Industrial growth revisited: Manufacturing output in Greece during the interwar period

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1: Introduction

Although industrial production and growth in Greece during the interwar period has attracted considerable attention, there has not been any serious challenge either in qualitative or quantitative terms to the orthodoxy established in the period itself. The literature usually sees the 1920s as a landmark in the industrialisation of the country and a time when Greek manufacturing achieved an "unprecedented prominence"[1]. The momentum given to industrial expansion in the 1920s was encouraged by institutional changes brought about by government policy aimed at reducing social tensions stemming from unemployed refugees gathered in urban areas[2], by the depreciation of the drachma and heavy tariffs[3]. The swift demographic changes that happened in the country following the Asia Minor debacle, however, have played a pivotal role in the literature in explaining industrial growth in the 1920s. According to conventional belief, the arrival of the refugees created the preconditions for an industrial expansion in the 1920s.[4] The sudden increase in the population of the country has been linked to industrial growth in three ways: firstly, the abundance of cheap labour gathered in urban centres exerted downward pressures on wages; secondly, the refugees it is argued, brought with them entrepreneurial skills, their skilled labour, in short contributing to an improvement of the human capital in Greece, and took initiatives that promoted industrial development; finally, the sudden expansion of the domestic market because of the increase in the population boosted demand which consequently stimulated industrial production. The carpet industry, an industry that emerged

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[1] Mazower (1991), pp.91-94.

[2] For more about this issue see Hadziiossif (1993), pp.279-283 & p.340.

[3] Mazower (1991), p.92; Riginos (1987), p.171; Riginos (1986), p.151.

[4] See Alogoskoufis & Lazaretou (1997), p.103; Dritsa (1990), p.163; Riginos (1987), p.97; Gevetsis (1975), pp.171-6; Pepelasis (1961), p.511; Aigidis (1934), pp.114-124.

in the 1920s and was mainly run by refugees, is usually mentioned as a representative example of the impact that refugees had in promoting new industries and entrepreneurial skills in the country.[5]

A.F.Freris takes a more moderate view of the effect that the refugees had on industrial development in Greece and argues that if the refugees had an impact on industry it was to reinforce tendencies that were already present.[6] By contrast, Kostas Kostis has challenged altogether the notion of a brisk industrial expansion in the 1920s and the effect of the arrival of the refugees on industry.[7] The argument that he puts forward is that between 1923 and 1932 Greek industry did not experience sufficiently significant progress to justify the belief that the arrival of the refugees was important to industrial growth.[8] He dismisses the correlation between real wages and industrial growth on theoretical grounds. Instead, he sees industrial growth before 1932 as slow, tentative and shaky and argues that the expansion of the electricity supply is what makes industry seem to be achieving growth.[9] The periodicity of the interwar period that Kostas Kostis uses, (he divides the period into two sub-periods: one that covers the 1920s up to 1932 and the other from the end of the Depression to the end of the interwar period), conceals certain advances in the 1920s. Furthermore, he does not provide any evidence to support his argument. Indeed, the existing indices of industrial production during the interwar period, which are described in the following section of this paper, show industrial growth in the 1920s to be far from negligible. As far as the role of cheap labour and real wages in promoting industry is concerned, it can be more

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[5] Dritsa (1990), pp.314-317; Dritsa (1989), pp.48-9; Gevetsis (1975), p.90; Aigidis (1934), pp.121-122. For a different view see Hadziiossif (1993), pp.102-3.

[6] Freris (1986), p.51.

[7] Kostis (1992), pp.37-38; Kostis (1987), pp.148-150.

[8] Kostis (1992), p.37.

important than the author maintains especially in a period of inflationary instability, as was the case in Greece in the 1920s.

Expansion in industry in the 1920s is in general seen as being rapid but this momentum is not thought to lead to any structural changes by the end of the decade. Small, self-financing family firms dominated the sector. It has been argued that the number of industrial establishments doubled between 1920 and 1930, an argument based on a comparison of the results of the two censuses which were conducted by the National Statistical Service in those two years.[10] This comparison, however, leads to false results as the two censuses are not directly comparable. They do not follow the same definition of what comprises an industry and the 1930 census includes companies that should be placed in the service sector. The 1930 census states that the unit of census is any firm even if this is based in the home of its owner or even if its owner is at the same time the only employee of the company.[11] By contrast, the census carried out in 1920 is restrictive in what is regarded as industry. Firms located in the home of the owner are excluded. It only includes companies which employ at least two people including the owner.[12] Therefore, a comparison of the results of the two censuses tends to overstate the number of new firms that were established in the 1920s. In addition, conclusions drawn about developments regarding the increase in the average number of workers per firm or the average horse power per firm in 1920 and in 1930 are not technically correct and do not give an accurate picture of the advances that occurred in the 1920s.

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[9] Kostis (1992), p.37.

[10] Mazower (1991), p.94; Dritsa (1990), pp.98-99; Bandaloukas (1984), p.585; Statistical YearBook, 1931 (1932), p.124; Statistical YearBook, 1930 (1931), p.177.

[11] Census of Establishments of Industrial and Commercial Enterprises of September 1930, No 737-6 (1934), p.e.

[12] Census of Establishments of Industrial and Commercial Enterprises of September 1930, No 737-6 (1934), p.ia; Census of Handicraft and Industrial Enterprises of 18th December 1920, No 275-2 (1926), p.e.

Historically, there has been a striking unanimity in the way scholars have seen Greek industry to perform during the Great Depression.[13] The literature, based on the existing quantitative evidence, portrays Greek industry as an outlier during those years; industrial production it is argued, continued growing after 1929 and only underwent a mild recession in 1932 from which it quickly recovered the following year to enjoy high rates of growth until the end of the decade. It has been argued that the backward character of the Greek economy shielded the country from experiencing a severe recession[14] and that the small part industrial production played in the total economy protected it from the consequences of the international slump[15]. On the other hand, signs of distress in the agricultural sector have been documented and it is believed that agricultural production started falling before the crash at the New York Stock exchange.[16] The economic crisis in Greece has been seen as being concerned mainly with balance of payments and exchange rate problems and as only slighting affecting the productive sectors of the economy.[17] Recently this view has been strengthened by reference to GDP figures which show a very moderate recession in Greece during the Great Depression.[18]

Economic revival from the Great Depression came early and was strong. According to the literature the catalyst to economic upswing in 1933 was the move to autarky that was promoted by state intervention and which also

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[13] See Alogoskoufis & Lazaretou (1997), p.115; Hadziiossif (1993), p.303; Kostis (1992), p.38; Mazower (1992), p.132; Mazower (1991), p.138; Dritsa (1990), p.61; Kostis (1986), p.22.

