Turkey in the interwar period: Industrial growth, market size and the limits of tariff protection*

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Abstract

The strong industrial growth in Turkey in the interwar years has often been associated with the protectionist trade policy of the 1930s. However, this interpretation has never been proved empirically. This paper approaches the question in an indirect way. Relying on the two independent reconstruction of the industrial output and the local demand for the industrial products, it shows that the effect of the tariff protection was significant in the first half of the 1930s, whereas in the rest of the decade when the output growth accelerated its effect was small, if not negligible. Also, the agricultural sector contributed to the industrial expansion through providing the local demand with an additional stimulus.

1 Introduction

This paper is a part of the larger PhD dissertation which looks into the contrasting degrees and paths of economic growth achieved in Turkey and Egypt in the interwar period. The available evidence regarding the real income per capita of Turkey and Egypt (Figure 1) indicates that while Turkey achieved a strong, if not spectacular, economic growth fueled by the industrialization, Egyptian economy failed to grow measured by any means in the interwar period. (Bulutay, 1974; Hansen, 1979; Yousef, 2002) The dominant tendency in the scholarship claims that while Turkey was one of the winners of the disintegration of the world economy in the 1930s as it followed quite heterodox inward-oriented economic policies at the time, Egypt adhered to the open economy policies and lost. The literature tends to attribute to the growth performances to the economic policies. Accordingly, the tariff protection and the expansion of the state

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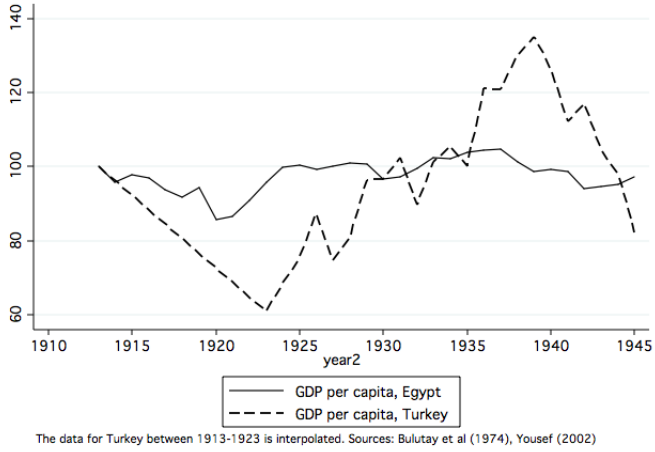
Figure 1: Income per capita indexes for Turkey and Egypt, 1913-1945 (1913=100)



industrial sector were the principal drivers of the Turkish growth and industrial expansion, which was also helped by the recovery from the devastating effects of the war.(Tezel, 1982; Boratav, 1995)[1]As for Egypt, although the nominal tariff rates were raised after 1929 to a certain degree, both the British influence on the policy making and the export sector (read landowners) did not allow higher protection. It is interesting to see that the effect of the protection, despite that common acceptance, has never been investigated empirically. Particularly for Egypt, the period is rather under-researched. Actually, the contrast which originates from the available macro evidence is not as solid in terms of its empirical foundations because there are serious gaps, problems and flaws in the aggregate series, with data constraints being more serious in the case of Egypt. So the larger project attempts, on the one hand, to reconstruct or construct the industrial series for both economies and, on the other, proposes an explanation for their industrialization experiences against the background of the disintegration of the world economy during the interwar years.

There are many studies of the causes and the propagation mechanism of the Great Depression for the North America and Europe, whereas the experience of periphery of the world economy still needs more attention. It is known that the commodity price volatility during the 1920s and the Great Depression not only resulted in massive external terms of trade shocks to the primary producers, but also led many of them to shift to the inward-oriented strategies and the then heterodox macro policies such as tariff and non-tariff barriers, devaluations, ex-

[1]In his classic reference book on the economic history of Turkey, Boratav (1985) describes the growth of the 1930s as etatist industrialization, which represents the conventional understanding of the period.

change rate controls, and so on.[2] Eichengreen (2009) considers the increased protection during that period as associated with the Gold Standard. Accordingly, the countries on gold were more likely to raise tariff barriers, because they were not able to abandon regressive monetary policies when they desperately need the expansionary policies. So the tariff protection was a plausible way of inflating the domestic economies. Williamson's (2002) analysis of the effects of tariff rates on the average growth rates show similar results for some part of the periphery: Although the tariff-growth connection was hardly positive for the periphery before the World War I, it turns out to be positive for the period 1924-1934 particularly for Latin America, if not for Asia. Williamson argues that the tariff-growth linkage was highly dependent on the conditions of international economy and more importantly the trade policies of industrial core. Tariff-induced growth depended on some other factors such as the size of the domestic market, accumulation and capital deepening.

In one of the very few comparative studies on the periphery,Diaz-Alejandro (1984), looking into the Latin American experience in the 1930s, views the performance of each country as the result of the depth of external terms of trade shocks, the policies used by government to speed the adjustment and the capacity of domestic economies to use new opportunities. Reactive countries on average performed better through expansionary exchange rate, tariff and monetary policies. The larger the pre-1929 share of exports in total output, the smaller the absolute size of domestic market, and the greater the institutional barriers to domestic resource mobility, the more difficult it was for the growing sectors to dominate the shrinking one.

Overall it is difficult to get to the broad applicable generalizations and a general theory of the recovery for the primary producers for the 1930s. However, relying on the relevant historiography, it is here suggested to formulate the dynamics of the economics recovery in a the following framework: To begin with, the size of the terms of trade shock did not only have an immediate impact on the aggregate income, but also had a huge endogenous effect on the policy making. In other words, the countries more exposed to the adverse price shocks reacted more dramatically. This partly explains why most the of the Latin American countries, unlike Asian ones, went for the protectionist and interventionist policies after 1929. However, this is not enough to explain the results of such policies.

Secondly, the periphery was on average affected from the depression through decline in the foreign demand, so the capacity of the economies to respond to the depression was limited by the ability of changing the orientation of the domestic economies, which had been dependent on the export revenues in the previous period.[3] In this connection, the degree of stimulating the industrial

[2]One can find the cross-country studies on the experience of periphery in the interwar period, along with a number of country-specific narratives, such as Thorp, 1984; Balderston, 2003; Gregory, 1989; Williamson, 2011; Aldcroft, 2006; Maddison, 1985; Eichengreen, 1985; Eichengreen, 2009.

[3]This reminds of the Olsonian argument that the external shocks like wars may put an end to the small distributional coalitions which are conducive to the growth deadlocks. (Olson,

sector through import-substitution behind the tariff walls was associated with the capacity of the changing the orientation of the economy. This might have taken the form of switching between different export products, or the supply side policies (restrictions, cartels and the like), or channeling the sources into the import-competing domestic sectors through protection. The question of orientation not only relates geography, product basket and supply and demand responsiveness, but also political economy factors.

