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Chasing the perfida Albione: Anglo-Italian productivity gap in the late thirties

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Chasing the *perfida Albione*: Anglo-Italian productivity gap in the late thirties

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Abstract: In this paper, I introduce new estimates of Anglo-Italian labour productivity levels in manufacturing during the late 1930s. The relatively high level of detail of the industrial censuses of the two countries, allows to retrieve also input data, enabling the use of the more sophisticated double deflation method. This approach treats outputs and inputs separately, thereby considering the input-output structure of the compared countries. These estimates, in turn, allow me to extend the analysis to other countries for which similar comparisons with the UK have already been made. I also provide preliminary estimates of labor productivity on a per-hour basis. The results point to a significant productivity gap at the aggregate level, with intersectoral heterogeneity being the prevailing pattern. Notably, Italian performance stands out favorably in textiles and, to a lesser extent, in iron and steel production and the chemical sector. Ultimately, these estimates, while affirming the substantial gap highlighted in other studies, actually propose an upward revision of the Italian productivity level.

Key-words: Productivity, Italy, UK, Manufacturing, Fascism;

JEL codes: N14; N64; O14; O47

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1 Introduction and historiographical context

The performance of the Italian economy during the Fascist period (1922-1943) is still a matter of debate in the Italian economic historiography.[1] To be sure, the revised national accounts estimates (Baffigi 2015) represent a much more secure footing for assessments and reappraisals than what was available before (Gabbuti 2020a). Furthermore, recent contributions such as Felice and Carreras (2012) and Giordano and Giugliano (2015), have carried out insightful exercises that offer an interesting characterization of the growth record of the Italian industry in the interwar period.

In this context, two different views can be identified. On the one hand, a relatively "optimistic" account is offered by the revised sector-specific value-added series of Felice and Carreras (2012), which show a growing industrial production in the '20s, during which Italy outperformed most European countries in terms of industrial output growth rates, and '30s – notwithstanding the large drop after the 1929 crisis. According to this view, the origins of the Italian post-WWII catching up might be traced back to the interwar years during which "Italian industry undertook a modernization towards more advanced manufactures that the other economies had already lived through" (Felice and Carreras 2012, p.450). Even more emphatic on this point is the provocative interpretation of Petri (2002), who suggests that the interwar period should be regarded as the crucial historical phase in which the technological capabilities for the catching-up of the golden age were actually laid down. Similarly, Zamagni (1997) argues that while the protection provided by autarky certainly enabled large firms to secure monopolistic profits, it also allowed them to undertake substantive investments that would prove crucial for Italy's economic development in the post-war period.[2] On the other hand, a decisively "pessimist" view of the Fascist period is expressed in the work of Giordano and Giugliano (2015). They claim that the interwar period should be split into two different phases: a first "laissez-faire" fascism, exemplified by the policies of the finance minister Alberto De' Stefani (1922-25), during which productivity in the industrial sector grew rapidly, and a more "interventionist" turn, especially in the 1930s, marked instead by a sharp slowdown. In particular, they find that the regime's measures aimed at restricting competition are to be blamed for this poor performance. Moreover, the reallocation of labour into more capital-intense productions was not coupled with a concomitant increase in labour productivity growth. From this pessimistic standpoint, the sources of Italy's postwar economic miracle must be sought elsewhere. An alternative literature, diverging from the views of Petri and

[1] In contrast, the Liberal Age, spanning from the unification of Italy in 1861 to the onset of World War I in 1914, has received significantly more attention from Italian academic scholars. This extensive research has led to the establishment of a shared and accepted view of the economic history of this period (Gabbuti 2020a). See, for example, Fenoaltea (2011), Ciccarelli and Fenoaltea (2013) and Zamagni (2003).

[2] A decisively optimistic interpretation of the entire pre-WWII period is also shared by Federico (1996) and Cohen and Federico (2001).

others, has indeed stressed the significant role played by the Marshall Plan (1948–1952) in reviving Italy's war-ravaged economy, in promoting a shift toward an open market economy (Fauri 2006), and fostering local economic development (Bianchi and Giorcelli 2023), most importantly through the transfer of technology and management practices (Giorcelli 2019).[3]

It is worth noting however, that, by and large, the available picture is not really complete, since it refers mostly to growth rates. Our knowledge about the levels of labour productivity of Italian manufacturing in comparative perspective is instead still rudimentary. Since Italy in the period in question was a latecomer industrializer, our limited knowledge of this issue has significant implications. In a catching-up context, a creditable performance in growth rates such as the one that several historians ascribe to the Italian industry in the interwar period (see Gabbuti (2020a) for a discussion), may result less commendable when considered taking into the underlying gap in productivity levels. The aim of this paper is precisely to provide new estimates of the labour productivity gap in manufacturing between UK and Italy in the later 1930s. Several reasons explain why the UK was chosen for this comparison. On the one hand, the UK was the pioneer of the Industrial Revolution and, although it had already lost ground to the USA, it remained a political, economic and industrial powerhouse. At the same time, the Italian government viewed the "perfidious Albion" as one of the main barriers to Italy's pursuit of international greatness. As Gallerano (1994, p. 210) notes, during the war, anti-British hatred surpassed "even that against the USA or the Soviet Union, despite the latter being identified as the most powerful enemies"[4]. Of course, the choice is also dictated by the good quality of data and the broad comparability of the two censuses. Finally, the United Kingdom is generally the country used as a comparison in similar comparative studies – see for instance Rostas (1948), Broadberry (1997), Dormois (2004), Fremdling et al. (2007) and De Jong and Woltjer (2011). This will thus allow me to extend the analysis to other countries for which similar comparison have already been made.

The only two contributions available so far are Bardini (1998) and Broadberry, Giordano, and Zollino (2013). The contribution of Bardini represents an exploratory assessment estimating the labour productivity of Italian manufacturing in three benchmark years (1911, 1937, 1951). As admitted by the author, the estimates reported were to be regarded as tentative and provisional and in need of further corroboration. Indeed, the methodology used, although similar in spirit to the one I employ, is somewhat more rudimentary and the use

[3] Giorcelli (2019) estimates a large impact of the United States Technical Assistance Productivity Program (1952–1958) on participating firms. Firms that adopted management practices experienced a 15.0 percent productivity increase within one year, and a cumulative increase of 49.3 percent over fifteen years. Technology transfers also enhanced performance, with productivity growing by 11.5 percent over a decade, before reaching a plateau. Notably, there was strong complementarity between management and technology transfers: firms receiving both saw their productivity surge by 86.3 percent after fifteen years, significantly exceeding the combined effects of the two individual transfers.

[4] For an interesting read on anti-British propaganda in Fascist Italy and the influence of ideology in the Fascist assessment of Britain, see Pili (2021).

of the sources is not always clear. Notwithstanding these methodological issues, Bardini concludes stating that "Italian heavy sectors seem to have been in better waters than it is generally thought" (Bardini 1998, p. 99). Broadberry, Giordano and Zollino find instead Italian productivity for the entire manufacturing sector to be around 35 percent of the British one around 1936.[5] Their estimates are constructed by retropolating a 1997 benchmark using series of employment and output. It is well-known that the projection of productivity estimates from a single benchmark may be afflicted by several biases, mostly due to standard index number problems (Krijnse Locker and Faerber 1984; Szilagyi 1984). Moreover, some scholars have criticised the use of "long-span" projections (Ward and Devereux 2003; Prados de la Escosura 2000), as the error gets larger the longer the time-span of extrapolation. For this reason, it would be recommended to construct additional benchmark to cross check the consistency of the overall picture as it was done by Broadberry (1997) for UK manufacturing. From this point of view, our analysis should be regarded as complementary to Broadberry, Giordano, and Zollino (2013).

Benchmarking the Italian manufacturing productivity performance in the late 1930s, that is at the end of the Fascist period and right before World War II, may also contribute to the formulation of a more balanced assessment of the economic and post-war legacy of the regime. Unlike Petri (2002), who focuses only on the chemical sector and adopts exclusively a national perspective, this paper takes a broader macroeconomic approach and introduces an international dimension to the analysis. Estimating the gap in industrial productivity may also contribute to the historiographical debate surrounding Italy's military and economic performance during World War II, a truly modern conflict where technological advancements and industrial capacity were decisive factors - both areas in which Italy struggled (Harrison 1998; Zamagni 1997).

The main finding of this paper is a substantial labor productivity gap with respect to the UK at the aggregate level, with consistent intersectoral heterogeneity. This finding holds true across various estimation techniques and is apparent in both per-worker and per-hour-worked estimates. However, the gap considerably narrows when productivity is assessed on a per-hour-worked basis, though these estimates should be interpreted with caution, particularly with respect to the sectoral breakdown.

The paper is constructed as follows. Section 2 provides the methodology employed to estimate comparative productivity levels, while section 3 presents the sources used, primarily the industrial census of 1936-1939 (ISTAT 1950). Section 4 presents and discusses the main results of the estimation, while Section 5 and 6 expand the analysis to an international dimension and by considering hours worked. Section 7 concludes.

[5] Broadberry et al. (2013) divide the economy into ten different sectors, but leave the manufacturing one as a unique entity, thus not allowing to discern between old and modern sectors.

2 Methodology: the industry-of-origin approach

Historically, to construct estimates of comparative productivity levels at the sector and industry level in a two-country context, two main approaches have been proposed: the *quantity approach* and the *price* or *value approach*.

Studies following the quantity approach, pioneered by Rostas (1948) and influenced by earlier attempts, such as Flux (1933), primarily revolve around the computation of physical output per worker. This method involves the identification of similarly defined trades and broadly comparable products in the industrial censuses of the countries under comparison. Various weighting schemes are then employed to derive total output and estimate the number of workers engaged in producing the compared goods[6]. However, this method, extensively used in pre-WWII comparative studies, is beset with challenges, as it relies on questionable weighting schemes[7] and typically has very limited coverage.[8]

In contrast, the price approach, initially introduced by Paige and Bombach (1959), necessitates the utilization of a currency converter, usually called in the literature Purchasing Power Parities (PPP), to make the output of the two countries comparable. This method proves more robust than the quantity approach, as it can cover a more substantial proportion of total output (Van Ark 1996). However, the choice of the converter holds paramount significance. While the official exchange rate could theoretically be used, it inherently excludes non-traded goods and is known to be influenced by various political factors. This is particularly true in the context of rising protectionist of the interwar period. Indeed, the exchange rate between the Italian Lira and the British Sterling exhibited significant fluctuations over the entire period, as shown in Figure 1.

Other studies have instead employed PPPs derived from the expenditure side – for instance the work of the International Comparison Project (ICP) –, which, however, fall short in encompassing semi-finished and intermediate products, which constitute a substantial share of industrial output. Moreover, final expenditure prices reflect both production costs and additional expenses contributing to the final price, such as transportation costs and taxes.

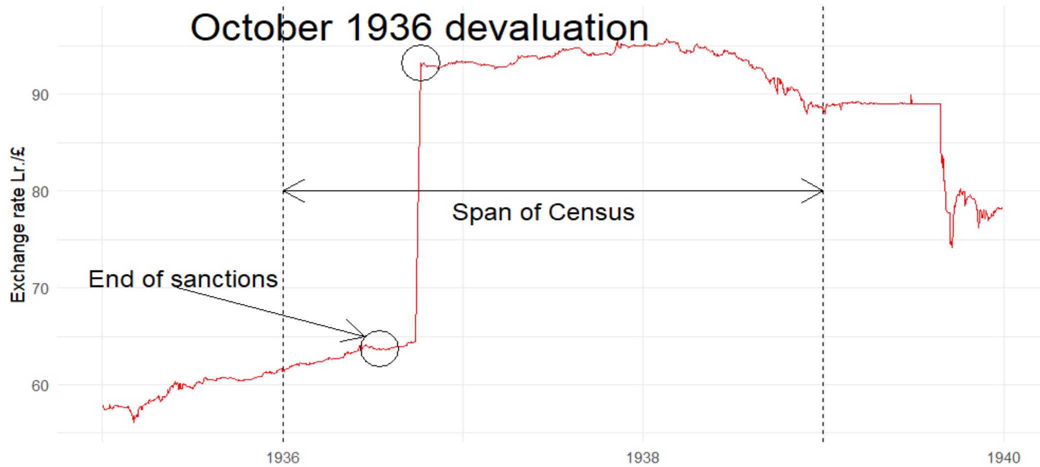
In line with the methodology developed at the University of Groningen (Groningen Growth and Development Centre), I have chosen to use unit values (UVs), that is the ratio of ex-factory output values by produced quantities as reported in the census. UVs represent average factory-gate prices, averaged throughout the year for broadly defined products (e.g. steel

[6]For a comprehensive discussion of this method, please refer to Rostas (1948) and Broadberry (1997, ch.2)

[7]For instance, if the industry consists of very heterogeneous products, such as cars, motorcycles, and bicycles, one must first convert the latter two into car-equivalents. This approach inevitably obscures the clear differences among the products and the potential variations in productivity between the two countries in specific productions.

