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**EMPLOYMENT AND UNEMPLOYMENT STATISTICS
IN THE UNITED STATES**

By

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Manpower is regarded as the most precious economic resource which must be fully utilized if the task of raising the general standard of living and maintaining higher rates of economic growth is to be achieved. This means that economic growth is the ultimate result of the effective utilization of the human resources to their full capacity. Any sort of deficiency, such as unemployment or under-unemployment, means that the economy in question is not able to produce the quantity of goods and services of which it is capable.

In fact, in order for the decision makers to achieve the effective utilization of manpower resources, to formulate employment policies and to attain the objective of full employment, statistical data are needed on the number and characteristics of the employed and the unemployed.

The primary aim of this paper is to discuss employment and unemployment statistics in the United States. Also an attempt is made to give some light about some refinement of solutions to this vital problem.

Before starting the detailed discussion on this subject, we wish to say some words about the order in which this discussion will proceed.

In part I : We will be concerned with the definitions and concepts of those who are employed, unemployed, or not in the labor force.

In part II : We will be concerned with the sampling techniques and some related questions.

In part III : We will be concerned with seasonal adjustments.

Following that is our conclusion.

PART I
CONCEPTS AND DEFINITIONS

In the United States, the Bureau of Labor Statistics announces, during the early part of every month, the total amount of employment and unemployment for the previous month along with many characteristics of the employed and unemployed. The population of the United States covers at any given time, a broad spectrum with respect to its participation in the labor force. In broad terms, the labor force, as defined by the Bureau of Census, includes all noninstitutionalized persons in the economy aged 14 years and over who are employed whether at work or holding a job but not actually at work plus all those who are seeking work. It excludes people who are unable or unwilling to work. This means that there are three main categories :

1. those who are employed,
2. those who are unemployed, and
3. those who are not in the labor force.

These three categories will be considered in turn in some detail :

The concept of the employed :

The concept of employment is based primarily upon the activity of working people for pay or profit. This includes all part-time and temporary work as well as regular full-time year-round employment. People are also counted as employed if they have a job at which they did not work during the survey week because of illness, vacation, bad weather, an industrial dispute, or various personal reasons, provided they were not looking for work at the same time. The latter are counted among the employed and tabulated separately as "with a job but not at work".

Included among the employed are unpaid family workers who do more than incidental work (15 or more hours a week) in a family business or a family farm. Such unpaid family workers are shown separately from wage and salaried workers and from the self-employed.

Also, students who both attend school and have a job are counted among the employed, as are housewives when they

have a job in addition to their housework. Only their hours of gainful employment are, of course, counted in their hours of work.

The concept of the unemployed :

The concept of unemployment is based primarily on the activity of looking for work on the part of persons who did not work during the survey week. Under this concept, unemployed persons are :

1. All persons who were not working and were looking for work.
2. All persons who were not working and would have been looking for work except that :
 - a) They were waiting to be called back to a job from which they had been laid off.
 - b) They were temporarily ill.
 - c) They believed there was no work available in their line or in the community.
 - d) They were waiting to report a new wage or salary job within thirty days.

The concept of those not in the labor force :

All persons 14 years of age and over who are not employed or not looking for work are defined as "not in the labor force." Many persons able to hold jobs or seek them are not doing so. According to the above concepts, these persons are neither employed nor unemployed. They are not in the labor force.

The category "not in labor force" includes housewives, persons who are at school, persons unable to work because of long - term physical or mental illness, retired persons, or persons having other personal reasons for not being in the labor force.

Much of the criticism concerning the above concepts and definitions of the employed, unemployed and those not in the labor force reflects the need to sharpen these definitions. This is important in order to insure the uniformity of reporting over any given period of time. From the statistical point of view, it is desirable that these definitions should not be subject to frequent changes since this affects the behavior of employment and unemployment over the economic time series.

The United States President's Committee to Appraise Employment and Unemployment Statistics set forth 5 general criteria to be used in defining the concepts of employment, unemployment, and those not in the labor force (1) :

1. The concept should correspond to objectively measurable phenomena and should depend as little as possible on personal, opinion or subjective attitudes.

2. The concept should be operationally feasible. It should be possible to get reliable data at reasonable cost.

3. The definitions used should be readily understood and broadly consistent with the common understanding of these concepts.