Thirdly, related to the aforementioned factors, another way out was to inflate the economy through expansionary monetary policies and exchange rate devaluations, which can account for the recovery of some economies when the international economy was showing the signs of the recovery after the mid-1930s. (Eichengreen, 1985)

Another important though often neglected point is that argument that the recovery in the developed countries depended on the the capacity of the domestic demand for the industrial goods, and particularly on the performance of the agricultural sector through the rural demand for the industrial goods is even more relevant for the primary producers.(Madsen, 2001) This point has never got enough attention. If the protectionism was aimed at changing the relative prices in favor of the domestic industrial producers, even though at the expense of the consumers, its success largely depended on the size of the domestic demand, and thus the growth of the farm income due to the massive size of rural sector.[4] The contribution of the agricultural sector to the industrialization in that way is clearly related to the sectoral terms of trade, i.e. relative industrial and agricultural prices. But the domestic terms of trade is only one factor affecting the rural demand, as there are also exogenous variables determining the agricultural output and productivity such as weather, factor endowments (land/labor composition), demographic changes, yields and so on. In this sense, Eichengreen's (1989) argument that the experience of the land abundant countries in the 1930s might have been different makes a lot of sense, because it was possible for them to increase agricultural output without large capital investments.

In the light of the above discussion, the main argument of this paper is that the key factor differentiating between the Egyptian and Turkish economic growth was neither the size of the terms of trade shock, or the economic policies. The decline in the export prices was of similar size. There is no any sign of increasing money supply and the devaluation was avoided for different reasons.[5]

1982)

[4]The trade theory convincingly shows that the protection causes welfare losses, though this does not mean that it has not expansionary effect on the local industry. The trade-off between the growth-inducing industrial expansion due to the protection and its short-term welfare losses is not a resolved matter.

[5]Turkish Lira was pegged to French Franc all the period and government avoided currency devaluation for the sake of "protecting the value of money". Similarly, Egyptian pound continued to be pegged to the British pound and thus appreciated against other currencies after 1931. Pamuk (2000a) shows that TL appreciated against the British pound and the US dollar over the 1930s. Similarly Egyptian pound was likely to be overvalued, as argued by Hansen (1991)

This caused both economies to rely on the degree of protection and the size of the domestic markets for the industrialization. Thus the main hypothesis of the present work is that basically the performance of the agricultural sector through the effects of the farm income combined with the tariff protection to determine the rate of industrial growth in the 1930s. Put another way, the expansionary effect of the tariff protection, if any, was limited by the absorption capacity of the domestic economy. In Turkish case, the agricultural growth and increasing farm income despite the low agricultural prices helped to increase the farm income, while Egypt suffered from chronic scarce land resources and cotton dependence. Under the classical neoclassical assumptions, i.e. limited land, labor and capital, different sectors might be supposed to compete for the production factors, however, if there are underutilized resources in place, as in the case of Turkey, it could be argued along the lines of dual economy models that the sectoral relationship was cooperative rather than competitive, as long as agriculture ensured cheap food and created the demand for industrial products at the same time, without giving up farm output. This was the case in Turkey, as there were some factors operating to the effect that agriculture supported the industrial expansion: Open land frontier, population growth, and finally increasing crop yields.

Thus, the following piece basically attempts to show to what extent the domestic private demand (rural and urban) for the industrial goods and the industrial growth moved in parallel. To do so, it measures the farm income and the industrial wages relying on the official data and reconstructs the industrial output series from the scratch. Consequently, it finds that the effect of the tariff protection was expansionary only in the short term (1930-1935), while the effect is not clear in the second half of the 1930s when the actual recovery happened.

2 Demand side: Farm income and wages

The dynamics of the agricultural growth in the early republican area was shaped by a number of factors: the open land frontier, demographic and economic recovery of the 1920s, external price shocks after 1929, small scale peasant farming, diversified output basket, expanding scope of commercialization in the countryside, and increasing market integration.[6] The focus of the paper does not permit to get into the details, though it is reasonable to recall that all those factors played a role in their own way to affect the income and wealth in countryside. Turkish historiography usually depicts the rural life of the the period as that of poverty, misery and depression. That interpretation is based on the idea that, firstly, the long period of the wars and then the depression in the world markets, after a short recovery between 1922-1929, hit the farmers.(Boratav, 1977) To make it worse, the ISI policies of the 1930s which maintained unfavorable terms of trade for the agriculture operated at the expense of the rural sector, in the interests of industrialization. In fact, this generic interpretation is

[6] Particularly the last two points, increasing commercialization and the market integration are often neglected in the historiography.

almost solely based on the evidence of the relative movement of industrial and agricultural prices. However, first of all, to appreciate the standard of living in the countryside, one normally wants to see some evidence on the consumption of basic commodities (agricultural and manufactured), which has never been documented. Secondly and more importantly, the terms of trade argument is telling only about those farmers who marketed their produce. However, the gap between the beginning and the end of the period in terms of the marketing and involvement into the cash nexus can safely be assumed to be large, due to the developments of railroads and other transportation facilities during the 1930s. This makes the explanatory power of the terms of trade argument even more limited. So considering such methodolohical issues, it makes much more sense to follow the more conventional method of calculating farm income per capita, a direct indicator of the rural standard of living. This paper measures the farm income as equal to the crop and livestock value added minus the tax payments and the net credit inflow, each of which is explained below.

Agricultural value-added is the market value of farm products net of the production costs. The farm products cover all the leading crops and livestock. The relevant output and price series are obtained from Bulutay et al (1974), which provides the only GDP estimation for the period. Although having various methodological problems, the agriculture section is the most reliable part of their extensive income estimation. The crop selection is rather comprehensive including the grains (wheat, barley, rye and maize), pulses (beans, broad beans, lentil, pea and vetch), tobacco, sugar beet, potatoes, cotton, sesame, onion, fruit/vegetables. A few corrections are made on the original data to avoid the double counting: Animal feed and manure figures are not taken into account. On the cost side, Bulutay et al (1974) took into account the seeds, natural and chemical fertilizers, machinery maintenance, weeds, irrigation and the animal use. One critical point is that the labor costs and rentals are left out on purpose as we are only interested in the net available income within the agricultural sector. In this sense, the question of rentals and labor costs is more about the distribution of total farm income between the tenants, landowners, landless laborers and small cultivators. Then finally, we obtain the gross agricultural value-added series in constant prices calculated with base year 1914 for the period 1924-1939, using the wholesale price index provided in Bulutay (1974).

