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Labor input account of China

(provisional translation)

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Labor input account aims to labor population who has labor ability and take part in the national economic action in a certain period. There are different meanings between labor resource and labor input. Labor resource is the populations of person's at all resident units, whose age is fitting and has labor ability at a point of time. It is a kind of stock and a part of social population. Labor input is the average level of employed population, who has labor ability and takes part in the national economic action in a certain period. In general it expressed by the start and end point of an account period. Expressed by formula as:

Labor input during the account period = (opening employed population + closing employed population)/2

Part 1 the necessary of develop labor input account

Five fundamental account tables and a set of national economy accounts, which are central framework of "*the system of national account of china 2002*" entirely and systematically, reflect the situation and result of national economy by different account methods. But in objective we shall construct and practice progressively "manpower capital account", since the factor of "population resource and manpower capital" take more important effect on Chinese social and economic development day by day. Labor input account is component and important base of "manpower capital account" and "national wealth account".

Part 2 fundamental content of labor input account

The fundamental contents of labor input account include the stock of employed population at the start and end of an accounting period, and also include the stock change during that period.

1. main body of accounting

Main part of labor input account is the entire resident institutional units and institutional enterprises in Chinese economic territory.

2. account object

Object of labor input account is employed population, who resides in China, have the labor ability and take part in national economic action.

3. concrete content of accounting

Essential of labor input account is the average level of employed population in the start and end point of an accounting period. So accounting factors contain employed population stock at the opening and closing, and its change during the period. The form of labor input account is a stock-flow matrix, which contain stock at the start point, the labor increase during the period by immigration and other factors, the labor decrease during the period by death, migration and other factors, and the labor population which include employed population at the opening and closing of the period and employed population stock at the end point,

as well as the structure mentions above.

Part 3 fundamental framework of labor input account

Labor input account is an important component of “population resource and manpower capital account”, which is a part of “*the system of national accounts of china 2002*”, it is a supplement to the core content of SNA and also a detailed operation to “population resource and manpower capital account”. It describes the employed population contribute to employed population economic process and result, and it also describes how social-economic activity influence to employed population. It is also the basic data to calculate per capita GDP and labor product ratio.

Principle of accounting

1. principle in recording

Stock data of labor input at the opening and closing point come from the end point of period in census year. If census time isn't the end of year we shall convert the census data into the data at the end point of the year by extrapolate method. Data change of labor input may control by total data of census, and enlarged in proportion by the data from sampling.

The record styles of labor input data are different by investigation: in census year, we record it as the aggregation of the census data at regular point; in other years, we are base on the data of census year, and calculate by the data of annual population sampling.

2. comprehensive principle

By the indexes of labor amounts at the opening and closing point of the period and data change during the period, labor input account reflect comprehensive information of labor input during the economic activity, include flow information, stock information, the information influenced by economic factor and non-economic factor, quantitative and qualitative information. Labor has attribute as national wealth and population resource, is important component of population capital, and also is the joint of national wealth account and population resource. Labor index synthesizes its economy character (such as wealth, accumulation, consumption, production.) and nature character.

Comprehensive principle is important in labor input account. China has accumulated abundant statistical data about labor classification and business manages data since 1949, especially since china carry out reformation and opening principles. But if we only stay on classification statistics, the data value will be greatly limited and no help to evaluate the situation of labor input and production efficiency comprehensively and systematically.

3. region principle

Labor is defined as aggregated employed population in certain region. Amount of labor is a very fundamental population phenomenon, any index reflect employed population should base on labor and certain boundary. So, if we

develop labor-input account, we must primarily classify regions base on employed population. The stock of employed population, and flow change by death, migrant, immigrant and other reason are also based on region boundary. In general, "region principle" classify by administrative divisions.

4. time principle

Labor is amount of employed population in a certain region as well as in a certain time point or period and its time stipulation is strict. So we need define time standard before we develop labor input account. If we have decided time point, we adopt it as standard account time and account labor amount at the point or change during that period.

