Estimation of Gross Domestic Product of Iran

(1906-1935)

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Abstract

This paper provides a brief technical survey of the historical national accounts of Iran. Gaining access to longer-term time series in compliance with concepts, classifications and standards comparable to the present one help fulfill quantitative studies in the area of business cycles. Despite the shortage of reliable, standardized and classified information, the methodology applied in this paper could present data for a 70 year period, including the existing 48 years time series which is available now. The historic endeavors of the pioneer researchers in the field of the system of national accounts, despite certain ambiguity and shortcomings, have been gateway in the context of historical data, compilation.

Keywords: Historical national accounts, Long-term time series, business cycles, system of national accounts, component based approach, indicator based approach, borderline year, extrapolation with indicator.

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Introduction

Systematic endeavors to produce historical national accounts dates back to early decades of the first half of the 20th century, i.e. the era prior to the presentation of the system of national accounts. Ever since, not only such endeavors have not been decreased, but they also have increased to a great extent. Streamlining the possibility of quantitative studies in business cycles and its factors affecting is one of the most important reasons for preparing the historical accounts. Without accessing long term time series, these studies would not be materialized. Moreover, reviewing the history of economic and better understanding of what our predecessors have faced through using concepts, classifications and standards comparable to present time, are recognized as more common causes of this approach.

The official results of Iran's national accounts, covering the period 1959 to 2006-i.e. 48 years- at present are provided and accessible to economic researches. Moreover, of these set of data, figures for 1988 to 2006 have been prepared in the form of seasonal interval, as well. The results of the researches conducted in this area include the years dating back to 1936, so that the national accounts series covers a 70 years period.

The above mentioned period entails various incidents resulting in deep scatter in time series of economic variables, especially in the real sector. The occurrence of World War II and the occupation of the country, instability and continuous administrative replacements, nationalization of oil industry, 1953's coup, sudden surge of crude oil prices, victory of Islamic revolution, the protracted imposed war and similar issues may be considered as several shocks to the economy of Iran which complicated the quantitative study of the natural trend of economic process. Expansion of time series span to former periods might be considered as a way to compensate for the mentioned problem in the time series data. As mentioned earlier, the review of the history of Iran's economy is by itself

our perpetual need and is crucial with regard to the lack of systematic information. The mentioned necessity has resulted in multiple endeavors made by many countries to compile historical national accounts, as Switzerland and the United States of America have estimations of their national income and product, since 1851 and 1750, respectively.

Despite extensive tendency toward historical national accounts, their theoretical and operational practicability has faced challenges, as well.

One of the most important challenges has been the lack of reliable and detailed information about the process of economic evolution in the former periods. This complicated issue is an important problem faced by historical economic estimators, but in spite of less accuracy and reliability, this never turned to a dilemma in presenting a quantitative impression. Among other challenges, the concept of non-market goods and services, and also the absence of integration in the national economy are issues which will be further surveyed below.

In the recent decades the economic developments process was aimed at reducing the share of the production of non-market and increasing the production of market goods. This fact bears significant importance, particularly with regard to production and consumption by households. Despite the necessity of the estimation of manufacturing of commodity products, services like cookery, being done by the family members are not included in the production boundary in the system of national accounts. On the other hand, it is obvious that in the present time toward the past, a considerable portion of meal consumed by the household is offered by the market producers. But the meal production (in its general sense) has been also existed in the past. In the estimation of historical gross domestic product (GDP), as we recede to the past, this leads to underestimation or overestimation of GDP growth rate and level in the current periods. In other words, this issue leads to weakening of the time comparability between historical national accounts and that of contemporary periods. If we assume the GDP as an indicator of welfare, the bias will find longer dimensions, which is required to be considered, further.

Although this matter should be considered as a real fact, it should be noted that it does not emerge only in historical estimations but it can also be a cause of problems regarding inter-temporal comparisons. Because of rapid changes in the social and economic situation of societies, the dimension of the said issue can be put into scrutiny. This issue also proves applicable in country comparisons. The comparison of GDP of a country like United States (that a considerable part of her products are produced as market), and an undeveloped country, say in Africa would be a good example. However, this issue must not be considered as a serious obstacle in the implementation of historical estimations. Although, inter-temporal and cross country comparisons are done at present, regardless of the fact that scales and time intervals among various countries are not completely similar; estimations and historical comparisons shall be done without any anxiety while the mentioned considerations are maintained. Lack of economic and national integrity is among other limitations which should be considered in historical national estimations. In many countries, particularly in European countries, the integration of cantons and small governments and formation of modern and big countries and administrations is an issue which its extent has been extended to 20th century. Lack of economic integration, especially in late 100 years, has been also observable in Iran. Using different currency and weight values and scales is a proof to this dilemma. Above all, the lack of efficient transportation networks, resulting in high price variations in different parts of the country leads to economic disintegration. With the existence of this dilemma which has hindered the smooth movement of the commodities across the country, it is hard to talk about the gross domestic and national product, being characterized by the geographical districts of the national economy.

The lack of integration is a real dilemma, and naturally it has been further serious dilemma for the countries with landlord-peasant systems. However, in spite of the fact that the reality of lack of integration is not deniable, it seems that this fact has not been an obstacle for national and

economic unity of the country, at least in the end of Qajar era and the periods following it. Considerable price diversity in various regions and cities of the country in the past periods has been a complicated issue for estimators. However, it seems that this fact has not eroded the lack of national and economic integration, completely.

In the present research, it is tried to prepare the GDP estimation consistent to the Iranian economy during 1906-1933, using available information for different economic activities. The mentioned period is consisted of two distinct periods of high importance, both in the history of the Iranian economy and the political economy of Iran. The first period coincided with the triumph of the constitution revolution which last until the 1920' coup. Political instability and implementation of certain reform policies in the country's political and economical arena were among the major characteristics of this period. Cancellation of the old tradition of landlord-peasant (feudalism) system during the said period is also noteworthy. Moreover, the mentioned period can also be regarded as a gateway toward modernization features which was opened in the political and economical life of the country. The second period covers the years in which Reza Khan reinforced his authority which led to his full strength, to be named as Reza Shah, or founder of the Pahlavi Dynasty. Despite Pahlavi despotism, the administrative, social and economical system of the country faced severe changes in the mentioned period. In fact, this period can also be considered as commencement of a 20 years period, the characteristics of which is utilizing the power and sovereignty of the government to grasp features of new civilization and modernization. The economic features approaches in the said period were observed as government controls on pioneering sectors of the economy and strong tendency toward industrialization.

The present report consists of four chapters. In the first chapter, estimations of Iranian GDP level being presented by other researchers during the review period or periods approximate to the said period are surveyed. Chapter two presents the methodology being applied in this

research. Chapter three includes estimations of GDP from production and expenditure approaches. Chapter four gives the results of estimations together with related tables and figures.

1. Review of Bharier's Estimation of Iran's GDP during the Beginning of 20th Century

Bharier has estimated, Iran's GNP (which seems to be GDP) for the year 1900 (1279 in the Iranian solar calendar[1]) at £ 70 million (equivalent to Qran 3.5 Billion, i.e. exchange rate of 50 Qran for one sterling pound). Of this figure, Qran 3.1 billion was that of private consumption expenditures (almost 89 percent), Qran 67 million as public consumption expenditures (1.9 percent) and Qran 300 million as gross capital formation (8.6 percent). According to Bharier, which seems to be true, a noticeable part of public sector expenditures corresponds to transfer payments, which in this case, bringing such payments into account as government consumption expenditures, does not seem to be correct. However, since the absolute value of figure is relatively negligible, it does not leave a remarkable impact on the final results. Bharier's estimation of private sector consumption expenditures is based on the Sykes Report on the North eastern part of Iran, in which the per capita wheat consumption has been reported about 24 Kgs (Ibs 50). Thus, Bharier has multiplied this figure by total population of the country and after getting its total value, being added by 30 percent for other consumption expenditures it amounted to Qran 3.1 billion. The figure for fixed capital formation for the year 1900 is also derived from Bharier's other book named: Capital

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[1] The Iranian year begins on 1 Farvardin (21 march) except for leap years (20 march). Consequently, each Iranian year covers nine months of one year in the Gregorian calendar, plus three months of the following year. Hence, a year on the Gregorian calendar is obtained by adding 621 to an Iranian year or 622 if the 4th quarter of the year is considered. Here for the simplicity we have added 621 to Iranian year for all periods.

