ARTICLES

*Terms of Trade between Italy and the United Kingdom 1815-1913**

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1. The Problem of the Periphery.

The study of the interaction of a lagging country with an economically progressive trading partner can lead to significant insights regarding the role of international trade in economic development. In modern times we have witnessed the emergence of such centres of economic power as Great Britain, Germany, the United States, Japan, and the Soviet Union, which have emerged as attractive trading partners as a result of their effective industrial organization, ability to accumulate capital, and technological leadership. The study of trade of the peripheral Latin American countries with the Atlantic industrial nexus during the present century has led Prebisch to advance his well-known hypothesis concerning the

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disadvantages to the periphery when its trade with the centre is shaped by market forces. Our study aims to apply the Prebisch framework in a similar historical situation involving trade between Great Britain and Italy during 1815-1913, a century of rapid advancement of the former and lagging performance of the latter.

Based essentially on inductive method, the Prebisch hypothesis invites further historical verification.[1] Is the recent experience of Latin American countries repeatable in other historic circumstances? On the basis of his studies Prebisch attributes his estimates of the secular movement in the terms of trade to the peculiar market structures that typify the interaction between the centre and the periphery. The declining terms of trade are viewed as major impediments to economic advancement in the less developed partners essentially for two interrelated reasons. One, their *gains* from trade in the sense of welfare are not maximal and tend to deteriorate further. Second, when export prices decline relative to import prices, the resulting difficulties in the balance of payments constrain development policies. Our application of the Prebisch framework in the context of the evolving industrial-commercial revolution in Europe not only affords an opportunity to analyze the international dimension of that episode from a fresh perspective but also represents a further test of some of the essential aspects of the Prebisch hypothesis.

The Prebisch thesis is still disputed on theoretical and statistical ground. Indeed, the contradictory classical position from Torrens through Keynes maintained that the terms of trade will move detrimentally to the industrial and beneficially for the primary-producing countries.[2] British-Italian trade is suitable for the Prebisch

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1 The following provide a background for the Prebisch thesis. H. W. Singer, « The Distribution of Gains Between Investing and Borrowing Countries », *American Economic Review*, (Proceedings), May 1950; Economic Commission for Latin America, *The Economic Development of Latin America and Its Principal Problems*, (New York: U.N., Department of Economic Affairs, 1950); R. Prebisch, « Commercial Policy in the Underdeveloped Countries », *American Economic Review*, (Proceedings), May 1959; G. L. Hyde, « A Critique of the Prebisch Thesis », *Economia Internazionale*, May 1963; M. June Flanders, « Prebisch on Protectionism: An Evaluation », *Economic Journal*, June 1964.

2 The classical position is reviewed in Bo Södersten, *International Economics*, (Harper & Row, 1970), pp. 184-90.

framework because Great Britain was an advanced centre country, buying about 2 percent of her imports from Italy, while Italy was a lagging periphery selling to Great Britain about 22 percent of exports during much of the nineteenth century. The trading relation between the two countries was subject to technological and demand disturbances similar to those which underlie U.S. trade with the « periphery ». On the supply side, Great Britain became a leader in manufactured cottons and other factory-produced « new » products making her an aggressive exporter and import-substituter. Italy, on the other side, developed inelastic and often growing demands for industrial products and raw materials, for example, in conjunction with railroad construction and development of basic industrial sectors. *A priori*, the Prebisch thesis should be confirmed in this instance. The T indexes presented here afford an interesting test of the thesis on the basis of long time series outside the rather peculiar context of Latin America in this century. Additionally, the long time series used in the present study make it possible to observe the relevance of forces other than « structural », especially the effects of economic unification on Italy (1861) and the protectionism in the 1870's and 1880's.

2. Methods of Analysis.[3]

Analysis of the data is undertaken in three steps: (1) the construction of various terms of trade (T) indexes, (2) interpretation of the results in terms of tendencies in the dominant components of trade, and (3) estimation of price and income elasticities of demand.

Our point of departure was Imlah's exhaustive study of the British terms of trade vis-à-vis the rest of the world,[4] and we use his results both as a check and a standard of comparison for the more narrowly delineated interaction of Italy and Great Britain. Calculation procedures for indexes tabulated in Appendix I were as follows.

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[3] See Appendix II, « Sources and Methods », for detail on the data used in this study.

[4] A. H. Imlah, *Economic Elements in the Pax Britannica* (Harvard University Press, 1958).

Let P stand for prices and Q for quantities of individual exports (x) and imports (m); second subscripts i=1...n stand for years, with « o » signifying the base year. We define:

(a) Volume relative for exports,
$$Vx = \frac{\Sigma Pxo\ Qxi}{\Sigma Pxo\ Qxo}$$

(b) Volume relative for imports,
$$Vm = \frac{\Sigma Pmo\ Qmi}{\Sigma Pmo\ Qmo}$$

(c) The gross barter terms of trade (a composite of Laspeyres volume indexes),
$$GBT = \frac{\Sigma Pxo\ Qxi}{\Sigma Pxo\ Qxo} \div \frac{\Sigma Pmo\ Qmi}{\Sigma Pmo\ Qmo}$$

(d) Paasche price index for exports,
$$Px = \frac{\Sigma Pxi\ Qxi}{\Sigma Pxo\ Qxi}$$