[8]In the words of Rostas (1948, p.11), "comparison of physical output per head can be made only for a certain number of industries for which quantitative data are available and where the output can be reduced to a sufficient degree of homogeneity".

Figure 1: GBP daily exchange rates against Italian Lira from 01/01/1935 to 01/01/1940



Source: https://tassidicambio.bancaditalia.it/terzevalute-wf-ui-web/timeSeries (accessed on 14 June 2024).
Notes: The international sanctions, imposed by the League of Nation as a response to the Italian invasion of Ethiopia, lasted from November 18, 1935 to July 14, 1936.

ingots, tyres, cotton yarns). The relative price of a product, called unit value ratio (UVR), is simply computed as the ratio of UVs expressed in national currencies. The major advantage of this methodology is that it allows for the inclusion of both final and intermediate products, something which is of great importance in this context given that a large part of manufacturing goods are used as inputs in other production processes. Notwithstanding this great advantage, one has to keep in mind that the use of UVs introduces a bias which would not be present if prices of more precisely defined products were used. Indeed, a "quality problem" arises due to the relatively broad definition of products, because one cannot safely assume that the compared products are exactly identical[9]. This challenge is notably accentuated as products become more technologically advanced (Timmer 1996). Of course, increasing the number of products and defining them more precisely helps reducing the potential bias.

Initially, the methodology as pioneered by scholars such as Van Ark (1996) and Maddison (1995), employed a bottom-up aggregation, directly from products to the entire manufacturing sector. Later, Timmer (2000) introduced a stratified sampling framework and demonstrated that the aggregation of relative prices could be refined by dividing the manufacturing sector into homogeneous strata, such as branches and industries. In this study, I adopt the latter approach and reclassify the industries in both censuses into 13 branches and 67 industries, broadly following the English classification.[10] The classification adopted and the details on

[9] To give an example, even for relatively simple products such as biscuits, the broad census categorization can aggregate relatively heterogeneous items in terms of quality, such as cookies, tea biscuits, shortbread, etc.

[10] Certain industries encompass highly specific groups of products and production, such as *jewelry* or *cotton spinning*. However, in other cases such as *basic chemicals and dyestuffs* and *means of transportation*, the resulting industries cover a broad range of products due to the different original categorizations used in the two censuses.

how to derive industry and branch $UVRs$ can be in the appendix. The methodology is the same outlined in Timmer (2000).

Most studies have computed comparative productivity levels by deflating gross output alone, a technique commonly referred to as *single deflation*[11]. However, estimates based on single deflation can be misleading and may deviate considerably from the theoretically favored *double deflation* approach, in which output and intermediate inputs are deflated using different PPPs. This is especially relevant when firms in different countries face a different price structure and possess distinct technical input-output coefficients.[12] In the case of single deflation, output values are used as weights. Double deflation requires instead two sets of prices, one for output and one for input, but the derivation of input $UVRs$ is the same. Following Fremdling et al. (2007), for each industry j I compute the value added indices as

$$\text{VA-PPP}_j^L = \frac{GO_j^{UK} \times \text{GO-PPP}_j^L - II_j^{UK} \times \text{II-PPP}_j^L}{GO_j^{UK} - II_j^{UK}} = \frac{\text{GO-PPP}_j^L - \text{II-PPP}_j^L \times s^{UK}}{1 - s^{UK}} \qquad (1)$$

and

$$\text{VA-PPP}_j^P = \frac{GO_j^{ITA} - II_j^{ITA}}{\frac{GO_j^{ITA}}{\text{GO-PPP}_j^P} - \frac{II_j^{ITA}}{\text{II-PPP}_j^P}} = \frac{1 - s^{ITA}}{\frac{1}{\text{GO-PPP}_j^P} - \frac{s^{ITA}}{\text{II-PPP}_j^P}} \qquad (2)$$

where GO, II, GO-PPP, and II-PPP represent gross output, intermediate inputs, and the gross output and intermediate input indices, respectively, and s is the input to output ratio. These indices can be either Laspeyres (L), if British prices are used, or Paasche (P), if Italian prices are used. As shown in the second half of the formula, value-added PPPs primarily depend on two factors: the difference between output and input indices, and the input/output ratio. Notably, when the gross output and input indices are close to each other, the value-added index will also be close, and it will be the same if the two are exactly equal. However, if the difference between them is relatively large, as is the case in this study, the input/output ratio becomes determinant – what De Jong and Woltjer (2011) refer to as the input-share effect. Assuming that the intermediate input index exceeds the gross output index — as I will show is typically the case — leads to a negative relationship between the value-added index and the input/output ratio. If the ratio becomes too high, the value-added index can even turn negative, surely an unappealing characteristic.

While theoretically correct, double deflation has seldom been implemented in practice due to the tendency for measurement errors in either set of prices to be amplified, leading

[11]See for instance Broadberry and Klein (2011), Broadberry (1997), Dormois (2004), and Lara and Prado (2022).

[12]For a simple illustration of how using a single PPP for output can yield inaccurate results, refer to Fremdling et al. (2007, pp. 360-361).

to volatile estimates. Nonetheless, the detailed census used in this study allowed to compare a relatively large number of input products, so that double deflation can be attempted.[13] An alternative approach involves relying solely on output prices, which are typically more numerous than input prices, and employing net output weights instead of output weights. This adjustment will at least partially account for input-output variations. Van Ark (1996) also highlights the effectiveness of this method, named the *adjusted single indicator*, in producing more robust estimates compared to the more complex double deflation technique. In this study, I present estimates derived from all three methods, although the preferred estimates are those computed via double deflation.

In what follows, the terms industry/sector PPP and industry/sector UVR will be used interchangeably.

3 Sources: the 1936-39 industrial census

Focusing on a specific benchmark year to compare labour productivity levels offers a key advantage: the possibility to draw data on production and labour from a unique source, ensuring, at least in principle, consistency between output and input measures. For the UK, I rely on the Fifth Census of Production (Board of Trade 1938–44), a widely used source for reconstructing British output and national income during the interwar period. It has been extensively used both in foundational works, such as those by Feinstein (1972) and Mitchell (1988), as well as in comparative studies analogous to the present study like those by Fremdling et al. (2007) and De Jong and Woltjer (2011). Conversely, for Italy, I employ the industrial census of production of 1936-39 (ISTAT 1950).

In contrast to the previous industrial censuses of 1911 and 1927, which solely reported the means of production and omitted a substantial portion of the industrial labor force (Fenoaltea 2015), the 1937-39 census represented a significant innovation. According to Barberi (1951), the latter was "the most notable attempt made in Italy to deepen the statistical knowledge of both the structural and economic characteristics of the industrial sector". The substantial apparatus put in place before and after the war[14] made it possible to cover a large portion of industrial and artisanal establishments as well as most of the labour force, with an admirable level of detail[15]. Notably, the discrepancies between population censuses (PCs) and industrial censuses (ICs) were relatively minor, especially when compared to the 1911 census (Zamagni

[13]In this study, I was able to retrieve price data for 142 input products, though, as I will later show, there is considerable sectoral variability. The number of matched input products exceeds that of Fremdling et al. (2007), despite their higher coverage ratios.

[14]The outbreak of WWII interrupted the processing of data so that the publication of the results resumed in 1947-48 and was completed in 1950.

[15]For instance, the British census reports data for two types of "steel ingots", whereas the Italian census provides data for forty-nine distinct types of steel ingots, including those with very small production quantities.

1987, p. 45). The manufacturing production was divided into 283 industries, called *sottoclassi*, grouped into 17 branches, called *classi*. Each *sottoclasse* was categorised as either industrial or artisanal, the difference being sometimes quite fictitious[16], so that some firms that were genuinely industrial were classified as artisanal, and vice versa. Given their strong inspiration from existing international industrial censuses, the accounting categories used in the Italian censuses are largely comparable to those employed in the English census. However, the two censuses differ in the scope as UK firms employing less than ten workers were not required to submit data on output or inputs, but only to give information on the average number of their employees, whilst the Italian census was designed to be all-encompassing and hence many small firms were censused. Because of this, estimated comparative productivity levels for Italy might be downward biased. At the same time, there are compelling reasons to suspect that the coverage within the Italian census is significantly skewed toward larger (and presumably more productive) firms, which were more likely to be included in the census compared to smaller ones. Indeed, the link between ISTAT and the individuals responsible for statistical reporting in large companies was strong and characterized by regular interactions (Misiani 2010).

However, this census is not without challenges. Firstly and most importantly, it is not a true "snapshot" of the industrial structure in a specific instance, as it was conducted over three different years. This raises some issues, primarily the potential for some workers to be counted multiple times.[17] Even though aggregate data, such as output and inputs, refer to a specific year, the *census year*, other structural data refer to a specific date, the *census date*.[18] These include general information about the firm, prime movers, machines used and most importantly employment. The census date usually corresponds to the period of peak productive capacity (Chiaventi 1987), resulting in inflated employment figures. Moreover, all those workers which could not be assigned to that or the other *sottoclasse* because indistinctly employed by all or the majority of the sections of an establishment – transports, production of energy, etc. – fell within a large class called *Servizi generali di stabilimento*, common to all industries of a specific branch. I assigned them to each specific *sottoclasse* based on relative gross output weights. Despite often being a small proportion, they can be notable in specific sectors. In particular, they account for around 30 percent of total employment in the metallurgical sector.

To correct, at least partially, the problem of seasonality, the official number of workers

[16]The only difference lied in the type of questionnaire submitted to the businesses, comprehensive in the former case and reduced in the latter. For some *sottoclassi*, both forms were used.

[17]Each worker was allocated to specific industries based on the "prevalent activity" criterion to avoid double-counting. Yet, complete resolution of the duplication issue remains elusive. Given the span of the census period, workers might have changed jobs, leading to two or more counts for some individuals.

[18]The census of fishing and food industries took place in 1937, that of mechanical and engineering industries in 1939, while the rest in 1938.

has been deflated by the ratio between the average number of hours worked in a year by blue-collars and the number of hours worked, again by blue-collar, in the month of the census date. In all those cases in which such data were not available the seasonal index of an affine *sottoclasse* has been used.[19] This correction factor has not been applied to independent artisans and business owners, as it is reasonable to assume their seasonal variation to be negligible.[20]

Finally, for some, relatively marginal *sottoclasse*, the census does not provide aggregate data. For the sake of comparability with the English census as well as the need to have homogeneous, non-overlapping strata (Timmer 2000), we need an estimate, even if rough, of these magnitudes. Faced with a similar problem, Fenoaltea and Bardini (2000) compute the wages to value-added ratio of an affine class and use it to estimate the missing value-added. This seems an unwarranted method, because total wages were reported only for a subset of censused firms, with no hint on which firms were excluded. Instead, I decided to estimate the missing values using gross output, input and value added per worker of an affine class[21]. These procedures resulted in a structure of value added and employment illustrated in Table 1. Interestingly the structure of manufacturing sectors were surprisingly similar. In both countries, the engineering sector accounted for the largest share of aggregate value-added, followed by textiles, foodstuffs, metallurgy and, especially for Italy, the chemicals. Similarly, the garment industry employed a significant portion of the workforce in both countries, even though its contribution to overall value-added was relatively modest. This similarity is particularly striking given that the two countries were at very different stages of development. In 1937, despite having comparable populations – 43 million in Italy and 47 million in the United Kingdom – Italy's per capita GDP was less than half that of the UK. Moreover, Italy was still in the early stages of industrialization, with the primary sector contributing just under one-third of total value-added and employing about half of the workforce. In contrast, the UK was far more industrialized, with the primary sector contributing a mere 3% to value-added and employing just 6% of the workforce.[22]

[19]Please refer to section 3.2.1 and Table 3.03 of Fenoaltea and Bardini (2000). I broadly follow their approach, the only difference being that they estimate employment figures for the month of April whilst I do it for the entire year.

[20]In the case of independent artisans, it seems more likely that seasonal variation would manifest through a reduction in working hours rather than a change in the number of workers.