Formation in Iran (not published). On the basis of the mentioned research results, out of Rials 300 million for total fixed capital formation, 47 percent was allocated to construction of housing by the households, 37 percent to domestically manufactured goods, 14 percent to expenditures of other constructions, and 2 percent to imported goods and equipments. On the basis of Bharier's estimations Iran's per capita GDP reached Qran 350[1] (£7) in 1900. According to Bharier's calculations, the value of wheat consumption has been amounted to Qran 2385 million, and unit price of wheat (Kg) reached Qran 0.84 on the average[2]. Given Bharier's figures for wheat per capita consumption and total population of 9.86 million persons, total wheat consumptions have been estimated to reach 2.8 million tons. This figure is inconsistent with the figure for the production of wheat being reported by Bharier in the same book. Bharier reported average wheat production during 1925 to 1929 at 1.1 million tons which was less than the figure estimated by him for the year 1900, i.e. about 25 years before that. Thus, it seems that Bharier's figures related to the wheat production and consumption level requires more subtle review.

2. Methodology

National Accounts is based on a series of concepts, standards and rules which are internationally accepted and is named as System of National Accounts (SNA).

So far, three versions of SNA have been prepared by the responsible international organizations and are presented to member countries to be implemented. Following tentative and group work of economists of

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[1] Bharier, Julian, Economic Development in Iran 1900-1970.

[2] In fact, inconvenient transportation situation has been among factors effective in economic dispersion which led to noticeable difference in price level in various regions of the country.

countries throughout the world, particularly economists in international agencies, such as United Nations, World Bank, International Monetary Fund, Europe Economic Commission, and OECD, the latest SNA version, after its 1953 and 1968 versions, was approved in 1993 and presented to international society [1].

As it is stated in the book "Estimation of Iran's GDP 1936-1958[2]" the historical approach for the estimation of GDP differs from estimations which are done for the current years. In the latter case, the conditions and the time interval to a national accountant is consistent with the estimation period. Thus, all supplementary information which is required by the accountant is simultaneously available to him. It should be noted that such supplementary information include his intuitive perceptions, as well. Therefore, although the National accountant relies further on statistics and quantitative data which are available to him, in some cases particularly in cases in which applying indirect methods are inevitable, he can refer to other available supplementary information related to economic situation to guarantee consistency of the results of his calculations and estimations. However, the process for estimation of historical variables are much different, since the objecting of estimating period has been passed for decades; and the results of intuitive perceptions of the national accountant requires to be reconstructed. Moreover, the quantity and quality of data and figures available for historical periods are not of equal weight compared to those for current periods. More importantly, the available data bear solely the capability to clarify a small part of field under survey, and thus identifying those parts which are in the dark area, requires to apply indirect methods, and being reconstructed on the basis of

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[1] To familiarize with System of National Accounts SNA version 1968, see "National Accounts of Iran 1974-1990" published by the Central Bank of Iran, Economic Accounts Dept. for SNA 1993, see: System of National Accounts 1993, Brussels, Luxembourg,…

[2] Khavarinejad. A

assumptions and supplementary information. The process for estimation on this basis tends to be similar to attempts made by a paleontologist who designs the complete feature of a prehistory dinosaur using only a piece of its bone (remains). This process of reconstruction or recreating, in addition to considering the conformity and consistency of parts, focuses on the consistency of each part to its surrounding environment as well as the conformity between type of the animal's food and that of its teeth and jaws can be also noticed in this case. Similarly, the historical national accounts estimator in addition to focusing on internal consistencies of the quantitative impression which is presented, is also required to be sensitive (responsive) toward consistencies of the results of his calculations and estimations with recognized economic trends. In other words, a historical national accountant shall be sensitive to internal consistencies of his results as well as their external consistencies. Thus to reconstruct the missing supplementary information and the undermined intrusive perception, and to materialize the possibility of judgment on the external consistency of results, in addition to utilizing the methodology of research and estimation of results, other available information about economic situation and general trends governing the economy during the survey period shall also be considered. Therefore, as in the case of former research on "Estimation of Iran's GDP during 1936-1958", a chapter has been allocated to the review of Iran's economic situation using available data and information.

In the estimation of this research, using production-expenditure approach, it is tried to make estimation on the basis of GDP components. In other words, basis of the method applied in this research is Component-based Approach, and thus the Indicator-based Approach has not been applied. "Component" is a variable which composes the GDP such as value-added in agriculture or manufacturing sectors. "Indicator" is a time-series variable which bears a strong correlation with the GDP in the

period after borderline year[1]. Thus, its changes can be regarded as an indicator of changes of main variable. Indexes of industrial products, unemployment rate, number of construction permits and luggage and passengers transported through railroad can be also considered as examples of such indicators. Certain variables such as industrial products (at least in industrial countries) bear both characteristics i.e. being component and indicator, simultaneously.

The Component-based Approach for the estimation of GDP tries to estimate various components composing GDP through utilization of direct and/or indirect methods in order to estimate GDP after adding up the results, ultimately. This method has been applied by Kuznets for the estimation of United States of America's GDP. However, Kuznets was able only to estimate commodity manufacturing sector of the U.S. economy, directly, while there were no information about non-commodity sector of the economy (services and trade). Thus, he used the proportional relation between production level of commodity and non-commodity sectors for the years after the borderline year. He could also estimate the non-commodity sector production of the economy through estimating regression parameter(s) for non-commodity production on one or more indicators for the years after the borderline year and extended it to the prior years.

In the Indicator-based Approach, GDP is estimated through using one or more indicators as a single item. To this end, first a time-series of suitable indicator(s) which typically have high correlation degree with the GDP are selected for the year after the borderline year. Then through fitting GDP on those indicators, the parameters related to each indicator are estimated, and after applying them on time-series indicator(s) in the years prior to the borderline year, GDP for those years are estimated, as well.

[1-] The borderline year is a year which distinct two periods of estimation qualitatively.

The advantage of component-based approach is that GDP is estimated directly, and those changes which are occurred in the structure of the economy in the course of time are considered automatically while in the indicator-based approach the structure of the economy has been assumed to be constant.

Therefore, given commodity sector of the economy -in the component based approach- is estimated directly and the non-commodity sector is estimated indirectly, this method has an advantage compared to component based approach. Technical description of the privileges of component based approach is, in short, that given real GNP, Q_t, is composed of two components, therefore we will have.

$$Q_t = X_{1t} + X_{2t}$$

In which X_{1t} is the vector for figures of part of production for which direct information are available for years prior to the borderline year, and X_{2t} is the residual vector or part of production for which information are not available. There is no direct method to estimate X_{2t} and it should be estimated indirectly; thus, we can use the following equation:

$$X_{2t} = a_1 X_{1t} + a_2 Z_t + e_{2t}$$

In which: Z_t is the vector for other variables bearing information both for periods before and after the borderline year and can be used as explanatory variables. e_{2t} is the component for residual. With the estimation of parameters for the above mentioned equations, estimation of components of real output shall be as follow:

$$Q_{ct} = (1 + a_1) X_{1t} + a_2 Z_t + e_{2t}$$

Estimation of indicator based for real output is also based on regression with the same explanatory variables, with a difference that dependant variable is Q_{it} instead of X_{2t}:

$$Q_{it} = b_1 X_{1t} + b_2 Z_t + e_{it}$$

The component based and indicator based approaches which have been presented in the latter equations respectively, are appeared to be similar; however, it should be noted that the component based approach bears an extra determining reservation which leads to more exact estimation of parameters.

As it was noted earlier, the general method to estimate Iran's GDP is component based approach, on this basis, first the value-added of each component of GDP is estimated, and then the aggregate of the components gives the GDP. In the estimation of each component of production it has been tried to apply the direct method, except in certain activities of the services sector which are produced through the results of regression relations. Since, the produced figures shall be consistent with the time series of 1936 and afterwards, the results of calculations shall be used as indicator. Thus, the method for calculations of production components shall be considered as "Extrapolation with Indicator" method.

Precisely, it should be said that to estimate any activity, which is considered as a part of GDP components, initially calculations related to the value of output or value-added for 1906-1936 are done, using available information, and the results are presented as an index in which 1936 has considered as the base year (1936=100). In the next stage, the value-added for 1936 has been assumed to be 100, and on the basis of the calculated index the figures for the remaining year are computed. The benefits of this method are its conformity to different figures for the initial year, which is named base year or the borderline year. In other words, if the figure for 1936 changes, figures for the preceding years shall change proportionately.

The fact which shall be brought into consideration is the difference in the mechanism for estimations related to 1936-1958 period compared to that of 1906-1935 which is the topic of this research. Estimations related to 1936-1958 as in the prevalent methods in the "National Accounts

System of Iran", due to more reliability of output and value-added figures, GDP has been produced through production approach and final expenditures tables have been prepared proportionately. Consequently, figure for change in the inventory has been estimated as a residual figure of GDP out of other components of marginal costs. Thus, to maximize utilization of available information a type of iterative and recursive methods are applied.