[14] Mazower (1991), p.293.

[15] Dritsa (1990), p.61.

[16] Hadziiossif (1993), p.250; Kostis (1986), pp.24-5 & p.42.

[17] Alogoskoufis & Lazaretou (1997), p.115.

[18] Kostelenos (1995), p.333, p.451 & p.462.

boosted industrial growth during that decade.[19]   Early devaluation has been hesitantly mentioned as a factor which led the country to recovery.[20]

The most frequently used index of industrial production for the period 1921 to 1938 in Greek literature is that produced by the Supreme Economic Council in the 1930s. This index does indeed depict the rapid rates of growth during the whole interwar period that both contemporary observers and modern economic historians describe. However, the cyclical fluctuations that this index charts, (it shows industrial output as growing after 1929), cast considerable doubt on its reliability in giving an accurate picture. Indeed, as is discussed in the next section, where existing quantitative data on industrial production for the interwar period is examined, all available indices produce the same picture.

Several questions arose from an examination of both the literature and the indices available on Greek industry during the period in question. Greece, a small open economy, is susceptible to fluctuations in the world economy and historically there has been a high correlation between economic activity in the country and international trends. Thus, the picture charted by indices for industrial performance in Greece during the Great Depression may not be reliable and may lead to misleading conclusions about the impact of the depression on the country. In addition, it will be interesting to reassess cyclical downturns both in the 1920s and the 1930s and indeed to ascertain if manufacturing growth during the period under examination here was as rapid as it has been argued in the literature.

Although numerous contemporary reports exist which describe the growth of Greek industry during the First World War the paucity of statistical data makes it

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[19] Hadziiossif (1993), p.353; Kostis (1992), p.39; Mazower (1991), p.237.

[20] Hadziiossif (1993), p.353; Mazower (1991), pp.12-3.

impossible to quantify the industrial performance of those years and examine whether the industrial expansion of the 1920s is a continuation of trends already established during the Great War.[21] By contrast, there is reliable statistical information on industry which can be used to construct a New Index of industrial output for the period 1921 to 1938. This should give the best possible indication as to industrial growth during the period in question, given the limitations of the data. Indeed, the main objective in this paper is to challenge in a quantitative way the established orthodoxy concerning industrial output in the interwar period.

In Section Two, earlier indices of industrial output and other available measurements of industrial growth during the period in question will be reviewed and the reliability of these estimates will be discussed. The methodology followed to construct a New Index of industrial production will be presented in detail in Section Three and data imperfections will be dealt with. In Section Four, the analysis will focus on the results and conclusions drawn from the New Index. This index will be compared with earlier estimates and it will be argued that the New Index of industrial growth is a much better assessment of the manufacturing performance in the country than existing estimates. Section Five puts forward hypotheses which shed new light on industrial advances during the period in question and explores the mechanisms that brought about these developments. The paper finishes with some concluding remarks.

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[21] It has been argued that during the Great War industry expanded significantly and that attitudes towards industry changed during that time. Disturbances to international trade during wartime, the presence of the Allied forces in Macedonia and the Entente blockade created the conditions according to the literature for the industrial expansion of that period. (Mazower (1991), p.57; Riginos (1987), pp.84-5; Zolotas (1926), p.18.)

2: Earlier Indices of Industrial Production

The first index of industrial production in Greece for the period 1921 to 1938 was constructed by the Supreme Economic Council in the 1930s. This index is described as a weighted volume index which includes approximately 80 per cent of the total industrial production.[22] It includes eleven industrial sectors including Electricity after 1925. These other sectors are Metallurgy, Mechanical, Construction, Textiles, Foodstuffs, Chemicals, Tanning and Leather, Paper, Clothing and Tobacco.[23] There is no information available on the statistical method followed, the data and the weighting used for the construction of this index which would allow us to evaluate its accuracy and statistical validity.

This index of industrial production picks up two recessions in the 1920s, one in 1923 the year after the Asia Minor debacle and a second one in 1926. Both downturns are well documented in qualitative evidence for the period. However, it shows industrial production in Greece as continuing to grow after the onset of the Great Depression, a picture which is strikingly at odds with the international trend and marks Greece out as an outstanding exception. It does show a mild downturn in 1932 but then a brisk recovery comes in 1933. In fact, according to this index, industrial production never fell below its 1929 level. Subsequently, the index presents the country as enjoying high rates of growth with a minor interruption in 1936 when production flattens out. (See Table 1, Column 2 and Figure 1.)

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[22] Supreme Economic Council (1937), p.23; Supreme Economic Council (1936), p.51; Supreme Economic Council (1935), p.7.

[23] Charitakis (1940), p.259.

Table 1: Earlier Indices of Industrial Production

	Supreme Economic Council	Mazower
1921	*36.49*	40.67
1922	*41.96*	43.10
1923	*37.31*	44.44
1924	*48.01*	56.16
1925	52.89	60.40
1926	50.31	57.98
1927	56.17	62.49
1928	59.50	67.34
1929	60.56	68.75
1930	62.64	70.30
1931	64.78	70.98
1932	61.08	67.74
1933	66.51	75.42
1934	75.84	89.90
1935	85.18	88.62
1936	84.32	93.54
1937	91.55	96.90
1938	100.00	100.00

Note: The index prepared by the Supreme Economic Council is not homogeneous. It does include   electricity but only after 1925.

Sources: Mazower (1990), p.311; Charitakis (ed.) (1940), p.259.