[21]When estimates were deemed unreliable, I simply excluded those industries from the comparison. This is the case, for instance, of the entire printing and publication branch, for which no data other than employment figures were available for all industries in the sector.

[22]Population data are mid-year estimates derived from Mitchell (2013), while GDP per capita estimates in 1937 – 4,827 for Italy as opposed to 9,911 for the United Kingdom – are derived from Bolt and van Zanden (2024) and are expressed in $2011. The shares of total employment and total value-added for Italy were calculated by the author based on data from Broadberry et al. (2013) and Baffigi (2013). For the UK, these calculations rely on Feinstein (1972) and Sefton and Weale (1995). Primary sector comprises agriculture and fishing; secondary sector comprises manufacturing, mining, construction and utilities while the tertiary comprises all services. The primary sector includes agriculture and fishing, the secondary sector encompasses manufacturing, mining, construction, and utilities, while the tertiary sector comprises all services.

Table 1: The structure of value added and employment in manufacturing: United Kingdom and Italy, 1936-39[a]

	Value Added					*Employment*			
	United Kingdom (1,000 £)	*Share (%)*	*Italy (1,000 Lr.)*	*Share (%)*	*Italy/UK[b] (%)*	*United Kingdom (No.)*	*Share (%)*	*Italy (No.)*	*Share (%)*
Food & Tobacco	182,348	16.9	4,352,282	16.5	35.3	479,465	9.9	338,144	12.5
Textiles	153,191	14.2	5,003,891	19.0	41.0	1,038,723	21.5	573,791	21.2
Clothing	80,995	7.5	1,246,104	4.7	28.9	535,886	11.1	450,709	16.6
Timber	37,268	3.5	933,740	3.6	52.5	194,894	4.0	264,882	9.8
Paper	35,865	3.3	568,766	2.2	26.6	160,097	3.3	52,216	1.9
Chemicals	88,373	8.2	3,004,402	11.4	37.5	197,362	4.1	116,320	4.3
Leather	10,140	0.9	388,368	1.5	66.7	48,102	1.0	33,335	1.2
Building Materials	58,482	5.4	1,172,097	4.5	43.6	262,115	5.4	175,237	6.5
Iron & Steel	122,976	11.4	2,223,292	8.5	18.0	572,695	11.8	163,542	6.0
Non-ferrous Metals	22,444	2.1	665,995	2.5	11.5	83,244	1.7	34,608	1.3
Engineering	256,825	23.8	6,091,423	23.2	19	1,138,451	23.5	451,737	16.7
Rubber	14,333	1.3	437,234	1.7	18.6	55,593	1.1	24,873	0.9
Sundry	14,543	1.3	214,728	0.8	15.5	68,566	1.4	29,618	1.1
Total manufacturing	**1,077,783**	**100**	**26,302,323**	**100**	**27.9**	**4,835,193**	**100**	**2,709,013**	**100**

Notes:
[a] The figures refer to the manufacturing industries included in the study. A total of £103,879,000 and 322,394 workers for the United Kingdom and Lr.4,609,949,000 and 520,244 workers for Italy have been excluded from the study due to severe lack of data or impossible comparability.
[b] The ratios are computed converting UK figures into Liras using Table 3's Fisher value added PPPs if possible or gross output PPPs otherwise.
Sources: Board of Trade (1938–44) and ISTAT (1950).

Table 2: Number of products matched (UVRs) and coverage ratios

	Gross Output			*Intermediate Input*		
Branch/sector	*UVRs*	*Cov. Ratio ITA (%)*	*Cov. Ratio UK (%)*	*UVRs*	*Cov. Ratio ITA (%)*	*Cov. Ratio UK (%)*
Food & tobacco	15	47.8	48.7	5	46.7	19.4
Textiles	40	51.5	68.2	46	47.3	51.8
Clothing	22	38.7	44.8	7	29.8	14.8
Timber	4	21.7	9.2	4	31.4	22.7
Paper	19	43.8	49.6	4	37.7	27.3
Chemicals	74	43.3	45.4	25	10.7	9.8
Leather	1	2.0	4.7	4	58.6	41.4
Building Materials	21	41.2	54.1	19	7.5	11.3
Iron & steel	50	64.7	46.6	11	50.7	31.4
Non-ferrous metals	12	39.0	56.3	12	21.0	24.2
Engineering	36	28.8	23.3	-	-	-
Rubber	13	70.0	62.8	4	60.7	52.0
Sundry	16	35.4	48.1	2	2.3	7.1
Total manufacturing	**323**	**44.6**	**45.0**	**142**	**24.3**	**13.5**

Notes: Author's elaborations on Board of Trade (1938–44) and the ISTAT (1950). All product UVRs are computed directly from the sources with the exception of five output item of the foodstuff sector for which Italian prices have been retrieved from *Riassunto dei prezzi dell'anno 1936* (ISTAT 1937).

4 Productivity Levels in Britain and Italy, late 1930s

I started by matching products in the two censuses to estimate unit value ratios. The details regarding the matched products and their corresponding coverage are outlined in Table 2. The full list of matched products and their respective UVRs are shown in the appendix. In terms of output, 323 products have been successfully matched, covering around 45 percent of total output in both countries. Notably, the quantity of matches and their coverage ratios significantly vary among different branches, primarily due to variations in product availability between the compared countries. The relatively detailed product specifications in the two censuses allowed for some sectors to be highly covered. This is prominently evident in the chemical sector, where 74 products were matched, including several chemical compounds. Similar considerations apply to metallurgy and textiles. However, the coverage of leather is rather unsatisfactory. The classification methods employed in both censuses resulted in only one product being effectively matched in the leather sector. This compromises the reliability of the estimate for this specific sector, although it does not substantially impact the overall accuracy for the whole manufacturing, given the sector's marginal significance. The Italian census also lacked disaggregated output values for foodstuff, restricting the availability of price data to a limited set of industries, specifically brewing, sugar, and tobacco products. This was quite limiting, because both sugar and beer were relatively marginal in Italy. To increase the coverage for this sector, I retrieve wholesale prices of five products (wheat flour, cornmeal, candies, chocolate and biscuits) from a different source, the *Riassunto dei prezzi dell'anno 1936* (Summary of 1936 prices) (ISTAT 1937). The source reports average 1935 prices for a wide variety of products in the major markets of the peninsula. To come up with a single price, a simple arithmetic mean has been taken. The prices of the first two products are "net of consumption tax, packaging costs, and are for goods free on board (FOB) at the departure station" while the others are "average prices based on the prices charged on the 1st and 3rd Saturday of each month at the factory by the most important companies in the Kingdom, net of all transportation and packaging costs, as reported by the National Fascist Federation of Sugar, Sweets, Related Industries, and Derivatives." Both set of prices are thus largely comparable to standard unit values. A separate issue arises concerning the engineering sector. Although the output coverage is relatively satisfactory, a hindrance arises from the inability to match any type of machine due to the discrepancy in the units of measure used, tons in the British case and number of machines in the Italian.

The richness of both censuses allowed also for the matching of various input products (right-hand side of Table 2). However, the coverage ratios and matches, totalling 142, generally show lower numbers as compared to output. This disparity primarily stems from the relatively high heterogeneity of inputs. Also, contrary to the Italian census, the British census only shows data for the main inputs, thus hindering the inclusion of most input items. Nevertheless, in certain sectors, a significant portion of intermediate inputs has been successfully covered. Regrettably, the lack of industry-specific disaggregation for input and auxiliary products in the Italian census, made it impossible to match any product in the engineering sector.

Table 3 presents the gross output and intermediate input PPPs, revealing large cross-sector heterogeneity. Output PPPs are notably high in advanced sectors such as metallurgy, engineering, and rubber, as well as in foodstuff, while they tend to be lower in other less advanced production, particularly in timber and building materials. Furthermore, across all sectors but one, the Laspeyres PPP consistently exceeds the Paasche PPP, suggesting the presence of the Gerschenkron effect. This effect occurs because using the quantity weights from one country tends to inflate the prices of the other. The rationale behind this is that when a country produces relatively small quantities of certain products, their prices are typically higher due to limited supply or lower economies of scale[23]. This discrepancy was expected, given that Italy and the United Kingdom were at significantly different stages of development during this period.

The intermediate input PPPs are shown in columns four-to-seven of Table 3 and they also are characterised by large intersectoral variability. Moreover, in 10 out of 12 cases they are higher than the corresponding gross output PPPs, revealing that Italian firms faced

[23]The same effect is found by Fremdling et al. (2007) in their UK-Germany comparison.

Table 3: Output, input and value added purchasing power parities in manufacturing, ITA and UK, 1936-39

	Gross output PPP (Lr./£)			*Intermediate input PPP (Lr./£)*			*ASI PPP (Lr./£)*			*Value added PPP (Lr./£)*		
Branch/sector	*Laspeyres*	*Paasche*	*Fisher*	*Laspeyres*	*Paasche*	*Fisher*	*Laspeyres*	*Paasche*	*Fisher*	*Laspeyres*	*Paasche*	*Fisher*
Food & tobacco	122.9	152.8	137.07	168.4	190.3	179.0	101.9	105.2	103.5	53.0	86.3	67.7
Textiles	118.3	98.3	107.8	133.2	117.1	124.9	116.2	95.6	105.4	90.7	69.8	79.6
Clothing	118.3	105.8	111.8	179.0	168.1	173.5	118.1	105.3	111.5	44.6	63.7	53.3
Timber	50.0	43.9	46.9	46.0	45.8	45.9	49.9	44.0	46.9	54.4	41.8	47.7
Paper	116.1	103.9	109.8	170.2	161.9	166.0	115.9	103.8	109.7	55.5	64.2	59.7
Chemicals	126.7	104.4	115.0	143.9	134.3	139.0	119.7	104.0	111.6	107.6	76.4	90.7
Leather	112.3	112.3	112.3	142.8	144.6	143.7	112.3	112.3	112.3	47.5	69.4	57.4
Building materials	67.4	66.0	66.7	104.1	99.9	102.0	66.5	62.1	64.3	46.1	46.0	46.0
Iron & steel	147.7	130.3	138.8	183.7	144.5	162.9	147.0	129.6	138.0	97.9	102.9	100.4
Non-ferrous metals	184.8	172.0	178.3	164.7	155.8	160.2	184.8	172.0	178.3	249.8	265.0	257.2
Engineering	130.8	119.3	124.9				129.5	117.2	123.2			
Rubber	162.3	142.8	152.2	150.3	134.6	142.2	162.3	142.8	152.2	173.8	155.0	164.1
Sundry	151.5	89.9	116.7	152.9	151.5	152.2	150.1	88.4	115.2	150.2	60.2	95.1
Total manufacturing	**126.9**	**111.2**	**118.8**	**151.0**	**134.8**	**142.6**	**119.6**	**100.6**	**109.7**	**95.3**	**80.2**	**87.4**

Notes: ASI PPP stands for *adjusted single indicator purchasing power parity*. Just like output PPP, only output prices are used but, unlike the latter, value added weights are used. The Laspeyres and Paasche value added PPPs are derived using equations 1 and 2 and as specified in Fremdling et al. (2007). Fisher indices are computed as the geometric mean of the Laspeyres and Paasche indices.

Sources: The gross output and intermediate input *purchasing power parities* (PPPs) are based on output and input *unit value ratios* (UVR) taken directly from Board of Trade (1938–44) and ISTAT (1950). See text for details.

higher relative input prices than their British counterparts. This was expected, given that Italy was a resource-poor country. It is interesting to note that in most sectors the variability between Laspeyres and Paasche indices is relatively modest, with the exception of sundry which is however constructed as a residual class. Above-average PPPs are found in textiles, clothing, food, paper and non-ferrous metals. The use of adjusted single deflation results in a marginal decrease in the overall PPP, but the overall picture remains largely unchanged. This is because the same set of prices is used as in the output calculation, with the only difference being the use of value added weights instead of gross output weights in the aggregation process. The lower PPP values can be attributed to the fact that, by considering value added, the higher costs faced by Italian firms for raw materials and inputs are factored in. Finally, in most sectors, value added PPPs are consistently different than gross output PPP, in most cases being smaller, which might suggest that the UK industry faced higher costs, very likely wages, than the Italian one.[24] Nevertheless, caution is needed due to its high volatility, both between Laspeyres and Paasche indices and between gross output and value added PPPs, which than translate into different estimated comparative productivity levels. Some of the observed variability can be attributed to the distinct production structures of the two countries, influenced by differences in their developmental stages as well as geographical and historical factors. Consider for instance Table 4, which shows the input/output structure of the iron and steel industry.