In addition to the mentioned difference between estimations for 1936-1958, and the method for estimation in the present research, breakdown level of estimations shall also be regarded as difference. In estimations for GDP in 1936-1958 all of GDP tables are estimated according to type of activity and GDP according to final expenditures are estimated similar to cover Iran national accounts tables. In the present estimation, breakdown level has a negligible change and is almost the same a general breakdown level. The mining sector has been integrated into manufacturing sector, due to its negligible share in the GDP, and financial institutions has not divided into sub-sectors of banks and Insurance companies, because Insurance service providers had not been established during the survey period. In the expenditure approach the breakdown level has been kept as before.

3. Estimation of GDP

3.1. Estimation of GDP through Production Approach

3.1.1. Agriculture

Estimation of value-added of the agriculture group, given its noticeable share of its value in the GDP during 1906-1935, is of utmost importance. However, information available on this group, particularly quantity and value of major agricultural produce, are negligible, scattered, and in some cases inconsistent. As it is stated in the introduction, the only available quantitative figure about major agricultural produce is those

reported by Bharier which have been given in the form of five year average (mean). The first five year dates back to 1925-1929, in which the amounts of production of wheat, barley, rice, cotton and tobacco have been estimated. In the case of livestock, the first period refers to 1930-1934. Therefore, it should be stated that there are not any information on the production of major agricultural produce during 1906-1925.

We have formerly expressed our views on the reliability of Bharier's estimations for the survey period. On the basis of results of the surveys in this research, it can be said that Bharier's figures are consistent with the information available on the Iranian economy. For the period 1906-1925, a separate estimation has been done on the basis of structure of the country's rural consumption which will be described as follows.

According to Willem Floor's report quoted by Binning, the per capita consumption of wheat by a household during 1950's has been 75 Kilograms. Given, annual population growth rate of %0.5, this figure amounts to 100 Kilograms per head in 1906. Thus, total wheat consumption is estimated to be 886900 MT as total population had reached 8869 thousand person in the mentioned period. Since, data related to the external sector of the economy is not indicative of either export or import of wheat during the survey period and year after the mentioned period, thus the figure for wheat consumption can be substituted as wheat production in 1906. Given the availability of this figure, and those of Bharier for 1925 year onward, implementation of certain methods for estimation of the missing years were provided. To this end, through applying average growth rate approach of the periods, the initial estimation of the missing years was materialized. As an example, the average growth rate of the period 1906-1925 (%1.17) was used for the estimation of 1907-1924 periods. Since, the growth rates being calculated through the above-mentioned mechanism led to dispersion in period intervals, and erode the inter-temporal consistency and harmony among

intervals, while do not show fluctuations of each period of various years; thus Hodrick-Prescott filter has been used to eliminate such problems.

In the third phase, this time series was used as an indicator. To estimate value-added in agriculture sector during 1906-1935 period. It should be noted that, since other farm crops in Bharier's figures, except wheat and barley, have not the importance of being considered as an indicator due to their relative weight; therefore, wheat has been applied as indicator in our estimation process. On the other hand, production of wheat and barley, on the average, have a ½ relation, as barley has been planted about half of wheat cultivation. Given this assumption, bringing barley into consideration or its replacement has had no impact in the final results. If barley had also been estimated, similar to wheat, on the basis of rural areas consumption pattern in 1906, extending of its results was not possible, as barley was used as livestock feed in addition to being used as human food item. Moreover, extending barley results had further complexities such as raising the likelihood of probable errors. This fact is true for the livestock number as it has been reported by Bharier. According to Bharier's data, number of sheep (as the most important item among livestock) has been 15200 thousand during 1930-1934 on the average. In the next period (1935-1939) this number amounted to 14000 thousand. Since Bharier's data relates to the sheep stock only, and do not give data on its increase or decrease, consideration of assumptions regarding meat consumption, export and related data shall increase computation errors. Therefore, the quantity of wheat production, which had a noticeable share in the value of agriculture sector, has been used as an indicator in the estimation of the value-added of this sector at constant prices.

To estimate the value-added of agriculture sector at current prices, an appropriate price index was required. As it was stated in the chapter on "Reviewing Iranian Economic Situation", no official estimate of changes

of price indexes for 1906-1935 was accessible, and the only available data was those which had been presented in the "Unique Report" being reported and confirmed by Bharier. Since indexes reported by Bharier were based on Yeganegi's wholesale price index, which was constructed on the basis of 50 domestically produced and imported goods in the Tehran market, with similar relative weights, it seems that the mentioned report has had ambiguities in representation of the changes of commodity prices. In the numerous available reports on changes of commodity prices during the last years of Qajar dynasty and Pahlavi dynasty (during the reign of the first Pahlavi king) are indicative of explicit difference with those reported in the Bharier-Yeganegi figures. According to Bharier-Yeganegi'S figures, the price index was increased by 56 percent during the period covering constitution revolution era ending to 1936. In other words, the price index has been increased by 1.5 percent annually. Meanwhile, as is disseminated in other reports which mentioned earlier, the price of wheat has been quadrupled during the mentioned period, and the prices of many other commodities had been increased noticeably, as well. Given the price changes of major agricultural products such as wheat, meat and rice (which its price had been decreased), it can be said that agricultural product prices have been increased by 2.5 times during the mentioned period.

Since, assuming equalized relative weight of the selected goods is considered as the main problem of Yeganegi's figures, thus fluctuations of the mentioned index -regardless of the size of these fluctuations- shall be admitted, and as the case maybe the mentioned figure can be adjusted and reconstructed through using other information. Accordingly, the Yeganegi's figures were revised and reconstructed to be used as the basis for estimation of value-added of agriculture sector at current prices.

3.1.2. Value-added of Oil Group

Due to high importance of the oil group in the GDP and Iran's exports, and the role of oil revenues in the public finance of the economy, the oil group has been shown in the national accounts of Iran as a separate group. Although, the share of oil group was negligible in the Iranian economy in the last year of the 19th century, the respective figures for the following years indicate the increasing role of oil group in the Iranian economy. In order to maintain the consistency and time-comparability the mentioned classification has been considered in the present research. The value-added of oil group has been divided into two separate sectors i.e. the value-added of crude oil, and the value-added of oil products, which the prevailing share is generally that of crude oil export. In this system, the method applied for the estimation of the value of output is similar to the one used in farming and animal husbandry sectors, i.e. the quantity of exports (volume of exports for crude exports and production for oil products) multiplied by the unit value. In the calculations at current prices, the prices of current year and that of constant price, the base year prices have been considered as the basis for calculations.

Figures for crude oil exports have been used as indicator in the estimations related to value-added of oil group (and oil export) during 1906-1935. Since, export of crude oil has been considered as the only activity in the oil group of the Iranian economy during the review years, it is expected that the time-series give an exact impression regarding the oil group developments in the Iranian economy during the mentioned period.

3.1.3. Value-added of Manufacturing and Mining Group

According to the classification applied in the national accounts of Iran, the manufacturing and mining group includes sectors as mining, manufacturing, construction and electricity, water and gas which will be explained as follows:

3.1.3.1. Manufacturing and Mining Sector

Given the negligible share of mining sector (oil excluded) during the survey period, the manufacturing and mining group has been estimated together in this report. In the estimation method for this group, the indicator figure obtained for manufacturing sector, has been extended to the whole manufacturing and mining group, using extrapolation approach.

Information which was utilized as manufacturing sector indicator has been derived from the book "Socio-Economic Developments in Iran by Statistics". These figures include cumulative aggregate of available manufacturing units of Iran in 1941. The time series reported in this paper covers a period from 1901-1941. The data present information on number of manufacturing units, number of employees by type of industry: Food, Textiles and Leather, Wood and Wooden products, Paper and Printing, Chemical products, plastic and rubber, Non-metallic Minerals, Basic Metals, Machinery and Equipment, Miscellaneous, and units active in rendering agricultural services. The reported data related to above units included industrial and traditional industries, as well.

Considering the available information, in the first step the value-added of manufacturing and mining group at constant prices was estimated using cumulative time series of all employees of industrial units (including old and new industrial units) as indicator through extrapolation method. In the next step, the indicator for constant figures were obtained through dividing the obtained figure by unit value index, and through using extrapolation approach the figures for value-added at constant prices were estimated, as well.

3.1.3.2. Electricity and Water Sector

In the national accounts of Iran, activities related to the purifications and distribution of gas (natural and liquid) has also been included under this heading. However, since the mentioned activities have not existed

during the survey period, therefore gas has been omitted from the said heading.

The electricity sector has also had a fractional share during the review period out of "electricity and water" sector. Estimation related to 1936 indicates that out of Rls 7.5 million value-added of "electricity and water" sector at current prices, the share of electricity has been 1.5 percent. This ratio is estimated to be 2 percent at the maximum at 1997 constant prices. It is obvious that, the mentioned ratio had been severely decreased during the years prior to 1936, i.e. approximately zero. Thus, elimination of data related to electricity from the selected indicator would have no significant impact in the final results.