The form of the agricultural taxation is one of the areas where a significant institutional change occurred with the advent of the new republican regime in Turkey. Under the Ottoman rule, from the 15-16th to the 19th century there happened a transition from *timar*, a type of feudal tenure system, to the different forms of tax farming, through which the central authority sold the right of the collection of the in-kind tax, which was called tithe, to the intermediaries in return for a fixed predetermined amount of money for a certain period. The government decided in 1925 to abolish tithe, which was 10 per cent of the gross produce at the time, and replace with it a new and modern tax system, which was based on a number of new cash taxes to be collected by the state agencies rather than any kind of intermediaries. Thus, the new taxes that replaced tithe

on the one hand immediately decreased the tax burden on the peasantry, and on the other, incentivized farmers to be involved in the product markets more than before. Until then the market incentives had been limited to the market opportunities as much as perceived by the farmers. It is no doubt the reform was one of the key agricultural policies that worked in favor of market expansion and the development of a commercial economy in Turkey.

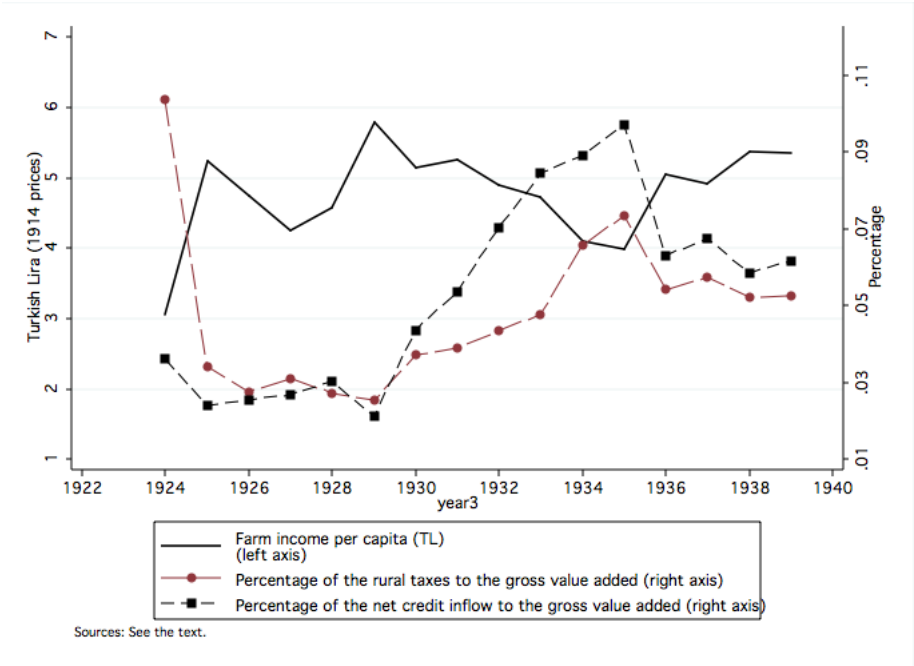
Tax payments are well documented in the official Fiscal Statistics series. The types of taxes that were collected during the period 1924-1939 were tithe (1923-1925), land tax (1925-1935), animal taxes (the whole period) and the wheat tax (1934-1941). Among these, the land and animal taxes formed the largest share of total taxes. Gross animal tax payment was between 12-16 million TL, while the land tax remained between around 7-8 million TL all over the period. The switch to the cash taxes has often been considered to have caused difficulties due to the deflation in farm prices. The argument is along the line of Fisher's debt-deflation theory. It is true that the land and animal taxes were fixed in nominal terms and when the prices started to decline, it became more difficult to pay off them. But, although the financial pressure was huge in the short term, when it was not possible to ease the burden of increasing real value of taxes, in the long term farmers were able to escape the tax burden by increasing output. That is exactly what happened. The price level remained low, but thanks to the increasing gross output and income, the taxes did not squeezed out the farmers: While the ratio of total tax payments to agricultural value added was 10 per cent in 1924, it stayed around the 4-5 per cent during the rest of the period. Also very soon after 1929, measures were undertaken such as the deferrals of the payments, or allowing the farmers to work for the roadworks and railway construction instead of paying cash.

As for the agricultural credits, the Agricultural Bank, which was established in 1888, was the main channel through which the formal credit was mobilized for the agricultural sector.[7] The gross agricultural credits provided directly by the bank was 16 million TL in 1924, but it increased to 40 million by 1938. The bank also supplied credits to the farmer cooperatives, which rapidly increased in number after 1924. Including the cooperative loans, the total amount of agricultural credits increased from 20 million TL in 1923 to 50 million TL in 1939, which was then almost 6 per cent of all agricultural value added.

Net credit inflow is calculated to be the total new loans provided by the bank or cooperatives net of the repayments, with no distinction made between the repayments on principal or interest. The data source is the extensive monograph on the history of the bank and farmer cooperatives.(Atasagun, 1939) It shows that the repayments notably lagged behind the new credit supply, meaning that the loss of the bank and the cooperatives was compensated by themselves or by the government. Total inflow, if defined by the loss of these institutions, was between 15-17 million TL in mid-1920s, however it attained 40 million TL by 1939. The casual look at the figures suggests that the turning point in the size of inflow was 1929. Then following a steep increase between 1929-1935 it stabilized

[7]The informal credits are not included in the present calculation due to the lack of data.

Figure 2: Farm income, taxes and credit inflow, 1924-1939 (1914 prices)



around 40 million TL. Furthermore, the ratio of the credit inflow to the gross value-added (crop and livestock) is more informative: It was 2 per cent in the period up to 1929, thereafter picked up to 10 per cent in 1935 and then fell back to 6 per cent in the rest of the decade, due to the rise in the gross output. Thus it is possible to argue that the government funded the credit expansion that took place particularly between 1929-1935 when agricultural sector needed to ease the effects of the deflation. In the following period, the rising gross output made the further external financing unnecessary.[8]

Thus consequently the real average farm income per capita series are obtained, dividing the gross value added net of the taxes and the net credit outflow by the rural population. Throughout the period, there appears a slight upward trend.. If the initial year is chosen to be 1925, the farm income per capita slightly exceeded the 1925 level by the end of the 1930s. 3-year moving averages do not give totally different results: the 1920s was a period of rapid increase of farm income, then came up the massive price decline between 1929 and 1934. Subsequently, the second half of the 1930s witnessed a strong recovery, which compensated the shock of preceding period. Thus it turns out that Turkish agriculture had a cycle of the growth, depression and the growth in the

[8]It is also not surprising to observe in the regional distribution of the credit expansion that principally the more commercialized cash-crop producing coastal regions (Aegean, Mediterranean and the Black Sea) benefited from the credit expansion.

period concerned. One should emphasize that the growth of 1930s was achieved despite the persistent low agricultural prices.