A more recent attempt to gauge industrial production during the period in question was made by Mark Mazower.[24] His calculations are based on output data for over 80 items appearing annually presumably in the Yearbooks of the National Statistical Service. Again, it is difficult to evaluate the method that was followed to construct these indices. However, the limited information presented suggests that value output figures converted at 1930 prices have been used and that Shipbuilding is also included. For reference purposes in this paper the index called "Net Output without Electricity" has been chosen from the indices that Mazower constructs. This index of manufacturing output shows a mild recession in 1926 but does not highlight the year 1923 as a year of turmoil. Furthermore, industrial production continues growing after 1929 and only in 1932 is there a downturn which is rapidly reversed in 1933. Overall, Mazower's index of manufacturing production in Greece shows very moderate growth between 1929 and 1931 and then a modest downturn in 1932, a picture which again is at variance with the world economy. After 1933, it depicts outstanding rates of growth with a minor glitch in 1935 when industrial growth seems to have lost momentum.

George Kostelenos has produced value added for the primary, secondary and tertiary sectors in his attempt to estimate GDP figures for Greece during the period 1858 to 1938.[25] He has also estimated a price index. His estimates of value added in the secondary sector deflated by an appropriate price index could give us some indication of the performance of the Greek secondary sector during the period in question here. However, the price index in *Money and Output,* a Laspeyres index, is constructed with the prices of goods mainly from the agricultural sector.[26] Only one item from the secondary sector, oil from

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[24] Mazower (1991), p.311.

[25] Kostelenos (1995).

[26] Kostelenos (1995), pp.310-316. The goods used for the construction of this price index are; wheat, cotton and tobacco, olives, olive oil and vineyards, meat, milk, iron ore, lead ore, magnesite and

olive stones, appears on the list of the goods used and there are no items at all from tertiary production although its share in the total value estimate of GDP is 42 per cent in 1938. In that same year the share of the primary sector is 50 per cent and that of the secondary sector 8 per cent. In fact, the goods used for the construction of the price index make up approximately 30 per cent of the total value estimate of GDP and this is exclusively value added from by the agricultural sector.[27]

A price index actually constructed by the National Statistical Service during the period in question, is a consumer price index based on up to 61 items. These goods are primarily agricultural products. A few goods from the secondary sector are included, mainly products of food processing industries as well as some imported foodstuffs. Therefore, it is apparent that neither of these two indices, neither the price index produced in *Money and Output* nor that of the National Statistical Service, can be used as appropriate deflators for GDP figures[28] not to mention value-added figures for the secondary sector. To use them would lead to misleading conclusions about industrial growth in Greece in the interwar period and overall GDP growth to say nothing of GDP per capita growth, and is doomed to distort cyclical fluctuations. Finally, other attempts to gauge industrial growth that appear in the literature by simply transforming the existing time series of gross value of industrial output at current prices into ratio form with a base year do not contribute at all to our understanding of the period and the proportional changes they show are illusive.[29]

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magnesia, salt, oil from olive stones.

[27] Kostelenos (1995), p.312.

[28] Kostelenos (1995), pp.331-333.

[29] Dritsa (1990), pp.129-133; Kostis (1990), p.119; Kostis (1987), p.148.

The reliability of existing quantitative evidence in gauging industrial growth in Greece in the interwar years has been seriously questioned in this paper. Doubts about the soundness of those indices are based on methodological reasoning and on the picture that they paint which is at odds with the international trend during the world economic crisis. In the section that follows the intention is to use available statistical information to produce a volume index of industrial output which will be a better assessment than the existing indices of industrial performance in Greece during the interwar period.

3: A New Index of Industrial Production: Method and Sources

3.1.Method

The methodology that has been followed to construct a New Index of industrial production in Greece during the interwar period is that developed by N.F.R.Crafts and C.K.Harley.[30] As they clearly demonstrate using the appropriate amount of value-added shares multiplied by quantity relatives is another way of obtaining Laspeyres and Paasche quantity indices.[31] To be precise, using value-added shares from the year in which the time series starts to weight quantity relatives defined on that same year gives a Laspeyres quantity index and using terminal year value-added shares to weight quantity relatives defined on that year gives a Paasche quantity index. A Laspeyres index normally gives higher estimates of growth whereas a Paasche index tends to give lower estimates of growth because the relative prices of rapidly growing sectors generally fall over time.[32]

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[30] For a comprehensive analysis of the methodology see at Crafts & Harley (1992), pp.703-730.

[31] Crafts & Harley (1992), p.722.

[32] Crafts & Harley (1992), p.706; Harley (1982), p.274.

The index of industrial production estimated here is the equivalent of a Paasche index weighted by value-added shares from the year 1938 and multiplied by quantity relatives worked back from that same year.

$$\sum_j VA_{j0}\, Q_{jt}/Q_{j0} \quad j=1, 2, ..., n$$

where t is the current year that the index refers to, 0 indicates the base year, (in this case 1938) and j denotes the different industries which make up the manufacturing sector and on which the construction of the index has been based.[33]

Therefore, in order to construct an index of secondary production in Greece during the interwar period appropriate weights as well as data on the volume of production for that period are needed. The weights employed here are derived from Kostelenos' estimates of value added for secondary production in Greece[34] and the data used to estimate the quantity relatives are those published in the Statistical Yearbooks of the National Statistical Service of Greece. This source, in spite of the limitations discussed below, provides systematic data both on volume and value of production for the secondary sector for the period 1921 to 1938. The availability of data on the secondary sector determines the boundaries of the index, thus the index constructed here covers the period 1921 to 1938, which is the same period as that covered by the Yearbooks.

3.2. Data

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[33] Both terms secondary production/sector and manufacturing production/sector have the same meaning in the context of this paper and they are used interchangeably. The term industry/industries is used to refer to the different sectors that make up the whole manufacturing sector and branches or sub-groups indicate categories that constitute an industry.

[34] Kostelenos (1995), pp.274-277.

The Statistical Yearbooks are the most reliable source of data on the manufacturing sector in Greece during the period in question. In the section where volumes of production are presented eleven separate industries are identified and a consistent way of presenting this data has been followed throughout the whole period.[35] In the section on values of production, twelve different industries are quoted, as an industry called wood industry (which does not appear in the section on quantities), is included. This industry produces furniture and woodwork used in construction[36] products that are not included in any industry of the manufacturing sectors appearing in the section of the Yearbooks that record volumes of production. In *Money and Output* the wood industry is included in the estimate of value added for industrial output. However, as there is no data on quantities produced by this industry, the wood industry will be excluded from the construction of the index here and weighting schemes will be adjusted accordingly.

