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The Ottoman Economy (1870-1913): Preliminary Second-Generation Estimates

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Abstract: The purpose of this study is to present a new estimate on the GDP and per capita GDP levels of the Ottoman Empire between 1870 and 1913. Since the earlier estimates employ different methods, this study re-combines data series using reliable secondary sources while attempting to incorporate the distribution margins, includes industrial production excluded from the industrial census, and correcting missing information in certain agricultural productions. The inclusion of "Distribution Margins" (DMs) that adjust from producer to market prices reflects the price difference which entails diverse GDP and per capita GDP levels. The DMs are crucial, especially to incorporating costs of distributing industrial and agricultural products between the center and periphery. This research concludes that GDP and per capita GDP levels were higher than those made by earlier estimates. The method and findings of this study make contributions to the recent discussions on the economic performance of the Ottoman Empire, particularly for the period preceding the First World War. This study also suggests new research areas to further improve future studies on GDP and per capita GDP levels of the Ottoman Empire.

Keywords: Ottoman Empire, GDP, Per Capita GDP, Middle East, Western Europe.

JEL Classification: B10, N15, N25, N4, N94

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Introduction

The last few decades have witnessed growing literature on the economic performances of societies, from the beginning of the sixteenth century to the First World War. The literature presented diverse economic performances regarding per capita GDP, daily wages, and living standards (Feinstein, 1972; Brown & Hopkins, 1981; Crafts, 1983; Parthasarathi, 1998; Van Zanden, 1999, 2001; Allen, 2001; Maddison, 2001, 2003; Pamuk & Özmucur, 2002; Geary & Stark, 2002, 2015; Fenoaltea, 2005; Burhop & Wolff, 2005; Clark, 2005, 2007; Pamuk, 2006). Each estimate included a distinct method on the purpose of the analysis. However, each method is based on the available reliable data, particularly for developing countries.

Economic historians have made concerted efforts to analyze societies' economic performances to illustrate the current differences between industrialized economies and followers. The Ottoman Empire is considered as one of the important "Powers" during the pre-industrial period although it has been considered as a developing society following the industrial revolution (Kennedy, 1988, pp. 9-10; Tilly, 1990, p. 24; Hoffman, 2015, p. 14). Economic historians paid due attention to the economic performance of the Ottoman Empire. Each estimate employed various methods and data sets to present GDP and per capita GDP levels. The mainstream Ottoman literature uses primary sources that include fiscal data, agricultural output, industrial production, and commercial statistics, particularly for the first years of the 20th century (Okyar, 1987; Eldem, 1994; Pamuk, 2006). Following the mainstream Ottoman literature, the existing literature based on comparative analysis has also used similar data (Maddison, 2001, 2003; Pamuk & van Zanden, 2010; Broadberry & Klein, 2012; Bolt & van Zanden, 2014).

The performance of the Ottoman economy relative to European, Middle Eastern, and Asian economies, beginning from the last decades of the 19th century up until the First World War, has been an important discussion in Ottoman economic history. This study has brought together and used data from a variety of sources to examine the economic performance of the Ottoman Empire for 1913. The estimates included output series of reliable secondary sources. The study employed a method based on alternative output approach (Feinstein, 1972; Eldem, 1994; Pamuk, 2006; Broadberry et. al., 2015). The findings suggested that the per capita GDP of the Ottoman Empire was relatively higher compared to the earlier estimates than those emerging from previous research. Since Maddison's and Pamuk's estimates have been generally adopted as the benchmark for comparing Ottoman economic performances to other economies, we suggest that an estimate which combines output approaches and Feinstein's distribution margins (DMs)

based methodology is likely to provide an estimate much more compatible with Maddison's and Pamuk's results than previously made attempts.

This study consists of four main parts. The first presented the method employed and a table summary of the composition of Ottoman GDP in 1913. The details of the new estimate for each category have been shown in the first part. The second briefly summarized earlier estimates and their methodologies. The third however, included "checking the estimates" discussions regarding earlier estimates and business cycles for the years between 1870 and 1913. The last evaluated the findings of the study compared to earlier estimates and per capita GDP levels of different countries.

The new Aggregate Estimates: Sources, Method and Findings

The estimate used in this study follows the methods of Feinstein (1972), Broadberry et. al. (2015), Eldem (1994), and Pamuk (1986). This approach provides a framework and allows us to use the large number of statistics carried out on the Ottoman economy. Thus, this study gives particular attention to the output approach, which is based on an index of real output subjected to agriculture, industry, and service (Feinstein, 1972; Eldem, 1994; Broadberry et. al. 2015). The construction of output series based on sectors and years has not been possible due to the lack of data, particularly for the periods preceding the First World War. The data limitations compel us to use another method based on the benchmark years (Pamuk, 2006). Accordingly, we have taken average growth rates between the benchmark years, which is estimated as 0,56% per annum for the period extending between 820-1913 (Pamuk, 2006, p. 822). Because of data limitations, the output series, however, do not contain as many detailed items as the estimates made for the United Kingdom.

Instead, this study combined output series under the following eight main items: i) agriculture, forestry, and fishing, ii) mining and quarrying, iii) manufacturing and construction, iv) financial activities, v) social and public services, vi) dwellings, vii) transportation, and viii) self-employment and services. Feinstein (1972) and Broadberry et. al. (2015) used these items and their output levels for the national output of the UK. Eldem (1994) also used them for the national output of the Ottoman Empire. Thus, this study has established its per capita GDP estimates through these commonly items for output approaches. For detailed information on the composition of output estimates, works of Eldem (1994, p. 224) and Feinstein (1972, p. 99) which contained the format of the earlier estimates are highly recommended for consultation.