(e) Paasche price index for imports,
$$\frac{\Sigma Pmi\ Qmi}{\Sigma Pmo\ Qmi}$$

(f) The net barter terms of trade (a ratio of Paasche price indexes),
$$NBT = \frac{\Sigma Pxo\ Qxi}{\Sigma Pxi\ Qxi} \div \frac{\Sigma Pmi\ Qmi}{\Sigma Pmo\ Qmi}$$

(g) Total volume relative,
$$TV = \frac{\Sigma Pxo\ Qxi + \Sigma Pmo\ Qmi}{\Sigma Pxo\ Qxo + \Sigma Pmo\ Qmo}$$

(h) Total gain from trade, $TG = TV \times NBT$

(i) Market or trade balance, $TB = GBT \times NBT$

(j) Market gain from trade, $MGT = TV \times TB$

Special statistical procedures have been devised to aid us in the interpretation of the T indexes. In selecting meaningful base years, we employ a shifting base—year technique, chain indexes, and moving averages as weights. Since data coverage changed over time, it is necessary to assume at this stage of research that price movements in the residuals and in the enumerated data are the same, and the composite quantum indexes (a), (b), (c), and (g) are adjusted accordingly. The interpretation of the indexes is facilitated by identifying price movements of dominant exports and imports.

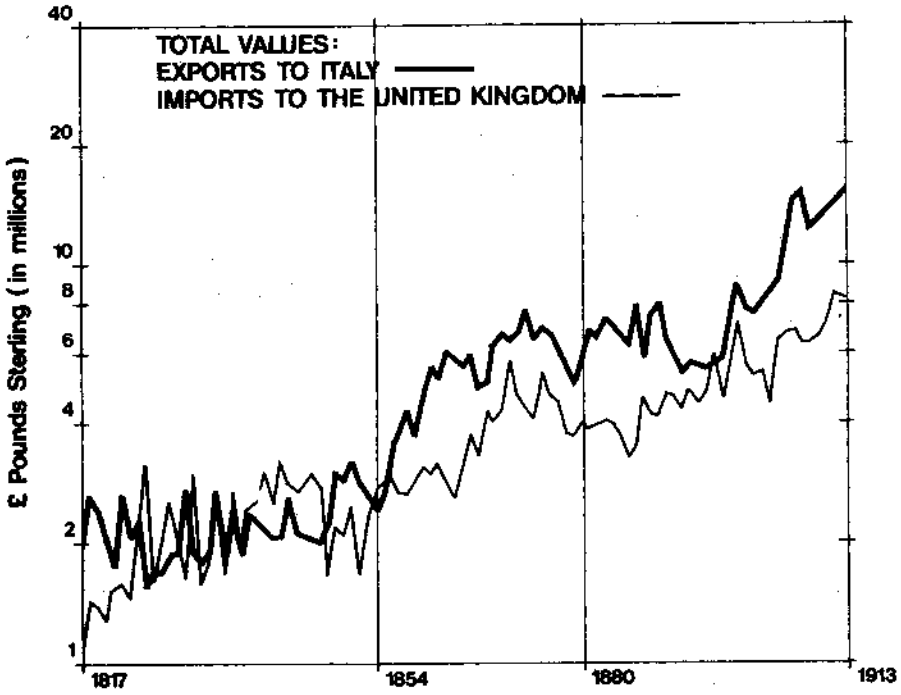
Improvements in the price data during the course of research required recalculation of indexes. Although we started the study with official prices of British imports, it became evident that to achieve more meaningful results we would have to substitute current market prices for the official prices between 1815 and 1853. (See Appendix II on Sources and Methods). This was made possible using a computer programme written for the study. It afforded us the luxury of experimentation with new ideas during the course of research.[5]

3. Character of Trade Between the Two Partners.

Trade between Britain and Italy in the century 1815-1913 shows a clear if uneven expanding trend, as can be seen in Graph 1. Britain held a significant but declining share of Italian trade during the nineteenth century, accounting for about one-third of Italian imports and exports during the first half of the century, for 20 percent between unification and the end of the century, and for about 12 percent just before World War I. The value of British exports to Italy increased sevenfold between 1815-1913, while her imports from Italy increased a little over tenfold.

Leaving aside the specific reasons for notable fluctuations in trade (the Continental Blockade, inflation of the Napoleonic Wars, Sir Robert Peel's tariff reform in 1842 and 1846, and consequences of the depressions in the late 1870's and 1880's), attention is called to the unmistakable tendency of Italy to be a net importer from Britain, as seen in Graph 1. Such a tendency apparently has been the fate of lagging economies also today. To be sure, by the second half of the last century Italy borrowed capital from the advanced countries like England and France so that the borrower could maintain an import balance. Yet, we cannot help but wonder whether such import balances were

[5] The computer programme written by R.B. Berner is patterned after William C. Benz, *Passion*, (W.H. Freeman Co., 1970). Our method is described in I.A. Glazier and V.N. Bandera, « Terms of Trade between South Italy and the United Kingdom, 1817-1869 », *The Journal of European Economic History*, Vol. I, No. 1, Spring 1972.



Graph 1. Total Values of Imports and Exports Between the U.K. and Italy, 1817-1913.