The quantity series presented in the Statistical Yearbooks are not complete as there is some missing data. The gaps in the data are clustered around the beginning of the quantity series and these gaps recur in consecutive years. The industry most badly affected in this respect is the mechanical industry. The situation, however, improves considerably by the end of the decade and the data series can be said to be complete by the early 1930s. The 1920s is considered a period of great expansion in the manufacturing sector when new sub-sectors were introduced. However, there is no previous industrial census, since very little information has survived from the census conducted in 1917, that can be used as a benchmark for an approximate estimation of missing quantity data and an evaluation of the new branches introduced in the 1920s. For these reasons therefore, an attempt to interpolate this missing data will be a

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[35] These industries are; Metallurgy, Mechanical Industry, Construction, Textiles, Foodstuffs, Chemicals, Tanning/Leather, Paper, Clothing, Tobacco, and Public Utilities.

[36] Kostelenos (1995), p.229.

precarious venture. Furthermore, the deficiencies in data do not permit the calculation of a Laspeyres index using 1921 as a base year which could then be compared with the Paasche index estimated in this article.

All Statistical Yearbooks contain retrospective data and where possible, missing data from earlier volumes is filled in and some figures corrected. Since in the Yearbooks which follow, it is these altered figures which are quoted where a change has been made and not the initial figures, the corrected figures have been used here to estimate quantity relatives on the assumption that the officials made an effort to improve the quality of the data. Last but not least, in the section on values in the Yearbooks more branches are listed than in the section on volumes. These differences are minor and do not affect the method used here to construct the index. Nevertheless, this must be noted since the products that are incorporated in the construction of value added in *Money and Output* correspond to those sub-groups appearing in the section on values in the Yearbooks.[37]

3.3. Weighting

G.K.Kostelenos in *Money and Output in Modern Greece: 1858-1938*, estimates value added for secondary production for the period 1858 to 1938. Although he follows the classification used in the National Accounts of Greece, 1948-1970 (1972) his taxonomy of industries is similar to that which appears in the Statistical Yearbooks of the interwar period.[38] The most important difference is that in the Statistical Yearbooks Metallurgy is included in secondary production, while Kostelenos does not take it into account at all in his estimate of value

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[37] These differences are: in Textiles knitwear products are included; in Mechanical Industry includes machinery and shipping repairs which is indeed the most important category in terms of value; ammunition appears under Chemicals, (with a noticeable increase after 1936) as do glassware and pottery. Tanning and Leather include products of mechanised shoemaking and finally the Paper Industry includes box making.

[38] Kostelenos (1995), pp.172-3.

added for this sector. In addition, in the Statistical Yearbooks Clothing appears as an industry by itself but in *Money and Output* this industry is incorporated in Textiles.

The way that value added for the secondary sector is estimated in *Money and Output* determines the weighting schemes that are employed in this paper. These weighting schemes have been adjusted to exclude the Wood Industry since there is no quantity data available on this sector. Unadjusted weighting schemes which include the Wood Industry appear in Appendix I, Table A.1. Different paths will be explored, defined by alternative weighting schemes which are presented in Table 2, in an attempt to produce an index of industrial output which will offer the best possible conjecture of industrial performance in Greece during the interwar period.

Table 2: Value Added per Industry used as Weighting (Base Year 1938)

	V.A. Excluding P.U.	*V.A. Including P.U.*
	A	**B**
Mechanical Industry	0.059	0.045
Construction Industry	0.059	0.045
Textiles Industry	0.289	0.219
Foodstuffs Industry	0.276	0.209
Chemical Industry	0.202	0.153
Tanning/Leather Industry	0.070	0.053
Paper Industry	0.030	0.023
Tobacco Industry	0.016	0.012
Public Utilities		0.241
Total	1.000	1.000
	V.A. Excluding P.U.	*V.A. Including P.U.*
	C	**D**
Mechanical Industry	0.059	0.045
Construction Industry		
Cement	0.025	0.019
Excluding Cement	0.034	0.026
Textiles Industry		
Textiles	0.286	0.217
Clothing	0.003	0.002
Foodstuffs Industry		
A: (i)	0.244	0.185
B: (ii)	0.008	0.006

C: (iii)	0.024	0.019
Chemical Industry	0.202	0.153
Tanning/Leather Industry	0.070	0.053
Paper Industry	0.030	0.023
Tobacco Industry	0.016	0.012
Public Utilities		0.241
Total	1.000	1.000

As Table 2 shows weights for each industrial sector as a whole can be easily estimated. However, it is not possible to derive individual weights for the component branches of each industrial sector as Kostelenos does not provide value added for sub-sectors. In fact, the existing statistical information on industrial production in Greece during the interwar period does not allow the construction of weighting schemes for sub-sectors. Only three sectors, Construction, Textiles and Foodstuffs can be divided into sub-groups following the methodology employed in *Money and Output* and subsequently to derive appropriate weighting for each group. Construction can be divided into two sub-groups; Cement and Construction excluding Cement. Textiles can be separated into Textiles and Clothing[39] and Foodstuffs into three sub-groups. The first sub-group of Foodstuffs includes alcohol-based products and products of the flour industry; the second sub-group refers to various vegetable and stone oils and their by-products and the third to confectionery, starch-based products and sundries.[40] Finally, value added for the secondary sector is produced both without Public Utilities and with Public Utilities. Public Utilities in

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[39] Indeed, in the Yearbooks Textiles and Clothing are listed separately as two different sectors.

[40] Kostelenos (1995), p.213. In particular, the first sub-group includes Anhydrous, Drinkable Alcohol, Denaturated Alcohol, Alcohol Drinks, Flour Products, Pasta, Dough; the second sub-group consists of Cotton Oil, Cotton Oil Cake, Coconut Oil, Oil from Coconut Stones and the third one of Halva, Turkish Delight, Candies, Chocolate, Starch, Starch-based Sugar, Biscuits, Ice, Beer, Canned Food (Fruit and Vegetables). [Beer is included in the third sub-group and not in the first which includes among others alcohol based products because it is not made from alcohol extracted from currants, figs or carubs as is the case with all other products included there. (Kostelenos (1995), p.213.)]

general include Electricity, Gas and Water. However, the Yearbooks provide data only for Electricity and this only from 1925 onwards. It also seems that Kostelenos has based his estimates of total value added for this industrial sector entirely on electricity production.[41] Hence, in this context Public Utilities actually means Electricity.