In addition to components of output series, this study has taken the DMs into account, which helps adjust from producer to market prices (Feinstein, 1972, p. 15). The research of Feinstein's DMs approach explains the vital importance of the issue as follows: "In his view, the possibility that these DMs inflated expenditure estimates was more likely as one moved backward to 1870 given that the scope for increasing productivity is less in distribution than in production. These UK DMs, 40 % for home-grown food; 35 % for home produced manufactures; 26.5 % for imported food and 43.5 % for imported manufactures, have been adopted here to cover distribution costs" (Bielenberg & O'Mahony, 1998, p. 110).

However, a serious question is raised regarding the application of those DMs of the UK economy to the Ottoman context. The current literature includes no research over DMs of the Ottoman Empire. A rough estimation may suggest that transportation costs in the Ottoman Empire were higher than those in the UK. It is also expected that the costs were probably higher in the Ottoman Empire because of the lower-level traffic that led to higher inefficiencies. The DMs of the Ottoman Empire should then be higher than those in the UK. However, the lack of data and specific research on this issue restricted our ability to determine DMs appropriate for the Ottoman Empire. Hence, we have decided to use DMs estimated by Feinstein for the UK economy. The rate used in this study has been 43.5% in estimating the GDP level of the year of 1913. We have imposed the highest rate not only for higher costs in the Ottoman Empire, but also the significant differences in economic performances for the period preceding the First World War. Since we have no chance to calculate these DMs for the Ottoman Empire, using the highest value of these margins will not be wrong compared to the UK.

This study has estimated GDP and per capita GDP levels in three main stages. The first stage has employed the output series of the Ottoman Empire established during the first years of the 20th century. Furthermore, the first stage has also expanded the output series by incorporating excluded data. The industrial census is based on manufactures established only in Western Anatolia provinces for the years extending between 1913 and 1915. Eldem has presented industrial output data from different provinces that were excluded from the industrial census (1994, p. 67). Following the industrial production, the agricultural census carries similar problems, particularly in the field of crop production. The data given in the agricultural census has shown that 30% of arable lands were also excluded from the census. Incorporating both industrial and agricultural census into estimations as they caused missing results in GDP and per capita GDP levels of the Ottoman Empire. This study adjusts data-based deficiencies by way of including industrial

production from different provinces and all cultivated lands in estimations. The second stage incorporated DMs (43.5%) into agricultural and industrial outputs to adjust the price levels of different regions of the Ottoman Empire. The third stage, however, has included the total production values of other sectors except for agriculture and industry from reliable secondary sources.

Agricultural Production

The first stage begins with agricultural statistics. The data series covering the years 1907, 1909, 1913, and 1914, belongs to the statistics department of the Forest, Mine, and Agriculture Ministry of the Ottoman Empire. Utilizing the total agricultural output is more accurate rather than estimates based on tax revenues as in earlier estimates (Eldem, 1994, p. 27). Agricultural output based on the census, however, has faulty and problematic data that needed to be adjusted for the sake of more reliable results. The field crop production includes such problems. As noted in the census, the total agricultural output represents the value reaped from 5.2 million hectares of arable lands. On this occasion, Güran argues that the cultivated lands were estimated 30% less than the accrual area (1997, p. 31). In this sense, we have increased the total field crop production by 30% under the same productivity assumption. This simple calculation raises the total field crop production from 5.310 million to 6.903 qurushes for 1913. The agricultural census shows the total fruit production was 882 million qurushes while the total production of some other agricultural commodities was about 1.534 million qurushes in 1913. (Güran, 1997, p. 20).

Another important item to be considered is meat production in the Ottoman Empire. Meat production has to be adjusted to obtain less faulty values. Pamuk and Özmucur (2002, p. 298) noted that the consumption basket contained 51.2 kg of mutton meat. However, since no research has been undertaken on the diets of private households in the Ottoman Empire, we have used the estimate from recent research on the living standards in the Ottoman Empire. This research determined the shares of commodities within the consumption basket through shares of each in total expenditure of the respective institutions. In this study, however, we argued that the diets of households should be different than those offered in soup kitchens. Even when scholars recognized faulty and missing assumptions through diets provided by such institutions, the lack of research on private diets led economic historians to use this established assumption found in the literature.

At this point, it is not possible to draw a closer estimate for private diets in meat consumption. The population census indicated that the Ottoman population was

approximately at about 18.3 million in 1913 (Behar, 1996, p. 46). Regarding those figures, the total demand for mutton would be 936.9 million kilograms which on average is to be obtained from 52.1 million sheep. The assumption is that the average weight of a sheep changes between 30 and 40 kilograms and 18 kilograms meat can be obtained from one single sheep. The Ottoman statistics show that the average price for a sheep was equal to 74 qurushes in 1913 (Pamuk, 2000). A simple calculation sufficiently shows that the total production of meat (mutton) for the Ottoman Empire. According to those figures, the total value of meat production should be around 3.856 million qurushes for the year of 1913. Table 1 presents aggregate agricultural output with 43.5% DMs in terms of Ottoman qurush and British pounds.