Part 4 structure of labor input account table

1. Fundamental structure of account table

Labor input account table mainly reflects the stock at the start and end of an accounting period and also reflects the stock change during the period. The essence of account is to reflecting basic quality of employed population. Labor is the account base and carrier of accounting. In now time, leading factors are knowledge-economy, information-economy, and high-technical economy. The quality of labor pays more important and act key function than material capital and currency capital. It has a strong relevant to the process of national economy development. Labor has economic attribute of national wealth and nature attribute of population resource, the joint of national wealth account and population resource account.

Across the row of labor input account table, it shows opening stock as well as stock change during the accounting period. Down the columns, it divided into stock change during the accounting period and closing stock. Crossing rows and columns, table is divided into six parts. The area of row 23rd columns 4th-24th is labor amount at the opening of the period, express by P_0 . the area of rows 1st-4th columns 1th-3th reflect the increment and decrement during the period, which don't make up of population change to the stock of opening and closing point, express by A_{ij} . The area of rows 1st-4th and columns 4th-21st reflect amount decreasing of the period and opening stock, express by B_{ij} . The area of rows 5th-22nd and columns 1th-3th reflect increasing of the period and change at the ending stock, express by C_{ij} . The area of rows 5th-22nd and columns 4th-21st reflect change make up of opening and closing stock, express by X_{ij} . The area of rows 5th-22nd and columns 22nd reflect the ending stock, express by P_1 .

In the table, matrixes mean:

P_0 : reflect labor stock and structure at the start point.

A_{ij} : reflect labor increment caused by immigrant and other factors and decrement caused by migrant, death and other factors during the period.

B_{ij} : reflect population decrease for migrant, death and other factors.

C_{ij} : reflect population increase for immigrant and other factors.

Xij: reflect population change which is a part of stock at the opening and closing point.

P1: reflect labor stock and structure at the end point.

In six parts we mention above, we parallel classify it by gender, resident, education and age. The signs of education and age are prominent, so we can establish the base for human capital accounting (such as retrain, health and labor ability).

The fundamental structure of labor input accounts see table 1.

2. Main indexes explain and balance

1) Population resource: population resides in china in certain point.

2) Human capital: the total of knowledge, health care, technical and capability which exist in “nature persons” include education degree; retrain level, health care and labor ability.

3) Employed population: it is a part of resident population, age is 16 or above, who are engaged in some social labor and get pay or income. Employed population means anyone with fix job, or without fix job but have temp work at the day before regulation day and his social labor is more than 16 days (include 16 days) in late 30 days.

4) Labor input: it is average level of employed population. Labor input is the average level of employed population, who has labor ability and takes part in the national economic action in a certain period. In general it expressed by the start and end point of an account period.

Fundamental balance

Labor input during the account period = (opening employed population + closing employed population)/2

Closing population=opening population +increment-decrement

Part 5 Methods of labor input accounts

“Direct method” is applied in arranging labor input account, the methods are mainly through population census, labor survey and other data.

1. Detailed process of arranging labor input accounts table

1) Fully collect and utilize available information of population census, population sample, and labor statistical data provided by NBS.

2) Analyze, check and adjust the collected basic data that is controlled in total amount according to data from labor statistical.

3) Classify labor in accordance with gender, resident, education and age by stock structure and flow change, then calculate structure data.

4) Check up the estimation result and consult with experts.

5) Revise and preliminarily accomplish labor input accounts.

2. Arrange labor input table

Data resource: china population statistical yearbook 2002, china labor statistical yearbook 2002.

Arrange method: “direct method”, base on population and labor data in 2001. Data balance see table2.