Well, what was behind the agricultural growth? The decomposition of the gross production into the prices, yields, acreage and crop composition show that the output growth was predominantly driven by the acreage expansion and very surprisingly the increasing yields, which by far outstripped the effect of the low prices during the second half of the 1930s.[9] Between 1925 and 1939, the output index increased by the two and half times, while the price index halved between 1929 and 1932 and stayed at that level thereafter. The most striking implication is the fact that yield index significantly outstripped the area index nearly all over the period. Thus, the most important conclusion is that the output growth relied not only area expansion as argued predominantly in the literature but also on yield increases. However, it is not really clear how higher yields were achieved without, at least to the best of our knowledge, notable development in the production technology, in the irrigation or seeds. From a Ricardian perspective, one is inclined to expect the yields decreasing as the new land of expectedly worse quality came to be sown. The only explanation of this puzzling phenomenon seems to be related to the population growth and demographic recovery that took place in the interwar period. The yields might well have been related to the increasing average family sizes and the better cultivation that brought about by the higher labor supply. Unfortunately, the evidence at this stage does not permit to go beyond the formulation of a hypothesis.[10]

Aggregate demand effect: Farm income and urban wages

To estimate the effect of the growth of the farm income and the industrial wages on the demand for the industrial goods, a composite index is needed. However, doing so requires some assumptions as to the income elasticity of demand for farmers and wage-earners, as the evidence on the direct consumption is lacking. Following Harley (1982), we refer to the extensive survey of the evidence on the income elasticity for the period before the 1950s, provided by Houthakker (1957) The elasticity estimations usually vary between 1 and 1.5 as given by the survey. Thus upon some experimentation, it is decided here to take 1.2 for farmers and 1.3 for the wage earners. It should be noted that the results do not change so much within a reasonable range.

Then the total demand effect of the growth of farm income and the wages

[9] The index formulas are the Fisher Ideal index formulas (the geometric mean of the relevant Laspeyres and Paasche indexes). The base year is taken to be to be 1925, the first year when the data on prices, yields and the area sown are fully available and taken from Bulutay's work, and the Agricultural Statistics series. Note also that "area" means the cropped area rather than the cultivated area, which is unknown as the statistical sources only mention the cropped area.

[10] One interesting point with the output index is that it appears stable between 1929-1935 when the deflation was felt the most severely. This refutes the Chayanovian interpretation that the peasants responded to the decline in prices by increasing the output by means of working harder at the expense of the leisure time.(Akarcay, 1999) Such a behavioral explanation of the output increase does not seem to be square with the timing of the recovery of the output.

are calculated in the following way:

$$d_t = f_t \cdot i_r \cdot p_r + w_t \cdot i_u \cdot p_u$$

where f_t and w_t are the log growth of the 3-year moving average of the farm income per capita and the urban wages at year t, i_r and i_u are the assumed income elasticities for the farmers and the wage earners, and finally p_r and p_u are the shares of the rural and urban population. This index is presented in comparison with the actual growth of the industrial output after the industrial output index is constructed. The industrial wage data are obtained from Pamuk (2000b).

3 Measuring the industrial growth

On the empirical side, the interpretation of the industrial growth of the interwar years has been based on the industrial value added series produced by Bulutay (1974) (cited as Bulutay series hereafter), which estimates an average of more than 10 per cent annual growth rate of manufacturing, mining and utilities. Since then the only correction to this first attempt has been made by Zendisayek (1997) which reduced the average growth rates down to 5.2 per cent by means of taking into account the handicrafts. Although the latter refers to the fundamental methodological weakness of the Bulutay series, it suffers serious problems as well.

Bulutay's data set only covers the state-encouraged enterprises, leaves out the handicrafts and home production that constituted more than half of the total value added by 1927 and thus has a huge selection bias. That is because there happened a scale increase in industry during the 1930s that probably led to a considerable shrink in handicrafts in favor of factory production. Thus ignoring the handicrafts causes a significant overestimation of the growth rates. Zendisayek (1997) suggests to bring the handicraft production into the picture by taking Bulutay series as representing the large scale part of the industry and using a separate series for the handicrafts. She relied on the value added series, presented by Eldem (1947), for the small scale industry and then combined them with Bulutay series. The weights to combine the series were derived from the statistics released by the State Institute of Statistics for 1938. However, this methodology is quite problematic at least in two ways: First of all, Eldem's series claiming to represent the handicraft production are no more than a simple guess. He, in his short paper, gives neither the explanation of his methodology nor any more of his sources, which casts a huge doubt on its correctness. Thus it hardly qualifies even for an informed guess. An extensive research of the primary sources shows that it is nearly impossible to measure the growth of handicrafts separately as it was for the most part undocumented. Secondly, the weighting Zendisayek employs inherently overestimates the growth rates. This is due to the fact that she takes the weights of large and small scale parts of the industry produced for 1938 as given, although the large scale grew much faster than handicrafts, thus so did its share. A simple experimentation shows that if

the share of the factories is reduced in favor of the small scale for the beginning of period and a linear change in scale is assumed, then one comes up with smaller industrial growth rates than Zendisayek predicts (5.2 per cent), perhaps 3-4 per cent per annum. Also nonetheless the growth path of the industry that Zendisayek finds is quite similar to the original Bulutay series which is not intuitive. This will be discussed later.

As a result, considering all these methodological problems, the present estimate prefers to employ a totally different methodology. It dismisses Eldem series all together and also to a lesser degree the data set on which Bulutay rests his analysis. In short, the former is unreliable and the latter is not representative.

Methodology

The main objective is to obtain a sensible measure of the industrial growth in the absence of sufficient direct output data. Typically in the cases where the proper direct data are lacking, the industry and population censuses are the primary sources of the information on the output, value added, employment or the technology. The first industrial census in Turkey was carried out in 1927, which was followed by the second one as late as in 1950. The first one is extensively used in the present work. Population censuses were carried out more often: 1927, 1935 and at every five-year period thereafter. 1935 population census is particularly useful, as it gives information about the employment composition at the time, making it possible to compare with 1927. The further direct data are, as was the case for many countries lacking the modern institutions collecting/producing the statistical data at the time, quite limited: the sectors where the government exercised strict supervision/monopoly such as in tobacco, alcohol, salt, mining and the utilities. Also one can come across more direct yet fragmentary regional or sectoral evidence, though the use of such evidence requires more care and caution. Thus, any time series data derived from such an imperfect set of evidence has necessarily to suffer some lack of precision.