Table 1
Agricultural Production for 1913

Sub-Sectors	Total Production Value (million qurushes)	Total Production Value with DMs (million qurushes)	Total Production Value (million British pounds)
Field Crops	6,903	9,905	90,0
Fruits	882	1,265	11,5
Meat	3,856	5,533	50,3
Some Other Products	1,534	2,201	20,0
Total	**13,175**	**18,904**	**171,8**

Note: 1 British pound = 110 Ottoman qurush (Pamuk, 2006, p. 819). Each following change calculation between the Ottoman qurush and the British pound is based on this exchange rate.

Industrial Production

According to the census of the Ottoman Empire, the industrial production was based on seven different sub-sectors (food, soil, leather, wood, textile, stationery, and chemical). Each manufacture employed at least ten workers. While the total number of manufacturers was 269 in 1913, the census consisted of manufacturers only established in Western Anatolia provinces (Ökçün, 1998). For more accurate estimate of industrial production, this study incorporated other industrial data drawn from reliable secondary sources (Eldem, 1994, p. 67). As given in Table 2, industrial production included not only the official census included manufacturers of Western Anatolia but also firms established in other provinces that were excluded in the industrial census.

Table 2
Industrial Production for 1913 (in British Pound)

Industrial Census of Western Anatolia*										
	Food	Soil	Leather	Wood	Textile	Stationery	Chemical	Metalwork[1]	Military[2]	**Total**
Firms in Operation	71	16	11	19	61	51	10	30	17	**286**
Informant Firms	68	14	11	19	59	45	10	30	17	**273**
Total Production of Informant Firms (in million qurush)	459.7	13.4	31.9	11.0	100.3	37.6	16.9	70.0	108.0	**848.8**
Production Value of All Firms in Operation (in million qurush)	479.9	15.3	32	11.0	103.7	42.6	16.9	70.0	108.0	**879.4**
Production Value (% 43,5 DM in million qurush)	688.6	21.9	45.7	15.7	148.6	60.9	24.2	100.4	108.0	**1,214.0**
Production Value (in million British Pound)	6.3	0.2	0.4	0.1	1.4	0.6	0.2	0.9	0.9	**11.0**
Other Regions of the Ottoman Empire (Except Western Anatolia) **										
Firms in Operation	152	10	8	4	55	6	5	8	-	**248**
Informant Firms	152	10	8	4	55	6	5	8	-	**248**
Total Production of Informant Firms (in million qurush)	396.0	9.0	19.0	8.0	38.0	4.0	4.0	33.0	-	**511.0**

Production Value of All Firms in Operation (in million qurush)	396.0	9.0	19.0	8.0	38.0	4.0	4.0	33.0	-	**511.0**
Production Value (% 43,5 DM in million qurush)	568.2	12.9	27.3	11.6	54.5	5.7	5.7	47.3	-	**733,2**
Production Value (in million British Pound)	5.1	0.1	0.2	0.1	0.6	0.05	0.05	0.5	-	**6.5**
Total Production (in millions of qurush)	**1,256.8**	**34.8**	**73.0**	**27.3**	**158.3**	**66.6**	**29.9**	**147.7**	**-**	**1,947.4**
Total Production (in millions of British Pound)	**11.4**	**0.3**	**0.6**	**0.2**	**1.9**	**0.65**	**0.25**	**1.3**	**-**	**17.5**

Source: * See, Ökçün, 1998, p. 26. ** Excluded industrial census for 1913. See, Eldem, 1994, p. 67.

Notes: Metalwork industry was excluded from Ottoman official census for 1913. 2 Eldem obtained the production of the military industry from related budgets and official reports (1994, p. 67). Istanbul was the only region that specialized in military industry. This means there would be no distribution margins in military production in the Ottoman Empire.

The industrial output presented in Table 2 is generated using various calculations, corrections, and newly added data. First, when one looks at industry numbers, the data is limited. The data is limited to food, soil, leather, wood, textile, stationery, and chemical firms established in Western Anatolia. Eldem, however, presented new data on the industrial production of the Ottoman Empire in 1913 (1994). The recent research provided data not only on metalwork and military industry, but also on similar firms established in other regions of the Ottoman Empire. Table 2 presented aggregate industrial output through combination of industrial census and secondary sources based on reliable primary sources. Finally, we have imposed 43.5% DMs to aggregate industrial output. The results have shown that total industrial production was approximately 1.950 million Ottoman qurushes and 17.5 million British pounds in 1913.

Following the industrial census and other industries established in different Ottoman regions, it is possible to incorporate small-size local industrial sectors

into the aggregate industrial output. We have employed output data of carpet business, handlooms, coppersmiths, saddlery, and shoemaking from reliable secondary sources (Eldem, 1994, pp.85-90). This study included those small-size production facilities since those professions were established within the Ottoman economy for the long term. Those sectors, however, are largely small-scale when considering the Ottoman economy because the products are based mostly on household production. Table 3 has presented output levels of these small-size manufacturers with DMs for 1913.

Table 3
Total Production of Small-Size Industries

Sub-Sectors	Total Production Value (million qurushes)	Total Production Value with DMs (million qurushes)	Total Production Value (million British pounds)
Carpet Business	108.5	155.7	1.4
Hand Looms	220	315.7	2.9
Coppersmith	33	47.4	0.4
Saddlery and Shoe-Making	214	307.1	2.8
Total	**575.5**	**825.9**	**7.5**

The findings presented in Table 3 highlight the importance of small-size local production in the Ottoman Empire. The data shows that the production value of this household-based or corner store-based production was approximately 42% of those in firms within the industrial census. However, in view of the nature of those firms, the DMs imposed over those productions should be higher. It is expected that producers within those industries have had lower financial resources to transfer their products towards larger markets. As mentioned above, no research that we are aware of has been undertaken on Ottoman DMs. This led us to use similar DMs, 43.5%. As a result, Table 2 and 3 provide aggregate industrial output levels of the Ottoman Empire in 1913. These figures show that the industrial production was almost 2,774.3 million Ottoman qurushes and approximately 25 million British pounds in 1913.