As Table 2 (which presents different weighting schemes) illustrates, four different indices of secondary production will be estimated and then compared. An index called New Index A (NIA) will be constructed which will exclude Public Utilities and which will be based on industries as a whole as they are identified in the Yearbooks and presented in column A of Table 2. The second index called New Index B (NIB) will once again be based on industries as a whole, but this time Public Utilities will be included. For the construction of New Index B the weighting scheme of Table 2, Column B has been followed. An index called New Index C, which will not include Electricity, will be also constructed based on the weighting scheme presented in column C of Table 2 where Construction, Textiles and Foodstuffs are disaggregated into sub-groups according to the sub-divisions described above. The final index estimated, called New Index D (NID), will incorporate Electricity and follow the weighting scheme of Column D, Table 2.

When Public Utilities are not taken into account in the total value added then two industries dominate overall industrial production each one having approximately one quarter of the market: they are Textiles with 27% and Foodstuffs with 26%. Chemicals follows with 19%. In total, these three industries contribute three-quarters of the whole production of the manufacturing sector. When Public Utilities are included in the assessment of the index, then the picture changes slightly. The percentage share of the value

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[41] Kostelenos (1995), pp.229-30 and pp.247-8.

added of this industry in the total value added of the secondary sector exceeds that of all other industries. Textiles and Foodstuffs follow closely behind. This time four industries, Public Utilities, Textiles, Foodstuffs and Chemicals contribute 80 per cent of the value added to the total value added of the manufacturing sector. (See Appendix I, Table A.1.)

Estimating a New Index of industrial output in Greece in the interwar years is hampered by deficiencies in data and by limitations in the weighting schemes that can be applied. In order to overcome both the limitations of the available statistical information and of deficiencies in data, the median of the quantity relatives of each industrial sector has been chosen as a robust measure to represent its central tendency in the construction of an index of industrial output which aims at being the best possible conjecture concerning industrial growth in Greece during the interwar period. By its nature as a sample representative the median does not take into account in its calculation the extreme values in the distribution, whether these are large or small, other than to note that they exist. Hence, in Appendix II an alternative method is employed to construct an index of industrial output for the period 1934 to 1938. The aim of this exercise is to test the validity and the consistency of the method implemented here.

4: The New Index of Industrial Production: Results and Implications

Table 3 and Figures 3 to 6 present four different versions of the New Index of industrial production in Greece during the period 1921 to 1938. The differences between them stem from the weighting schemes that have been followed in their construction and whether Electricity has been included or not. (See Table 2.) As expected all four indices show the same trend and exhibit the same cyclical fluctuations but they suggest different rates of growth. There is an insignificant deviation in the rates of growth indicated by New Index A and New Index C. Similarly, New Index B and New Index D, which are comparable as they include the same industries, suggest some disparity in the rates of growth,

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which is again negligible. In this paper, New Index C and New Index D will be used for the analysis, although there will be references to the results shown by New Index A and New Index B, the other two indices. New Index C and New Index D are a better representation of industrial performance than the other two indices since their construction is based on more disaggregated weighting schemes than those used for New Index A and New Index B.

Table 3: New Indices of Industrial Production

(Base year: 1938)

	New Index A	New Index B	New Index C	New Index D
1921	42.67		44.47	
1922	47.04		48.66	
1923	45.54		45.07	
1924	54.95		54.93	
1925	61.38	50.16	60.47	49.47
1926	56.04	46.10	54.95	45.28
1927	62.43	51.84	61.30	50.99
1928	72.73	60.55	71.01	59.25
1929	76.26	64.83	74.98	63.85
1930	69.93	61.97	69.42	61.58
1931	67.50	61.45	67.20	61.22
1932	67.07	61.57	66.20	60.91
1933	74.62	67.74	74.70	67.81
1934	86.19	79.46	85.35	78.82
1935	89.84	84.44	88.92	83.74
1936	93.56	91.17	92.24	90.17
1937	97.69	95.72	96.11	94.52
1938	100.00	100.00	100.00	100.00

Source: See text.

The most striking difference between these indices and earlier estimates of industrial output in Greece is that these New Indices are more sensitive to economic fluctuations than the older estimates. The picture that emerges from them seems more plausible than the one that older estimates depict, thus making these New Indices the best guess as to industrial performance in Greece during the interwar period. By contrast with earlier indices which all show Greece to have escaped the Great Depression unscathed, the New Indices show the country as having entered the depression with the rest of the world. New Index C shows that industrial output fell by 4.06 per cent per annum between 1929 and 1932. This decrease in industrial output is moderated to 1.56 per cent per annum if Electricity is included. (See Tables 4 and 5.) The trough year is shown to be 1932 and then both New Index C and New Index A show a vigorous recovery which continues unhindered until 1938. Very high rates of growth were experienced during the first two years after recovery began, 13 per cent in 1933 and 14 per cent in 1934, then in subsequent years growth slowed down to 4 per cent per annum. (See Appendix III Table A.3.) The growth in output after 1933 that the New Indices show is uninterrupted, in contrast to the older estimates (i.e. the index of the Supreme Economic Council in 1936 and Mazower's index in 1935) which suggest it suffered a temporary check.

The New Indices describe industrial performance as buoyant in the 1920s. New Index C gives an annual rate of growth of 6.75 per cent for the period 1921 to 1929 and New Index D, which includes Electricity, implies an annual rate of 6.59 per cent for the period 1925 to 1929. The industrial growth that the New Indices indicate for the 1920s is not continuous. They report two downturns in industrial output during this decade, one in 1923 and then a second slump in 1926 which is shown to be more serious than earlier estimates imply.

Tables 4 and 5 compare rates of growth in industrial production that can be derived from the New Indices and from earlier estimates. Mazower's index can be contrasted with New Index C. On the other hand, the index of the Supreme Economic Council, since it includes Electricity after 1925, is analogous to New Index D. The period 1921 to 1938 is divided into three sub-periods; (a) 1921 to 1929, or 1925 to 1929 where Electricity is included (b) 1929 to 1932 and (c) 1932 to 1938. New Index C shows similar growth rates to those of the Mazower index in the 1920s. However, New Index C shows a steep decline in industrial output between 1929 and 1932 which appears far less serious in Mazower's index. The annual rate of growth that New Index C implies for the 1930s is higher than that of the Mazower index. As is to be expected, the New Index shows a more moderate rate of growth over the whole period than the Mazower index does.