Measurement of the British industrial growth before the mid-nineteenth century is a good methodological case in point. Hoffman's(1955) first generation index provided the common ground for other scholars to refine the measurement of the extent of British industrial revolution. The second and third generation indexes presented by Deane (1962), and later by Crafts (1983) , Harley (1982) and Crafts (1992) all used similar or reconstructed versions of the basic sectoral series that Hoffman and later Deane and Cole used. These series are based either on the relevant input indices which best reflect the output growth in the corresponding sectors or the reasonable proxies. For instance, the cotton industry is represented by the retained cotton imports, the wool by the sum of estimated domestic clips and imports, the clothing by a weighted average of the textile output and the whole food and drink industries by a transformation of population growth with an index of milling and baking in Harley (1982), which reminds that "any particular series is subject to considerable uncertainty" and "data for this period are imperfect and so any estimates of growth are controlled

conjectures". [11]

The lack of sufficient industrial data has also faced those working on the post-unification Italian industry. Gerchenkron's(1962) estimates of Italian industrial growth for the years before 1913 mostly used input data: Growth of the silk industry was measured by the raw silk output, the cotton by the net imports of the cotton and flour milling by the wheat consumption.[12] However thereafter his series were to be significantly improved by various scholars. In his comprehensive revision of Italian industrial growth before 1914, Stefano Fenoaltea masterfully uses a different technique: Textile series are constructed from input to output stages, following the different stages of production controlling for the foreign trade and lags between transformations.[13] This procedure causes the output variation across time not only to be dependent on the underlying input data, but also on the change of foreign trade of the various inputs and intermediate goods. Apart from textile, Fenoaltea does not make significant changes on other manufacturing series: Wood products are measured by two series, both based on the finished lumber output, the tobacco by the total weight of output, the leather by the statistical interpolation of four data points in different years and so on and so forth.

Thus, the methodology of the present work is preferred to be in accordance with those cited above. Textile and to a lesser extent leather series, which add up to half of the value added by 1927, are constructed from mostly Fenoaltea's point of view, as much as the data permits: The production process is vertically divided and the subsequent series for the inputs and further intermediates are obtained. For the rest, either direct output data or some proxies, such as wheat consumption measuring the growth of flour milling, are used. Overall, the input and foreign trade data and some little yet really valuable information on various sectors are used.

After obtaining individual sectoral series, the problem is to combine all of them into an aggregate output index, which requires a sound weighting system. In principle, if the complete annual price data are at hand, it would be possible to get a price-weighted quantity indices, such as Paasche or Laspeyres. The alternative is to get the sectoral value added shares, which are used as weights, for a benchmark year., Those shares are often derived from the census type data. If this is not possible, the sectoral employment data can be used as a second best solution. Even when this is done, another and perhaps more serious problem is the fact that the industrial structure changes over time, and so does productivity. What might be ideal to refer to this problem is to change the sectoral weights for different periods keeping an eye on the change in value added structure, or employment. Alternatively, one can use the available information on the price and quantity movements to calibrate the weights across time, as done by Harley

[11] Harley(1982), p. 272. Actually, Crafts and Harley's aforementioned papers make improvement on the choice of weights rather than basic series provided mostly by Deane and Cole (1962) along with other works. For a full list of the data sources, see Crafts(1983), p.180.

[12] Gerchenkron (1962), p.367

[13] Fenoaltea (2001); Fenoaltea (1988); Fenoaltea (2000). Also see Fenoaltea (2003) for an extensive historiographical survey.

(1982) who sought to figure out how the weights of cotton and iron changed during the industrial revolution in Britain. In the present work, 1927 industrial census and 1935 population census provide a plausible basis to determine the value added composition. The basic weights for 1927 emanate from the census data on the value added and employment and the employment data for 1935 render it feasible to see the shifts in weights over time.

This procedure leads to a considerable amount of uncertainty, measurement errors and crude simplifications by its nature. On top of that, the inability to take into consideration the technical change across time constitutes the most serious problem. The issue is particularly serious if the time frame spans a large period, however, in our case, this is thought to be less of a problem as the index only covers the 14-year period.

Individual series

The present aggregate index is based on 14 different sectoral output series, most of which are presented in weights and some only as indexes: Foodstuff (milling/bakery, sugar, olive oil, tobacco and alcohol), leather, woods, textile (cotton, wool, silk and oriental carpets/rugs), utilities, construction and mining. The procedure to get each series, and thus the precision of each varies with the type of data and the data sources. The extensive explanations on how each individual series are constructed can be found in the Appendix.

The following is a just a brief summary: First of all, cotton series (raw cotton, cotton yarn and cotton cloth) are derived from the official raw cotton data and the relevant foreign trade at each stage of production. Then the silk series (live cocoons, dried cocoon and reeled silk) are derived from an estimation of the live cocoon output, controlling for the net imports. The technical coefficients needed to figure out the weight losses during the drying and reeling of cocoons are obtained from Fenoaltea (1988). This is thought to be reasonable because the degree of mechanization in those stages of production in the period that Fenoaltea considers and in our case is comparable. As for the wool industry, the greasy and clean wool, and the wool yarn series are estimated to begin with. The technical coefficients are derived from various sectoral reports and the foreign trade is controlled. Then the wool yarn consumption is allocated to the wool cloth and the oriental carpet production. To do so, a separate series for the carpet production (exports and local sales) are estimated. Thus, the cotton cloth, reeled silk, wool cloth and the carpet output series represent the whole the textile sector in the aggregate series.

Foodstuff series are either derived from the direct output data or represented by proxies: The estimated wheat consumption measures the milling and bakery industry. The data on sugar, tobacco and alcohol are the direct output data. As for the olive oil, it is obtained by means of extrapolating the output data with the olive output.

Leather industry is represented by the consumption of the processed leather, which is derived from a benchmark year estimation of the raw leather and the annual number of the sheep and cattle subject to tax. A horizontal distinction

between the sheep and cattle skins is made and the foreign trade at each stage is controlled. The output of lumber measures the woods industry. Finally, the output indexes representing the construction, utilities and the mining are obtained from Bulutay et al (1974).

Weighting

The aggregate output index is produced by combining the quantity relatives with the base year 1927 using the weights derived from 1927 industrial and 1935 population census. The census data report the total output value, input costs, the number of enterprises, employment and horsepower for nine groups of industries. The categories are as follows: Mining, foodstuff (including leather), textile, woods, paper, metal processing and machinery, construction, chemical, and finally electricity and others. Furthermore, each branch is divided into sub-industries, which add up to 95. However, only the number of enterprises, employment and horse power are given at the sub-industry level.

First of all, the value added is simply taken as the output value minus total input costs. Subsequently, the value added in each sub-sector is determined. For instance, the share of milling is obtained through two stages: The share of foodstuff in total value added is 64 per cent and the share of milling in total foodstuff value added is determined by multiplying 0.64 with 0.22, which is the employment share of the milling within the foodstuff industry. Calculating this way, it turns out that almost 80 per cent of the total value added is covered by the existing series.[14]The sectors that are totally left out are the paper, metal processing and the machinery and chemicals. To deal with the undocumented series, the conventional way is to assume that the growth of the undocumented sectors was more or less the same as the documented ones. Alternatively, Fenoaltea suggests to use some rough guesses making reasonable assumptions about the undocumented industries due to the problem of what he calls "double inflation".[15] Accordingly if the unobserved series are assumed to move with observed series and one series are really poorly observed, then that poor series will represent all the way more than it should. Although the double inflation is a serious issue in principle, the present index prefers to follow the conventional method because, first of all, it is not that straightforward to make plausible guesses about the totally undocumented industries, such as the chemicals and paper, and secondly the largest series such as textile and foodstuff are not particularly poor in the present index. So the conventional method is followed by inflating the value added shares that are obtained from direct value added and employment data, leading to that the textile representing 22.4 per percent of the aggregate index, foodstuff 66.5 per cent, mining and wood each 4.3, and the construction and utilities 1.3 and 1.1 per cent respectively.