Total Production Values of other Sectors

This study employed total production values of other sectors, including mining and quarrying, financial activities, social and public services, dwellings, transportation, self-employment, and services, both in GDP and per capita GDP estimates. It should be noted however, that those statistics are contained sales amount with current prices of 1913. It is for this reason that the distribution margins are not applied to the total production value for each individual sector. Table 4 presented the total production values of each sector in terms of Ottoman qurush and British pounds for 1913. Each data is based on primary sources generated by the Ottoman government from the last decades of the 19th century. Thus, each data reflected exact and absolute values instead of estimates. As mentioned in the analysis of industrial production, the data generated by the Ottoman government might have presented missing information. This problem has probably resulted from the fact that the Ottoman Empire stretched over large territories even when certain parts of it had been lost on the eve of the First World War.

Table 4

Total Production Values of Other Sectors for 1913

Sectors	Total Production Value (million qurushes)	Total Production Value (million British Pounds)
Transportation	729.0	6.6
Mines	197.0	1.8
Government spending	1,774.0	16.1
Financial activities	266.0	2.4
Housing incomes	664.0	6.0
Self-employment and services	1,025.0	9.3
Total	**4,654.0**	**42.2**

Source: Eldem (1994, p. 224)

Net Export

To obtain net export (NX), Pamuk's re-casting process is used instead of the direct use of archival documents (Pamuk, 1995). As the export of the Ottoman Empire was registered concerning free on board (f.o.b.) prices, at the same time, the imports of the Ottoman Empire were registered concerning cost, insurance, and freight (c.i.f.) prices. For reliable and comparable results, Pamuk subtracted c.i.f. prices

from import prices obtained from foreign statistics and added transportation and insurance costs into the f.o.b. export prices. Thus, the net export of the Ottoman Empire was -1.122 million qurushes for 1913 (Table 5).

Population

An important yet complicated issue in economic history analysis related to the fact that the population has been drawn from the Ottoman population census (Behar, 1996, pp. 46-55). Along with the established output data, the population represents one of the most important indicators to determine the per capita GDP levels of the Ottoman Empire. It is difficult to present an absolute population for the Ottoman Empire on the eve of the First World War. The recent literature presented different population levels for 1913. Each population mentioned in the recent literature is dependent on the purpose of the analysis. This study estimated the population of the Ottoman Empire for the year in 1913 to be 18.3 million. Even if this estimation is based on the census of the Ottoman Empire, we decided to consider the population of Anatolia along the small provinces in the Middle East. Given that the output census has excluded substantial parts of the Middle East and regions remaining in Arabia, this study chose to use the same approach and has focused on certain territories around Anatolia.

GDP and Per Capita GDP Estimates

This part presented the estimate outlined in this study. Extensive use has been continually made for the 1913 estimate of Ottoman agricultural output as well as the 1913 estimate of Ottoman industrial output. This study, however, used reliable secondary sources based on primary sources for in order to incorporate other output series into the estimate. Those sources generated the basis for the output approach, which accounts for Ottoman GDP. The year 1913 was chosen for the estimate in view of the availability of data sources. The recent literature showed that the revisions have not been made to those basic sources, and hence, this study appears to offer a revision by way of including Feinstein's DMs on the estimate of GDP and per capita GDP levels of the Ottoman Empire. However, the revision of agricultural and industrial output series have caused to emerge higher values than those in earlier estimates.

Table 5
GDP at Current Prices of 1913

Sectors	Total Values (million qurushes)	Total Values (million British pounds)
Agriculture	18,904,0	171.8
Industry	2,773.3	25.2
Other services	4,654.0	42.3
Domestic Income	26,331.3	239.3
Net Export	(-1,122.0)	(-10.2)
National Income	25,209.3	229.1
Indirect taxes	1,008.4	9.2
Net National Product	26,217.7	238.3
Depreciation	1,119.5	10.1
GDP	27,337.2	248.4

Table 5 also presented a few more calculations set to obtain the GDP level of the Ottoman Empire. The sum of aggregate output levels of agriculture, industry, and other different services provided the domestic income for 1913. Inclusion of the net export value allowed for finding the national income for the benchmarked year. However, in order to obtain GDP estimates, this study also included indirect taxes and depreciation using Eldem's method based on the output approach (1994, p. 224). Because the lack of data, it is difficult to determine the absolute rates for those variables according to primary sources. Interestingly enough, no research has been fully dedicated so far on depreciation in the Ottoman Empire.

The method used Eldem provided information on the rates of those economic variables in GDP. According to this secondary source, indirect taxes were approximately 4% of national income in the Ottoman Empire. When this figure was included to the estimate, indirect taxes have become approximately 1,008.4 million Ottoman qurushes while the net national product emerged as 26,217.7 million Ottoman qurushes. The only research related to the GDP estimate employing depreciation has shown that this rate was approximately 4,27% in the Ottoman Empire. The only estimate in the literature on the depreciation rate has used this figure, and a study claiming the opposite has not been done yet. Thus, this study chose to employ this only figure in the GDP estimate, thus leading to the result of 1,119.5 million Ottoman qurushes of depreciation. The findings presented in

Table 5 suggested that GDP was approximately 27,337.2 million Ottoman qurushes equal to 248.4 million British pounds in 1913.