Activities of the water sector include gathering, purification and distribution of water for non-agricultural purposes, mainly household uses. This sector has a strong correlation with the size of population. Given, the simple structure of exploitation or gathering of water during the survey period, which were depended to water wells and (underground) water canals (qanats), it is probable that the severity of correlation has been even further than in the contemporary periods. Considering the above facts, the value-added of water sector has been estimated through using regression relations as presented in the book "the Estimation of Gross Domestic Product of Iran during 1936-1958".

3.1.3.3. Construction Sector

The value-added of construction sector in the national accounts of Iran, is divided to private and public sub-sectors. The estimation of value-added of this sector for the period 1936-1958 has been separately done according to public and private sectors, as well.

Since, a noticeable part of private sector construction has been that of residential units during the survey period, as it is the same even at the present time, it seems that this sector has had a strong correlation with the

size of population. However, with regard to the fact that there have been no sign of speculation demand, and on the basis of available information which was formerly referred to, land and other factors of housing construction have been accessible relatively; the mentioned correlation has probably been stronger.

Bharier has presented estimation on the number of housing units during 1900-1936. On the basis of Bharier's calculations a total of 16000 housing units have been annually added on the average to housing stock during 1900-1935. The costs associated with each housing unit has amounted to Qran (Rials) 8750 in the mentioned years. If we accept the figure for change (increase) in the number of housing units, as Bharier has reported, the figure for costs of construction of housing units is not reliable as compared with other available prices. As it is reported in the book "Iqtesad-a-kucheh" price of each 300 Kilograms of plaster has been 8 Qrans in Tehran in the beginning of the constitution era. However, the mentioned price was almost more than doubled at the end of reign of First Pahlavi. According to the said reference, costs of each square meter of construction has been Qran 40 to 50 in the beginning of constitution era; therefore, through adjusting this figure to other cities and rural areas (with a share of 80 percent of total population) and considering the structure of expenditure in the mentioned areas, the figure would reach Qran 20 per square meter i.e. would be halved at the maximum. Thus, considering 50 square meter as the area of each housing unit in the country, on the average, the figure would reach Qran 1000 per housing unit. Bringing into account the price of plaster which had been increased during 1906-1936 and almost doubled, it can be said that the growth in the costs of construction has reached about 2.5 percent during this period. In other words, costs of construction have estimated to be Rls 2000 per housing unit during 1935-36. It is worthy of note that, as a result of changes occurred in the composition of construction materials, particularly in

urban areas and large cities, costs of construction increased in the mentioned area during the survey period. According to information available this context, construction materials during the Constitution era were consisted of clay, mixture of straw and clay and the like, while for the latter periods brick, lime and plaster have been used as construction material. In the research, to maintain comparability, the price of plaster has been selected as our basis.

Unfortunately, Bharier's estimation numbers of residential units during 1906-1935 have been done on annual average basis, while their fluctuations have not been included. Thus, such data cannot be utilized by itself as indicator in our estimations. As mentioned earlier, population changes have been used in order to estimate value-added (and private sector capital formation in construction sector).

In the public sector constructions, Bharier figures have been used for the years 1906-1935, while estimations have been done on the basis of figures derived from budgetary documents after the required consistencies were implemented.

In the field of price indexes, the basis and starting point as in the agriculture group has been the unit value figures (wholesale price index). These figures were reconstructed on the basis of ratio of plaster prices during 1906-1935, to construct an appropriate index to make the required adjustments in the prices of construction sector inputs.

3.1.4. Services Group

The services group includes activities such as: Trade, Transport, storage and communications; Financial Institutions services; Real state and professional services; Public services; and Social, personal and household services. The estimation process has been done through determining an indicator using available information as regards to each of mentioned sectors with the application of extrapolation approach.

3.1.4.1. Trade

The results of a regression relation, in which the value-added of trade sector correlates to manufacturing and agriculture sectors, have been used in the trade sector. The result obtained has been used as indicator for the estimation of the value-added of trade sector, at current prices. To estimate figures for constant prices, Yeganegi's index was applied.

3.1.4.2. Transport, Storage and Communication

3.1.4.2.1. Transport:

On the basis of the available data, the transport sector has enjoyed a magnitude importance in most years of the survey period. This importance is not rooted in the appropriate transportation infrastructures, but conversely, it has been due to lack of such infrastructures. In other words, the status quo led the expenses on procurement of commodities in the country (i.e. price of commodities) to be allocated to transportation costs.

To estimate value-added in transportation at constant prices, in the first stage, the aggregate of agricultural production for transaction, being considered as 10 percent of output after deducting the agricultural exports, plus total export and import was used as indicator.

In order to convert the figures at constant prices, and to estimate transportation expenditures at current prices, at first an appropriate price index should be constructed. Thus, through utilizing information on the situation of Iran's roads in the years prior to Constitution era reported in the book "Ganj-e-Shayegan"[1], the average distance for various luggage's to reach destination was estimated[2]. This distance amounted to 422

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[1] Iqtesade-e-kucheh, p 168, the price of each 300 Kilograms of wheat has been per 200 in 1936 that mean, each Kilogram of wheat has been less than 14 Shahi.

[2] Iqtesad-e-Iran page 192, table 1, since Bharier has assumed a one percent growth rate for the Iranian economy in the beginning of 20th century, the figure for wheat production in 1925 cannot be less than its products in 1900 by 1.7 million tons.

kilometers roughly. The average of this expenditure was obtained through using information on the transportation cost for the mentioned period in various references. According to the results derived, which seems to be acceptable, the costs of transferring goods per ton-kilometers has approximately been one Qran. Thus, on this basis –given the negligible share of costs associated to passenger and intermediate costs- it can be said that, the value-added of transportation sector in 1906 has amounted to Qran 282 million. This figure is comparable to Rls 287 million for the year 1936. Since figures for 1906 and 1936 (both at current and constant prices) are accessible, the lower and upper extent of the explicit index of the value-added in transportation sector has also been known to us. In order to estimate figures for the middle years of the period, the year 1921 in which trucks were imported and put into operation in the modern transportation fleet was considered as basis for extrapolation of the explicit index of value-added in this sector. In the years prior to 1921, number of transportation means was gradually added and helped reduce the costs associated to transportation to a noticeable extent. Therefore, the correction coefficients were implemented downward on the unit value index, on the basis of the increase in the stock of transportation machinery. Ultimately, the obtained time-series was used to convert constant figures into current ones.

  3.1.4.2.2. Storage: To estimate the value-added of storage at constant prices, the volume of imports (goods) has been used, which through extrapolation these figures were estimated in consistency with estimates done in 1936. To convert the obtained figures into current prices, through using import explicit index, as indicator, the appropriate and consistent indexes for storage shall be estimated. Thus, by multiplying the value-added figures by constant prices of storage sector, figures at current prices shall be obtained.

3.1.4.2.3. Communications: Calculations related to the communication
sector is based on Bharier's book. Bharier has reported
number of letter posted, both inland and outside the county,
domestic and external telegraphs and the amount of
revenues in this book for the years, 1915, 1930, 1935.
Missing year's figures were estimated through using mean
distribution method and trend projections. The figures for
revenue have been used as indicator for value-added at
current prices, and the aggregate of quantitative figures
obtained are used in the estimation of value-added of the
communication sector at constant prices.

3.1.4.3. Financial Institutions Services:

Banking sector services have been in their infancy in Iran during the
survey period. Thus, its economic and financial role and share had been
negligible but growing. Banks deposits and credit payments shall be
considered as a good proxy indicator for the estimation of value-added in
this sector. However, although the available information in this field lacks
the proper coverage, it seems that given the structure and trend of both
deposits and credits as are reported can be used as an acceptable indicator
to estimate value-added of this sector at current prices. In order to adjust
the obtained figures, GDP implicit deflator (excluding financial
institutions sector) has been used.

Imputed bank service charges (being deducted from the aggregates of
value-added totally) is also estimated on the basis of current and constant
value-added of the banking services.

3.1.4.4. Real Estate Services: Real estate services are services, which
are frequently rendered by housing units. These services have
been calculated both by the rental units and residential units
used by their owners, and are reflected in the GDP. Since the

amount of increase in the mentioned services depends, to a noticeable degree, to the increase in number of housing units, therefore the value-added of the private sector constructions can be considered as an appropriate indicator. Thus, the value-added of private sector construction at current prices has been used to estimate the value-added of real estate (and professional services) at current prices. However, the value-added of private sector constructions at constant prices has been utilized to estimate the value-added of real estate services (and professional services) at constant prices.