« caused » by capital inflows, or capital inflows were brought about by a chronic tendency of the lagging partner to generate payment deficits.

Apparently, fortuitous conditions rather than desirable structural changes were responsible for Italy's temporary surplus balances of trade with the U.K. in twenty of the ninety-seven years. Generally speaking, cyclical fluctuations in British exports were governed by the state of the business cycle in Europe through its effect on incomes and demand.[6] Similarly, imports from Italy followed the British

[6] The correspondence, of course, is not always a perfect one. In the 1820's and 1830's imports and exports fluctuate within a fairly narrow range. British exports fall from a peak during the post-Napoleonic boom in 1818 to a trough in 1821, recover and fall again during the financial crisis of 1825, then fluctuate without significant trend until the 1840's — rising in 1834 and in the boom of 1836, falling in the panic of 1837. Exports are unaffected by the depression of 1840-42, but rise in the boom of 1846 and in the recovery of 1849 and 1851. During the mid-Victorian boom (1850-1869), exports

trade cycle, although this is less apparent after 1860 than before.[7]

With regard to comparative-cost structure of trade, rapid technological advancement and capital accumulation made Britain a highly competitive supplier in the world market. However, starting around 1880, Britain's relative share of the Italian market was shrinking because of competition from industrializing Continental countries. For example, competition from Germany, Belgium and the U.S. reduced Britain's share in the growing Italian demand for coal, iron and steel.

Understandably enough, the Prebisch method investigates the the effects of income cycles and haphazardly spreading industrialisation not only on trade volumes and trade balances, but also — and primarily — on international prices, that is to say, on the terms of trade. Such movements in prices will be characterized next; at first they will be interpreted descriptively and then more analytically on the basis of estimated price and income elasticities of demand.

4. Trends in the Terms of Trade.

The movements in export and import price indexes, as well as in the various composite T indexes, are the epiphenomena of changes in Marshallian « reciprocal supply-demand » that govern

show an upward trend, with interruptions in 1852, in 1854 (Crimean War), in 1859 (Italian War of Independence), in 1861-1862 (cotton famine), in 1865, (financial crisis), and in 1867-1868 (world-wide slump). In the post-unification decades British exports rise again in periods of boom — in 1869-1873, 1880-1883, between 1887-1890 (very sharply in 1887 in anticipation of the Italian import tariff of 1888), and between 1896 and 1913. Exports fall during periods of depression — in 1874-1879, 1884-1886, 1891-1894, 1900-1901 and 1908-1909.

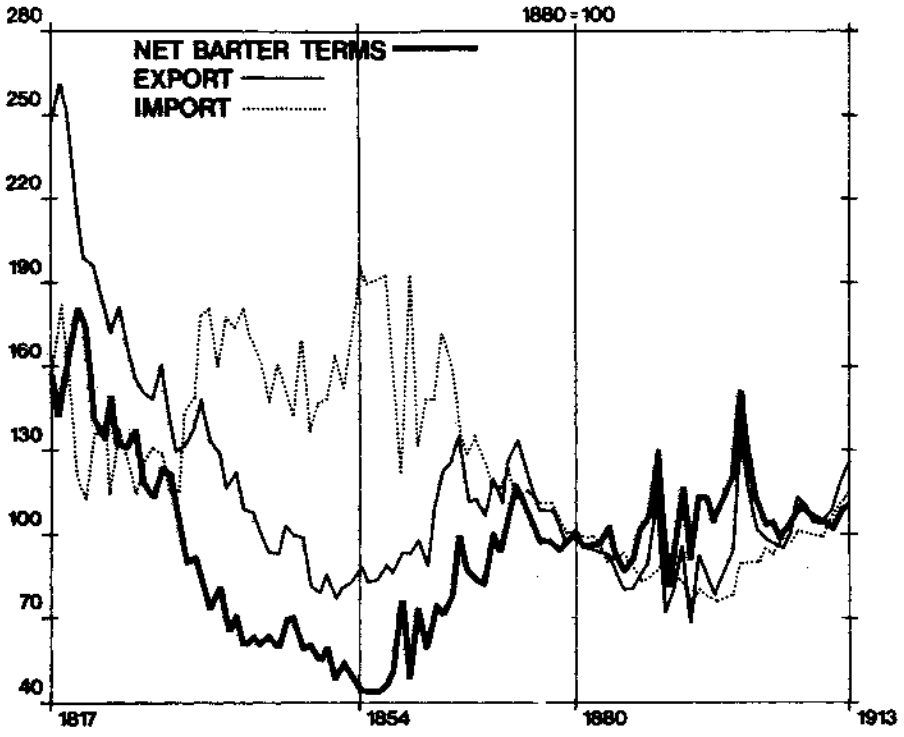
[7] Imports show a slow upward trend through the post-Napoleonic decades to the 1850's, then a slight decline in the years immediately following unification (1859-1865). Imports recover in the late 1860's with monetary devaluation and fixed exchange rates in 1866 and rise again between 1870-1871 (rapid economic expansion in both countries). Imports follow a downward course through the later 1870's and 1880's, fall in the Italian depression of 1876-1879 and remain at a low level in the period of restoration of convertibility and revaluation of the lira (1883) and during the investment boom in Italy between 1879-1887, as Italian trade is diverted to Continental markets. Imports fluctuate slowly upwards during the Italian depression of 1887-1893 and then rise more rapidly during the second boom between 1896-1913.

the exchange of values between the centre and the periphery. For the sake of analogy with the Imlah study, the indexes were calculated from the British viewpoint, so that the NBT represents the ratio of the United Kingdom's weighted export to import prices, and hence rising numbers indicate favorable movement for the United Kingdom and unfavorable movement for Italy.