1) Labor stock at the opening

At the beginning of year 2001, labor stock(row 23rd) in the aggregate is 720.85 million persons, in which, by sex, male is 364.03 million persons and female is 356.82 million persons; by residence, urban is 231.51 million persons and rural is 489.34 million persons; by education, illiterate and semi-illiterate is 56.23 million persons, primary school is 222.74 million persons, junior middle school is 304.92 million persons, high school or special secondary school is 96.59 million persons, junior college is 29.56 million persons, undergraduate is 10.09 million persons, graduate and above is 0.27 million persons; by age, 16-24 is 113.85 million persons, 25-34 is 219.26 million persons, 35-44 is 194.98 million persons, 45-54 is 134.07 million persons, 55-64 is 37.06 million persons, 65 and above is 21.63 million persons.

In the area of row 23rd and columns 4th-21st, opening stock and its structure express by:

$$\begin{aligned} &72085.0 \\ &=36403.0+35682.0 \\ &=23151.0+48934.0 \\ &=5623.0+22274.0+30492.0+9659.0+2956.0+1009.0+72.0 \\ &=11385.0+21926.0+19498.0+13407.0+3706.0+2163.0 \end{aligned}$$

In the area of rows 1th-23th and column 21th, opening stock and flows form it express by:

$$72085.0=7587.5+64497.5$$

2) Labor increment during the period

(1) Increment irrelevant with ending stock

Labor increment is 11.213 million persons in 2001(see column 3rd), in which, irrelevant with ending labor population is 3.31 million persons, another is 7.89 million persons. The increment irrelevant with ending labor population include immigrant and other factors caused increasing, at the same time, migrant, death and other factors caused decreasing. The increment irrelevant with ending labor population is 3.318 million persons, in which, migrant is 0.127 million persons, death is 1.301 million persons and other factor is 1.891 million persons (the area of rows 1st-4th, columns 1th-3th). And during the period, immigrant then migrant is 0.104 million persons, immigrant then death is 0.191 million persons, immigrant then decrease by other factors is 0.104 million persons, the

total is 0.398 million persons. During the period, increase caused by other factors then migrant is 0.023 million persons, death is 1.11 million persons, decrease caused by other factors is 1.787 million persons, the total is 2.92 million persons. In the area of row 4th and columns 1th-3rd, basic equations are:

$$39.8 = 10.4 + 19.1 + 10.4 \quad ; \quad 292.0 = 2.3 + 111.0 + 178.7 \quad ;$$

$$331.8 = 12.7 + 130.1 + 189.$$

(2) Increment form ending labor stock

labor increment relevant with ending stock is 7.89 million persons in 2001 (see rows 5th-22nd, column 1th-3th), in which, immigrant is 2.211 million persons, by sex, male is 1.326 million persons and female is 0.884 million persons; by residence, urban is 0.663 million persons and rural is 1.547 million persons; by education, illiterate and semi-illiterate is 0.654 million persons, primary school is 0.575 million persons, junior middle school is 0.243 million persons, high school or special secondary school is 0.486 million persons, junior college is 0.159 million persons, undergraduate is 0.088 million persons, graduate and above is 0.095 million persons; by age, 16-24 is 0.615 million persons, 25-34 is 0.729 million persons, 35-44 is 0.42 million persons, 45-54 is 0.265 million persons, 55-64 is 0.133 million persons, 65 and above is 0.049 million persons. Increment caused by other factors is 5.684 million persons, by sex, male is 3.411 million persons and female is 2.274 million persons; by residence, urban is 1.705 million persons and rural is 3.979 million persons; by education, illiterate and semi-illiterate is 1.45 million persons, primary school is 1.478 million persons, junior middle school is 0.625 million persons, high school or special secondary school is 1.251 million persons, junior college is 0.409 million persons, undergraduate is 0.227 million persons, graduate and above is 0.244 million persons; by age, 16-24 is 1.58 million persons, 25-34 is 1.876 million persons, 35-44 is 1.08 million persons, 45-54 is 0.682 million persons, 55-64 is 0.341 million persons, 65 and above is 0.125 million persons. In the area of row 5th-22nd and columns 1th-3rd, basic equations are:

$$221.1$$

$$= 132.6 + 88.4$$

$$= 66.3 + 154.7$$

$$= 56.4 + 57.5 + 24.3 + 48.6 + 15.9 + 8.8 + 9.5$$

$$= 61.5 + 72.9 + 42.0 + 26.5 + 13.3 + 4.9$$

$$568.4$$

$$= 341.1 + 227.4$$

$$= 170.5 + 397.9$$

$$= 145.0 + 147.8 + 62.5 + 125.1 + 40.9 + 22.7 + 24.4$$

$$= 158 + 187.6 + 108.0 + 68.2 + 34.1 + 12.5$$

789.5

=473.7+315.8

=236.9+552.7

=201.3+205.3+86.8+173.7+56.8+31.6+33.9

=219.5+260.5+150.0+94.7+47.4+17.4

3) Labor decrement during the period

(1) Decrement irrelevant with beginning stock

Labor decrement is 79.193 million persons in 2001(see row 4th), in which, irrelevant with beginning labor population is 3.318 million persons, another is 75.875 million persons. The decrement irrelevant with beginning labor population include immigrant and other factors caused decreasing during the accounting period, at the same time, migrant, death and other factors caused decreasing. The decrement irrelevant with beginning labor population is 3.318 million persons (the area of rows 1st-4th, columns 1th-3th). It is same with the increment irrelevant with ending labor population. Analyze and equation are omit.

(2) Decrement form beginning labor stock

labor decrement relevant with beginning stock is 75.875 million persons in 2001(see rows 1st-4th, column 4th-21st), in which, migrant is 12.14 million persons, by sex, male is 4.684 million persons and female is 7.456 million persons; by residence, urban is 0.833 million persons and rural is 11.307 million persons; by education, illiterate and semi-illiterate is 0.21 million persons, primary school is 0.647 million persons, junior middle school is 2.016 million persons, high school or special secondary school is 8.411 million persons, junior college is 0.418 million persons, undergraduate is 0.386 million persons, graduate and above is 0.053 million persons; by age, 16-24 is 1.594 million persons, 25-34 is 0.622 million persons, 35-44 is 2.627 million persons, 45-54 is 2.944 million persons, 55-64 is 4.094 million persons, 65 and above is 0.217 million persons. Death during the period is 21.245 million persons. by sex, male is 8.197 million persons and female is 13.048 million persons; by residence, urban is 1.458 million persons and rural is 19.787 million persons; by education, illiterate and semi-illiterate is 0.367million persons, primary school is 1.132 million persons, junior middle school is 3.529 million persons, high school or special secondary school is 14.719 million persons, junior college is 0.731 million persons, undergraduate is 0.675 million persons, graduate and above is 0.093 million persons; by age, 16-24 is 2.79 million persons, 25-34 is 1.159 million persons, 35-44 is 4.598 million persons, 45-54 is 5.153 million persons, 55-64 is 7.165 million persons, 65 and above is 0.38 million persons. decrement caused by other factors is 42.49 million persons, by sex, male is 13.694 million persons and female is 26.096 million persons; by residence, urban is 2.916 million persons and rural is 39.574 million persons; by education, illiterate and semi-illiterate is 0.733 million persons, primary school is 2.263 million persons, junior middle

school is 7.058 million persons, high school or special secondary school is 29.438 million persons, junior college is 1.462 million persons, undergraduate is 1.35 million persons, graduate and above is 0.186 million persons; by age, 16-24 is 5.581 million persons, 25-34 is 2.318 million persons, 35-44 is 9.196 million persons, 45-54 is 10.305 million persons, 55-64 is 14.33 million persons, 65 and above is 0.76 million persons. In the area of row 1st-4th and columns 4th-21st, basic equations are:

$$\begin{aligned}
 &1214.0 \\
 &=468.4+745.6 \\
 &=83.3+1130.7 \\
 &=21.0+64.7+201.6+841.1+41.8+38.6+5.3 \\
 &=159.4+66.2+262.7+294.4+409.4+21.7 \\
 &2124.5 \\
 &=819.7+1304.8 \\
 &=145.8+1978.7 \\
 &=36.7+113.2+352.9+1471.9+73.1+67.5+9.3 \\
 &=279.0+115.9+459.8+515.3+716.5+38.0 \\
 &4249.0 \\
 &=1639.4+2609.6 \\
 &=291.6+3957.4 \\
 &=73.3+226.3+705.8+2943.8+146.2+135.0+18.6 \\
 &=558.1+231.8+919.6+1030.5+1433.0+76.0 \\
 &7587.5 \\
 &=2927.5+4660.0 \\
 &=520.8+7066.7 \\
 &=131.0+404.2+1260.3+5256.7+261.1+241.1+33.1 \\
 &=996.5+413.9+1642.2+1840.3+2558.9+135.8
 \end{aligned}$$

4) Labor change relevant with opening and closing stock

In labor input table, there is an important area make up of rows 5th-22nd and columns 4th-21st. It reflects labor change which is a part of opening and closing stock. We analyze labor structure and its data. By sex, male is 334.755 million persons and female is 310.22 million persons. By residence, urban is 176.825 million persons and rural is 362.833 million persons.

By education, illiterate and semi-illiterate is 110.44 million persons, and 43.876 million persons have changed from illiterate and semi-illiterate into primary school through variable ways; primary school is 71.588 million persons, and 147.111 million persons have changed from primary school into junior middle school through variable ways; junior middle school is 54.411 million persons, and 237.906 million persons have changed into high school or special secondary school through variable ways; high school or special secondary school is 1.919 million persons, and 42.104 million persons have changed from high school or special secondary school into junior college through variable ways; junior college is 18.045 million persons, and 8.905 million persons have changed from junior college into undergraduate through variable ways; undergraduate is 6.448 million persons, and 1.231 million persons have changed into graduate through variable ways; graduate and above is 0.389 million persons.

By age, labor age between 16-24 is 76.15 million persons, and 27.735 million persons have changed from 24 at the opening to 25 at the closing, then they belong to next age-group. Labor between 25-34 is 126.348 million persons, and 88.773 million persons have changed from 34 at the opening to 35 at the closing, then they belong to next age-group. Labor between 35-44 is 157.818 million persons, and 20.74 million persons have changed from 44 at the opening to 45 at the closing, then they belong to next age-group. Labor between 45-54 is 108.886 million persons, and 6.781 million persons have changed from 54 at the opening to 55 at the closing, then they belong to next age-group. Labor between 55-64 is 3.191 million persons, and 6.781 million persons have changed from 64 at the opening to 65 at the closing, then they belong to next age-group. 65 and above is 20.272 million persons.

This period composing beginning and ending stock, it is 644.975 millions. Composing in opening:

by sex, male is 334.755 million persons and female is 310.22 million persons; by residence, urban is 226.302 million persons and rural is 418.673 million persons; by education, illiterate and semi-illiterate is 54.92 million persons, primary school is 218.698 million persons, junior middle school is 292.317 million persons, high school or special secondary school is 44.023 million persons, junior college is 26.949 million persons, undergraduate is 7.679 million persons, graduate and above is 0.389 million persons; by age, 16-24 is 103.885 million persons, 25-34 is 215.121 million persons, 35-44 is 178.558 million persons, 45-54 is 115.667 million persons, 55-64 is 11.476 million persons, 65 and above is 20.272 million persons. Composing in closing: by sex,

male is 334.755 million persons and female is 310.22 million persons; by residence, urban is 232.665 million persons and rural is 412.31 million persons; by education, illiterate and semi-illiterate is 11.044 million persons, primary school is 115.464 million persons, junior middle school is 201.521 million persons, high school or special secondary school is 239.825 million persons, junior college is 60.148 million persons, undergraduate is 15.353 million persons, graduate and above is 1.619 million persons; by age, 16-24 is 76.15 million persons, 25-34 is 154.083 million persons, 35-44 is 246.591 million persons, 45-54 is 129.627 million persons, 55-64 is 9.972 million persons, 65 and above is 28.553 million persons.