These findings allowed us to estimate the per capita GDP levels of the Ottoman Empire in terms of Ottoman qurush and British pound in 1913. These figures suggested that the per capita GDP was approximately 1,494 Ottoman qurushes regarding the population that was given prior to 1913. Once the per capita GDP is obtained in terms of Ottoman qurush, it would then be easy to convert this value into British pound and 1990 US dollars to establish a comparative perspective with earlier estimates. Regarding exchange rates given in Table 6, the new aggregate estimate showed that per capita GDP was 13,57 British pounds in 1913. This figure also indicated that the per capita GDP level was 1,502 US dollars with the stable prices of 1990.

Table 6
Exchange Rates

	1840	1880	1890	1907	1911	1913
Qurush	109	110	110	110	110	110
Gold Lira	1,09	1,10	1,10	1,10	1,10	1,10
British Pound, 1990	51,80	62,20	72,50	72,50	72,50	72,50
US Dollars, 1990	92,20	110,72	110,72	110,72	110,72	110,72

Notes: For exchange rates of qurush, gold lira, and British pound; see, Pamuk, 2006: 819; and, Pamuk, 2000: 191. For the values of 1990, see "Five Ways to Compute the Relative Value of a U.K. Dollar Amount, 1270 to present" MeasuringWorth, accessed Dec. 27, 2019, https://www.measuringworth.com/calculators/ukcompare/; and, Lawrence H. Officer and Samuel H. Williamson, "Computing 'Real Value' Over Time with a Conversion between U.K. Pounds and U.S. Dollars, 1791 to Present", MeasuringWorth, accessed December 27, 2019, https://www.measuringworth.com/calculators/exchange/.

However, before giving how this study converted the Ottoman qurush to the US Dollars with the stable prices of 1990, it is important to look at earlier estimates within the Ottoman literature. According to Pamuk, $ 1,213 at the stable prices of 1990 is the same as £ 10 in 1913 (2009, pp. 143-44). Although Pamuk (2014, pp. 107-46) indicated that 10 British pounds are equal to approximately 1200 US Dollars with stable prices of 1990 in earlier estimates, he decreased the 1913 per capita GDP estimate to $ 1,150 with the stable prices of 1990 in his recent research. This means that the exchange rates regarding Pamuk's earlier estimates have shown that £ 1 in 1913 approximately equals 115 US Dollars in 1990.

This study also developed its exchange rates using data available in recent literature. Officer and Williamson (2019) calculated and presented relative values of the British pound and US Dollars for the long- term. These newly established exchange rates have provided detailed information over the values of the British pound in 1913 regarding the values of 1990. These relative values have five main dimensions: i) real wage or real wealth, ii) household purchasing power, iii) relative labor earnings, iv) relative income, v) relative output. The nature of this study directed us to employ household purchasing power values to construct the exchange rates among Ottoman currencies and foreign monetary values. Using a comparative perspective, the value of £ 1 in 1913 is close to the findings of Pamuk's earlier estimates (2006). The $ 5 difference probably results from corrections of recent research in prices of commodities mostly based on foodstuff and other diverse consumption patterns of households held between the Ottoman Empire and European countries. The findings, however, have shown that the estimates in these figures provided us rather with accurate estimates in converting Ottoman currencies into British Pound and US Dollars in 1990. Thus, it is possible to find the value of 13,57 British pounds in 1913 by multiplying this figure with 110,72, and hence, the per capita GDP of the Ottoman Empire is estimated at about 1,502 US Dollars in 1990.

Earlier Estimates for the Ottoman Empire

The two main pieces of literature have estimated the GDP and per capita GDP levels of the Ottoman Empire from the beginning of the 16th century to the First World War. The first is the mainstream Ottoman literature based on available primary sources. The second however, is the current literature that presented comparative analysis among economies, including the Ottoman's. Each estimate included different GDP and per capita GDP estimates because of diverse methods and sources. The found differences probably result from the complexity of the changing boundaries of the Ottoman Empire. While some are dependent on the current boundaries of Turkey, others have taken boundaries of the Ottoman Empire into account in their estimate of economic performances. A careful glance should be sufficient to clear up the dilemma emerging from the changing boundaries of the Ottoman Empire. As Eldem (1994, pp. 227-28) has shown, the per capita GDP of the Ottoman Empire was about 1,070 qurushes in 1913. Another estimate on the boundaries of Turkey indicated 1,103 qurushes for the same year. Pamuk also argued that the per capita GDP level of the Ottoman Empire was 1,200 qurushes in 1913 (2006, p. 817). In sum, the per capita GDP estimates for different boundaries are found to be close to each other, and hence, estimates based on the boundaries of Turkey reflect the levels of the Ottoman Empire (Table 7).