British firms, which could easily acquire iron ore, were able to produce pig-iron more readily, whereas Italian firms specialised on recycling scrap metal (Bonelli 1982). This is reflected in the lower share of iron ore used by Italian firms. Another classic example is the cotton industry. In an effort to reduce cotton imports, the Italian regime made compulsory the use of rayon in cotton spinning (Cerretano 2020). In contrast, the UK could straightforwardly import cotton from its massive colonial empire. As a result, artificial silk made up only 0.8% of total inputs in the UK's cotton spinning industry, but a substantial 16.6% for Italian producers.

A second source of variability arises directly from the different industrial classification adopted by the two census offices. Referring again to Table 4, at first glance, the share of steel ingots in the UK's total output appears quite small compared to Italy, where this item accounts for one-fifth of total production. However, this discrepancy is largely artificial and stems from differences in categorization rather than actual production volumes. In the UK, pig-iron and steel ingots production were recorded separately, whereas in Italy they were aggregated within the same *sottoclasse*. If the value of *produced output* rather than *sold output* had been

[24]For the Liberal period (1861–1914), Federico et al. (2019) show very low Italian real wage levels, positioning Italy behind both advanced and peripheral European countries. This finding aligns with low labor share estimates by Gabbuti (2020b). Gabbuti further observes a persistently low and slightly declining labor share during the Fascist period, corroborating Zamagni's (1975) point on the reliance of Italian capitalism on low labour costs.

Table 4: Output and inputs in the iron and steel industry

Output			
	UVR (Lr./£)	**Share on total output (UK)**	**Share on total output (ITA)**
Pig iron	205.0	8.4 %	3.8 %
Steel ingots, common	164.2	1.3 %	20.0 %
Steel ingots, special	61.9	0.6 %	5.2 %
Steel blooms, billets and slabs, common steel	165.4	6.4 %	4.4 %
Iron scrap bars	181.5	0.1 %	1.2 %
Other products		37.3 %	40.9 %
Inputs			
	UVR (Lr./£)	**Share on total inputs (UK)**	**Share on total inputs (ITA)**
Iron ore	156.5	5.5 %	1.6 %
Scrap	166.9	9.3 %	13.8 %
Steel ingots	123.9	3.0 %	28.7 %
Other inputs		21.1 %	14.6 %
Industry UVRs (Lr./£)			
	Laspeyres	**Paasche**	**Fischer**
Gross Output	150.1	132.0	140.8
Inputs	183.7	144.5	162.9
Value Added	96.9	104.9	100.8

Notes: Author's elaborations on the Board of Trade (1938–44) and ISTAT (1950).

recorded, no bias would arise. However, since this is not the case, the categorization *per sé* introduces a distortion. Given that pig-iron is the main input for steel ingots, this implies that it would carry a much higher weight in the estimation of the Laspeyres index and a relatively lower weight in the Paasche index. This is because a significant portion of produced pig-iron in Italy was already incorporated into steel ingots. The same line of reasoning applies for the input/output relation between ingots and semi-finished steel products as well as for inputs. If the relative prices of the products compared were very similar, this discrepancy would have little to no effect on the outcome. However, the error becomes more pronounced when there is a larger difference between relative prices and when intermediate goods represent a larger share of an industry's production.

Table 5 presents the estimates of comparative productivity levels in Italy and the UK. It is evident that British manufacturing productivity holds a substantial lead, regardless of the index employed. Considering single deflated and ASI estimates, overall Italian labor productivity is approximately 37-40 percent of the UK's level. The introduction of double deflation has a notable impact on the overall value, resulting in a 35 percent increase and positioning Italian productivity at around half that of the UK.

Still, major differences can be spotted at the sectoral level. In the case of timber, non-ferrous metals and rubber Italian comparative productivity slightly decreases when using

Table 5: Value added per worker (% ITA/UK), 1936-39

	Valued added per worker		
Branch	*Single deflated*	*ASI deflated*	*Double deflated*
Food & tobacco	24.7	32.7	50.0
Textiles	54.6	56.1	74.3
Clothing	16.4	16.4	34.3
Timber	39.3	39.3	38.7
Paper	44.3	44.3	81.4
Chemicals	50.2	51.7	63.6
Leather	49.2	49.2	96.2
Building Materials	44.9	46.6	65.1
Iron & steel	45.5	45.8	62.9
Non-ferrous metals	40.0	40.0	27.7
Engineering	48.0	48.6	
Rubber	44.8	44.8	41.5
Sundry	29.3	29.7	35.9
Total manufacturing	**36.7**	**39.7**	**49.8**

Notes: All estimates are computed deflating value added per worker by either the corresponding Fisher gross output PPPs, Fisher ASI PPPs or Fisher value added PPPs listed in Table 3.

double deflation, whilst it increases in all other cases. For instance, productivity in the paper, clothing, foodstuff and leather sectors nearly doubles. However, the relatively small number of comparable products makes these estimates inevitably less robust, especially for the leather sector. Nevertheless, the overall direction of these results appears plausible when considering the high input costs faced by Italian producers during the interwar period, a time marked by significant international protectionism. The figure for paper also shows a consistent increase. However, this likely represents an upper bound, given the lower quality of Italian paper during this period.[25] A substantial increase is also clear in the case of iron and steel production, largely driven by the relatively high input costs that Italian producers faced. Interestingly, Italy shows a relatively strong performance in the textile sector. However, this improvement is primarily due to the wool, silk and rayon industries, while productivity in the cotton sector slightly declines when measured using double deflation.[26] Other sectors show instead a large productivity lag.

Overall, regardless of the estimation method employed, Italy's productivity gap is evident, ranging from one-third to one-half of British productivity. This gap is even more significant considering that by this time, the UK had long lost its lead in manufacturing productivity to

[25]Italian producers of paper and cardboard utilized over 150,000 tons of recycled paper, which was slightly less than the amount of virgin cellulose employed as input (ISTAT 1950).

[26]According to my estimates, Italian productivity in cotton spinning and cotton weaving is 70 and 46, respectively. This finding aligns closely with Broadberry and Marrison (2002), who show that in the first half of the twentieth century Britain's comparative labour productivity performance in cotton textiles was much higher than in other manufacturing sectors.

the US and, to some extent, Germany. Interestingly, the single-deflated estimate for the entire manufacturing sector aligns closely with Broadberry et al. (2011) 1936 estimate of value added per worker — 35.6 versus 36.7. However, single-deflated figures should be viewed as lower-bound estimates. While double-deflated estimates may be less precise and volatile due to limited input coverage, the crucial takeaway is the upward trend, corroborated by higher intermediate input PPPs and thus higher input prices that are not taken into account with single deflation only. As discussed in the previous section, the broader scope of the Italian census may introduce a downward bias in Italy's comparative productivity levels. Assuming that the British firms in the 1-9 group, which accounted for around 10 percent of the total workforce (Rostas 1948), had a productivity level of around 70 percent of the average British firm, would lead to a modest upward bias in favour of Italy of only about 3 percent,[27]. Such a small bias, if present, is insufficient to alter the overall conclusions or impact the analysis significantly.

5 Like with like: expanding the international comparison

Now that we have established the benchmark, we can place Italy in a broader international context. In Figure 2, I combine Italian double-deflated estimates with data from Fremdling et al. (2007) for Germany and De Jong and Woltjer (2011) for the United States. All estimates are expressed relative to the UK, which always takes on the value one hundred. While it is important to note that the estimates may not be entirely comparable due to differences in identified sectors and products, I made an effort to align as closely as possible with the English classification to enhance international comparability with other studies, so that this comparison still holds some significance. A number of interesting points emerge from the picture. As expected, the United States exhibits a robust leadership across all sectors, with a particularly pronounced lead in advanced production as opposed to more traditional ones, such as textiles and foodstuffs.[28] In these latter categories, the gap between the US and the UK remains within the ratio of 3:2. These sectors are also the only ones in which the UK maintains a productivity advantage with respect to Germany, which in the late 1930s had al-

[27] A similar assumption has been made by Fremdling et al. (2007) in their UK-Germany comparison. They also faced a similar problem in that the German census reports also data for firms in the 5-9 group. From the British census, they computed that the smallest firms in the 11-24 group averaged around 90 percent of the productivity as a whole, and thus cautiously assume the productivity level of firms in the 5-10 group to be around 80 percent of the total industry average.

[28] Several authors have proposed complementary theories to explain the strong US lead over Europe. Among many others, Habakkuk (1962) points to the country's vast land and resource endowments, resulting in high real wages which, in turn, pushed American firms to invest heavily in labor-saving technologies. Chandler (1990) highlight the American system of mass production, a model difficult to replicate in Europe due to different market conditions. Meanwhile, Mowery and Rosenberg (2000) emphasize the focus of American firms on three key technological clusters—the internal combustion engine, chemistry, and electricity—which proved pivotal to twentieth-century technological progress.

ready surged ahead. This is evidence of UK's relative economic decline and accentuates even more the evident lag in Italy's economic progress. Italian lag is large across most sectors, with the sole exception being silk and artificial silk production, where Italy stands out positively also as compared to Germany. Interestingly, the latter industry stood out in the business history literature as one of the country's most innovative and important sectors in terms of both invested capital and employed workforce and as one of the sectors that particularly benefited from autarkic policies (Cerretano 2020).[29] Finally, note that, unlike Germany and the United States, it seems that Italy does not exhibit a clear-cut distinction in the performance of "traditional" and "modern" sectors with respect to the UK.

In Figure 3, I expand the comparison to include data for France (Dormois 2004) and Czechoslovakia (Broadberry and Klein 2011).

These figures are single-deflated estimates due to the unavailability of double-deflated estimates for the latter two countries. Additionally, direct benchmark estimates for France are available only for 1930, not for 1935.[30] Italy stands out as the least productive country among those considered, both in manufacturing and across all included sectors. Interestingly, Czechoslovakia appears quite productive, surpassing France in both chemicals and textiles and being on par in metallurgy, while being much more productive than Italy. Although this region, and especially Czechia, was very industrialized in the context of Eastern Europe, these results seem somewhat inflated, considering that in 1935 Czech GDP per capita was around 82% of Italy's (Bolt and van Zanden 2024). Further international comparison seems needed to cross-check the bilateral benchmark estimates.

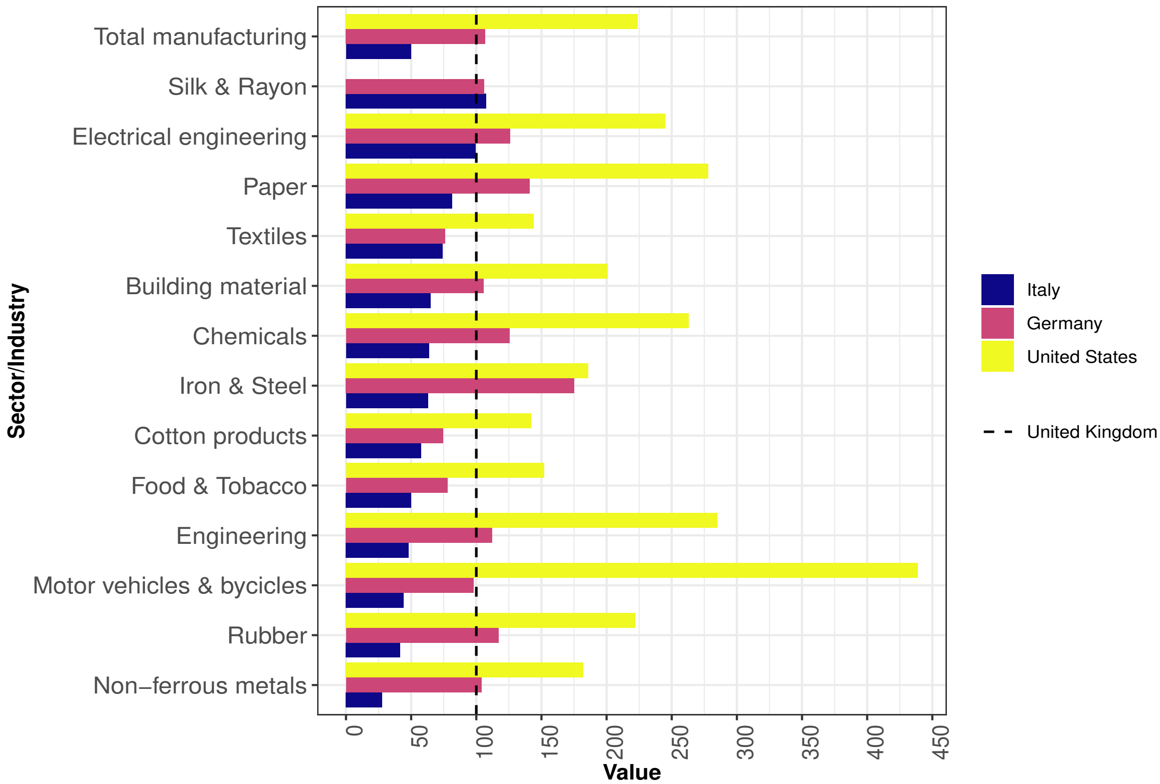
6 Accounting for hours worked

Up to this point, we have only focused on output per worker as a measure of labor productivity. However, this is known to be a rather crude measure. De Jong and Woltjer (2011), for example, show how the well-known finding by Broadberry (1997) of a relatively stable comparative performance between the US and the UK in the 1930s, around a 2 to 1 ratio, no longer holds true when accounting for hours worked. Indeed, work-sharing practices were much more widespread in the US, leading to a faster decline in the average number of hours

[29] According to Cerretano (2020, p.1111), the protection offered by autarky enabled a "Verdoorn-Kaldorian effect, whereby growing demand led to economies of scale and, with it, greater expertise." Moreover, by the late 1930s, SNIA, the main rayon producing firm in Italy and one of the largest in the world, began producing high-quality yarn, introducing innovations comparable to those used in Courtaulds' and Glanzstoff's plants (Cerretano 2018, p.559). Finally, the rayon industry was "to some extent a 'collective invention,' where know-how did not belong to any specific national context, although technology transfer was not costless for recipient firms" (Cerretano 2011, p.207).