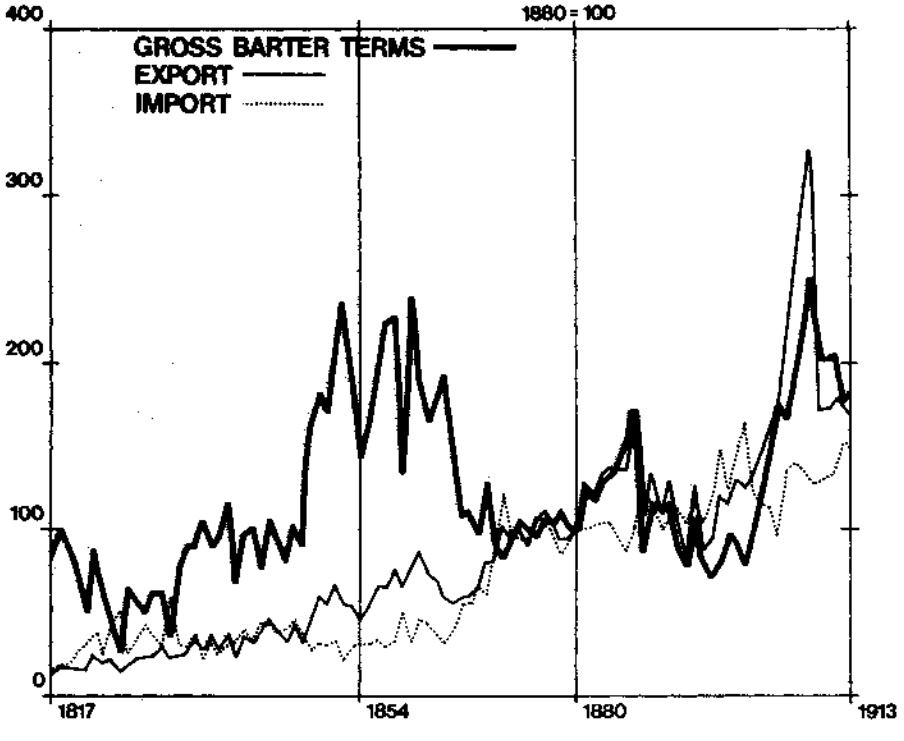
On the basis of Graph 2 and 3, as well as various indexes tabulated in Appendix I, three distinct phases can be distinguished:

(1) *1817-1857*: Decisive decline of NBT and hence welfare improvement for Italy. Since GBT shows inverse movement, both indexes imply that Italy tended to receive increasing amounts of imports per unit of exports. NBT was apparently dominated by the unmistakable downward trend in British export prices. Such a trend reflects effective transmission to the periphery of the fruits of British improvements in production efficiency due to both capital accumulation and technological progress.

The decline of British export prices was especially pronounced in the textile sector — particularly in cotton yarns, plain and printed calicoes, woollen and worsted yarns and manufactures and British linens. The average export price of cotton manufactures fell by 63% between 1817 and 1833 (the latter year being the low point of the period of most rapid decline) and by 73% in 1843. Export volumes of manufactures, in 1880 prices, fell from 29% to 25% of total exports in this period. Cotton twist and yarns also exerted a very strong depressing influence on the aggregate export price index, the price of yarns falling by 69% between 1817-1833 and by 80% in 1843, while volumes quadrupled between 1817-1840, rising to 16% of total exports in 1840. As the combined volumes of cotton yarns and manufactures rose from 29% to 40% of total exports between 1817-1840, the aggregate British export price index fell even more rapidly. Woollens had somewhat less influence on the aggregate price index as wool prices fell more slowly than cottons after 1815 due to a slower rate of mechanization and a lower level of Italian demand. Wool prices fell by 23% between 1817-1841 while volumes declined from 16.9% to 8.6% of total exports. British linens also con-



Graph 2. The Net Barter Terms of Trade of the U.K., with Italy; U.K. import and export price indexes, 1817-1913.



Graph 3. The Gross Barter Terms of Trade of the U.K., with Italy; U.K. import and export volume indexes, 1817-1913.

tributed to the fall in the aggregate price index, linen prices declining by 45% between 1817-1843 while export volumes rose from very small quantities to 2% of total exports.

Cheap cotton and woollen textile and yarns were the most important British exports to Italy in the decades after 1815. Britain had little competition in these products in the Italian market. Britain also dominated the Italian market in capital goods, particularly bar iron, bolt and rod iron, copper sheets and nails, iron hoops, chains, hardware, etc. This trade started to expand in the 1830's and 1840's.