Table 7
Comparative Estimates of the Ottoman Empire and Turkey, 1907-1914

	1907	1913	1914
Population (Ottomans, millions)	24,8	20,7	20,9
GDP (Ottomans, million qurushes)	21,920	22,143	24,107
Per Capita GDP (Ottomans, qurush)	**884**	**1070**	**1153**
Population (Turkey)	14,54	15,32	15,46
GDP (Turkey, million qurushes)	13,386	16,897	18,336
Per Capita GDP (Turkey, qurush)	**921**	**1103**	**1186**

Notes: Eldem (1994)

Secondly, the differences in the per capita GDP levels of the Ottoman Empire have emerged in the current literature. Angus Maddison's (2001; 2003) *The World Economy: A Millennial Perspective* and *The World Economy: Historical Statistics* represent two of the pioneering comparative studies presenting aggregate GDP and per capita GDP levels of economies. These estimates have included data on the population, GDP, and per capita GDP levels of the Ottoman Empire. The method adopted under Maddison projects is based on price levels and purchasing power parities (PPPs) with 1990 Geary-Khamis dollars. This estimate is based on the components of the CPI and their values with the stable prices of 1990. Following Maddison's projects, few other studies have developed these estimates with current prices of subsequent years. First, Pamuk and Van Zanden (2010) have used a similar method, however, based on the purchasing power and standards of living regarding the CPI with the prices of 1990. The findings of this research are close to the per capita GDP estimates of Maddison Projects for the benchmark years of 1700, 1820, 1870, and 1913.

On the other hand, Broadberry and Klein (2012) have used a comparative perspective to estimate the per capita GDP levels of the Ottoman Empire. This study has developed estimates on the boundaries of the Ottoman Empire following the Balkan Wars without Arabian territories. The method of the study is based on benchmark years. Furthermore, this estimate converted all national currency units to 1990 international dollars, using PPPs from Maddison. Contrary to other estimates based on the year 1913, this study has mostly focused on the years 1905 and 1927 within the time series projection methodology. Changing benchmark years within the time series projection methodology entails to different outcomes

in per capita GDP estimates with the stable prices of 1990. Although the literature argued that the problems of time series projection methodology in the per capita GDP estimates (Prados de la Escosura, 2000; Ward & Devereux, 2003), Broadberry (2003) argued that there are small differences in per capita GDP estimates based on time series projection and the benchmark year methodologies. Employing the data based on the years of 1905 and 1927 with the prices of 1990 entails to the emergence of higher estimates for per capita GDP levels of the Ottoman Empire.

Bolt and Van Zanden (2014) employed similar method under the benchmark years. This study, however, has incorporated new data series into the earlier estimates made within the Maddison Projects. In particular, the new real wage levels presented by Pamuk and Shatzmiller (2011) that entail to changes in standards of living and purchasing power are at the center of this estimate for the Ottoman Empire. Updated wage levels should increase purchasing power parity while higher estimates for per capita GDP levels probably result from including new and higher real wages. In short, the recent literature has included the different per capita GDP estimates for the Ottoman Empire. The newly used data series or small changes in methodology led to results of small differences. In other words, the differences in estimates are based not only on the changing boundaries of the Ottoman Empire but also on the changing methodology and data series over time.

Following the discussion, estimates shown in the current literature, the Ottoman literature's estimates have in the last few decades employed different methods and data series. The mainstream Ottoman literature has employed a series of primary and secondary sources under different approaches in estimating GDP and per capita GDP levels for the years extending between 1840 and 1913. Those estimates are based on primary resources such as the official census made on different Ottoman sectors. The constituent sectors include agriculture, industry, commerce, government spending, and other financial expenses for the benchmark years of 1907, 19013, and 1914 (Eldem, 1994, p. 224). This first estimate is based on the output approach. However, the data employed is limited to the official census of the Ottoman Empire. For instance, the industrial census consists of manufactures that employed more than 10 workers and those located in only Western Anatolia (Ökçün, 1998). This study has also derived populations of the benchmark years from the census for both the current boundaries of the Ottoman Empire and Turkey (Eldem, 1994, p. 226-27).

The second estimate examined the economic performance including the political decisions from the beginning of the 19th century to the First World War (Okyar, 1987). This study has divided the era into two sub-periods. The first, is

the period when political reforms were imposed by the State beginning with the 19th century to the 1880s. The second is when economic growth emerged as the outcome of a new political structure during the last decades of the 19th century. The main argument indicated is that the key political factors were the reforms over the institutional structures toward centralization for the 19th century Ottoman Empire. As far as the modern economic growth is concerned, it is argued that the Ottoman Empire concentrated on increasing production capacity with certain attempts through industrialization policies from the beginning of the 1840s. Okyar (1987) noted that foreign debts became the primary financial resources instead of traditional domestic borrowing mechanisms of earlier periods as tax-farming, Esham, or privately established organizations (cash waqfs). Thus, the main argument of this study is that the flow of financial resources with lower interest rates has had a positive effect on economic growth, particularly in the last decades of the Ottoman Empire.

The reforms toward highly centralized political structures entailed to better economic performances in terms of per capita GDP regarding the earlier periods dominated by decentralized institutions for the Ottoman Empire (Table 8). The second period had three main benchmark years for GDP and per capita GDP estimates to show the effects of changing political structure during the first period. Okyar estimated GDP levels by employing primary sources and self-created data for 1890, 1907, and 1911 (1987, p. 45). Each estimate was based on a value-added approach, and Ottoman GDP was 158.9 million gold liras for 1890, 212,1 million gold liras for 1907, and 235,1 million gold liras for 1911. When the population was imposed for each benchmark year, the per capita GDP levels were at 8.9 gold liras for 1890, 9.6 gold liras for 1907, and 9.15 gold liras for 1911 (For population, Eldem, 1994, pp. 14-22).

The final estimate of the mainstream Ottoman literature included more complex and comprehensive methods. This estimate used a variety yet combined sources within the three main stages (Pamuk, 2006, p. 815). Employing benchmark years was the dominant method within this estimate as it was the same in former estimations. The first stage was based on the moving backward method from the data of Turkey. The per capita GDP of the Ottoman Empire decreased approximately 50% or more during the First World War. Pamuk noted that in 1929, Turkey's per capita GDP levels reached the level of 1913 (2006, p. 813).