[30] Due to the lack of information about quantities in the French survey, Dormois' calculations are based on a basket of 64 industrial commodities representative of all branches of the industrial sector and not on product UVRs.

Figure 2: Double deflated value added per worker, international comparison with respect to the UK (=100): Italy, United States and Germany, late 1930s

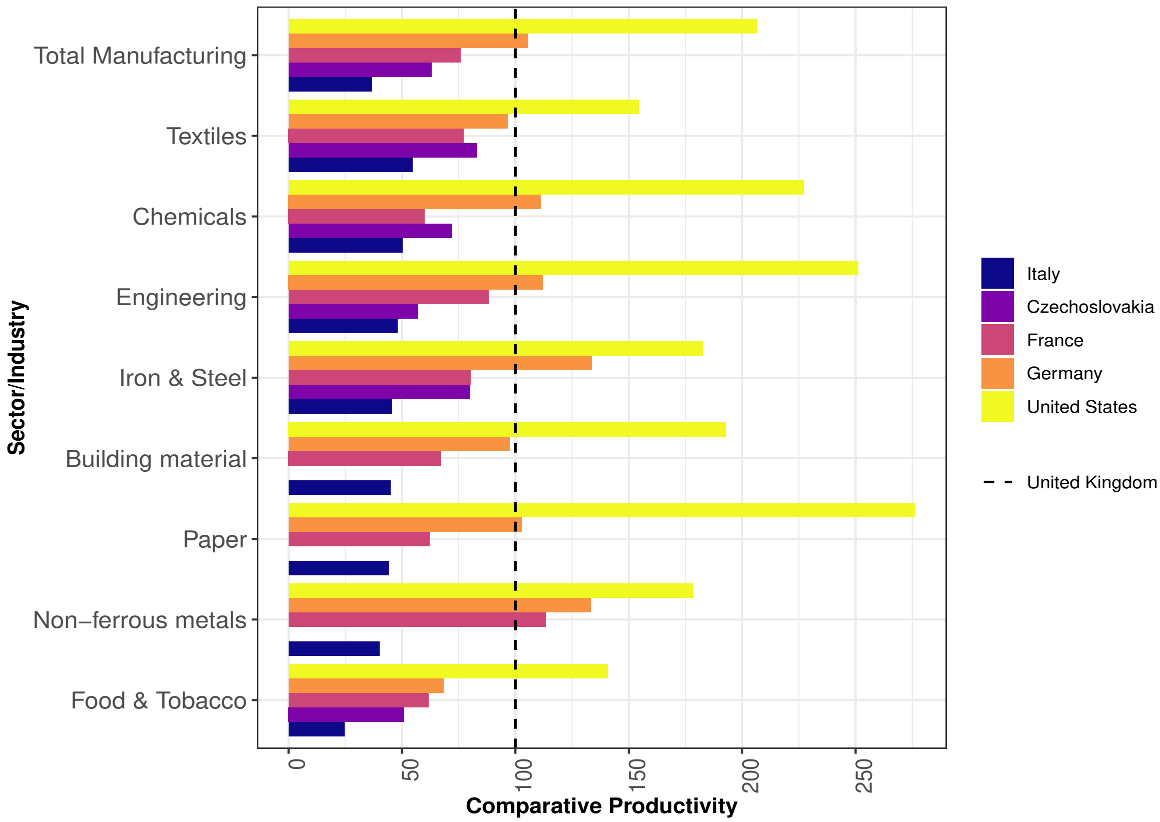


Source: Data for Germany and the United States are from Fremdling et al. (2007, Table 1 and 5) and De Jong and Woltjer (2011, Table 3 and 4), respectively.
Notes: the red dashed line is the UK benchmark value, equal to 100. All productivity levels are double-deflated, with the exception of 'Engineering', 'Electrical engineering', and 'Motor vehicles & bicycles' which are single-deflated. For Germany and Italy, 'Cotton products' is the weighted mean of 'Cotton spinning' and 'Cotton weaving'. For Germany 'Silk & Rayon' only refers to rayon. For Germany and the US, 'Paper' includes also printing and publishing.

worked as compared to the UK. The same holds true in this case. Italian trade unions gave work-sharing a pivotal role in the 1930s (Toniolo and Piva 1988). As a response to the great depression, the average working day went from 7 hours and 17 minutes in 1929 to 6 hours and 43 minutes in 1932 (Tattara and Toniolo 1976), and in the following years the increase in hours worked did not keep pace with the increase in occupation (Toniolo 1980).

As mentioned earlier, the *Censimento industriale* includes information on the number of hours worked, but this refer exclusively to a subset of operatives working in industrial firms. Hence, I adopt the approach of De Jong and Woltjer (2011) and rely on the *Yearbook of Labor Statistics* (International Labour Office 1939) as the primary source of information. This publication provides data on the average hours of work per worker per month across various sectors and industries. For those industries for which data in the main source are not

Figure 3: Single deflated value added per worker, international comparison with respect to the UK (=100): Italy, France, Germany, Czechoslovakia and United States, late 1930s



Source: Data for Germany and Czechoslovakia are from Fremdling et al. (2007, Table 1) and Broadberry and Klein (2011, Table 5), respectively. In their US/UK comparison, De Jong and Woltjer (2011) do not compute single deflated value added. The figures shown are computed by the author based on their data. Data for France refer to a comparison around 1930 and are taken from Dormois (2004, Table 2). Due to the lack of information about quantities in the French survey, Dormois' calculations are based on a basket of 64 industrial commodities representative of all branches of the industrial sector and not on product UVRs.
Notes: the red dashed line is the UK benchmark value, equal to 100. All productivity levels are single-deflated

available, I assign a value equal to the branch mean. This information is then combined with data on the number of days of vacation provided by Huberman and Minns (2007) to derive an estimate of annual average hours worked, shown in the first column of Table 6.

In any case, these estimates should be considered as preliminary and tentative. The data on the number of hours worked is available for far fewer industries and sectors than the *sottoclassi* listed in the census. Consequently, for most *sottoclassi*, the values were imputed. This likely introduces a selection bias. Furthermore, it is important to consider that the data were provided directly to the ILO by the *Confederazione fascista degli industriali*, the national confederation of industrial employers, which likely had numerous reasons to under-report the actual workload in their firms. It is worth noting that, on the one hand, there may have been incentives for the fascist government, particularly the confederation of employers, to

Table 6: Annual average hours worked, United Kingdom 1935 and Italy 1936-39

	Italy		*United Kingdom*
	ILO[a]	Giordano et al. (2012)[b]	De Jong et al. (2011)[c]
Food & tobacco	1,785	1,558	2,288
Textiles	1,689	1,779	2,250
Clothing	1,561	1,652	2,142
Timber	1,618	1,752	2,278
Paper	1,778	1,954	2,292
Chemicals	1,844	2,222	2,261
Leather	1,662	1,652	2,302
Building Materials	1,719	1,592	2,264
Iron & steel	1,944	1,987	2,273
Non-ferrous metals	1,944	2,000	2,274
Engineering	1,872	1,817	2,266
Rubber	1,778	1,774	2,261
Sundry	1,562	1,815	2,239
Total manufacturing	**1,731**	**1,758**	**2,255**

Notes:
[a] Data sourced from International Labour Office (1939) and reworked as explained in the text.
[b] Data sourced from Giordano and Giugliano (2012, Table 3). The manufacturing average is lower than the total reported in the original paper due to exclusion of utilities, mining, printing, and photography and cinema, all with higher yearly hours worked.
[c] Data sourced from De Jong and Woltjer (2011). Minor variations arise from the exclusion of some industries.

provide downward-biased data. On the other hand, it is also plausible that these data pertain primarily to larger firms, leaving open the question of whether their working time patterns align with those of smaller firms. In other words, these estimates are inevitably tentative and should be interpreted with caution.

I estimate that on average a worker in the manufacturing sector worked for 1,731 hours. This aligns closely with the findings of Giordano and Giugliano (2012), who estimated an average of 1,758 hours in 1938[31], though some differences can be easily spotted, particularly in the case of food, where my estimate is higher, and chemicals, where my estimate is lower. The final column of Table 6 presents the estimates by De Jong and Woltjer (2011). The difference is striking, revealing that the average British worked for 2,255 hours, partly due to longer weekly hours and partly to fewer holidays.

Table 7 presents comparative labour productivity on a person-hour basis. The estimate for the entire manufacturing sector ranges from 47.7 with single deflation to a notably higher

[31] They provide branch-specific estimates, using the Italian industrial census as the main source. For every industry, I assign a value corresponding to the branch value provided by Giordano and Giugliano (2012, p.44). The resulting manufacturing average is lower than theirs – 1,871 – because of the exclusion of printing, photography and cinema, and utilities, all of which had higher-than-average values.

Table 7: Value added per hour worked (% ITA/UK), 1936-39

	Valued added per hour worked		
Branch	*Single deflated*	*ASI deflated*	*Double deflated*
Food & tobacco	31.7	41.9	64.1
Textiles	72.7	74.7	99.0
Clothing	22.4	22.5	47.1
Timber	55.4	55.4	54.4
Paper	57.1	57.2	105.0
Chemicals	61.5	63.4	78.0
Leather	68.2	68.2	133.3
Building Materials	59.2	61.4	85.8
Iron & steel	54.6	54.9	75.6
Non-ferrous metals	46.8	46.8	32.5
Engineering	57.3	58.1	
Rubber	57.0	57.0	52.8
Sundry	42.0	42.5	51.5
Total manufacturing	**47.7**	**51.7**	**64.8**

Notes: All estimates are computed deflating value added per hour worked by either the corresponding Fisher gross output PPPs, Fisher ASI PPPs or Fisher value added PPPs listed in Table 3.

64.8 with double deflation, an increase of thirty-five percentage points. Nonetheless, this reveals that the gap between Italy and the UK is visible even when hours worked are accounted for. Still, interesting insights emerge at the sectoral level. According to the double deflation estimates, Italian productivity appears to be higher than that of the UK in the leather sector—an industry with a longstanding tradition in Italy and still a cornerstone of several industrial districts in central Italy today. As emphasized multiple times, however, the limited number of UVRs available for this specific industry makes the estimates inherently fragile. Productivity in the textile and paper industries was comparable between the two countries, while in chemicals and the building sector, Italy's productivity was not significantly lower. However, it is important to note that productivity in the building sector tends to be volatile due to its close ties to the construction industry's fluctuating dynamics. Note also that the aggregation obscures high intrasectoral heterogeneity. For instance, the apparent high productivity in textiles is driven by two productions: wool and, most importantly, silk and artificial silk. As said, the latter stood out as one of the country's largest high-tech sectors and its leading company, Snia Viscosa, was among the largest world producers as well as the largest corporation by capital in Italy (Cerretano 2020). Similarly, the performance in the chemical sector becomes less commendable when looking at the production of basic chemicals, fertilisers and drugs. Nevertheless, it is crucial to approach these estimates cautiously, considering them as tentative and provisional. Nonetheless, they align with the findings from the previous section. It could also be argued that the value added per worker estimated earlier might represent a lower bound for the actual productivity gap between Italy and the United Kingdom.