Another issue is the change of composition of industrial value added over

[14]The unobserved sub-sectors within foodstuff are the rice preparation, chocolate/cake/desert baking, fruit and the vegetable packing/drying, dairy, meat processing, fish packing and the fur manufacturing.

[15]Fenoaltea (2011), p.53.

Table 1: Sectoral Weights (%)

Sectors	1927	1935
Cotton	9.6	14.9
Silk	2.6	4
Wool	4	6.2
Carpet	3.8	5.9
Milling	15.6	12
Sugar	0.6	0.4
Olive oil	11.2	8.7
Alcohol	1.4	1.1
Tobacco	11.4	8.8
Leather	29.9	23.1
Wood	3.8	8.4
Construction	1.1	2.4
Mining	3.8	3.8
Utilities	1	0.3

time. The problem is even more relevant when considering the ongoing import substitution and the industrial policies of the 1930s that favored large scale factory system- to the extent that some sectors are more inclined to factory production than others and the factory production tend to create more value added than the small-scale. For that purpose, the employment figures that are published in 1935 Annual Statistics are used to figure out how the value added structure might have changed, only by judging from the employment data.[16]

If the value added composition at nine-industry level is assumed not to have changed between 1927 and 1935, keeping labor productivity constant, we get a rough estimate of the value added shares for 1935. This is done by creating hypothetical unit value added per worker in each sector (by dividing value added in each sector by employment size) in 1927 and then multiply those unit values by the employment in the corresponding sector in 1935. Then, it is observed tat some important changes took place in the share of the foodstuff and textile and, to a smaller degree, in wood and construction and chemicals. The foodstuff share (including leather) decreases from 64 to 50 percent, in favor of the textiles whose share increased from 18 to 28 per cent. The shares of construction and wood rises from 1.1 and 3.8 to 2.4 and 8.4 per cent. Thus it is clear that the magnitude of change in composition throughout the period cannot simply be ignored. The way to deal with it is to use a chained index using different weight schemes for the different periods. The benchmark year after which the new weights are used

[16] Another way to gauge the change of value added structure is to look at the movement of relative prices and quantity changes, as done by Harley (1982) which offers a different weighting to measure the size of British industrial output increase during industrial revolution. Though a complete set of annual price data is lacking, this can be done by focusing on foodstuff and textile prices for benchmark years (say 1927 and 1935) as they are the ones whose weights more significantly changed than others.

is taken to be 1933, when the import duties were revised to increase to the effect that a stronger tariff protection came into existence. Therefore, the resultant output index are calculated and presented in two different forms, with the 1927 weights and with the changing weights (Figure 3).

The resultant output index

As a result, the two alternative aggregate indices are shown in the Figure 3. The average annual growth rate turns out to be 5 per cent with 1927 weights and is 5.5 per cent with changing weights.[17] The same series are also produced in another scenario where the correction on the cotton yields for pre-1929 that Bulutay et al (1974) made is not accepted.[18] According to this, the corresponding average growth rates are reduced to 4.6 (with 1927 weights) and 4.7 per cent (with changing weights). All in all, all possible acceptable estimations of the average growth rates vary between 4.6 an 5.5 percent. These findings stand in stark contrast with Bulutay's value added estimation which suggested 10.4 per cent average growth per annum. A difference between output and the value added of such a scale might be due either to a breakthrough cost-reducing technical change or to an unusual gap between the growth of input and output prices, though none of which seem probable. It is most likely that because of the huge selection bias, the Bulutay series is only valid for a part of large scale enterprises, which were able to benefit from government support. However, there was an entirely different dynamics of the widespread handicraft production that grew much slower than the factory production.

Equally importantly, another improvement the new output index makes relates to the growth path. It is shown that the industrial expansion came to a halt between 1930 and 1932, which is quite reasonable considering the demand shock of the time. However, Bulutay series estimated an inexplicable smooth positive upward path between 1929 and 1934, when the demand should have bottomed. Thus the present index not only corrects the overestimation in the official series, also produces a much reasonable growth pattern.

4 Limits of the tariff protection

Thus both estimations, of the growth of the industrial output and of the private demand for the industrial goods, have been presented. (Figure 4) What is striking with this is that until 1930, the output closely follows the estimated demand. In the following period between 1931-1934, the output grows all the way more than the demand. And the gap goes away in the rest of the time. What is missing in the aggregate demand is exports and public demand. However, it is clear that the gross exports did sharply decline all over the period, with

[17] The growth rates are equal to the log differences in two consecutive years: $i_t = ln(I_t/I_{t-1}) \cdot 100$ where i_t represents the growth rate at year t.

[18] This is an important issue because the raw cotton series have an impact on the cotton, wool and carpet series due to the way they are estimated.

Figure 3: Industrial growth in Turkey

the exports of the manufactured goods being obviously negligible. As for the public demand, the actual increase in the public consumption and investment soared after the first year plan was drafted in 1933. Moreover, most of the public construction and enterprises was materialized after 1935. Thus the only variable that can account for the unexplained rise in the industrial output is the tariff protection. 1929 was the turning point in Turkey's tariffs policy. The rates were frozen at the pre-World War I level by the Lausanne Treaty, lower than the 1916 figures, until 1929. So as soon as the restrictions were lifted in 1929, Turkish government put high rates particularly for the consumption goods. Table 2 gives an idea about the degree of the increases in the revised rates, though the estimated variable is not the perfect one. For most of the products, the nominal protection per weight increased by 2-5 times. The cotton cloth, all types of wool and silk and sugar were among the mostly protected. Thereafter in 1933 the rates were raised again.

Furthermore, the figure 4 also points to the limits of the tariff protection, which has been considered to be the main driver of the ISI in Turkey. It is because there does not seem to be an extra gain from the revised higher protectionist movement of the 1933, as the growth rates of output and the local private demand are comparable afterwards. This might be related to the issue of the effective protection. It is difficult to interpret that, as the size of the further effective protection brought about by the revised rates is unknown. One might also consider that the import substitution might well have reached its limits by the mid-1930s so that even though the effective rates were significant, the effect on output was negligible. If this is so, it is a legitimate question to ask what was the motivation behind the raising of the tariff walls that did not seem to have led to extra growth in industrial output. Such questions shows the

Figure 4: Industrial output and the private demand for industrial goods

direction of the further research.

Actually the above discussion can be seen as a way of determining the actual effect of the tariff protection on the local industry. The scholars who have attempted to quantify such effects have faced the significant methodological and data problems.[19] Measuring the effective protection is usually considered to be the most suitable technique, however, even that does not give a straightforward answer. In this sense, estimating the independent series for the local demand and the local output and comparing them suggests an indirect way of testing the relationship between the protection and the local industry.