The second stage included current data based on the census of the Ottoman Empire. In addition to the current census set for each sector, this estimate included daily wages and domestic prices among Middle Eastern and Balkan societies in a

comparative perspective. It could be expected that the purchasing power parities of the Ottoman Empire and other societies (mostly Middle Eastern and Balkan countries) would be close to each other in view of the close domestic prices and per capita GDP levels (Pamuk, 2006, p. 814). Finally, the third stage included census for output series in addition to fiscal and commercial data from reliable secondary sources. Daily wages, however, were the most important variables in estimating the per capita GDP levels regarding the latter estimate. The daily wages of both skilled and unskilled workers in the Ottoman Empire were slightly higher than those of the Middle Eastern and Balkan countries (Pamuk, 2006, p. 821). The combination of each data series showed that GDP was at 130 million gold liras for 1840, 160 million gold liras for 1880, and 260 million gold liras for 1913 while per capita GDP levels were 5, 8, and 12 gold liras for the benchmark years (Pamuk, 2006, p. 817).

Checking the Estimates

Earlier estimates have used different methods to estimate the GDP and per capita GDP levels for the Ottoman Empire. Pamuk (2006), however, applied three different mechanisms for checking the estimates. The first employs similar data series such as prices of staple goods and wages of unskilled workers from different countries located close to the Ottoman economy. The second method involved comparison of productivity levels of early industrialized economies and the Ottoman Empire in examining the divergence between 1820 and 1913. The third is based on the annual growth rates among benchmark years. Pamuk has argued that if the growth rate were higher than 1% in the Ottoman Empire, the per capita GDP would be approximately 400 US dollars in 1820, which was equal to the subsistence level of the Maddison framework (2006, p. 822). For this reason, the economic growth should be between 0 and 1 % for the Ottoman Empire. This study includes different methods and historical evidence for checking estimates.

The Ottoman economy faced several shocks as a result of the exogenous and endogenous factors during the era extending between 1870 and 1880, causing the per capita GDP levels to decrease at least 4% during this period (Pamuk, 2006, p. 820). The political crisis that emerged particularly in the Balkan provinces led to the financial crisis because of independence movements. While these crises deteriorated tax revenues, increasing military struggles entailed to increasing costs for state finance from the beginning of the 1870s. More importantly, the spreading financial crisis of European markets forced the Ottoman Empire to declare a moratorium during the same period. Following the moratorium, a war emerged between Russia and the Ottoman Empire in 1877. Thus, the exogenous

shocks caused decreases in both population and territories during the last decades of the 19th century (Pamuk, 1984, p. 109). Furthermore, the Ottoman Empire also witnessed a famine-affected agricultural production and alongside increased prices, particularly in the Anatolian provinces. Thus, the economic decline inevitably caused negative growth in this sub-period. As Table 8 shows, because of exogenous shocks, the average per capita GDP levels decreased from the beginning of the 1870s up until the 20th century.

The Ottoman economy also encountered emerging economic problems resulting from the Great Depression between 1873 and 1896. The last quarter of the 19th century witnessed a period of decline of foreign trade, investment, and capital flows. The capital inflow was at 8.1 million British pounds in the period extending between 1865 and 1875, which decreases to 6.4 million British pounds during the last quarter of the 19th century and 4.1 million British pounds in the first years of the 20th century (Pamuk, 1984, p. 113). As highlighted in Table 8, the decreases in average per capita levels could be expected during the last quarter of the 19th century.

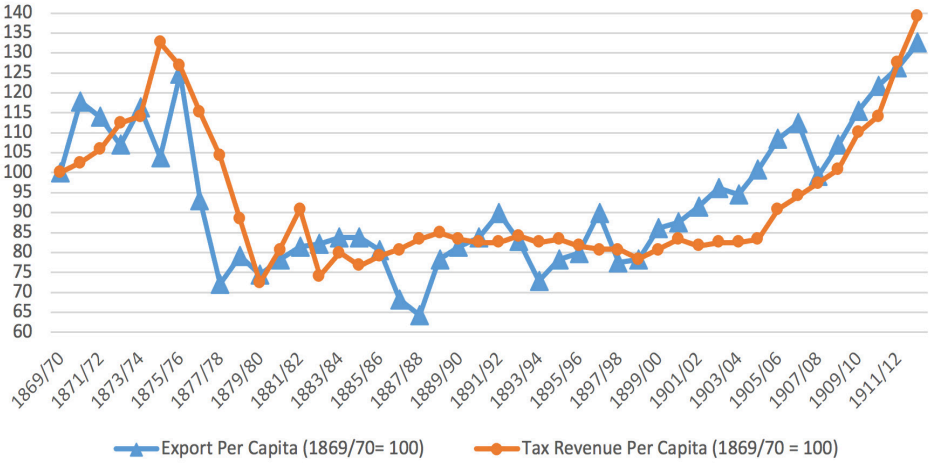
Following the exogenous shocks emerging during the last quarter of the 19th century, another critical indicator that allows us to check estimates was manifested in the trend of Ottoman foreign trade during the 19th century. During the first three-quarters of the 19th century, the export growth rate was at 5.2% per annum which decreases to 2.6% per annum in the last quarter of the century and increases only 4.3 % per annum until the First World War (Pamuk, 1984, p. 109). The import trend carried similar trend compared to export made during the same period. The trend of average per capita estimates showed a similar trend with the trend of not only the capital inflows but also the foreign trade for the Ottoman Empire. As far the per capita tax revenues are concerned, the Ottoman Empire had had a better performance from the beginning of the 20th century. While annual growth rates of per capita tax revenues were 0,7 % during the last decades of the 19th century which increased to 4,3 % until the First World War (Pamuk, 1984, p. 117). The trend of those economic variables appears to be compatible with the trend of average per capita GDP levels (Table 8).