Table 4: Annual Growth Rates of Industrial Production in Greece, 1921-1938
(Excluding Electricity)

	New Index A	New Index C	Mazower
1921-1929	7.53	6.75	6.78
1929-1932	-4.19	-4.06	-0.49
1932-1938	6.88	7.12	6.71
1921-1938	5.14	4.88	5.43

Source: Tables 1 and 3.

Table 5: Annual Growth Rates of Industrial Production in Greece, 1925-1938
(Including Electricity)

	New Index B	New Index D	Supreme Economic Council
1925-1929	6.62	6.59	3.45
1929-1932	-1.71	-1.56	0.29
1932-1938	8.42	8.61	8.65
1925-1938	5.45	5.56	5.02

Source: Tables 1 and 3.

A comparison between New Index D and the index of the Supreme Economic Council, both of which take into account Electricity output, shows that New Index D reports a faster annual rate of growth between 1925 and 1929. These two indices also display different pictures for the period 1929 to 1932 but they imply comparable rates of growth in the 1930s. When the performance of Electricity, with its rapid growth throughout the period for which data is available is taken into account, it is bound to affect significantly the performance of the manufacturing sector as a whole. The decisive influence that Electricity can exert on index numbers on industrial output also stems from the fact that its share in the total value added of the secondary sector is significant. Therefore, both because of its rapid growth throughout the period in question here and the size of its value-added share, Electricity smooths out recessions and accelerates overall growth in the manufacturing sector when it is included in the construction of an index of industrial output in Greece in the interwar period.

The New Indices are the equivalent of a Paasche index which is bound to understate growth. Hence, the rates of growth illustrated by them should not be expected to overstate growth in industrial output in the interwar period. The

New Indices indicate high rates of growth for the 1920s regardless of whether Electricity is included or not, thus clearly demonstrating that industrial growth during that decade was not merely driven by the performance of the Public Utilities as recently Kostas Kostis[42] has argued. The New Indices also challenge the conventional orthodoxy that in Greece after 1929 there were none of those "mournful indices which characterize[d] the crisis in other countries"[43]. Industrial output indeed fell after 1929 even when Electricity is included and by 1932 which is the trough year, it had reached a lower level than that achieved in 1929. Furthermore, the New Indices confirm that Greek industrial output exhibited a robust recovery after 1933 and show rapid rates of growth for the rest of the decade. In the following section the nature of the industrial growth in the interwar period will be examined and some hypotheses as to the causes of this industrial expansion will be put forward.

5: Agenda for Further Research

For Greece the 1920s was a decade of protracted reconstruction and recovery. The country experienced both severe political and monetary upheaval and when the drachma was stabilised *de jure* in 1928 it had lost almost 95 per cent of its pre-war value. This monetary instability, which resulted primarily from the way that governments financed budget deficits, has been seen as a hindrance to industrial expansion in the 1920s.[44] However, contrary to this belief price changes in the 1920s stimulated industrial growth.

Recent literature on inflation has established both on theoretical grounds and from empirical findings that inflation and uncertainty about future price changes

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[42] Kostis (1992), pp.37-38; Kostis (1987), pp.148-150.

[43] Cited in Mazower (1992), p.132.

[44] Kostis (1992), p.37; Demathas et al. (1991), p.61.

are costly and reduce economic welfare and growth.[45] Barro shows that the estimated effects of inflation on growth and investment are significantly negative and argues that there is reason to believe that the relations reflect causation from higher long-term inflation to reduced growth and investment.[46] However, he accepts that it is possible that the endogeneity of inflation could produce a positive relation between inflation and growth at least for a while. This pattern tends to emerge if output fluctuations are driven primarily by shocks to money or to the aggregate demand for goods.[47]

Contrary to the established literature on inflation, Barry Eichengreen argues that price-level changes exercised a powerful influence over the economic recovery of the industrial nations in the 1920s.[48] This argument is based on the particular conditions, expectations and ideology that prevailed after the end of the First World War and does not imply that the process was without limits or free of costs.[49] The main channels through which inflation promoted economic activity in the 1920s were reduced real wages and real interest rates.[50]

In the conjuncture of the 1920s in Greece there are both demand and supply side paths through which price-level changes could have favoured industrial activity. As Greek industry produced mainly for the domestic market, the sudden increase in the population expanded the size of the market and created favourable demand side effects. Supply side effects of the inflation of the 1920s, however, must have been more important. The stimulus to aggregate

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[45] Barro (1995); Briault (1995).

[46] Barro (1995), p.174.

[47] Barro (1995), p.171.

[48] Eichengreen (1993), pp.25-6.

[49] Eichengreen (1993), p.26.

[50] Eichengreen (1993), p.38.

production from inflation was transmitted mainly through three channels; through real wages, the macroeconomic policy of the National Bank and the fall in real interest rates which the rising prices brought about and which encouraged domestic investment.

A study on wages shows that the price level was increasing faster than the average male worker's wage from 1921 to 1936.[51] In terms of wages two forces were at work at the same time which are difficult to disentangle in order to assess the impact of each; the time-lag required for wages to adjust fully to price-level changes and the increase in the active population that demographic changes brought about.

The National Bank which was a mixed bank, (a commercial bank which also served as a central bank), followed expansionary policies until the middle of 1925. Figure 7 shows a positive relationship between New Index C and the monetary base (M0). Restrictive policies from both the National Bank and the government in 1926 affected economic activity. The timing of this change in economic performance is located in late 1925 and early 1926[52] when pressure to improve the fiscal performance of the government and to follow contractionary monetary policies was increased. Zolotas describes this recession as a "cleansing recession" and as a period of shortage of capital which drove interest rates up.[53] New Index C shows industrial production in 1926 as slowing down substantially, by more than nine per cent, mirroring at the same time qualitative evidence which describes industry as going through a severe recession during that year. Industrial activity revives afterwards. The

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[51] Riginos (1987), p.152.