4. The definitions should not be so inclusive that they yield figures which are difficult to interpret.

5. The concept of the labor force should reflect the usual market criteria used in measuring the national output. Employment should mean holding a job for pay or profit and unemployment would include those not working who are looking for work that yields a monetary reward.

Since the goal of fuller utilization of manpower resources will demand information on the characteristics of the unemployed and those not in the labor force, there is a need for detailed classification within each of these two groups.

Part II

THE CURRENT SAMPLING SURVEYS

In the United States, there are three main sources of employment and unemployment statistics :

First : The household survey :

Data concerning the household survey is collected by the Bureau of the Census from a national sample of households, and the results are analyzed and published by the Bureau of Labor Statistics. The size of this sample is 35000 households representing 357 sample areas in 701 counties and independent cities with coverage in every State and the District of Columbia.

The selection of the households surveyed is based upon "area probability sample" constructed to represent all types

(1) U. S. President's Committee to Appraise Employment and Unemployment Statistics : « Measuring Employment and Unemployment », Washington : GPO, 1962, pp. 44.

of areas in the cities, small towns, rural districts and farms. A system of "rotation groups" has been worked out under which each household selected for interview is in the sample for four months, then dropped for eight months, and then brought back into the sample for four months a year later. This means that in any month, about three-fourths of the households have been interviewed in the preceding month. This procedure offers some advantages in the way of statistical reliability.

The households, to be interviewed, are selected by the use of maps to identify land segments or by other devices which list the households in a given area in some order. Interviewers then go to the sample locations and then question the respondent.

The household survey, as a technique of measurement, has some disadvantages. Since it is a sample rather than a complete count, the results are affected by sampling variability. The current sample is not sufficiently large to provide reasonable estimates for States and local areas. Also, the responses to questions are influenced by memory errors and by lack of information on the part of the households interviewed.

From a purely technical point of view, a careful sample design makes it possible for the household survey to yield estimates of employment and unemployment that have reasonably small sampling errors. Because of the heterogeneity of the United States labor market behaviour, there is a need for increasing the size of the population sampled. In this way errors can be reduced.

In order to reduce response errors, it is necessary to improve the accuracy of interviewing through greater control on the causes of respondent error.

The data collected by the household survey are based on the activity or status reported for the calendar week including the 12th of the month. These data are published, each month, by the Bureau of Labor Statistics in "Employment and Earnings." The following major categories of data provided by the household survey are :

(1) *Labor force* :

Data on total and civilian labor force by age and by color, and total labor force participation rates.

(2) *Employed persons :*

Data on employed persons in agriculture and in non-agricultural industries by :

- age and sex,
- class of worker and occupation,
- number of hours worked.

Data on employed persons in nonagricultural industries by full-time and part-time status, hours of work and reasons of working part-time.

Data on employed persons with a job, but not at work, by reason for not working and pay status.

Data on persons at work in agriculture and in nonagricultural industries by class of worker and number of hours worked.

(3) *Unemployed persons :*

Data on number of unemployed persons and rate of unemployment by :

- age and sex,
- industry of last job,
- occupation of last job,
- marital status and household relationship.

Data on unemployed persons by duration of unemployment including the long-term unemployed by :

- industry and occupation of last job,
- sex, age, color and marital status.

Data on unemployed persons looking for full-time or part-time work by age, sex, and major occupation group.

Data on rates of unemployment by major industry and occupation group.

(4) *Not in labor force :*

Data on persons not in labor force by sex and age, by color, and by main activity during the survey week (keeping house, going to school, being unable to work, and the remainder).

Second : The employer survey.

The data collected are based on a sample of 180,000 business establishments employing about 25 million nonfarm and salary workers. State agencies mail questionnaires to establishments and examine the returns for consistency, accuracy, and completeness. The States use the information to prepare state and area series and then send the data to the Bureau of Labor Statistics for use in preparing the national series. The payroll survey provides monthly data on the employment of wage and salary workers in nonagricultural establishments by detailed industry breakdowns and corresponding data, on average weekly hours, average hourly and weekly earnings, and labor turnover (accessions and separations) for the Nation, States, and metropolitan areas. The data relate to all workers, full-time or part-time, who received pay during the payroll period which includes the 12th of the month.