At the same time export prices from Italy, after a period of initial decline between 1815 and 1826, stayed firm or even rose modestly, while British industrialization was progressing rapidly. Import prices fell steadily in the deflationary decade 1815-1826 except in 1816 and 1817, which were years of poor harvests in Italy and England. The fall in agricultural prices between 1815-1826 reflects the changed international equilibrium which followed the sudden transformation from a war-time to peace-time economy. The European countries increased agricultural production during the Napoleonic wars, which resulted in cheaper supplies in the post-war period.[8] After 1818 the Italian States with large quantities of olive oil, wine, citrus fruit, raw silk, wool, etc., attempted to maintain domestic prices by following Britain's example and raised import duties to protect internal markets and encouraged exports. The initial phase of declining prices, particularly of sulphur, citrus fruit, wool, sumach, etc., continued until 1826. Wine and oil prices fell till 1832 or 1833.

Between 1826 and 1849 import prices from Italy fluctuated around a fairly stable equilibrium reflecting a somewhat stronger level of internal and foreign demand. In the 1850's agricultural prices rose as a consequence of increased British demand for Italian products during the Crimean War reflecting the rapid expansion of the international economy and a rising inflationary trend. In the middle and late 1850's, grain, wine, silk, sulphur and other

[8] G. Bursotti, *Biblioteca di Commercio*, (Naples, 1841-1846), Vol. II, pp. 10-11.

prices rose because of poor harvests and vine and silk worm disease which severely reduced Italian agricultural output. Grain and wine prices fell sharply however in 1858 and 1859. Silk prices moved against this general trend rising between 1817 and 1857 in response to growing demand from English, Continental and U.S. markets.[9]

Silk, olive oil and sulphur were the most important imports from Italy into Britain in the decades after 1815. Silk made up almost 70% of the volume of imports in the 1820's, 65% in 1840 and 22% in 1850. Silk imports declined sharply after 1850 with silk worm disease in Northern Italy and a shift in British demand to cheaper Asian silks and the introduction of mechanical silk-spinning machines in England. Olive oil (from Naples and Sicily) accounted for 12% of imports in 1840 rising to 37% by 1850. Sulphur, in which Sicily held a world monopoly in the nineteenth century made up about 2% of imports in 1830 and 10% in 1850. Other food stuffs and raw materials, predominantly from the South of Italy—sumach for dyeing and leather tanning; hemp for sailmaking, cordage and clothing; chemicals—boracic acid (from Tuscany), barilla for bleaching, and cream of tartar; citrus fruits (lemons and oranges); wheat and wine made up the balance of imports. Small quantities of Italian wheat were imported into Britain in years of poor harvests and high prices—in the post-Napoleonic period, in the late 1830's and early 1840's, after the repeal of the Corn Laws in 1846, etc. Italian wheat declined rapidly in importance with the arrival of cheap wheat from overseas in the 1860's and 1870's.

(2) *1857-1875*: A sharp rise in NBT and hence deteriorating gains from trade for Italy. From the welfare standpoint, that tendency is corroborated by the declining GBT measuring relative volumes of exports to imports in constant prices. Simultaneously, the United Kingdom showed a definite tendency to generate export surpluses with Italy, as measured in current prices, which corresponded to Italy's trade deficits with the usual painful

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9 M. ROMANI, *Storia Economica D'Italia Nel Secolo XIX, 1815-1914*, I, (Milan, 1968), pp. 40-43, 61-63, 113-120.

price and income repercussions. The rising NBT reflects the unmistakable secular decline of Italian export prices (i.e., British import prices) that continued for four decades until 1898.

Italian export prices fell dramatically in the late 1850's with general economic depression (1857), poor harvest, and political and economic crises between 1858 and 1860, particularly during the Italian unification wars of 1859. Prices continued to fall during the political and economic crises of the 1860's, the depression of 1861, and the Austro-Italian War of 1866. The economic crisis between 1863 and 1866 culminated in the *corso forzoso* (devaluation of the lira in May, 1866) and in financial and industrial depression in Europe in 1866-1867. The troughs in the export price index in 1859 and 1861 reflect the sudden downward movement in sulphur and wheat prices. Prices of mineral ores, dyestuffs, animal skin and wool manufactures also declined. Agricultural prices fell more slowly than non-agricultural product prices till 1882. Olive oil, wine, sulphur, liquorice juice and silk and silk manufactures dominate the export price index.

At the same time, British export prices rose sharply, mainly between 1851 and 1866, and then declined between 1866 and 1887. Unlike more recent experience, when prices of manufactured goods are generally inflexible, British export prices showed considerable fluctuation, especially if we consider the years between 1860 and 1875. British export prices rose gradually between 1851 and 1862 and then rapidly until 1866. In the 1850's rising prices can be partly attributed to the growing importance of metal manufactures and other higher—priced British products exported to Italy. In the 1860's the sharp rise in the index was the result of the cotton crisis during the U.S. Civil War. Cotton yarn rose 37% and cotton manufactures 52% in this period. Export prices declined in the postwar depression (1866-67) as cotton prices began to fall to their pre-war levels. Export prices rose again during the boom of 1871-1873 as coal prices doubled with the sharp rise in output of British iron and steel. Between 1883 and 1887 export prices declined as pig and wrought iron fell to their lowest levels since 1852. Cotton yarns and manufactures fell less rapidly.