[52] Zolotas (1929), p.230; National Bank of Greece, Annual Report for 1926 (1927), p.III; National Bank of Greece, Annual Report for 1925 (1926), p.VI-VII.

[53] Zolotas (1929), pp.230-238.

stabilisation *per se* does not seem to have affected industrial growth, thus contradicting conventional wisdom which regards stabilisation from high inflation as contractionary and following the pattern that new empirical research has established which shows stabilisation to be expansionary.[54]

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[54] Easterly (1996).

There is no information about market interest rates in Greece and the discount rate of the National Bank is an imperfect measure of the cost of credit because the National Bank did not discount freely but rationed credit. At the same time the National Bank by restricting its discount rate to low levels, reduced the cost of borrowing for the government from the domestic market, which in fact was the main market from which the government could borrow before stabilisation. The stimulus to industrial production from falling real interest rates was probably transmitted through balance sheet effects; an unexpected rise in the price level, which is not reflected in interest rates, reduces the value of liabilities by inflating away a portion of entrepreneurs' debts. With this burden lightened, the entrepreneurs were willing to borrow more to expand the volume of production.[55] Yet another mechanism may have facilitated investment in Greece in the 1920s in particular in small family firms; reallocation of savings from deposits to investment in small businesses. The rate of return on such investments in the inflationary environment of the 1920s was probably higher than keeping cash in the bank.

Industrial expansion in the 1920s stemmed from the idiosyncrasies of that decade which at the same time conditioned the nature and character of the industrial growth. The growth was rapid but not steady and was sustainable so long as the conditions that determined it prevailed. The character of this expansion can be assessed by examining the reasons that stimulated industrial growth. The industrial expansion of the 1920s, indeed industrial growth throughout the whole interwar period, did not change the character of the Greek manufacturing sector. The predominance of small family firms, consumer goods industries, low investment ratios and the limited share of capital goods industries in the total value added were the main features of the manufacturing sector in Greece during the whole interwar period.

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[55] Eichengreen (1993), p.42.

The New Index of Industrial Production shows the impact of the Great Depression on economic activity in the country to be more severe than was previously thought. It does indeed show that the impact of the depression was not confined to balance of payments and exchange rate problems but also spread to the real economy. Industrial output started falling in 1929 and reached its trough in 1932. Subsequently, high rates of growth prevailed until the end of the decade. The literature mainly concentrates on autarky to explain industrial growth in the 1930s. The swift change in the trend of industrial activity, however, must also be correlated to the fact that the country "shed its golden fetters" early. Greece left the Gold Standard in April 1932 and a month later, in May the drachma stood at 51.20 per cent of its stabilisation parity. It is ironic and an indication of the contradictions of politics that the loss of the "battle for the drachma" brought the government headed by Eleftherios Venizelos to its knees but at the same time led the country out of the depression.[56]

In a comparative analysis of depreciation in the 1930s Eichengreen and Sachs note a statistically significant positive correlation between devaluation and economic revival for a cross-section of countries in the 1930s.[57] Depreciation and flexible exchange rates enabled policy-makers to pursue monetary policies that could be independent of the exchange rate. In fact late in 1931 and early in 1932 when Greece was still on the Gold Standard, the Bank of Greece, (the

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[56] The "battle for the drachma" is a term coined to describe the incredible lengths that Venizelos' government went to defend the exchange rate of the drachma at its stabilisation parity and all the expectations that had been invested in maintaining that parity. For more on this see Mazower (1991), pp.143-176.

[57] Eichengreen & Sachs (1985). Figure 1 in Eichengreen & Sachs' (1985) article shows the percentage change in the exchange rate between 1929 and 1935 and the percentage change in industrial production. If Greece is added to this figure, its position will be close to countries which devalued at an early date. In particular, Greece's position will be between that of the United Kingdom and Sweden but closer to the y-axis demonstrating a strong positive relationship between the magnitude of the depreciation of the drachma and the rate of growth of the industrial sector.

central bank in the country), pursued expansionary policies in order to combat fierce opposition from the other banks and to strengthen its position in the country.[58] These policies were against the rules of the game and the central bank's main target which was to keep the parity of the drachma stable. More research, however, must be carried out in order to establish a link on the one hand between strong devaluation and economic activity and on the other between credit rationing by the central bank and economic growth in the 1930s.

6: Conclusion

The focus in this paper is to construct a New Index of industrial growth in Greece during the interwar period and in this way to provide a quantitative challenge to the established orthodoxy. The construction of a definite index of industrial output in Greece during that period is perhaps, not plausible given constraints imposed by deficiencies in data and the limited statistical information available. Any attempt, therefore, to estimate industrial growth during the period in question remains a controlled conjecture. This, however, should not be an excuse for not improving upon the statistical methods used to overcome constraints and to produce index numbers which depict industrial advances in Greece in the interwar years with a high degree of certainty.

The New Index of industrial output produced here is a Paasche quantity index which by its nature understates growth. It reveals that Greece enjoyed high rates of growth both in the 1920s and in the 1930s thus confirming claims in the literature. The major contribution of the New Index, however, is the way that it illustrates economic downturns. It rejects the way that cyclical fluctuations in the interwar period have been presented in the literature. Contrary to the dominant view in the literature which sees Greek industry as escaping the Great Depression, the New Index shows industrial output as falling after 1929.

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[58] Kostis (1986), pp.92-3.

The New Index also reveals growth rates in the 1920s as precarious and dependent on the idiosyncrasies of that decade.

The results that the New Index produces encourage new research aimed at an in depth analysis of the causes of industrial growth in Greece in the interwar period and a reassessment of the impact of the Great Depression on the productive sectors of the economy. The paper puts forward some hypotheses which shed new light on the causes of rapid growth and economic collapses in the interwar period. The inflation of the 1920s is regarded as a stimulus to industrial expansion during that decade. Thus the conventional literature, which sees the demographic changes that happened in the country because of the Asia Minor debacle as the impetus to industrial growth in the 1920s, is challenged. The paper also suggests that early and strong devaluation contributed to the robust recovery of the secondary sector from the Great Depression.