The design of sampling plan of establishment employment and payrolls used by the Bureau of labor Statistics is known as "sampling proportionate to average size of establishment." The universe of establishments is stratified first by industry and then within each industry by the size of establishment in terms of employment. For each industry the total size of the sample is distributed among the size class cells on the basis of average employment per establishment in each cell. Under this type of design, large establishments fall into the sample with certainty. The size of samples for the various industries is determined empirically on the basis of experience and of cost considerations.

There are two ways of viewing the system of employer reports. From one stand point, the estimates consist of an annual series of measurements provided by the benchmarks and a secondary system of estimates derived from payroll data provided on a month - by - month basis by the reporting employers.

The U.S. President's Committee to Appraise Employment and Unemployment Statistics did see a need of (1) improvement of the less adequate benchmark segments, (2) development of probability sampling using probability proportional to an appropriate variable or index for sampling efficiency, (3) reach for means of speeding up laggard reports and measurement of the

error occasioned by incomplete coverage of the sample at the first closing and (4) improvements of methods of estimation⁽¹⁾.

Third : Unemployment insurance data.

The insured unemployment statistics are compiled by the Bureau of Employment Security and its affiliated State employment security agencies. They are based on a count of the number of persons filing claims for benefits certifying to a week of total or partial unemployment.

Generally, the unemployment insurance laws do not cover workers in agriculture, domestic service, self-employed workers, unpaid family workers, employees of nonprofit organizations, most state and local government workers, and employees in firms below a minimum size (with less than four workers). Another group excluded from the unemployment figures are unemployed persons who have exhausted their benefit rights.

State agencies issue weekly reports on the number of initial claims, the volume and rate of insured unemployment under State unemployment insurance programs, and the volume under programs of unemployment compensation for Federal employees, exservicemen, and for railroad workers. These statistics are published by the Bureau of Employment Security, U.S. Department of Labor in "Unemployment Insurance Claims".

Each of the above three main bodies of data makes its own contribution to the total picture. To some extent, the household survey is the most comprehensive coverage of employment and unemployment statistics on the national level rather than on the state level.

From our previous discussion, it is clear that employment and unemployment statistics derived by the household survey and by the employer survey should be strengthened by appropriate augmentation of the samples and by improvement in the sampling procedures.

PART III

SEASONAL ADJUSTMENT

Many changes in employment and unemployment occur during the course of the year because of the changing seasons, holidays, vacations, if not directly affecting the particular series, then indirectly through other related economic phenomena.

(1) Ibid, pp. 16, 17.

However, these movements which are called seasonal, are not perfectly regular, i.e. do not repeat themselves exactly from year to year. The pattern of weather is never exactly the same from one year to another, the number of weekends in a month, economic relationships change sometimes gradually and systematically sometimes abruptly and irregularly.

Historical charts of employment and unemployment data may exhibit within-year swings, i.e., contain such regular movements to greater or lesser degree. In order to compare these data for any two months accurately, a statistical technique called seasonal adjustment is often used. Seasonally adjusted data are defined as what remain after removal of regularly recurrent ebbs and flows in economic activity due to the typical weather pattern, holidays, vacations, crop-growing cycles, and the like. In this sense, the adjusted figures are of central importance for the purposes of economic analysis and policy guidance.

It should be emphasized that the task of measuring and removing seasonal movements would not be difficult if these movements were precisely repetitive from year to year. However, the fundamental difficulty in measuring seasonal movements lies in the causes or year-to-year change in the seasonal pattern due to social and economic trends.

In the United States, the published seasonal adjustments of employment and unemployment have been computed by the Bureau of Labor Statistics Seasonal Factor Method. This method is an adaptation of the standard ratio-to-moving average method with a provision for moving adjustment factors to take account of changing seasonal patterns.

The BLS method is based on a multiplicative model which treats each monthly value as a product of trend-cycle (T), seasonal (S), and irregular (I) components. The trend-cycle component is a combination of the long-term movement underlying the series, the periodic movements that accompany economic cycles, and the short-term sub-cycles that may have occurred in the series. The seasonal component is the annually repetitive variations which are characteristic of each month of the year in a pattern which changes only gradually from one year to the next. The irregular component contains whatever is left after removing the trend-cycle and the seasonal; it is a mixture of all random movements and very short subcycles.