Regardless of the notable overall increase in the transition from value added per worker to value added per hour worked and of the possible bias introduced, a significant lag persists in most sectors and at the aggregate level.

7 Conclusions

This paper provides a reappraisal of the productivity gap in manufacturing between the UK and Italy at the end of the 1930s, by providing industry-of-origin estimates computed with up-to-date techniques. The estimates show a large productivity gap on a per-worker basis, which decreases when hours of work are accounted for. Although the gap at the aggregate level is persistent, there is a noteworthy variability across sectors, revealing Italy's relatively favorable performance in textiles and, to a lesser extent, in metallurgy and chemicals, the latter also being the sector emphasized by Petri (2002).

Future research could investigate the potential impact of 1930s sustained inflation (Toniolo 1980) on these productivity estimates. Similarly, it appears crucial to explore the possible impact of military mobilization following the colonial venture in Ethiopia – an event that marked the beginning of a decade of warfare by Fascist Italy –, which might have temporarily boosted labor productivity. Indeed, although the international sanctions imposed by the League of Nations ended at the beginning of the census period and were ill-designed (Mulder 2022, ch.8), their potentially distorting impact should not be overlooked and deserves further investigation. For instance, even though oil and coal were not embargoed, "the mere expectation of oil sanctions produced a marked increase in the price of oil and oil derivatives on the Italian market," with prices rising by over 50% in the months following the sanctions' introduction (Ristuccia 2000, pp.88-89). Moreover, fluctuations in labor productivity, which are significantly influenced by business cycles (Van Ark 1996), highlight the importance of incorporating additional benchmarks. These benchmarks could eventually enable an analysis of sectoral productivity dynamics as well as provide valuable insights on the medium- and long-term effects of Fascist economic policies on Italy's industrial structure.

How does this paper contributes to the literature on Italy's inability to effectively mobilize during World War II? According to Zamagni (1998), Italy's mobilization struggles stemmed from two critical constraints: insufficient availability of raw materials and inadequate industrial organization. Aircraft production offers a clear example of these limitations. In 1939, Italy produced 1,750 aircraft, peaking at 3,503 in 1941, but production declined sharply to 2,024 by 1943 (Zamagni 1998, p.196). In stark contrast, British aircraft production soared from 7,940 units in 1939 to 26,263 by 1943 (Broadberry and Howlett 1998, p.59). The present productivity estimates, which show a substantial yet lower than previously thought gap, suggest that Italy's economy was, at least partially, already mobilized and perhaps close to the limits of its productive capacity in some sectors, possibly as a consequence of the Italian involvement in the Spanish civil war and the invasion of Ethiopia. Once the war had started, there was already little room for further expansion and mobilization.

The paper also contributes to the debate on the causes of Italy's postwar economic miracle. While Italy undeniably benefited from the Marshall Plan and the favorable macroeconomic and geopolitical conditions of the postwar period, these estimates raise the possibility that these policies were particularly effective because Italy already possessed a creditable endowment of industrial and technological capital in a number of key sectors. Before the war, Italy's manufacturing sector, though much smaller in scale, shared structural similarities with those of more industrialised economies like the United Kingdom. While the productivity gap was substantial, the paper's estimates, particularly those based on value added per hour worked, suggest that Italian firms were closer to their UK counterparts than previously thought in terms of productivity. This was particularly true in key sectors such as textiles, chemicals, and innovative industries like rayon production. Speculatively, one might argue that the channels through which the Marshall Plan exerted a positive influence, that is technological transfer and managerial innovations, were so pronounced in Italy precisely because they were applied to an industrial context which had already accumulated a sufficient degree of technical knowledge and capabilities. Indeed, even a staunch opponent of the corporative system and autarky, such as Demaria (1941, p.520), acknowledged autarky as a radical measure aimed at addressing the "great problem of creating an industrial bloc that is almost entirely complete with fundamental components." However, while this argument might hold when comparing Italy to the United Kingdom, a broader international perspective might lead to a more nuanced assessment. In comparisons with more dynamic Western economies, including Czechoslovakia, Italy consistently lagged behind. This highlights the need for more comparative research, more comprehensive than the one presented in this paper, to fully understand these dynamics.

To conclude, if these estimates are validated, they would indicate that Italian performance was higher than previously assessed, suggesting that the long term account by Broadberry et al. (2013) may be in need of an upward revision. However, it is unlikely that this would shift the overall perspective to an overly optimistic view. The gap with other industrialized nations remained significant, highlighting even further Italy's structural shortcomings. Despite the ambitions of the Fascist political elites – influenced as they were by an irresponsible and short-sighted military-industrial complex – to conduct a great-power policy, Italy was still characterised by a significant gap with the leading economies of the period.

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A Matching industries

In Table 8, the matching of the two censuses is shown. In this process, I tried to stick as closely as possible to the English categorization. This approach was chosen because the definition of industries in the British census is generally much broader than the corresponding Italian ones. Aiming at a finer-grained classification was impractical due to the difficulty of reasonably assigning value added or employment to specific productions. Consequently, this sometimes resulted in very specifically defined industries, with a one-to-one correspondence between the English and Italian classes (e.g., coopering, matches, ink). In other instances, the original classifications in the censuses made it impossible to have closely defined industries. For example, the British census classified the iron and steel sector according to products (e.g., wire, wrought iron), while the Italian census classified it based on the production process. As a result, the entire steel production feel within a single industry.

Table 8: Matching of Industries, United Kingdom Census 1935 and Italian Census 1936-39

Branch/industry	UK Trade	ITA sottoclasse
Food & tobacco		
Grain Milling	Grain Milling	34-36, 59
Bread, Cakes & Biscuits	Bread, Cakes, Pastries etc.	37-38
	Biscuit	40-41
Cocoa & Sugar confectionery	Cocoa & Sugar confectionery	42, 65
Fish curing	Fish curing	46-47
Preserved foods	Preserved foods	44, 49
	Bacon curing & sausage	60-63
Butter, cheese, etc.	Butter, cheese, etc.	50
Sugar	Sugar & glucose	64
Feedstuff	Cattle dog, etc.	48
Ice	Ice	66-67
Brewing	Brewing & malting	55-57
Spirit distilling	Spirit distilling	165
Spirit Rectifying	Spirit Rectifying	54
Tobacco	Tobacco	273
Textiles		
Cotton spinning	Cotton spinning	215
Cotton weaving	Cotton weaving	216
Wool	Woollen & worsted	217-218, 220-222, 233
Silk & art. silk	Silk & art. silk	210-213, 223
Linen & hemp	Linen & hemp	225-227
Jute	Jute	228
	Canvas goods & sack	
Hosiery	Hosiery	224

Continues below

Branch/industry	UK Trade	ITA sottoclasse
Rope & twine	Rope & twine	229
Lace	Lace	230-231
Elastic webbing	Elastic webbing	235
Flock & rag	Flock & rag	214, 219
Textile finishing	Textile finishing	237, 255
Horse hair, etc.	Coir fibre, etc.	262
Clothing		
Hat & cap	Hat & cap	238
Umbrella stick	Umbrella stick	245
Fur	Fur	201, 251
Tailoring, etc.	Tailoring, etc.	239-240, 242, 244, 246-247, 254
Glove	Glove	207, 250
Boot & shoe	Boot & shoe	206, 241
Timber		
Saw-mill products	Saw-mill products Wooden crates, etc.	19, 21, 25, 29-30
Coopering	Coopering	20
Furniture & upholstery	Furniture & upholstery	24, 243, 249
Cane	Cane, etc.	26-27
Paper		
Paper	Paper Cardboard box Wallpaper Manufactured stationery	191-196
Pens & pencils	Pens & pencils	272
Chemicals		
Soap & candle	Soap, etc.	174, 176
Match	Match	168
Explosives	Explosives, etc.	158
Starch & polishes	Starch & polishes	175, 187
Ink	Ink, etc.	186
Paint & colour	Paint, etc.	184-185
Coke, oil, etc.	Chemicals, etc. (partly) Oil & tallow Petroleum Manufactured fuel	166-167, 173
Basic chemicals	Chemicals, etc. (partly) Fertiliser, etc.	157, 159-164, 169, 171-172, 176-181, 188-189 (partly)
Leather		
Tanning & dressing	Tanning & dressing	202

Continues below

Branch/industry	UK Trade	ITA sottoclasse
Leather goods	Leather goods	203-205
Building materials		
Brick	Brick	143-144
China & earthenware	China & earthenware	145, 149
Glass	Glass	178
Cement	Cement	142
Asbestos & build. mat.	Asbestos goods, etc.	138-141
	Building materials	146, 236
Abrasives	Manufactured abrasives	147
Iron & steel		
Iron & steel	Blast furnaces	70
	Smelting & rolling	71
	Foundries	72
	Wrought iron etc.	73
	Wire	78
	Finished Brass	79
Fabricated metals	Hardware, etc. (partly)	76
	Chain, etc.	99
	Tool & implement	100
	Cutlery	101, 102
	Needle, etc.	103, 104
Non-ferrous metals		
Non-ferrous metals	Copper & brass	74
	Aluminium, etc.	75
	Gold & silver	
Jewellery	Plate & jewellery	111-112, 141bis
Engineering		
Means of transportation	Shipbuilding	22
	Motor & cycle	23
	Aircraft	113-122
	Railway carriage	
	Carriage cart	
Electrical engineering	Electrical engineering	123-126, 265, 270, 274
Mechanical & precision engineering	Mechanical engineering	80-98
	Hardware, etc. (partly)	105-110
	Watch and clock	234, 275
	Scientific instruments, etc.	280
Rubber		
Rubber	Rubber	264, 266, 269
Sundry		

Continues below

Branch/industry	UK Trade	ITA sottoclasse
Plastic, buttons, etc.	Plastic, etc.	183, 248, 261, 271
Linoleum & oilcloth	Linoleum & oilcloth	232
Musical instruments	Musical instruments	267
Games & toys	Games & toys	268
Brush	Brush	28, 263

Notes: Author's elaborations on Board of Trade (1938–44) and (ISTAT 1950).

B Computing UVRs

For each product i I compute unit values as

$$uv_i = \frac{o_i}{q_i} \tag{3}$$

where o_i is the output value of product i and q_i is the reported quantity. For each comparable product I compute the relative price, here called unit value ratio (UVR), expressed in Italian Liras over sterling pounds

$$UVR_i^{ITA/UK} = \frac{uv_i^{ITA}}{uv_i^{UK}} \tag{4}$$

$UVRs$ are then weighted multiple times, first according to their share in the individual industry and then according to the industry's share in the branch and again according to the branch share in manufacturing as a whole. If base country weights, in this case British weights, are used, a Laspeyres type price index is produced; in the opposite case a Paasche type price index is derived. When a unique index is needed, it is common to simply take the geometric mean of the two, deriving what is called a Fisher index. Therefore, for each industry j

$$UVR_j^L = \frac{\sum_{i=1}^{I_j} uv_{ij}^{ITA} q_{ij}^{UK}}{\sum_{i=1}^{I_j} uv_{ij}^{UK} q_{ij}^{UK}} \tag{5}$$

and

$$UVR_j^P = \frac{\sum_{i=1}^{I_j} uv_{ij}^{ITA} q_{ij}^{ITA}}{\sum_{i=1}^{I_j} uv_{ij}^{ITA} q_{ij}^{ITA}} \tag{6}$$

with $i \in (1, \ldots, I_j)$, I_j being the total number of matched products in industry j and UVR_j^L and UVR_j^P being the industry Laspeyres and Paasche indices, respectively. Given that only a fraction of $UVRs$ within an industry can be computed, one need a rule to determine whether the resulting average UVR is reliable enough to be representative of the entire industry, including those products for which no relative price could be derived. For each industry j I compute the number of matches n_j and the coefficient of variation of the Laspeyres index as

$$cv_j^L = \frac{(1 - cov_j) \sum_{i=1}^{I_j} var_i^L}{(n_j - 1) \sum_{i=1}^{I_j} o_i} \tag{7}$$

with

$$var_i^L = o_i \left[log \left(\frac{UVR_i}{UVR_j^L} \right) \right]^2 \tag{8}$$

where $cov_j \in [0,1]$ indicates how much of the industry is covered by the matched products. For the Paasche index the computation is entirely similar. An industry UVR is deemed to be representative for the entire industry if $n > 1$ and $(cv_j^L + cv_j^P)/2 < 0.1$. If these conditions are met, the entire industry weight is allotted to compute the branch UVR. If not, only the covered value is used. The derivation of branch and manufacturing sector $UVRs$ follow the same line or reasoning.