5 Conclusion

This paper presents, to begin with, the first industrial output index for Turkey for the interwar period. That presents a significant improvement over the existing official value added series and brings a fresh perspective in interpreting the history of the industry in the period concerned. The overestimation in the existing series is corrected and the growth path becomes more reasonable. Moreover, the output growth is compared with an estimate growth of private demand. This suggests that the effect of the tariff protection, represented by a gap between the output and local demand growth rates, has been significant though short-term and came to end by 1935. The actual surge in the output came up after the mid-1930s and that was much more associated with the local demand, rather than the tariff protection. Also the effect of the farm income on the aggregate demand was more pronounced than that of wages if one looks at the composition of the demand index. Thus it turns out that the agricultural

[19] See Federico (1998), for a brief review of the methodological problems.

Table 2: Estimated average value of the tariff per 100 kg (TL)

Sectors	**1916**	**1929**	**1933**
Cotton yarn	14.9	50.17	58.36
Cotton cloth	131.42	238.49	295.95
Wool yarn	21.04	110.83	139.58
Wool cloth	57.5	223.5	335
Silk industry	721.2	2015.06	2153.28
Leather industry	246.62	516.76	539.5
Sugar industry	6.8	22.55	17
Coal industry	0.1	0.46	0.65
Paper industry	16.18	39.81	44.198

Source: SumerBank, Quarterly Bulletin, 1936. The ad valorem rates are converted into the money equivalent per 100 kg and the rates for the silk, leather, sugar, coal and paper are estimated over a range of products.

recovery, due to a puzzling combination of the acreage and yield expansion, contributed to the industrial expansion of the second half of the 1930s.

Doing so, it is argued that the role of the policies, in this case the tariff policy, might have been overemphasized when interpreting the economic recovery in the periphery during the 1930s. It is more reasonable to consider that the local and international factors affecting market demand for the industrial goods combined with the policies to determine the growth patterns of economies. In this context, the Turkish case shows that the industrial growth cannot be attributed only to the autarchic and inward-oriented economic policies. The agricultural growth that had little to do with the particular policies made a substantial contribution to the industrial expansion, which has often been ignored. It is likely that without the output and yield improvements in agriculture, just like in the land-scarce countries who also could not escape the huge deflation of the post-1929, Turkey might have experienced a much more limited industrial development. In other words, Turkey might have followed the Egyptian way, i.e. a restricted industrial development in an economy which chronically suffered the crisis of the export sector.

Appendix

Notes on the individual industrial series

The following notes briefly mention how the individual sectoral series are constructed.

The construction of textile series are largely inspired and informed by Fenoaltea's papers on Italian cotton, wool and silk industries, cited before. The present series simply follow his basic technique: The vertical disintegration of production process to allow for the foreign trade in intermediate goods. Here, the final estimated cotton and woolen cloth series and the total reeled silk consumption series measure the growth of cotton, wool and silk industries. Additionally, a separate independent oriental carpet output series is estimated. Therefore, the whole textile sector is represented by these four series.

For cotton, first of all, the domestic output of raw cotton in weight is obtained from official statistics, then the net import of the raw cotton is added to them. The following step is to proceed from the raw cotton consumption to the yarn production. To do so, 10 percent weight waste of raw cotton is assumed, as suggested by expert reports.(Report (2008); Vasif (2008); Fazli (2008)) Subsequently the domestic yarn production is combined with the net yarn imports yielding the total yarn consumption, which is simply taken to be equal to the cotton cloth production, since the possible waste is considered to be recycled during the production process. It should be noted that there is a number of types of cotton yarn that were traded. They are simply aggregated in weight due to the absence of another unit of measure.[20]Finally, the three-year moving average of cloth series is calculated since the sufficient information on inventories is lacking. One should also be reminded that although a proportion of the cotton yarn should be allocated to the consumption in the silk industry, it is simply ignored because that amount was negligible in size next to the total yarn consumption.

Silk ranks the third in importance within the textile sector, but since the silk series are also needed to derive wool series, it is estimated earlier. The official sources on the silk are quite limited, providing only live cocoon figures starting from 1933. In the Ottoman period, the industry was monitored by the Ottoman Public Debt Administration (Duyun-u Umumiye) until 1920 so the data on the number of families producing cocoons, the total amount of cocoon output, raw silk and the figures of looms are better documented for the Ottoman period. However, Dalsar's monograph on the history of Bursa silk industry provides figures of the live cocoon production for the years between 1926-1936.(Dalsar, 1960) On the processing side, the data are limited too. Another report on the state of reeling and weaving industry give the number of hand and steam-engine reeling machines in 1913 and the number of the land looms and power looms by 1920 and 1930.(Resat, 2008b) According to this, in 1913, there were 561 hand reeling and 7739 the steam reeling machines located in the factories, showing a high degree of mechanization in reeling. As for weaving, we have figures for Bursa: 348 power loom and 617 hand loom un 1920. Supposing that the pre-war mechanization levels did not change so much during the 1920s, these numbers may suggest that the reeling was predominantly mechanized, while weaving to a certain degree depended on the hand looms. Since sufficient information on the throwing,

[20]Fenoaltea (2001) argues that the length can be considered as another and more relevant unit of measure than weight, as one considers the quality changes across time. He converts all series in weights into the length series using a weight-length conversion method.

dying and cloth production are lacking, the present index looks only at drying and reeling stages. The live cocoon series are derived from combining official statistics and a comprehensive monograph on Bursa silk industry. (Dalsar 1960) Then the procedure goes as follows: the net import of live cocoons is added to those series, and the resulting consumption of live cocoon are transformed into dried cocoon, using a coefficient for the weight loss. Secondly, the net import dried series are added to the domestic dried cocoon. Lastly to get the domestic production of reeled silk, we refer to the coefficient provided by Fenoaltea as well. The final touch is to take 3 year moving average of reeled silk series to allow for inventory changes.

The wool industry, which is the second largest in textile, is disaggregated into three broad stages: Production of the clean wool, wool yarn and finally the woolen cloth. At the intermediate stage, the wool yarn series are allocated into the woolen cloth and the yarn consumption for the oriental carpets. In the end, the growth of wool industry is measured by that of the woolen cloth. To begin with, the greasy wool series are derived from the annual number of sheep, and after combining with imported greasy wool, the series is converted into clean wool series. The coefficient for the transformation is derived from the contemporary reports. Then, the domestic clean wool are added to net import of clean wool, which yields total available clean wool for yarn production. Getting the total yarn from the available clean wool required another coefficient, which was again derived from various sectoral reports.(Torgut, 2008; Sureyya, 2008; Izmir, 2008) Thus if the net wool yarn imports are added to the latter, we obtain total available wool yarn for the cloth production. The next step to allocate the wool yarn series into wool cloth and oriental carpet. To this end, an allocation is made for 1928. The reason to choose that particular year is related to the available information. (Torgut 2008) Following that benchmark allocation, we project the amount of wool yarn consumed for carpets in that year back and forth to other years, using a carpet output index, whose construction is done separately below. As a result, we deduct wool used for carpet from the total wool yarn series to get the wool yarn allocated to the cloth output.