3.1.4.5. Public Services: Public services include services which are rendered by various layers of the government to the public. A remarkable part of government budget is allocated to the procurement of such services. In the present research, figures related to the government budget have been compiled from various sources including budget law (s), plan law (s) and other laws and approvals, and are used to meet the above objectives. However, in the absence of budgetary figures for certain years, estimations are done out of necessity.

Since budgetary figures for the survey period were not available by current and capital expenses breakdown, and figures for transfers have not been reported properly, therefore it has been tried to recognize the nature of that item on the basis of notes under such heading and the appendix explanations, and classify the item, accordingly. Figures estimated upon the mentioned mechanism have been used as indicator for the value-added of public services at current prices. To estimate the respective figures at constant prices, Yeganegi's index has been utilized.

3.1.4.6. Social, Personal and Household Services: The social, personal and household services consist all social services including training and private health services, scientific and research

institute's services, vocational services, professional and labor union services, and private and household services such as repair services, laundries, public bath's; barber shops, photography shops, and household servants. To estimate value-added of this sector, as a result of the nature of the mentioned services which have a high degree correlation with population, the estimation of regression parameters in which constant value-added has been fitted on population, have been used. To estimate value-added at current prices, Yeganegi's wholesale price index (consistent with implicit index of the value-added of the sector in 1936) has been utilized.

3.2. Estimation of Gross Domestic Product through Expenditure Approach

3.2.1. Private Consumption

Estimation of private consumption expenditures, as the most important item in the marginal cost of the economy, had further complexities particularly during the survey period and estimation process. In the first step, consumption of rural households and total consumption of rural areas were estimated separately using information available in the Willem Floor book as reported by Binning. Then, through adding up of consumption of urban households (by affecting a 25 percent coefficient) total consumption was estimated and used in the next step as our base. Since we had the figure (estimate) for private consumption expenditures at current prices in 1906 and the related expenditures for 1936; therefore, the starting point and ending year of time our series became available.

In the second step, in order to estimate the middle years the aggregate of the sources providing goods consumed by the households, i.e. the

value-added of agriculture, social, personal and household services, electricity and water; 80 percent of manufacturing and mining sector; trade; transport, storage and communications; and 80 percent of imports were altogether used as indicator. These calculations were repeated to estimate value-added at constant figures. Then, through dividing current figures of the indicator to constant ones, the initial implicit index was calculated. With the dividing of the current figures obtained in the first step as the benchmark figure by the mentioned implicit index, the constant benchmark figure was obtained, as well. On this basis, the limits of time-series at constant prices were also determined. In the next step, with the composition of the indicators obtained in the second step and the two limits existed for 1906 and 1936, the consistent time series was obtained.

3.2.2. Government Consumption Expenditures

Descriptions which were presented earlier on the estimation of the value-added for public services can be utilized in this sector, as well. However, it should be noted that the obtained indicator was affected on the figure for government consumption expenditures in 1936.

3.2.3. Fixed Capital Formation

In the present national accounts of Iran, the fixed capital formation is calculated and presented with decomposition of capital formation in the form of construction, and machineries, while each one give private and public breakdown. Capital formation in construction by the government include capital formation in construction by the general government (including central government, municipalities, and Social Security Organization) and public corporations1, which their figures are derived from government budget, municipalities, budget, Social Security

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[1-] Public corporation is corporations which are listed in the budget law only.

Organization and public corporations. Private capital formation shall be estimated by Urban and rural breakdown using the results of statistical surveys of the Central Bank and Iran Center for Statistics.

Capital formation in machineries is estimated through commodity flow approach, in a way that with the adding up of imported capital goods and domestically produced goods, the total supply of such goods is calculated and by deducting capital goods exported, capital formation in machineries (after other necessary adjustments such as inclusion of installation charges in the calculations and adding transport and trade margins) shall be estimated.

In our estimations for 1936-1958 periods, it has also been tried to make the estimations in accordance with the mentioned approach. In the present research, the said approach has been maintained and the related description shall be presented as follows fewer than two separate headings of fixed capital formation in machineries and construction.

3.2.3.1. Capital Formation in Machineries: As it was noted earlier, the method applied to estimate such type of capital formation is the commodity flow approach. In this method, the capital goods from imports and those from domestically produced goods shall be recognized and their aggregate shall be used as indicator in the estimation of mentioned time-series.

To recognize domestically produced capital goods, the value-added of manufacturing and mining sector estimated through production approach was considered as the basis of calculations. With the affecting of a 20 percent coefficient to the value-added of this sector, its output was estimated. In the next step, it was assumed that 20 percent of the output of manufacturing sector shall be utilized in the production process as capital goods. In the case of imported capital goods, the estimation process underwent a three-step process. In the first step, on the basis of available data related to 1926 onward, on the composition of imported goods and

the value of machineries and equipments, the share in the total imported final goods was estimated. Since the available data for 1909 to 1925 period included solely the imported final goods, in the next step, with the extending of the mentioned ratio to the information on imported final goods for the years 1909-1925, the value of machineries and equipments for the years were also estimated. In the case of 1906 to 1908, the value of machineries and equipments were estimated through use of trends.

The aggregate of mentioned estimates of domestic and imported capital goods was considered on the basis for estimation of fixed capital formation in machineries at current prices. In order to make adjustments in the time series figures obtained at constant prices, components adjustment approach has been used. At first, domestically produced machineries were adjusted with the implicit index of manufacturing sector, and imported machineries were adjusted with implicit index of imported goods. In the next step, the aggregate of mentioned figures was used as indicator to estimate fixed capital formation in machineries at constant prices.

3.2.3.2. Fixed Capital Formation in Construction: Explanations related to estimation of value-added in construction sector shall be substituted for this sector, as well.

3.2.4. Exports and Imports

Figures for exports and imports are estimated on the basis of figures which were reported by Bharier. These data have been compared and checked with other available information on Iran's foreign trade statistics during the survey period.

In order to estimate exports and imports figures at constant prices, the quantity of imported and exported goods have been used. In other words, the volumes of imports and exports have been used as indicator for constant value of the mentioned figures. However, for the current value

estimations, the Rial value of imports and exports of county during the survey period have been used as indicator.

3.2.5. Net Indirect Taxes

The net indirect taxes, or as is commonly-used in the system of national accounts (1993), taxes levied on production and imports is an item which on the basis of its inclusive, GDP at various prices (factors, basic, producers and market) can be derived.

Since, taxes or subsidies on manufacturing products of the economic agents inside the county have been very small during the survey period, and the only tax which could be consider significant as an indirect tax has been customs taxes (or customs revenues). Therefore, information related to this item has been used as an indicator. In order to calculate the constant prices, the GDP implicit deflator at basic prices has been used.

3.2.6. Terms of Trade Effect

The terms of trade effect shows profit and loss results of commodity exchanges in the external sector of the economy. As it is customary in the national accounts of Iran, terms of trade effect has been calculated through using Courbis-Kurabayashii method. As is shown in the results of the surveys the Iranian economy has faced a loss in the external sector exchanges during all years of the survey period. This has caused the gross domestic income, at constant prices, to be always less than GDP.

4. Reviewing the Results of GDP Estimation

GDP at basic prices shall be estimated with the adding up of the value-added in various sectors of the economy, their method of estimating described earlier. As is shown in the appendix Tables, in the year 1906 or the first year of the time series, the gross domestic product of the country was estimated to amount Rls 1405 million (almost equal to Qran 1.4 billion) at current and basic prices. With adding up of net indirect taxes the figure reaches Rls 1.45 billion for GDP at market prices. This figure is

far different with the figure estimated by Bharier which has been reached through final expenditures approach using a few simple assumptions. On the basis of Bharier estimation, the GDP figure for 1900, i.e. six years before our starting year 1906, has been amounted to Qran 3.5 billion, which shows overestimation, while compared with the results of this research.

The basis of Bharier's estimation dates back to his estimation of private consumption expenditures. Bharier has assumed, on the basis of Sykes Report of Northeastern parts of the country, the average wheat consumption of each Iranian 24 Kilograms per month. According to population statistics, as is presented by Bharier, Iran population has been 9.86 million persons in the year 1900. Therefore, annual average of total wheat consumption reached 2.84 million tons. Bharier, then assumes that with a 30 percent increase in the costs of wheat consumption, the total private consumption amounts Qran 3.1 billion. Considering Qran 300 million for capital formation and about Qran 70 million as government consumption expenditures, the GDP at market prices roughly reached Qran 3.5 billion[1].

On the basis Bhariers' assumptions and the results obtained, the price of wheat in the year 1900 has been estimated to be more than 16 Shahi. However, as is shown in many reports available on wheat prices, the price of each 300 Kilograms of wheat has been Qran 30 to 40 in 1906; in other words the price of each kilogram of wheat has been less than four Shahi. Therefore, part of overestimation in the Bharier estimation has been the result of overestimation of wheat prices. The amount of consumption of

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[1] As it was said earlier, Bharier's estimate is in fact a very rough estimate. Net of exports which is -108 million Rials and figure for change in inventory which require to be separately estimated has been neglected in Bharier's estimation.