C Products covered

In Tables 9 and 10 are listed the values and the relative prices of all output and input products used in this study. All of them were retrieved from the *Fifth Census of Production* (Board of Trade 1938–44) and the *II Censimento Generale dell'Industria e del Commercio* (ISTAT 1950), with the exception of five output products of the foodstuff sector – wheat flour, maize flour, biscuits, sugar confectionery and chocolate bars – for which Italian prices have been retrieved from *Riassunto dei prezzi dell'anno 1936* (ISTAT 1937).

Table 9: Values of output and unit values, Italy and UK, late 1930s

Product	Output Value British £ 000	Output Value Italian Lr. 000	UVR Lr./£	Product	Output Value British £ 000	Output Value Italian Lr. 000	UVR Lr./£
Wheat flour	46,381	7,359,766	196.5	Potassium iodide	83	6,102	455.1
Maize flour	4,934	1,149,965	208.4	Potassium sulphate	14	818	121.6

Continues below

Product	Output Value British £ 000	Output Value Italian Lr. 000	UVR Lr./£	Product	Output Value British £ 000	Output Value Italian Lr. 000	UVR Lr./£
Biscuits	16,654	78,580	73.4	Sodium carbonate and caustic soda	6,852	194,471	88.7
Sugar confectionery	13,460	88,397	129.1	Sodium chromate and bichromate	197	7,383	128.9
Chocolate bars	4,666	150,185	221.7	Sodium phosphate	53	3,776	88.0
Sugar, unrefined	2,703	5,522	155.2	Sodium sulphate	224	6,646	105.5
Sugar, refined	33,652	569,348	126.9	Zinc oxide	787	28,843	171.2
Molasses	2,903	28,649	27.8	Amyl acetate	41	1,033	107.3
Beet pulp, dry	148	9,387	93.9	Butyl acetate	190	9,747	138.2
Beer	54,898	74,909	95.4	Superphosphate	746	277,937	93.3
Malt	4,770	16,424	120.3	Sulphate of ammonia	2,211	101,955	157.3
Yeast	853	23,047	61.2	Glue	913	25,265	174.1
Cigars	541	96,198	21.8	Ladies' hand-bags, leather	1,506	28,853	112.3
Cigarettes	38,461	576,331	58.5	Building bricks	15,909	164,096	35.5
Snuff	111	7,496	23.3	Roofing tiles	2,326	40,414	57.4
Cotton yarn, single	53,287	1,645,168	124.8	Magnesite bricks	124	782	75.2
Cotton yarn, double	16,658	819,079	83.4	Refractory bricks	2,895	81,160	164.4
Cotton waste, unmanufactured	2,634	41,121	161.9	Chrome bricks	106	101	75.4
Damasks, brocades, etc.	2,024	53,752	87.3	Sanitary ware, pipes and tubes	4,202	10,401	78.9
Pile fabrics	959	51,777	105.1	Sanitary earthenware	1,466	28,648	70.0
Handkerchiefs, cotton	687	21,671	33.5	Earthenware tiles	2,660	45,081	23.5
Bed coverings	1,410	82,857	94.8	Red pottery	340	10,764	71.3
Towels	2,036	7,499	121.1	Bulbs for electric lamps	287	7,894	108.0
Cotton piece-goods, unbleached	43,000	935,178	127.6	Stationery glassware	6	1,605	67.7
Tops	19,771	650,016	197.3	Domestic and fancy glassware	1,151	58,702	38.7
Noils	1,802	31,163	148.6	Safety glass	1,120	19,979	56.4
Wool yarn, carded	4,583	616,490	108.3	Cement	8,791	312,885	90.5
Wool yarn, combed	28,796	312,627	126.6	Gypsum	517	113,674	65.6
Mohair and other hair, yarn	1,689	4,129	82.1	Building material of concrete	3,070	45,083	70.9
Woollen tissues, all wool	12,370	209,284	70.1	Paving material of concrete	1,363	64,762	77.8
Woollen tissues, mixed	10,215	339,324	92.1	Buil material of asbestos cement	1,367	62,886	68.9
Worsted tissues, all wool	13,262	356,732	124.1	Yarn and cloth, asbestos	291	6,772	145.6
Worsted tissues, mixed	6,471	199,790	84.3	Brake and lutch linings	959	4,629	61.1
Blankets and shawls	2,266	120,998	55.1	Grinding wheels	1,111	24,622	74.6
Thrown silk, pure	1,446	251,645	139.6	Pig iron	18,469	267,314	205.0
Artificial silk threads, double	1,269	282,807	25.1	Ferro-manganese	696	35,680	225.2
Silk piece-goods, pure	1,218	168,912	58.3	Spiegeleisen	100	14,315	165.8
Artificial silk piece-goods, pure	10,650	406,756	83.4	Ferro-tungsten	552	5,354	188.5
Silk and rayon piece-goods, mixed	6,449	94,863	138.5	Ferro-molybdenumn	263	5,523	113.0
Flax yarn	872	11,345	183.8	Steel ingots, common steel	2,916	1,333,192	164.2
Soft hemp yarn	313	264,672	132.2	Steel ingots, special steel	1,398	363,652	61.9
Jute yarn	3,131	55,436	177.1	Steel casting, common steel	1,781	157,646	72.7
Sacks and bags, jute	2,241	157,936	118.0	Steel casting, special steel	617	23,965	57.1
Stockings and hose	16,066	390,122	52.9	Steel blooms, etc., common steel	14,134	306,723	165.4
Underwear	10,743	219,298	76.8	Steel blooms, etc., special steel	1,199	45,645	153.5
Fancy hosiery	9,887	132,593	55.3	Iron scrap bars	79	85,683	181.5
Knitted gloves	297	6,518	83.7	Steel flats, common steel	2,346	16,297	155.5
Knitted fabric	5,413	46,811	68.1	Steel wire rods, etc., common steel	9,090	1,031,711	155.1
Hard hemp twine	797	2,315	237.8	Hoop and strip	1,780	79,135	117.6
Hard hemp cordage	1,276	10,347	162.4	Thick plates, common steel	7,666	193,556	167.4
Soft hemp twine	613	47,351	92.5	Thick plates, special steel	2,124	156,911	289.9
Soft hemp cordage	116	50,400	59.4	Thin plates & sheets, common steel	8,385	230,338	138.1
Cotton nets	257	5,265	103.7	Thin plates & sheets, special steel	608	2,891	58.9
Hair curled	413	3,746	90.6	Galvanised sheets	4,846	37,216	158.5

Continues below

Product	Output Value		UVR	Product	Output Value		UVR
	British £ 000	Italian Lr. 000	Lr./£		British £ 000	Italian Lr. 000	Lr./£
Fibres dressed for brush-making	153	2,962	180.5	Steel rails, over 36 lbs per yard	2,551	82,308	160.5
Hats and caps, straw	1,555	6,528	43.9	Steel rails, under 36 lbs per yard	257	9,039	141.9
Hats and caps, wool felt	2,365	52,021	78.6	Railway material	2,500	21,356	86.2
Hats and caps, fur felt	3,085	95,506	125.7	Tyres and axles	1,679	27,289	102.8
Hat and caps, cloth	1,204	14,309	65.3	Tinned plates and sheets	11,545	204,035	123.4
Umbrellas and sunshades, complete	768	26,165	71.5	Terne plates ans sheets	371	6,687	108.5
Men's overcoats	2,475	69,712	136.0	Cold drawn tubes	3,708	91,639	59.1
Rainproofed garments	6,485	43,547	208.1	Iron and steel tubes, weldless	4,237	205,454	112.9
Aprons and similar outer garments	5,695	13,906	212.1	Iron and steel tubes, welded	5,843	23,082	134.0
Shirts	6,285	76,995	81.9	Iron and steel wire	5,403	119,511	122.3
Collars and cuffs	841	5,038	72.5	Malleable iron casting	1,823	28,408	116.8
Corsets, corset belts and brasseries	4,197	14,696	70.5	Hollow-ware, iron and steel	3,311	6,757	103.9
Hats and bonnets, millinery	2,367	36,894	126.6	Lamps and lanterns	263	4,302	71.6
Handkerchiefs	177	11,827	36.5	Lighters, complete	49	210	131.8
Neckties, etc., of woven fabrics	2,583	16,108	82.4	Upholstery and mattress springs	350	4,607	129.8
Braces, suspenders, belts	908	5,812	60.4	Springs, laminated	1,053	8,993	110.8
Fabric gloves, cotton	103	195	28.7	Screws for wood	710	11,995	90.1
Leather gloves	2,405	53,997	51.1	Bolts and nuts	4,473	60,324	141.4
Men's boots and shoes	12,951	378,127	125.0	Rivets and washers	991	9,060	241.0
Women's boots and shoes	16,526	253,891	113.5	Horse shoes	81	1,478	99.9
Youths' and infants' shoes	4,926	104,208	125.6	Files and rasps	730	10,462	72.2
House shoes, other than of rubber	2,219	28,894	74.6	Axes and hatchets	140	1,550	75.9
Boot and shoe uppers	82	33,708	98.4	Forks	195	1,080	20.5
Sawn woods	6,153	314,538	49.9	Scissors and secateurs	183	4,303	44.8
Plywood	341	124,594	32.9	Safety razors, complete	349	308	11.5
Wood wool	164	4,100	73.0	Safety razors, blades	1,319	3,715	13.4
Wet coopering	546	18,374	74.8	Snap fasteners	115	4,271	577.5
Newsprint	8,051	111,226	150.0	Paper fasteners	23	735	47.1
Printing paper	7,784	117,606	115.0	Buckles	237	3,427	15.2
Writing paper	4,860	148,559	77.7	Safety pins	123	812	70.6
Kraft paper	1,805	61,702	174.7	Copper, unwrought	883	54,016	220.1
Straw paper	324	37,701	86.2	Copper, wrought	4,844	152,867	185.9
Blotting paper	389	4,666	83.0	Copper, tubes	1,380	31,717	114.4
Cigarette paper	451	30,634	76.5	Brass and alloys of copper, wrought	5,679	169,930	148.4
Vegetable parchment	443	10,150	180.8	Brass and alloys of copper, tubes	1,084	25,242	107.2
Oiled and waterproof wrappings	1,131	8,132	97.6	Aluminium and aluminium alloys	5,406	177,642	161.5
Insulating pressboards	106	3,170	62.6	Lead sheets	1,448	27,518	205.9
Wallpaper	3,251	10,649	98.7	Lead pipes	2,053	26,015	182.0
Paper bags	4,177	80,525	119.4	Nickel and nickel alloys	3,031	40,992	99.6
Calendars	739	1,172	175.8	Zinc pipes	348	12,933	122.2
Toilet paper	389	5,503	80.3	Silver, refined	8,251	36,202	215.7
Envelopes	2,559	23,349	83.9	Gold, refined	19,099	380,785	209.7
Playing cards	286	4,825	57.9	Motor vessels	10,748	879,237	121.3
Fountain and stylographic pens	610	13,186	90.7	Motor cars, complete	48,379	767,669	103.4
Nibs for fountain pens, gold	245	2,735	110.6	Passenger vehicles, complete	957	81,969	90.1
Propelling pencils	156	2,017	55.2	Goods vehicles, complete	8,646	384,265	370.1
Glycerin	880	59,326	244.2	Ambulances	76	1,280	80.2
Soap, for domestic purposes	15,208	516,254	88.9	Chassis for private cars, complete	3,278	119,074	76.7
Soap, for industrial purposes	1,138	16,327	159.5	Trailers, complete	576	30,753	204.5
Candles	1,200	111,800	153.8	Motor cycles, complete	2,216	55,812	138.3
Tooth paste	1,492	21,790	65.3	Tricars, complete	397	9,896	118.7
Shampoo, solid	254	2,888	36.0	Bicycles and tricycles, complete	6,664	72,903	87.9