Carpet production constitutes the fourth series in textile. It is nearly equal to silk in terms of value added and was an export-oriented industry. Exports figures, both quantity and value added are well documented, however the local consumption remains unknown. But since a significant amount of woolen yarn was consumed in that sector, it is necessary to estimate the local sales. The total annual export was around 1500 tons before 1929 and it decreased in the subsequent years, as the foreign demand shrank. The local sales are estimated as follows: An estimation is made for 1929, referring to an expert report.(Resat, 2008a) which suggests that around 500 tons of carpets were sold in the domestic market. Then we extend this figure in weight back and forth to find the local sales for the earlier and later years. To do so, it is assumed that the local demand for carpets (recall that carpet was produced in the countryside by rural families to top up their revenues so that output was not restricted by supply conditions) moved with the demand for cotton and silk cloth. A weighted average of cotton and silk cloth output, according to their value added, is calculated for this purpose. Subsequently, the carpet exports and local sales are combined to arrive at the aggregate output series.

Foodstuff

Foodstuff industry is represented by five distinct series: Milling/bakery, sugar, olive oil, tobacco and alcohol. They represent nearly 80 percent of the aggregate value added

produced in the food processing industry according to the 1927 industry census. The rest 20 percent value added was created in vegetable and fruit drying/packing/processing, meat packing add chocolate and sugar-related bakery, for which no apparent proxies or output data has been found due partly to the complicated production process in each.

Milling and bakery is measured by the wheat consumption, which is a conventional measure. The aggregate wheat consumption is equivalent to the aggregate wheat output net of the seeds for the following year's sowing and the net wheat imports. We use Bulutay et al (1974) for the seeding estimations and the official data on the wheat output.

Sugar was totally produced by the government enterprises, so the output figures are easily available. Sugar industry was typical example of government intervention and has always been related to the the politics of self-sufficiency as the third pillar of "three-white" policy (next to cotton and wheat) during the 1930s. The sector actually produced only 0.5 percent of the total value added, though it was thought to to have shown the degree of industrialization in that period.

Another regional, though important, industry was the olive oil production. Olive was widely produced in Turkey, overwhelmingly in Aegean region and its surrounding neighborhood. Both olive and olive oil production was diffused all over the producing region, which was well integrated with the foreign markets through Izmir port and connecting railways. Also, it was the principle source of vegetable oil supply of the country.(Yahya, 2008) The other vegetable oil types, such as those produced from the cotton waste, and *pirine* were in infancy. So the olive oil production is taken to represent the aggregate vegetable oil output. The output figure is obtained by combining a regional direct estimation with the data on olive production.

Tobacco and alcohol production was under the state supervision so that the related data on output, sales and costs are fairly abundant. At the time Turkey was a big tobacco producer and seller, especially of the oriental type. The processing was also developed to the extent that around one tenth of the total industrial value added took place in tobacco processing in 1927. Official finished tobacco output series show the output change between 1925 and 1939. The alcohol series consist of the output of *raki*, wine and the cognac.

Others

Leather output series are represented by the consumption of processed leather. Initially a benchmark year estimation is made as follows: We abandoned various available direct guesses of the raw leather output because they are not consistent. (Hayrettin, 2008; Dericilik; Dericilik, 2008) So it is decided to use the foreign trade and industrial census data to get that point estimation. To do that, a horizontal distinction between sheep and cattle skin is assumed. The implied point value added per ton for the sheep and cattle skin is calculated from the foreign trade figures, also referring to various reports on production process. Then the total value added produced by the processing raw leather, as is stated by 1927 Industrial census (around 6 million TL), is divided by this unit value added, yielding the processed leather and its equivalent of raw leather. That figure represents total raw leather consumption for 1927. If the portion of imported cattle skins is deducted, - sheep skin import was negligible- one obtains total locally produced raw skin. At this stage, this total figure is allocated between sheep and cattle skin. For this purpose, the composition of the animals slaughtered in public abattoirs in 1927 and the average sheep and cattle skin weights are used to

make that allocation. Then the sheep skin in weight is combined with raw sheep skin exports. Thus an estimation of aggregate raw skin in two categories (sheep and cattle) for 1927 is obtained. The rest of the estimation is based on the official data on the number of animals: The amount of sheep skin consumption in 1927 are extended to other years using the number of sheep that are subject to tax and the export series are discounted from that to arrive at local consumption. Combining the total raw sheep and cattle skin consumption we get the aggregate raw skin consumption by the local industry between 1925 and 1939. Since the largest proportion of the value added is produced by the shoes and other finished good manufacturers, the raw skin consumption should be converted into processed skin consumption. The coefficient for this is obtained through a careful reading of the sectoral reports, suggesting 4 per cent weight loss during the processing. Finally the resulting processed skin series grows with adding net import series, which all produce the final estimated consumption of processed leather series.

Woods industry is perhaps the most poorly documented one. It covers both timber production and the timber processing in carpenter workshops to manufacture furnitures. The volume of timber output is thought to be the best representative proxy. The correction for the foreign trade does not bring much change in the underlying output data, as the size of net timber imports does not exceed 2-3 percent of the aggregate output level.

Mining, unlike woods, series are fairly well documented due to the government monopoly. The extraction of all goods are well known since the early 1920s, among which coal, salt and chrome come first in importance. It can be reminded that iron extraction did not start as late as in 1938 in Turkey, as until then iron-related industries, whose value added share was quite small, were dependent in imports. Bulutay et al (1974) calculated a weighted average quantity index of a wide range of goods (coal, salt, chrome, lignite, copper, boracite, sulphur, smeriglio and zinc). The weights are derived according to the production value of each one in 1936, with coal, salt and chrome representing 64, 24 and 7 per cent of the aggregate index.

The present utilities series are based on the revenue and price data on the consumption in three big cities (Istanbul, Ankara and Izmir). Unfortunately water, gas and electric data on other cities are not available and the only correction can be made with an eye on the relative urbanization rate in three big cities and others. A close look shows that the expansion of urban population was not significantly different in the rest of the country. So it can be assumed that the output of the utilities of the Istanbul, Ankara and Izmir can represent the growth of the whole sector in the country. Thus the present index is based on the data compiled by Bulutay and his colleagues.

Lastly, the construction sector is represented for the weighted average of the building iron and cement series provided by Bulutay et al (1974). This should be improved with respect to the rural construction, however, due to the small share of construction in total industrial value added (1.3 per cent), it is left as a possible revision.

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