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wheat has also been his other mistake. Based on Bharier estimation, wheat production has been 1.1 million tons during 1925-1929, on the average. Meanwhile, according to his calculations on the expenditure side, the households should have been used 2.8 million tons of wheat in the year 1900. With regards to the significant difference between the two figures (about 1.7 million tons) and the fact that there have been no wheat imports during the mentioned years, it can explicitly be said that the figure presented by Bharier for private consumption, and thus the result of GDP estimated by him on this basis is highly overestimated.

The results obtained from GDP estimation at basic prices and constant 1997 price shows that the annual average growth rate has been about 3.9 percent during 1906-1936. If this period be divided into two periods of 1906-1920 and 1921-1936, the rates of annual growth shall respectively reach 2.5 and 5.1 percent which is indicative of doubling of the rate of growth during the second period.

Gross Domestic Product By Value-added of Economic Activities

(At current prices)

(Million Rials)

Activity Year	Agriculture	Oil	Manufacturing and Mining	Services group	GDP at basic price
1906	703/496	0/302	102/224	616/742	1422/490
1907	721/683	0/171	104/453	634/823	1460/832
1908	734/188	0/098	106/240	670/184	1510/474
1909	740/829	0/088	106/812	673/831	1521/100
1910	752/608	0/105	108/600	717/671	1578/498
1911	769/855	0/161	112/368	771/199	1653/046
1912	787/048	0/341	114/745	769/299	1670/930
1913	804/241	12/386	118/387	797/301	1731/723

Activity / Year	Agriculture	Oil	Manufacturing and Mining	Services group	GDP at basic price
1914	821/531	23/194	121/746	776/437	1742/222
1915	910/508	14/923	137/534	806/265	1868/476
1916	988/420	45/902	152/367	841/740	2027/636
1917	1069/342	73/709	169/165	869/376	2180/843
1918	1101/914	106/892	177/117	829/693	2214/684
1919	1124/526	124/307	182/987	896/236	2327/262
1920	1062/903	160/786	169/039	814/295	2206/266
1921	1062/914	221/836	170/924	801/672	2256/823
1922	1220/026	294/667	204/868	1055/973	2774/887
1923	1207/407	263/373	177/683	979/631	2627/175
1924	1316/580	353/960	192/980	1004/699	2866/881
1925	1377/043	374/509	200/045	1066/421	3015/985
1926	1458/960	449/911	227/632	1030/502	3162/610
1927	1465/484	409/977	220/121	1090/138	3179/824
1928	1499/541	713/383	232/393	1137/226	3570/942
1929	1631/810	747/688	263/987	1333/127	3962/852
1930	1757/539	690/986	277/901	1336/005	4030/460
1931	1874/806	699/907	295/033	1389/282	4219/265
1932	2018/290	786/080	335/149	1516/691	4580/514
1933	2151/035	919/236	355/280	1603/737	5003/377
1934	2444/083	960/375	420/646	1931/153	5666/894
1935	2912/324	891/290	523/070	2107/341	6370/138
1936	3203/697	1071/177	619/837	2402/126	7178/477

Gross Domestic Product By Value-added of Economic Activities

(At constant 1997 prices)

(Million Rials)

Activity Year	Agriculture	Oil	Manufacturing and Mining	Services	GDP at basic price
1906	2079033	215	224088	1281431	3584381
1907	2090863	115	230897	1328682	3650132
1908	2102653	88	239185	1427575	3769162
1909	2114344	93	247058	1494230	3855064
1910	2125894	138	255859	1602840	3984041
1911	2137296	232	267624	1684476	4088894
1912	2148611	409	275458	1706796	4130588
1913	2159990	70497	287050	1768744	4285485
1914	2171697	105109	297960	1774694	4348509
1915	2184135	42912	306522	1724498	4257125
1916	2197851	128813	317056	1727123	4369875
1917	2213549	215081	330420	1733574	4491725
1918	2232081	340281	346679	1720088	4637965
1919	2254430	376726	364608	1810710	4805508
1920	2281676	490538	390171	1913991	5075302
1921	2314949	700493	416486	1885407	5316629
1922	2355366	983971	434800	2232145	6005497
1923	2403957	955185	406648	2114822	5879395
1924	2461589	1313092	413069	2105156	6291278
1925	2528891	1385931	428877	2210175	6551374
1926	2606192	1642124	482457	2184912	6910212
1927	2693478	1440436	505771	2375604	7007501
1928	2790387	1879481	561179	2587056	7802995
1929	2896224	1933049	605556	2920052	8338091
1930	3010004	1964355	617184	2886035	8439246
1931	3130517	1914170	644153	2967699	8609428
1932	3256411	2099840	708399	3169363	9145960
1933	3386280	2643472	738805	3380143	10116185
1934	3518773	2586556	780283	3676178	10462536
1935	3652697	2467272	812201	3562051	10428494
1936	3768007	2888632	901035	3852529	11302334

Gross Domestic Product by Components of final Expenditures

(At current prices)

(Million Rials)

Expenditures Year	Private Consumption	Public Consumption	Fixed Capital Formation	Changes in Inventory	Net Export	GDP at market price
1906	1043/000	101/342	81/494	159/886	73/835	1459/557
1907	1061/091	115/819	86/379	207/135	45/411	1515/835
1908	1068/804	144/774	92/508	149/714	92/936	1548/736
1909	1115/900	166/490	97/091	97/583	88/277	1565/342
1910	1169/972	197/161	103/505	106/288	52/987	1629/913
1911	1274/958	206/611	114/711	75/109	33/073	1704/461
1912	1301/349	209/185	120/498	39/075	57/021	1727/128
1913	1386/214	220/827	132/506	40/295	-6/269	1773/573
1914	1325/107	233/362	133/011	43/832	41/585	1776/898
1915	1403/572	246/608	147/669	40/858	58/467	1897/173
1916	1514/531	260/327	170/502	42/825	75/323	2063/507
1917	1592/869	274/219	188/757	232/228	-64/185	2223/889
1918	1616/819	288/845	207/997	371/482	-213/066	2272/078
1919	1768/646	304/243	238/446	313/460	-236/552	2388/243
1920	1628/189	318/907	236/339	234/086	-129/947	2287/574
1921	1744/980	266/290	267/130	207/531	-139/430	2346/501
1922	1957/731	426/576	324/719	83/349	92/516	2884/891
1923	2019/824	325/833	235/270	42/306	115/143	2738/375
1924	2207/510	317/871	248/481	-46/001	249/026	2976/886
1925	2375/073	326/938	262/168	-39/433	202/440	3127/186
1926	2396/406	321/251	351/304	-67/404	271/057	3272/615
1927	2459/759	334/519	353/792	12/888	234/092	3395/051
1928	2518/336	370/135	424/452	-4/131	520/421	3829/214
1929	2773/114	463/209	498/450	51/234	465/011	4251/017
1930	2837/899	450/045	497/138	68/197	479/695	4332/973
1931	2858/797	496/789	549/949	-477/836	1021/143	4448/841
1932	3031/904	552/495	698/815	-57/429	815/076	5040/860
1933	3230/415	638/864	751/790	-28/417	825/635	5418/286
1934	3677/659	750/126	977/859	-75/459	816/186	6146/371
1935	4417/802	760/245	1134/660	-142/181	728/114	6898/639
1936	4797/288	872/161	1403/503	-152/867	889/724	7809/809

Gross Domestic Product by Components of final Expenditures

(At constant 1997 prices)

(Million Rials)

Expenditures Year	Private Consumption	Public Consumption	Fixed Capital Formation	Changes in Inventory	Net Export	GDP at market price
1906	2261726	275547	246475	-385080	1279273	3677941
1907	2306010	317430	259031	-390025	1295352	3787799
1908	2360005	403239	278176	-544710	1368092	3864802
1909	2429401	475318	293026	-85589	855224	3967379
1910	2483692	572420	309313	-194526	943130	4114031
1911	2599450	604985	338820	-373944	1046978	4216289
1912	2660261	617802	354633	-203249	840302	4269748
1913	2752646	657857	383720	-111580	706584	4389227
1914	2700020	701298	394458	-325426	964856	4435205
1915	2676935	681336	399492	-371038	935893	4322619
1916	2697745	675649	418487	-346310	1001742	4447314
1917	2811492	671038	449596	338044	310364	4580533
1918	2754942	706829	478898	543730	273964	4758363
1919	2852702	755297	531465	259649	532527	4931640
1920	2829043	910457	596577	461354	465229	5262661
1921	2989406	800251	681649	343778	713168	5528251
1922	3082706	1124165	726472	194482	1116152	6243978
1923	3221593	930232	582170	209799	1184882	6128676
1924	3344068	850780	576615	-46780	1808406	6533090
1925	3537961	875049	607663	-76483	1849148	6793337
1926	3587334	846600	777309	166200	1773536	7150979
1927	3766032	955029	832304	19369	1909877	7482611
1928	3929613	1112325	1012115	193699	2120563	8368316
1929	4252950	1322429	1141073	273325	1955662	8945439
1930	4300458	1243400	1118180	363038	2048669	9073746
1931	4260991	1350760	1173926	-399833	2692831	9078674
1932	4432815	1456001	1394581	454232	2329073	10066702
1933	4665146	1658102	1471675	453159	2708425	10956505
1934	4929330	1736397	1659539	146961	2877053	11349281
1935	5303567	1479850	1715521	53563	2742669	11295170
1936	5515498	1589336	1737235	287686	3168287	12298041