(3) *1875-1913*: A slight upward trend and considerable fluctuation in NBT; both tendencies were undesirable for Italy. Italy's deterioration of the « gains » started around 1860 and continued into the twentieth century, although such a tendency became less pronounced or was perhaps even eliminated in the decade before World War I. The fluctuations in relative export-import prices and volumes during 1875-1913, and especially during 1886-1902, undoubtedly generated undesirable fluctuations in Italy's trade balance. A sharp rise in GBT since 1896 reflects the pronounced export balance of the U.K. with Italy.

Italian export prices (British import prices) fell during the Great Depression of 1875-1897 and rose during the world boom of 1898-1913. Export prices fell by 37% between 1875-1897 while export volumes rose by 20%. Prices declined between 1875-1897 because of falling British demand for Italian products and stiffer national competition for Italian exports in British markets. Wine prices declined only in the 1890's because of vine disease (phylloxera) in France which began in 1886 and 1887. Sulphur, citrus fruit, sumach, hemp, and chemical product prices fell together between the 1870's and 1898. Silk and silk manufactures declined between 1876 and 1897 because of the long depression in the English silk industry which started with the Anglo-French free-trade treaty of 1860. Silk prices fell sharply in the 1880's because of the French-Italian tariff war which deprived the Italian silk industry of its most important market.

British export prices fell between 1873-1886, then fluctuated widely between 1886-1902, and finally rose between 1905-1913. Export prices declined by 45% between 1875 and 1886—coal, iron, cotton manufactures and sugar showing the largest decline after the depression of the 1870's—while export volumes increased. After 1886 export prices started to rise. From 1886 to 1902 prices rose by 26% as volumes rose by 20% and between 1905 and 1913 prices increased by 30% as volumes rose by 15%. Woollens and worsted manufactures, soda, copper ingots and sheathing, rails, iron and steel manufactures, boiler sheet and armour plate, cotton yarn and manufactures and coal were the most important British exports

to Italy after 1875. By 1890 coal became the single most important British export to Italy. It dominated the peaks and troughs in the export price index—the fall in 1887 (because of the depression in the English coal trade), the abrupt rise in the index in 1900 (due to naval demands for coal during the Boer War), etc. Coal had a particular importance for British-Italian trade since the mid-nineteenth century as it provided the prime energy source for Italian industry. In 1880 it made up 11% of the value of exports, by 1890 it had grown to 20% and by 1913 to 51% of total British exports.

British trade with Italy between 1880 and 1913, however, was undermined by two adverse trends—Italian industrialization enjoying high protection, and foreign (German) competition. Italian tariffs coincided with a rising wave of protectionism and a period of falling prices and profits in Europe which began with the Great Depression. The tariff of 1878 introduced rates of 15%-20% on the import of textiles and machinery and effectively destroyed the British trade in cotton yarns. The tariff of 1887 imposed still higher rates on grain, textiles (cotton manufactures 34%, cotton yarns 14%-19% woollens 15%-35%, iron and steel products 13%) and caused exports of British cottons to collapse entirely. It also provided a great stimulus for the rapid growth of the Italian metallurgical industry and the demand for imports was correspondingly reduced.

Britain started to feel the effects of German competition in iron and steel manufactures in the Italian market with the opening of the St. Gothard railroad in 1883. Germany enjoyed a number of advantages in the Italian market in this period: Italy's tariff war with France (1887-1896) opened opportunities for German firms and for German investment; German banks financed the re-organization of the Italian railways in the mid-1880's; Italian-German trade treaties were concluded in 1891 and renewed in 1904, etc. With the development of the trans-Alpine railways, Germany also had a great advantage in cheap transport costs to Italy. In the 1880's and 1890's German metal manufacturers sent by rail from Westphalia to Northern Italy displaced the higher-priced British

products, which came by sea to Genoa, in the markets of Milan and Turin.[10]

Between 1880 and 1913 Italy's foreign trade grew by over 40% and Germany absorbed a larger proportion of this increase than any other country. Germany's share of Italy's total trade rose from 7% to 16% between 1880-1913. Britain's share of the Italian market in this period fell from 25% to 15%, although her imports to Italy increased, in absolute terms, from £ 5.4 million to over £ 14 million as the Italian economy expanded. Britain, however, lost her comparative advantage in many competitive lines to Germany in this period—in chemicals, in iron and steel products, copper and brass manufactures, tools, certain types of machinery, scientific instruments, etc. By the turn of the century Britain retained only a few strategic sectors of the Italian market—metal manufactures, textile and agricultural machinery and coal.

5. Estimates of Price and Income Elasticities.

To gain further insight into the economic meaning of observed international price tendencies, we have undertaken more formal analysis of our empirical evidence and shall offer here our estimates of demand elasticities.

This section presents estimates for Italy and the U.K. of:

(a) price and income elasticities of bilateral import demand between Italy and the U.K. over the period 1817-1913, (Lines 9-13 in Table 1);

(b) « elasticities of substitution » between U.K. imports from Italy and Italian imports from the U.K. (Lines 1-8 in Table 1). In addition to these aggregated parameters, preliminary estimates of price and income elasticities for specific traded commodities are presented in Tables 6 and 7. (Appendix I)

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[10] *Parliamentary Papers*, « Royal Commission on the Depression of Trade and Industry », 2nd Report, C 4715, 1886 Part II; *Miscellaneous Series of Diplomatic Consular Reports*, 417, « Report on the Economic and Financial Situation in Italy », Vol. LXXXVIII, 1897.