These three components, when multiplied together, completely exhaust the original observations (O) .

The multiplicative rather than the additive relationship has been selected because it appears appropriate for employment and unemployment series. It has been mentioned from the past experience of the B L S that using an additive model was not as good as using the multiplicative model.

The B L S Seasonal Factor Method involves three iterations. Each iteration consists of two phases. The first phase of each iteration starts with a centered 12-month moving average as the estimate of trend-cycle. The second phase in each iteration starts with an improved trend-cycle in which the 12-month moving average has been improved by capturing the residual trend-cycle from the irregulars of the first phase.

The B L S method uses "credence factors" as supplementary weights in developing seasonal factors from seasonal-irregular ratios, in capturing residual trend-cycle from irregulars, and for improving the centered 12-month moving average of the original observations. These credence factors are based on the irregulars from the second phase of each iteration. Their purpose is to reduce the impact of the large irregulars associated with certain observations. Observations with small irregulars are given full weight (credence factor of 1.0) ; observations with large irregulars are given no weight (credence factor of 0.0) ; observations in between have weights between one and zero.

The major series of operations of the B L S Seasonal Factor Method as used since 1964 may be summarized as follows :

The first phase of the first iteration starts with an estimate of trend-cycle which is the centered 12-month moving average of the original values. The original values are divided by the trend-cycle values to get a series of seasonal-irregular (S I) ratios, $(O/T = S I)$. For each calendar month, the seasonal-irregular ratios are arranged by year and moving 7-term weighted averages are obtained (in percentage form) as estimates of the unforced seasonal factors. The unforced seasonal factors for each year are then adjusted to yield a monthly average of 100.0 for the calendar year. Irregulars are obtained by dividing the seasonal-irregular ratios by forced seasonals $(SI/S = I)$. At this point, the first phase of the first iteration is complete.

The second phase of the first iteration starts with an improved estimate of the trend-cycle which is the product of

the earlier trend-cycle and a moving 9-term weighted average of the irregulars of the first phase. This improved trend-cycle fits the original data in a manner which makes the irregulars more nearly random. New seasonal-irregular ratios are obtained by dividing the original values by the improved estimate of trend - cycle. New seasonal factors are obtained as moving 7-term weighted averages of the new seasonal - irregular ratios. The seasonal factors are forced to average 100.0 for the calendar year. At this point, the generated trend-cycle and seasonal components represent the components of the original series fairly well except that original values associated with large irregulars are exerted too much influence on the 12 - month average. Such original values are identified by calculating a moving 61 - term standard deviation of the irregulars and using this to calibrate, in standard deviations units, the irregular associated with the middle (31st) term. For the 30 terms at each end of the series, the adjacent standard deviation is used for the calibration. Each irregular is standardized by getting its absolute difference from the mean of the 61 terms used to obtain its standard deviation and dividing this difference by the standard deviation.

Having identified the values with large irregulars, preliminary "credence factors" (to be used as supplementary weights) are assigned to each value, based on its standardized irregular. All observations having a standardized irregular of 1.000 or less receive a credence factor of 1.000. All observations having a standardized irregular of 2.800 or more receive a credence factor of 0.000. For values between 1.000 and 2.000, the credence factor is a linear interpolation between the associated values of 1.000 and 0.000. Credence factors for standardized irregulars between 1.000 and 2.800 are calculated by the formula $C.F$ (credence factor) = $1.555 - .555H$, where H is the standardized irregular.

With these supplementary weights, it is possible to return to the SI ratios of the second phase to obtain a better partitioning of the SI ratios into seasonals and irregulars. The adjusted unforced seasonals is a 7-term moving average of the SI ratios using the product of the standard 7-term weights and the preliminary credence factors associated with the values. In this way, the undue impact of a large irregular is reduced. The newly developed unforced seasonals are forced in the normal manner to total 1200.0 for the calendar year ; after which new irregulars

are calculated by dividing the latest forced seasonals S into the SI values.

In preparation for the second iteration, the last irregulars of the first iteration are used to develop new (intermediate) credence factors. These intermediate credence factors are obtained in the same manner as the preliminary credence factors (61-term moving average process).