Share of Economic Activities in GDP

(At current prices)

<div align="right">(Percent)</div>

Activity Year	Agriculture	Oil	Manufacturing and Mining	Services	GDP at basic price
1906	49/5	0/0	7/2	43/4	100/0
1907	49/4	0/0	7/2	43/5	100/0
1908	48/6	0/0	7/0	44/4	100/0
1909	48/7	0/0	7/0	44/3	100/0
1910	47/7	0/0	6/9	45/5	100/0
1911	46/6	0/0	6/8	46/7	100/0
1912	47/1	0/0	6/9	46/0	100/0
1913	46/4	0/7	6/8	46/0	100/0
1914	47/2	1/3	7/0	44/6	100/0
1915	48/7	0/8	7/4	43/2	100/0
1916	48/7	2/3	7/5	41/5	100/0
1917	49/0	3/4	7/8	39/9	100/0
1918	49/8	4/8	8/0	37/5	100/0
1919	48/3	5/3	7/9	38/5	100/0
1920	48/2	7/3	7/7	36/9	100/0
1921	47/1	9/8	7/6	35/5	100/0
1922	44/0	10/6	7/4	38/1	100/0
1923	46/0	10/0	6/8	37/3	100/0
1924	45/9	12/3	6/7	35/0	100/0
1925	45/7	12/4	6/6	35/4	100/0
1926	46/1	14/2	7/2	32/6	100/0
1927	46/1	12/9	6/9	34/3	100/0
1928	42/0	20/0	6/5	31/8	100/0
1929	41/2	18/9	6/7	33/6	100/0
1930	43/6	17/1	6/9	33/1	100/0
1931	44/4	16/6	7/0	32/9	100/0
1932	44/1	17/2	7/3	33/1	100/0
1933	43/0	18/4	7/1	32/1	100/0
1934	43/1	16/9	7/4	34/1	100/0
1935	45/7	14/0	8/2	33/1	100/0
1936	44/6	14/9	8/6	33/5	100/0

Share of Components of final Expenditures in GDP

(At current prices)

(Percent)

Expenditure / Year	Private Consumption	Public Consumption	Fixed Capital Formation	Changes in Inventory	Net Export	GDP at market price
1906	71/5	6/9	5/6	11/0	5/1	100/0
1907	70/0	7/6	5/7	13/7	3/0	100/0
1908	69/0	9/3	6/0	9/7	6/0	100/0
1909	71/3	10/6	6/2	6/2	5/6	100/0
1910	71/8	12/1	6/4	6/5	3/3	100/0
1911	74/8	12/1	6/7	4/4	1/9	100/0
1912	75/3	12/1	7/0	2/3	3/3	100/0
1913	78/2	12/5	7/5	2/3	-0/4	100/0
1914	74/6	13/1	7/5	2/5	2/3	100/0
1915	74/0	13/0	7/8	2/2	3/1	100/0
1916	73/4	12/6	8/3	2/1	3/7	100/0
1917	71/6	12/3	8/5	10/4	-2/9	100/0
1918	71/2	12/7	9/2	16/3	-9/4	100/0
1919	74/1	12/7	10/0	13/1	-9/9	100/0
1920	71/2	13/9	10/3	10/2	-5/7	100/0
1921	74/4	11/3	11/4	8/8	-5/9	100/0
1922	67/9	14/8	11/3	2/9	3/2	100/0
1923	73/8	11/9	8/6	1/5	4/2	100/0
1924	74/2	10/7	8/3	-1/5	8/4	100/0
1925	75/9	10/5	8/4	-1/3	6/5	100/0
1926	73/2	9/8	10/7	-2/1	8/3	100/0
1927	72/5	9/9	10/4	0/4	6/9	100/0
1928	65/8	9/7	11/1	-0/1	13/6	100/0
1929	65/2	10/9	11/7	1/2	10/9	100/0
1930	65/5	10/4	11/5	1/6	11/1	100/0
1931	64/3	11/2	12/4	-10/7	23/0	100/0
1932	60/1	11/0	13/9	-1/1	16/2	100/0
1933	59/6	11/8	13/9	-0/5	15/2	100/0
1934	59/8	12/2	15/9	-1/2	13/3	100/0
1935	64/0	11/0	16/4	-2/1	10/6	100/0
1936	61/4	11/2	18/0	-2/0	11/4	100/0

GDP Growth Rate by Value-added of Economic Activities

(At constant 1997 prices)

(Percent)

Activity Year	Agriculture	Oil	Manufacturing and Mining	Services	GDP at basic price
1906					
1907	0/6	-46/7	3/0	3/7	1/8
1908	0/6	-23/2	3/6	7/4	3/3
1909	0/6	5/3	3/3	4/7	2/3
1910	0/5	48/8	3/6	7/3	3/3
1911	0/5	68/2	4/6	5/1	2/6
1912	0/5	76/0	2/9	1/3	1/0
1913	0/5	17138/4	4/2	3/6	3/8
1914	0/5	49/1	3/8	0/3	1/5
1915	0/6	-59/2	2/9	-2/8	-2/1
1916	0/6	200/2	3/4	0/2	2/6
1917	0/7	67/0	4/2	0/4	2/8
1918	0/8	58/2	4/9	-0/8	3/3
1919	1/0	10/7	5/2	5/3	3/6
1920	1/2	30/2	7/0	5/7	5/6
1921	1/5	42/8	6/7	-1/5	4/8
1922	1/7	40/5	4/4	18/4	13/0
1923	2/1	-2/9	-6/5	-5/3	-2/1
1924	2/4	37/5	1/6	-0/5	7/0
1925	2/7	5/5	3/8	5/0	4/1
1926	3/1	18/5	12/5	-1/1	5/5
1927	3/3	-12/3	4/8	8/7	1/4
1928	3/6	30/5	11/0	8/9	11/4
1929	3/8	2/9	7/9	12/9	6/9
1930	3/9	1/6	1/9	-1/2	1/2
1931	4/0	-2/6	4/4	2/8	2/0
1932	4/0	9/7	10/0	6/8	6/2
1933	4/0	25/9	4/3	6/7	10/6
1934	3/9	-2/2	5/6	8/8	3/4
1935	3/8	-4/6	4/1	-3/1	-0/3
1936	3/2	17/1	10/9	8/2	8/4

GDP Growth Rate by Components of final Expenditures

(At constant 1997 prices)

(Percent)

Expenditures / Year	Private Consumption	Public Consumption	Fixed Capital Formation	Changes in Inventory	Net Export	GDP at market price
1906						
1907	2/0	15/2	5/1			3/0
1908	2/3	27/0	7/4			2/0
1909	2/9	17/9	5/3			2/7
1910	2/2	20/4	5/6			3/7
1911	4/7	5/7	9/5			2/5
1912	2/3	2/1	4/7			1/3
1913	3/5	6/5	8/2			2/8
1914	-1/9	6/6	2/8			1/0
1915	-0/9	-2/8	1/3			-2/5
1916	0/8	-0/8	4/8			2/9
1917	4/2	-0/7	7/4			3/0
1918	-2/0	5/3	6/5			3/9
1919	3/5	6/9	11/0			3/6
1920	-0/8	20/5	12/3			6/7
1921	5/7	-12/1	14/3			5/0
1922	3/1	40/5	6/6			12/9
1923	4/5	-17/3	-19/9			-1/8
1924	3/8	-8/5	-1/0			6/6
1925	5/8	2/9	5/4			4/0
1926	1/4	-3/3	27/9			5/3
1927	5/0	12/8	7/1			4/6
1928	4/3	16/5	21/6			11/8
1929	8/2	18/9	12/7			6/9
1930	1/1	-6/0	-2/0			1/4
1931	-0/9	8/6	5/0			0/1
1932	4/0	7/8	18/8			10/9
1933	5/2	13/9	5/5			8/8
1934	5/7	4/7	12/8			3/6
1935	7/6	-14/8	3/4			-0/5
1936	4/0	7/4	1/3			8/9

References

1- Andrist, Felix, Anderson. Richard, G., & Williams, Marcela M. (2000). *Real Output in Switzerland: New Estimates for 1914–47.* Federal Reserve Bank of St. Louis Review, 1, May.