Appendix I

Table A.1: Value Added per Industry used as Weighting (Base Year 1938)

	V.A. Excluding P.U.	*V.A. Including P.U.*
	A	*B*
Mechanical Industry	0.056	0.043
Construction Industry	0.057	0.044
Textiles Industry	0.276	0.212
Foodstuffs Industry	0.264	0.202
Chemical Industry	0.193	0.148
Tanning/Leather Industry	0.067	0.052
Paper Industry	0.029	0.022
Tobacco Industry	0.015	0.012
Wood	0.043	0.033
Public Utilities		0.233
Total	1.000	1.000

	V.A. Excluding P.U.	*V.A. Including P.U.*
	C	*D*
Mechanical Industry	0.056	0.043
Construction Industry		
Cement	0.024	0.018
Excluding Cement	0.033	0.025
Textiles Industry		
Textiles	0.273	0.210
Clothing	0.003	0.002
Foodstuffs Industry		
A: (i)	0.233	0.179
B: (ii)	0.007	0.006
C: (iii)	0.023	0.018
Chemical Industry	0.193	0.148
Tanning/Leather Industry	0.067	0.052
Paper Industry	0.029	0.022
Tobacco Industry	0.015	0.012
Wood	0.043	0.033
Public Utilities		0.233
Total	1.000	1.000

Source: Calculations are based on Kostelenos' (1995) estimates of value added for secondary production, pp.274-277.

Appendix II

The construction of an index is controlled both by data and statistical methods. The median of the quantity relatives of each industrial sector defined on 1938 output has been used as a sample representative in the construction of the New Indices of industrial production in this paper. The median of each industrial sector is then weighted each year by value-added shares of industrial production for 1938 calculated from Kostelenos.[59] The median as a sample representative, however, tends to exclude extreme values. Therefore, another measure is implemented in this Appendix to test the validity and consistency of the method employed for the calculation of the New Index.

This alternative index is again a Paasche index estimated for the limited period 1934 to 1938. The boundaries of this alternative index have been set by the availability of data as the objective is to take into account in its calculation all the branches of each industrial sector. Between 1934 and 1938 the quantity series provided by the Statistical Yearbooks are complete. In addition to data, appropriate weighting is required to incorporate the sub-sectors of each manufacturing sector in the construction of an alternative index. As has been mentioned above, it is not possible to use value-added shares from each sub-sector for the simple reason that there are no such estimates relating to Greek industry in the interwar period. Instead, gross output shares of the sub-sectors are calculated for 1938 on the basis of gross output data quoted in the Statistical Yearbook for 1938.[60] In this way, index numbers are produced for each manufacturing sector which are then weighted by the weighting schemes presented in Table 2 (Column C and D) which are based on the value added of the secondary production.

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[59] Kostelenos (1995), pp.274-277.

[60] Statistical Yearbook, 1939 (1940), pp.137-138.

Value-added shares provide comprehensive and satisfactory weights. However, to use gross value shares to enumerate the significance of particular sub-sectors within an industry or indeed the importance of manufacturing sectors within the secondary sector is a less perfect measure. Doubt is also cast upon the practice of using gross output shares to weight industrial sub-sectors and then of using value added shares as weighting for each manufacturing sector. The index numbers of a possible alternative index estimated here are shown in Table A.2. An alternative index of industrial output for the period 1934 to 1938 is estimated first without taking into account Public Utilities (Alternative Index A) and then Alternative Index B is produced which includes Electricity. In Table A.2 New Index C, New Index D, the index of the Supreme Economic Council and the Mazower Index are also presented.

Table A.2: Indices of Industrial Production in Greece (Base Year 1938)

	Alternative Index A	New Index C	Mazower Index
1934	84.86	85.35	89.90
1935	85.43	88.92	88.62
1936	91.49	92.24	93.54
1937	94.60	96.11	96.90
1938	100.00	100.00	100.00
Annual Rate of Growth	4.19	4.04	2.70

	Alternative Index B (including P.U.)	New Index D (including P.U.)	Supreme Economic Council
1934	78.44	78.82	75.85
1935	81.09	83.74	85.19
1936	89.59	90.17	84.30
1937	93.37	94.52	91.55
1938	100.00	100.00	100.00
Annual Rate of Growth	6.26	6.13	7.15

Sources: See text of Appendix II.

The possible alternative indices are in considerable agreement with the New Indices. Alternative Index A implies an annual rate of growth of 4.19 per cent which is similar to the 4.04 per cent annual rate of growth that New Index C shows. The discrepancy between the two indices, New Index C and Alternative Index A, lies in 1935 when Alternative Index A indicates a modest rate of

growth. In contrast, the Mazower Index presents industrial production as slowing down in 1935. A comparison between Alternative Index B and New Index D which both include Electricity, shows them to be in substantial accord; Alternative Index B shows an annual rate of growth of 6.26 per cent and New Index D 6.13 per cent. The index of the Supreme Economic Council which also includes Electricity suggests an annual rate of growth of 7.15 per cent during the sub-period 1934 to 1938 which is significantly higher than that of New Index D and Alternative Index B.

Perhaps it is not possible, given the deficiencies in data, to construct a definite index of industrial output in Greece during the interwar period. Some statistical principles, however, can be applied in a consistent fashion to construct index numbers of manufacturing output which will be the best possible conjecture for that period. Hence, the use of the median of the series of quantity relatives of each industrial sector weighted by the equivalent value-added share is seen as to be the best possible method for constructing a New Index of Industrial output. This conviction is grounded both in restrictions and weaknesses in the available data and in the results produced by the construction of a possible alternative index.

Table A.3: Industrial Output; % Change on a Year Earlier

	New Index A	New Index B	New Index C	New Index D
1921				
1922	10.24		9.43	
1923	-3.18		-7.38	
1924	20.66		21.88	
1925	11.69		10.08	
1926	-8.70	-8.09	-9.12	-8.47
1927	11.40	12.45	11.55	12.61
1928	16.51	16.81	15.84	16.20
1929	4.86	7.07	5.59	7.78
1930	-8.30	-4.41	-7.41	-3.56
1931	-3.48	-0.84	-3.20	-0.58
1932	-0.64	0.19	-1.48	-0.51
1933	11.26	10.04	12.83	11.32
1934	15.51	17.29	14.26	16.24
1935	4.24	6.28	4.18	6.25
1936	4.14	7.96	3.74	7.67
1937	4.41	4.99	4.19	4.83
1938	2.37	4.47	4.05	5.80

Source: Table 3.

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