The first use of the intermediate credence factors is to yield an improved 12-month moving average of the original data. This is accomplished by creating a modified original series in which, for all original values having a credence factor of less than 1.000, the irregular component is reduced. The amount of reduction for any value is such that the deviation of its new irregular from 1.000 is equal to the product of the value's credence factor and the deviation of its irregular component from 1.000. The effect of this operation is to obtain a series of modified original values, each of which is composed of the trend-cycle and seasonal components developed in the first iteration, and an irregular which has been scaled down whenever it has exceeded one standard deviation.

The formula for the modified original values used by the BLS is :

$$O' = T \times S \times I'$$

where : O' = modified original

T = trend cycle

S = seasonal

I' = modified irregular = $1.0 + CF (I - 1.000)$

CF = credence factor

I = irregular

Substituting :

$$\begin{aligned} O' &= TS [1.0 + CF (I - 1.000)] \\ &= TS + TS (CF) (I) = TS (CF) \end{aligned}$$

However, the original observation $O = TSI$

Substituting :

$$\begin{aligned} O' &= TS + (CF) O - TS (CF) \\ &= (CF) O - TS (1 - CF) \\ &= (CF) O + \frac{O}{I} O (1 - CF) \\ &= O \left(CF - \frac{1 - CF}{I} \right) \end{aligned}$$

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It should be mentioned that the creation of the modified original series is considered as the end of the first iteration.

The first phase of the second iteration starts with a trend-cycle which is the centered 12-month moving average of the modified original values. Seasonal - irregular ratios (SI) are then obtained by dividing the original values (not modified) by the 12-month average. The SI ratios are arrayed by month and moving 7-term averages, using normal 7-term weights and intermediate credence factors, are taken to yield unforced seasonals. The unforced seasonals are forced to yield seasonals S which average 100.0 for the calendar year. Irregulars are then obtained by the usual way.

The second phase of the second iteration starts with an improved trend-cycle which is the product of the centered 12-month moving average of the modified originals and the smoothed irregulars. The second phase repeats the steps and procedures of the first phase to develop new SI ratios, new unforced seasonals making use of the intermediate credence factors, new forced seasonals S, and new irregulars I. The new irregulars are used to develop final credence factors and a second modified original series in the same manner as before. This completes the second iteration.

The first phase of the third iteration starts with a trend-cycle which is the centered 12-month moving average of the second modified original series. SI ratios are then obtained by dividing the original values by the 12-month average. Seasonal factors are developed as moving 7-term weighted averages of the SI ratios using as weights the product of the 7-term weight pattern and the final credence factors. They are forced to average 100 - for the calendar year. Irregular ratios are developed in the usual way.

The second phase of the third iteration starts with an improved trend - cycle which is the product of the earlier trend-cycle and a trend correction which is a movement 9-term weighted average of the last irregulars using as weights the normal 9-term weights and the final credence factors. New SI ratios are computed. These are used as the base for the final seasonal factors which are obtained as moving 7-term weighted averages of the SI ratios using as weights the product of the normal 7-term weight pattern by the final credence factors. The seasonal factors are forced to average 100.0 for the calendar year. Final

irregulars are then computed. The seasonally adjusted series is obtained by applying the final seasonal factors to the original values. Using 61 - month moving periods sweeping the entire length of the series, standard deviations of the final irregulars are developed. These indicate the pattern of the irregulars over the series. They also yield a measure of the irregularity that can be compared with the final seasonal factors.

The reason of why the B L S uses three iterations to partition unemployment - employment series into trend - cycle, seasonal and irregular components is that additional iterations yield very small changes.

It should be emphasized that past studies indicate that seasonal adjustment is a task involving considerable technical difficulty. There are no statistically adequate tests for removal of seasonal effects or for the changes in the seasonal patterns which are induced by averaging the monthly ratios to moving averages for only a few a past years.

To sum up the discussion concerning seasonal adjustment of employment - unemployment series, it is noteworthy to mention that the B L S seasonal factor method seems to meet the minimum requirements for satisfactory method of seasonal adjustment.

CONCLUSION

The present paper recognizes the importance of the employment and unemployment statistics in achieving maximum development and use of manpower resources. Although the American methods and procedures concerning employment and unemployment statistics cannot be fully transferable to the Arab Republic of Egypt because of the differences in social and economic conditions, they do provide paths of improvement and development to our manpower statistics. As a matter of fact, we are still far behind the United States in this vital area.

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