2- Ashraf, Ahmad. (1970). *Historical Obstacles to Capital Growth in Iran, Qajar Era*. Tehran: Zamineh Press.

3- Bank Melli Iran. (1959). *30 Years History of Bank Melli Iran*, *1928-1958.* Tehran: Bank Melli Iran.

4- Bharier, Julian. (1968). A note on the Population of Iran (1906-1966). *Population studies*, 22, 274.

5- Blake, Nathan, S. & Gordon Robert, J. (1989). The Estimation of Prewar Gross National Product: Methodology and New Evidence. *Journal of Political Economy*, 97, 38-92.

6- Central Bank of I.R. Iran, Economic Accounts Department. (2002). *National Accounts of Iran 1960-1997*. Tehran: Central Bank of I. R. Iran, Economic Accounts Department.

7- Central Bank of I.R. Iran, Economic Accounts Department. (2006). From Production to Financial Accounts By Institutional Sectors of the Economy,(on the basis of SNA 1993 version) Tehran: Central Bank of I.R. Iran, Economic Accounts Department.

8- Central Bank of I.R. Iran, Statistical Research and Studies Department. (2000). *Detailed Report on Revision in Wholesale Price Index of Iran Based on 1997 Base Year*. Tehran: Central Bank of Iran, Statistical Research and Studies Department.

9- Central Bank of I.R. Iran, Statistical Research and Studies. Department. (2000). *Detailed Report on Revision in Base Year of Consumer Price Index in Urban Areas of Iran-1997 Base Year*.

Tehran: Central Bank of Iran, Statistical Research & Studies Department.

10- David, Paul, A. (1967). New Light on A Statistical Dark Age: U.S. Real Product Growth before 1840. *American Economic Review*, 57, 294-306.

11- Ettehadieh Nezam-Mafi, Mansoureh. (1993). The Khalisah of Varamin, *International Journal of Middle East Studies*. 25, 5-15.

12- Floor, Willem. (2003). *Agriculture in Qajar Iran*. Washington D.C.: Mage Publishers.

13- Friedman, Milton, & Schwartz, Anna, J. (1682). *Monetary Trends in the United States and United Kingdom: Their Relation to Income, Prices, and Interest Rates, 1867–1975*. Chicago: University of Chicago Press.

14- Gallman, Robert, E. (1960). Commodity Output, 1839-1899. In William N. Parker. *The American Economy in the Nineteenth Century*, (pp. 13-67*)* Princeton: Princeton University Press.

15- Gallman, Robert, E. (1966). *Gross National Product in the United States*. 1834 -1909. In Dorothy S. Brad, (Eds.).   In Output, Employment, and Productivity in the United States after 1800, (pp. 3-76) New York: Columbia University Press.

16- Gallman, Robert, E. (2000). *Economic Growth and Structural Change in the on Nineteenth Century*. In Stanly L. Engerman and Robert E. Gallman (Eds.). The Cambridge Economic History of the United State. (pp. 1-57). Cambridge: Cambridge University Press.

17- Gilbert, Milton, Jaszy, George, Denison, Edward, F., & Schwartz, Charles, F. (1948). Objectives of National Income Measurement: A Reply to Professor Kuznets. *Review of Economics and Statistics*, 30, 179-195.

18- Hansen, Bradly. (2001). The Political Economy of the Opium Trade in Iran, 1921-1941, *the Journal of Economic History*, 61, 1.

19- Issawi, Charles. (1983). *Economic History of Iran, Qajar Era, 1800-1914*. (Azhand, Yaqoob, Trans). Tehran: Gostare Press.

20- Jamalzadeh, Mohammad Ali. (1914). *Ganj-e-Shayegan, Economic Situation of Iran*. Berlin: Kavah.

21- Johnston, Louis, D. (1997). *The Growth of the Service Sector in Historical Perspective: Explaining Trends in U.S. Sectoral Output and Employment, 1840-1990.* Paper Presented To the Clio metrics Conference, Toronto.

22- Julian. (1984). *Economic Developments in Iran, (1900-1970).* (Specialized Research Center for Accounting and Auditing Trans). Tehran: Auditing Institute Publications.

23- Katouzian, Mohammad Ali. (1989). *The Political Economy of Iran.* (Mohammad Reza, Nafisi, and Kambiz, Azizi Trans). Tehran: Papyroos Press.

24- Kendrick, John, W. (1961). *Productivity Trends in the United States*. Princeton: Princeton University Press.

25- Khavarinejad, Abolfazl. (2002). *The Estimation of Gross Domestic Product of Iran (1936-1958).* Tehran: Monetary and Banking Research Academy.

26- Kuznets, Simon, S. (1938). *Commodity Flow and Capital Formation, General Series, 3.* New York: National Bureau of Economic Research.

27- Kuznets, Simon, S. (1940). *National Income and Its Composition, 1919–1938 General Series, 40.* New York: National Bureau of Economic Research.

28- Kuznets, Simon, S. (1946). *National Product since 1869, General Series, no. 46.* New York: National Bureau of Economic Research.

29- Kuznets, Simon, S. (1961). *Capital in American Economy: Its Formation and Financing, Studies in Capital Formation and Financing*. Princeton: Princeton University Press.

30- Kuznets, Simton. (1948). National Income: A New Version. *The Review of Economics and Statistics*, 30, 156-157.

31- Kuznets, Simton. (1961). *Capital in the American Economy: Its Formation and Financing*. Princeton: Princeton University Press.

32- Lambton, A.K.S. (1998). *Landlord and Farmer in Iran*. (Manoochehr, Amiri , Trans). Tehran: Elmi VA Farhangei Press.

33- Mahmudi, Jalil & Saidi, Naser. (2002). *Joys for a High Jump: First Labor Unions in Iran, (1906-1940).* Tehran: Ghatreh Press.

34- North, Douglass. C. (1960). The United States Balance of Payments, 1790-1860. In William, N. Parker, Editor, (pp. 573-627) Trends in the American Economy in the Nineteenth Century. Princeton: Princeton University Press.

35- Pourshafeei, Majid. (2005). *Iqtisad-e-Kucheh, Report on the National Currency of Iran, Consumer Prices and Wages During the last two Decades(1778-1978).* Tehran: Gaam-e-Now Press.

36- Romer, Christina, D. (1986). New Estimates of Prewar Gross National Product and Unemployment. *Journal of Economic History*, 46, 341-352.

37- Seyf, Ahmad. (1984). Commercialization of agriculture, Production and trade of opium in Persia. 1850-1906. *International Journal of*

Middle East Studies. 16.

38- Seyf, Ahmad. (1994). *Economy of Iran in the 19th Century*. Tehran: Cheshmeh Press.

39- Sheffrin, Steven, M. (1988). Have Economic Fluctuations Been Dampened? A Look at Evidence outside the United States. *Journal of Monetary Economics*, 21(1), 73-83.

40- Simon, Mathew. (1960). The United States Balance Of Payments, 1861-1900. In William, N. Parker, (Ed.). *The American Economy In The Nineteenth Century,* (pp. 629-711). Princeton: Princeton University Press.

41- Statistical Center of Iran. (1977). *Socio-Economic Developments in Iran.* Tehran: Statistical Center of Iran.

42- *The National Income and Product Accounts of the United States,1929–82*. (1986). Washington: Government Printing Office.

43- Towne, Marvin, & Wayne, Rasmussen. (1960). *Farm Gross Product and Gross Investment in the Nineteenth Century*. In William N. Parker, (Ed.). The American Economy In The Nineteenth Century (pp.255-312). Princeton: Princeton University Press.

44- United Nations Statistics Division. (1993). *System of National Accounts*. New York, Washington, D.C.: United Nations Statistic Division.

45- Weiss, Thomas. (1992). U.*S. Labor Force Estimates and Economic Growth, 1800-1860.* In Robert E. Gallman And John Joseph Wallis, (Eds.). The Standard Of Living In The United States Before 1860, (pp. 19-75). Chicago: University Of Chicago Press.

46- Weiss, Thomas. (1994). *Economic Growth Before 1860: Revised Conjectures*. In Thomas Weiss and Donald Scheafer, (Eds.).

American Economic Development in Historical Perspective, (pp. 12-27). Stanford: Stanford University Press, 1994.

47- Ziyaei, Manoochehr. (1986). *Budget, Plan and other Laws and Approvals…* . Tehran: Plan and Budget Organization Publications.