The model used is the familiar double-log demand function in which both price and income elasticities are constant.[11] The typical equation for the demand for imports is:

$$(1) \qquad \ln M_t = a_0 + a_1 \ln Y_t - a_2 \ln(Pm/Pd)_t + u_t,$$

where M_t is the quantity of imports (index);

Y_t is the "permanent" level of activity, varies across equations, deflated by Pd_t "permanent" to be defined below;

Pm_t is the import price index;

Pd_t is a general wholesale price index;

and u_t is a random error term such that $E(u) = 0$, $E(uu') = \sigma^2 I$.

The model is applied to both total imports and to the demand for individual commodities.[12] That the dependent variable is expressed in index number form and the A variables are in levels is only a matter of scale, and will be reflected in the constant term a_0.[13] In these equations the « permanent » level of the activity variable Y_t can be approximated by an infinite geometrically declining distributed lag.[14] Simultaneous equation bias is a

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[11] See for example E. E. Leamer and R. M. Stern, *Quantitative International Economics*, (Boston: Allyn and Bacon, 1970), Chapter II.

[12] The methodology employed here is constrained by the availability of supplementary series and by a desire to explore the suitability of alternative methods of data manipulation for estimation in a simple model of demand. The results are preliminary. Although the estimates of price elasticities are generally satisfactory, those of income or activity elasticities for individual commodity equations often have a negative sign. This is not true, however, for total imports. Either the method used amounts to misspecification of the model or its error terms, or some of the disaggregated imports in both directions (Italy-U.K. and U.K.-Italy) are inferior goods. Over the sample period incomes and output rose rapidly in both countries while their mutual interdependence declined.

[13] Were we to use levels for the individual commodities, and if these added to total imports, a system of demand equations could be derived and estimated. However, the derivation of a complete system of equations in which the demands for both domestic and imported goods are determined simultaneously would be preferable on theoretical and empirical grounds to a demand function derived for imports alone. See R. B. Berner, « Specifying Import Demand Functions », Université Catholique de Louvain, Institut des Sciences Économiques, 1971, and *An Empirical General Equilibrium Model of International Discrimination*, Pennsylvania, 1974.

[14] This function takes the form (where A denotes activity)

$$\ln A_t^* = (1 - \lambda) \sum_{i=0}^{\infty} \lambda^i \ln A_{t-i}.$$

problem in the elasticity estimates since prices and incomes are endogenous variables, but we have ignored it for the present time. In disaggregating, we have tried to examine whether or not individual commodity elasticities are larger than those for total imports. Finally, changes in exchange rates and tariffs are introduced by separate spot exchange rates (lire/pound), denoted e, and tariffs (specific tariffs - lire/cwt.) denoted T, terms in the logarithmic equations for the specific commodities in Tables 6 and 7 (Appendix I).[15]

Table 1 presents double-log results for price elasticities of aggregate imports for both partners as well as for separate demand equations.[16] In calculating price elasticities we compared the results for subperiod 1860-1913 with those for the entire century and found statistically significant differences. In lines 1 and 2 of Table 1, it is noterworthy that the elasticity of substitution is significantly (at the 5% level) higher in each case for the later

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The proxy results in demand functions of the form

$$1nM_t = (1 - \lambda)a_0 + a_1 1nA_t + \lambda 1nM_{t-1} + (u_t - \lambda u_{t-1}).$$

The error structure here is different from that in equation (1), and presents difficulties in estimation. In these exploratory equations, *a priori* $\lambda = 0$ frequently. If the u_t are generated by a first-order autoregressive process with serial correlation coefficient ρ, λ may proxy for ρ, and in fact, this eliminates the estimation problem. There is no reason, however, to suppose that $\rho = \lambda$ *a priori*. See H. THEIL, *Principles of Ecomometrics*, New York, 1971.

15 The price term can be decomposed as

$$1n\ PR = a_2 1n\ Pm - a_3 1nPd + b\ 1n\ e + c\ 1n\ T^*$$

where PR is the composite relative price, T^* is the *ad valorem* equivalent of the tariff, and the other symbols are the same as above. When the separate terms are included in the equations, we expect that $b > 0$ for U.K. imports and $b < 0$ for Italian imports, and that the import tariff coefficient, c, will be negative.

16 Given the equations for total imports for each country (from the other), subtracting one from other yields

$$1n(MI_t/MU_t) = d_0 - d_1 1n\ PMI_t + d_2 1n\ PMU_t + d_3 1nAI_t - d_4 1nAU_t + \varepsilon_t.$$

Capital letters following the variables denote country: I for Italy and U for U.K. If domestic prices enter in a non-homogeneous way in equation (1), there would be a separate term for 1nPd, the coefficient of which was not equal to a_2, which can be included as well. Data for the A and Pd variables are available from 1855 onward. The full sample (1817-1913) can therefore only be used to test the extreme version of the elasticity of substitution model, albeit with a Koyck lag. The relevant equation is thus

$$1n(MI/MU) = (1 - \lambda)a_0 - a_1 1n(PMI/PMU) + \lambda 1n(MI/MU)_{-1} + \varepsilon_t.$$

period.[17] This is also the case with long-run elasticities implied by the parameters in lines 3 and 4. These results, indicating more elastic demand and hence a more responsive price mechanism in the later period, cast a doubt on the Prebisch contention that industrialization involves inevitable monopolization of markets and consequent price rigidities.