In the area of row 22nd columns 4th-21st, data balance express as:

By sex: $33475.5=33475.5$; $31022.0=31022.0$

By resident: $22630.2=17682.5+4947.7$; $41867.3=5584.0+36283.3$

By education: $5492.0=1104.4+4387.6$; $21869.8=7158.8+14711.1$;

$29231.7=5441.1+23790.6$; $4402.3=191.9+4210.4$;

$2694.9=1804.5+890.5$; $767.9=644.8+123.1$;

$38.9=38.9$;

By age: $10388.5=7615.0+2773.5$; $21512.1=12634.8+8877.3$;

$17855.8=15781.8+2074.0$; $11566.7=10888.6+678.1$;

$1147.1=319.1+828.0$; $2027.2=2027.2$;

In the area of row 5th-22nd columns 21st, data balance express as:

By sex: $33475.5=33475.5$; $31022.0=31022.0$;

By resident: $23266.5=17682.5+5584.0$; $41231.0=4947.7+36283.3$;

By education:

$1104.4=1104.4$; $11546.4=4387.6+7158.8$;

$20152.1=14711.1+5441.1$;

$23982.5=23790.6+191.9$; $6014.8=4210.4+1804.5$;

$1535.3=890.5+644.8$; $161.9=123.1+38.9$;

By age:

$7615.0=7615.0$; $15408.3=2773.5+12634.8$; $24659.1=8877.3+15781.8$;

$12962.7=2074.0+10888.6$; $997.2=678.1+319.1$; $2855.3=828.0+2027.2$;

5) Labor ending stock

At the ending of year 2001, labor stock(column 22nd) in the aggregate is 652.87 million persons, in which, by sex, male is 339.492 million persons and female is 313.378 million persons; by residence, urban is 235.033 million persons and rural is 417.837 million persons; by education, illiterate and semi-illiterate is 13.057 million persons, primary school is 117.517 million persons, junior middle school is 202.39 million persons, high school or special secondary school is 241.562 million persons, junior college is 60.717 million persons, undergraduate is 15.669 million persons, graduate and above is 1.959 million persons; by age, 16-24 is 78.344 million persons, 25-34 is 156.689 million persons, 35-44 is 248.091 million persons, 45-54 is 130.574 million persons, 55-64 is 10.446 million persons, 65 and above is 28.726 million persons.

In the area of row 5th-22nd and columns 22nd, data balance express as:

$$\begin{aligned}
 &65287.0 \\
 &=33949.2+31337.8 \\
 &=23503.3+41783.7 \\
 &=1305.7+11751.7+20239.0+24156.2+6071.7+1566.9+195.9 \\
 &=7834.4+15668.9+24809.1+13057.4+1044.6+2872.6
 \end{aligned}$$

The relation of ending stock and flows composing ending stock express as:

$$65287.0=789.5+64497.5;$$

Part 6 main result of labor input account in China

Data table of labor input account shows: in the beginning of 2001, labor stock is 720.88 million persons and the ending stock is 652.87 million persons. In this year, average labor input is 686.85 million persons. In which, this period increment reduces again, it is 3.32 million persons, do not constitute the number of the opening and closing stock. This period composing period beginning stock but does not constitute the labor stock at the end point, it is 75.88million persons. This period composing period ending stock but does not constitute the stock at beginning point, it is 7.9 millions. There are 644.98 million persons during this period participates the national economy activity as from beginning to end.

The result we obtain can't get the indexes at chapter 17 in SNA1993 because we don't account labor input by industries and we don't survey labor system in relevant industries. These contents will be aims for our further research.

(Translated by Chen Jie)

Appendix:

table1: fundamental structure of labor input account

table2: data table of labor input account