Figure 1 highlights the trend of per capita tax revenues and exports which match the shocks emerging between 1870 and 1913. As mentioned earlier, the Ottoman economy faced a decline because of the moratorium, famine, political crisis in Balkan provinces, military struggle with Russia, and financial crisis in European markets between 1870 and 1880. Figure 1 shows this economic decline in terms of

per capita tax revenues and exports, particularly from the beginning of the Russian war. As shown, the effects of the Great Depression were much longer than earlier shocks. The stagnation and slight decline appear to be compatible with the trend of per capita tax revenues and exports during the last quarter of the 19th century.

Figure 1

The Trend of Per Capita Tax Revenues and Exports (1870-1913)



Source: The population data is derived from Behar (1996). For tax revenues, see Güran (2003), and for exports "Ottoman Financial Statistics: Budgets, 1841-1918" in *State Institute of Statistics Prime Ministry Republic of Turkey* ed. Tevfik Güran (Ankara: Turkish Statistical Institute, 2003). For exports, see Pamuk (1995).

An Assessment over Per Capita GDP Estimates

Table 8 highlights the comparative estimates over the per capita GDP levels of the Ottoman Empire. These estimates have ranged from the 16th century to the First World War. The data shows values of different estimates in terms of US Dollars with the prices of 1990. Different methods and data series employed within the estimates entailed to diverse outcomes. However, the data has shown that the differences in the per capita GDP estimates are relatively small considering the benchmark years. The nature of historical data, particularly for developing economies before the First World War helped economic historians to further examine economic performances through benchmark years. However, lack of data limited the boundaries of research, especially within both the Ottoman and current literature. Eldem's estimate is based on output series (1994) while Okyar (1987) employs tax revenues to establish the per capita GDP levels for specific years. Pamuk, used far more complex methodology, considering not only the output

series but also benchmark years, and the findings of this study are slightly higher than those made by earlier Ottoman literature.

The current literature chose to employ different methods based on time series projection and benchmark years methodology. Those estimates have mostly used from real wages and price levels, which were adjusted regarding the prices of 1990. Thus, the findings of the current literature are higher than those realized by the Ottoman literature. However, one of the most important contributions of the current literature is that those studies can estimate per capita GDP levels for earlier periods thanks, to the very methods they have employed. The estimates covered earlier periods before the 19th century, however, should be considered carefully in view of the changing consumption patterns of individuals over time. No research has been made on individual and household diets in the Ottoman Empire. This has directed economic historians to estimate per capita GDP levels through a stable consumption basket set for the long term. Despite the problems in data series, these estimates have been widely used by economic historians, particularly for examining the economic performance of the Ottoman Empire.

Table 8

Per Capita GDP Estimates in a Comparative Perspective, 1500-1913 (1990 US Dollars)

Sources	1500	1600	1700	1750	1820	1840	1870	1880	1890	1907	1911	1913
Eldem*										890		1077
Okyar*									887	956	912	
Pamuk*						712		800				1195
Maddison	600	600	600		643		825					1213
Van Zanden & Pamuk			597	648	682		887					1211
Broadberry & Klein							952					1407
Bolt & Van Zanden		600	700		740							
Bulut & Altay					770		1078					1502
Average	**600**	**600**	**632**	**648**	**709**	**712**	**935**	**800**	**887**	**923**	**912**	**1268**

Notes: * The estimates of the Ottoman literature are in Ottoman currencies. Each estimate is converted into 1990 US Dollars through exchange rates presented in Table 6.

What causes the emergence of higher estimates within this study is that the use of a new approach based on Distribution Margins of Feinstein (1973). Since no research has been made on the DMs of the Ottoman Empire, we have chosen to

use the margins emerging in the British economy. One research employed similar DMs to estimate the per capita GDP levels in the Irish economy (Bielenberg & O'Mahony, 1998). Although the authors accepted higher costs in the Irish economy compared to the British economy, the lack of research has directed them to use the margins used for the UK economy. In other words, it is expected that the Ottoman Empire should have higher DMs, leading to higher estimates than those made in this study. However, the data has limited to use different margins that are compatible with the Ottoman economy in 1913. Furthermore, this study has also included certain corrections of agricultural and industrial outputs. Incorporating small-size (household-based) manufacturing production into the estimate should cause higher estimates than those made in earlier estimates. The findings, however, are compatible with the historical evidence of business cycles that emerged in the Ottoman Empire. More importantly, even if the results are higher, there are relatively small differences between the findings of this study and earlier estimates.

Concluding Remarks

This study sought to reestablish the GDP per capita series for the Ottoman Empire between 1870 and 1913. The findings of the study have revealed that the per capita GDP levels are slightly higher than former estimates. However, this difference might have occurred because of the methods used in earlier estimates. This current study included the DMs to estimate the per capita GDP levels of the Ottoman Empire. Even if these margins are based on estimates of Feinstein for the British economy, Feinstein's findings and method are widely accepted by other economic historians. This research and alongside the method based on DMs may effectively contribute to the current discussions on the economic performance of the Ottoman Empire while encouraging Ottoman economic historians in the future to further examine the DMs within the Ottoman economy.

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