 9.73)	(2.83, 3.71)	(4.55, 9.09)	(3.83, 10.11)	(3.42, 7.39)	(1.23, 3.52)
6-9	(7.70, 12.98)	(5.66, 7.40)	(5.08, 6.75)	(2.27, 3.16)	(0.75, 5.84)	(2.97, 9.37)	(1.04, 5.35)	(0.40, 2.84)
1-9	(4.13, 9.71)	(3.65, 5.45)	(4.51, 6.19)	(1.75, 2.66)	(0.98, 6.02)	(0.89, 7.68)	(0.46, 4.90)	(0.03, 2.57)