Continues below

Product	Output Value British £ 000	Output Value Italian Lr. 000	UVR Lr./£	Product	Output Value British £ 000	Output Value Italian Lr. 000	UVR Lr./£
Face powder	872	12,096	19.6	Frames, bicycles	432	7,305	65.3
Safety matches	957	27,664	12.5	Hubs, bicycles	685	7,939	42.8
Other matches	3,314	47,531	30.1	Saddles, bicycles	399	2,915	58.4
Fuses and blasting accessories	1,345	9,380	37.4	Mudguards, bicycles	175	2,751	114.6
High explosives, etc.	2,161	32,872	66.4	Aeroplanes, complete	4,602	715,593	163.4
Starch, rice	523	9,196	36.4	Railway carriage	990	42,229	94.0
Starch, maize	164	11,867	85.9	Railway wagons, standard gauge	1,860	100,478	333.2
Dextrine	135	8,813	130.1	Tramcars and trolley vehicles	238	7,460	66.8
Polishes for floor and furniture	1,178	11,189	66.2	Generators, alterning current	916	19,663	39.9
Polishes for metal	1,859	3,519	52.1	Power transformers	2,445	94,938	84.5
Printer’s ink	2,356	24,625	119.6	Mercury rectifiers	262	13,100	35.0
White lead	1,129	7,248	136.8	Vacuum cleaners	3,286	2,483	93.4
Colour black	64	1,056	42.6	Bulbs, complete	3,489	76,968	57.6
Lithopone	538	22,138	196.6	Ignition magnetos	284	16,630	168.9
Ochres and earth colours	329	5,478	56.2	Radio-gramophones	1,766	175,125	58.2
Potter’s colours	114	2,019	14.8	House service meters, complete	2,499	27,154	52.8
Cellulose enamels	968	27,880	146.1	Metal casements	2,989	39,161	28.4
Tallow	571	17,251	236.6	Metal doors	180	6,363	45.1
Lubrificating oils	3,770	158,509	111.8	Staircases of iron and steel	45	1,849	194.0
Motor spirit	4,374	346,955	123.0	Structural steel	6,007	52,880	147.8
Fuel oil	1,169	74,723	119.7	Gas meters	1,878	10,906	53.2
Kerosene	482	38,484	133.4	Water meters	327	11,815	19.3
Gas oil	652	51,925	105.0	Watches of gold or platinum	63	478	58.9
Paraffin	103	4,527	143.8	Watches of silver and other	44	2,634	50.6
Metallurgical coke	9,597	316,887	332.2	Electric clocks, complete	199	733	168.4
Anthracene	8	293	46.5	Lenses for spectacle	589	657	193.1
Benzene	3,478	24,048	84.2	Outer covers, cycle	1,061	57,517	91.0
Naphtalene	189	3,914	255.2	Outer covers, motor car/airplane	10,685	374,834	194.4
Quinine and quinine salts	259	21,136	144.3	Outer covers, motor cycle	247	6,472	95.3
Acetyl-salicylic acid	175	568	88.1	Inner tubes, cycle	316	11,227	98.6
Arseno-benzol	107	2,581	86.4	Inner tubes, motor car and airplane	1,071	33,962	140.4
Direct colours	820	65,652	114.1	Inner tubes, motor cycle	43	2,231	179.6
Acid colours	996	18,449	110.0	Rubber boots	462	11,853	122.0
Basic colours	445	8,716	150.0	Rubber shoes	1,580	117,830	119.0
Sulphur colours	280	16,927	57.7	Sponge rubber goods	257	3,779	134.1
Vat colours	867	15,576	267.8	Rubber threads	317	15,429	97.8
Logwood	15	1,632	226.1	Rubber heels and soles	760	18,580	108.6
Extract for tanning, quebracho	129	31,241	391.1	Reinforced hose	294	26,883	112.2
Extract for tanning, others	574	76,396	174.1	Vulcanite and ebonite	548	22,497	92.2
Acetic acid	327	15,704	153.2	Buttons of corozo	144	25,398	56.4
Hydrochloric acid	504	9,713	80.2	Buttons of casein	489	14,287	78.2
Nitric acid	237	49,316	84.4	Buttons of mother-of-pearl	46	8,436	23.6
Salicylic acid	157	1,115	141.7	Buttons of horn and bone	47	1,670	17.8
Sulphuric acid	1,958	131,878	72.5	Hair combs	146	15,220	41.7
Aluminium sulphate	375	8,580	158.0	Moulding powder	928	22,855	141.7
Calcium hypochlorite	278	5,894	47.0	Solid and liquid resins	2,356	20,725	210.9
Camphor	34	5,175	102.7	Linoleum	4,925	29,530	191.9
Chloroform	104	135	48.5	Cork carpet	96	2,199	182.3
Copper sulphate	447	237,733	144.6	Pianos	1,242	3,389	131.0
Ethyl acetate	104	3,830	100.3	Automatic pianos	13	17	76.4
Formaldehyde	202	8,022	134.7	Juvenile cycles	89	776	25.2
Sulphur dioxide	38	3,600	266.3	Household brooms and bruches	1,337	5,817	61.3

Continues below

Product	Output Value British £ 000	Output Value Italian Lr. 000	UVR Lr./£	Product	Output Value British £ 000	Output Value Italian Lr. 000	UVR Lr./£
Iodine	26	5,670	347.0	Tooth brushes	403	5,172	61.1
Litharge	151	4,786	172.3	Shaving brushes	170	2,334	57.0
Acetate of lime	7	20	107.7	Painters' and decorators' brushes	775	10,291	62.6
Magnesium sulphate	79	894	59.4				

Notes: Author's elaborations on Board of Trade (1938–44) and ISTAT (1950). All product UVRs are computed directly from the sources with the exception of five output items of the foodstuff sector – wheat flour, maize flour, biscuits, sugar confectionery and chocolate bars – for which Italian prices have been retrieved from *Riassunto dei prezzi dell'anno 1936* (1937).

Table 10: Values of inputs and unit values, Italy and UK, late 1930s

Product	Input Value British £ 000	Input Value Italian Lr. 000	UVR Lr./£	Product	Input Value British £ 000	Input Value Italian Lr. 000	UVR Lr./£
Wheat	35,860	6,890,064	189.2	Mercury	14	9	71.3
Maize	7,501	1,033,375	204.0	Waxes	238	7,337	191.4
Malt	5,240	22,631	104.2	Mineral oils	93	1,031	338.2
Barley	5,784	11,616	124.1	Vegetable oils	82	1,391	191.0
Wheat	23	38	163.8	Colours	572	6,301	127.2
Raw cotton	37,476	1,310,329	130.0	White lead	377	270	123.4
Cotton waste	2,252	74,480	150.1	Linseed oil	1,137	30,593	193.5
Cotton yarn	8,011	211,444	116.7	Turpentine	223	3,903	75.6
Staple fibre of artificial silk	405	365,847	45.6	White spirit	512	11,159	165.3
Cotton yarns	38,870	1,083,947	136.7	Resins	593	13,251	123.2
Rayon yarns, continuous filament	2,982	150,514	52.8	Whale oil	1,318	439	298.3
Rayon yarns, staple fibre	297	212,617	60.8	Fish oil	303	1,169	136.6
Wool yarns	142	24,077	100.4	Tallow	171	12,289	164.0
Silk yarns	25	3,340	44.6	Iodine	59	8,486	392.5
Recovered wool	1,566	119,731	183.7	Pyrites	343	104,485	132.9
Woollen rags	2,085	51,097	163.7	Sulphur, crude	372	14,285	100.1
Woollen yarn	3,325	271,286	137.6	Phosphate rock	618	146,705	129.9
Worsted yarn	10,072	284,621	153.0	Chrome ore	51	2,341	140.0
Yarns of mohair and other hair	431	4,759	133.9	Calcium carbide	232	19,010	128.5
Silk cocoons	266	283,122	145.9	Cattle and calf, hides and skins	6,777	565,273	145.5
Raw silk	1,544	255,661	126.9	Sheep and lamb skins	1,293	25,175	130.8
Cotton yarn	1,469	13,201	103.3	Goat sins	826	39,727	142.5
Cotton linters	148	12,964	99.6	Reptile skins	32	1	66.6
Rayon yarns, continuous filament	5,983	98,912	83.3	China clay	183	9,755	128.5
Flax, tow	344	1,695	74.1	Clay	390	16,723	49.8
Flax, dressed	157	9,637	93.1	Glaze	393	1,896	191.2
Hemp, soft	262	258,358	114.6	Plaster	54	697	38.6
Flax, yarn	807	52,173	241.6	Felspar	266	2,116	65.9
Hemp, yarn	26	116,789	137.7	Flint	335	2,387	39.5
Jute, raw	2,696	106,082	151.1	White sand	253	17,015	130.2
Cotton yarn	4,062	150,373	125.4	Carbonate of potash	20	1,509	97.1
Wool yarn	8,479	159,880	126.7	Soda ash	710	19,398	97.0
Silk yarn	1,483	32,758	84.2	Oxide of lead	33	2,193	147.5
Artificial silk yarn	3,197	90,112	72.7	Felspar	31	593	57.6
Manila	545	1,209	173.7	Borax	34	1,393	225.8
Soft hemp	258	15,937	160.8	Sodium sulfate	35	2,465	97.7
Cotton yarn	655	6,736	237.3	Limestone	69	1,734	92.8
Hemp yarn	234	60,934	89.3	Asbestos, raw and fibre	540	22,667	106.3

Continues below

Product	Input Value British £ 000	Input Value Italian Lr. 000	UVR Lr./£	Product	Input Value British £ 000	Input Value Italian Lr. 000	UVR Lr./£
Cotton yarn	1,255	45,577	116.4	Carborundum	136	2,347	108.3
Silk yarn	42	6,145	108.9	Corundum, artificial	295	5,501	73.0
Artificial silk yarn	3,197	25,135	52.2	Emery	41	912	135.4
Wool yarn	19	3,039	97.0	Paper, all kinds	35	2,180	62.2
Cotton yarn	318	5,438	136.2	Iron ore	7,415	81,750	156.5
Silk yarn	9	133	44.3	Limestone	492	7,755	59.6
Artificial silk yarn	160	7,206	65.6	Dolomite	198	16,621	396.4
Wool yarn	4	40	196.9	Coke	6,368	187,166	292.3
Rubber	287	4,547	111.8	Scrap	12,516	724,025	166.9
Horse-hair	166	5,949	141.4	Pig iron	13,029	228,153	216.2
Hog-hair	139	1,897	145.9	Ferro-alloys	2,679	96,066	128.6
Other hair	119	223	35.0	Steel ingots	3,998	1,500,278	123.9
Feathers	375	1,326	102.7	Lead	15	4,085	160.0
Wool	373	54,091	105.6	Tin	2,264	37,952	111.8
Fur	534	33,248	158.4	Wire rods	3,372	185,025	143.6
Skins treated	1,096	29,140	68.3	Aluminium, scrap	1,757	15,336	89.1
Sole leather	4,376	290,388	195.9	Brass, scrap	2,165	121,729	213.4
Rubber soles	146	2,865	105.7	Copper, scrap	1,151	58,229	198.2
Rubber heels	74	3,082	119.9	Lead, scrap	1,003	15,094	186.0
Upper leather	7,962	249,079	183.1	Zinc, scrap	142	25,938	82.7
Timber, hard	977	99,715	53.2	Tin, scrap	546	8,606	137.9
Timber, soft	6,637	265,305	43.4	Zinc ore	1,274	25,328	46.1
Veneers	1,493	10,140	45.3	Aluminium, unwrought	2,897	112,955	126.4
Hides	305	927	140.2	Tin, unwrought	1,529	14,227	118.5
Mechanical wood pulp	2,750	25,028	203.8	Copper, electrolytic	1,960	36,342	182.0
Chemical wood pulp	6,608	220,352	151.3	Copper, other than electrolytic	4,331	62,100	196.5
Waste paper	1,001	96,497	255.8	Magnesium	71	1,920	206.1
Linen and cotton rags	619	27,327	84.4	Crude rubber	4,785	213,901	173.6
Paraffin	551	58,697	188.5	Reclaimed rubber	166	4,715	184.0
Tallow	1,127	62,855	206.5	Cotton yarn	1,758	113,498	96.5
Stearin	67	8,967	190.3	Carbon black	440	11,912	97.7
Caustic soda	352	15,981	114.4	Linseed oil	733	5,357	170.8
Nitrate of ammonia	103	899	85.7	Cork	178	667	79.5
Nitrate of soda	54	440	147.3				

Notes: Author's elaborations on Board of Trade (1938–44) and ISTAT (1950)). All product UVRs are computed directly from the sources.