In lines 5-8 of Table 1, various extensions of the elasticity of substitution approach are explored for 1861-1913.[18] Lines 5, 7 and 8 show the price elasticity for imports into the U.K. to be higher than that for imports into Italy. The reverse, however, is implied by parameters in line 6, one of which is not significant and has the wrong sign. Thus the implication that U.K. exporters possessed a greater degree of control over prices as part of monopolistic tendencies emerges as an interesting hypothesis which merits further investigation.

Income elasticities of demand which result from estimation of structural equations in lines 9-13 are found statistically significant.[19] The Prebisch hypothesis that the income elasticity of the U.K. for imports from the periphery is less than that of Italy for imports from the centre might possibly be supported by these results but wide variability in elasticity estimates again makes the inference doubtful. While income elasticities are relatively stable at values below unity,[20] price elasticities depend on whether or not

[17] These estimates are made under the *a priori* hypothesis that $\lambda = 0$. The value of the F-statistic to determine whether or not the observations, in the subsample of line 2 are drawn from the same population as the full sample in line 1, equals 8.93, while the critical value at the 1% significance level is 4.82. Hence, we reject equality of the two samples. Similarly, where $\lambda \neq 0$, in lines 3 and 4, $F = 7.74$ and hence the equality is rejected.

[18] Using now the unlagged form of the equation for total imports, the first equation in footnote 16.

[19] The Durbin-Watson statistics for those equations in which no lagged dependent variable appears and the modified Durbin test for the contrary case both indicate the presence of serial correlation of the residuals. This should be attributed to misspecification rather than to serial correlation *per se*. For example, the model for which parameters are presented in line 11 does poorly in the period 1879-1887. This equation for British imports from Italy lacks a tariff term; 1879 is the date that a moderate tariff was introduced. In future research, we will employ an aggregate tariff index. The hypothesis of structural change has not been explored within the period 1861-1913, and cannot be rejected *a priori*.

[20] Note that the elasticity .29 in line 9 Table 1 is an impact or short-run elasticity; the long-run elasticity (calculation not shown) is .56.

TABLE 1.

VARIANTS OF LOG ESTIMATES OF INCOME AND PRICE ELASTICITIES

Dependent Variable (Sample)	Constant	ln(PMI/PMU)	ln(MI/MU)$_{-1}$	lnPMI	lnPMU	lnYU*	lnYI	lnPDU	lnPDI	ln(YI/YU)	ln(PDI/PDU)	lnMU$_{-1}$	ln(PMU/PDU)	ln(PMI/PDI)	$\bar{R}^2$	SE	DW
1.1n(MI/MU) (1817-1913)	-.2001 (6.352)	-.6448 (11.01)													.56	.30	.75
2.1n(MI/MU) (1860-1913)	-.0798 (1.78)	-.8579 (11.35)													.71	.26	.52
3.1n(MI/MU) (1816-1913)	-.9072 (2.998)	-.3268 (4.80)	.5421 (6.976)												.71	.24	2.06
4.1n(MI/MU) (1840-1913)	-.0869 (1.096)	-.4381 (4.534)	.5276 (5.556)												.81	.20	1.70
5.1n(MI/MU) (1860-1913)	-.2299 (7.892)			-.4932 (6.690)	1.008 (8.477)										.60	.29	.94
6.1n(MI/MU) (1861-1913)	-9.902 (1.992)			-1.316 (8.512)	.9068 (4.662)	-.6766 (2.629)	2.327 (4.740)	.9342 (1.173)	2.300 (3.603)						.83	.19	1.26
7.1n(MI/MU) (1861-1913)	8.109 (2.099)			-.7090 (8.491)	1.125 (5.195)					.7318 (2.417)	1.505 (2.025)				.76	.23	.82
8.1n(MI/MU) (1861-1913)	-.0774 (2.174)		.4793 (5.211)	-.3722 (3.857)	.8212 (4.860)										.83	.19	1.82
9.1nMU (1861-1913)	-.5794 (2.127)				-.4258 (8.315)	.2887 (2.540)						.4853 (4.512)			.88	.13	1.68
10.1nMU (1861-1913)	-7.047 (4.630)				-.6347 (4.298)	.8900 (10.70)		1.102 (3.678)							.87	.13	.71
11.1nMI (1861-1913)	-4.734 (7.300)					7.787 (14.98)							-.6596 (4.407)		.86	.14	.64
12.1nMI (1861-1913)	-4.090 (6.143)			-.6689 (7.980)			1.059 (6.317)		2.093 (6.189)						.55	.14	1.25
13.1nMI (1861-1913)	-2.149 (3.321)						.5396 (3.433)							-.4736 (5.310)	.34	.17	.74

Symbols:

MI Italian imports from the UK, index, 1880 = 1.
MU UK imports from Italy, index, 1880 = 1.
PMI Price index of MI, 1880 = 1.
PMU Price index of MU, 1880 = 1.
YU UK GNP at factor cosr, deflated by PDU, and expressed in lire in lines 6-8, in sterling in lines 9-11.
YI Italian GNP at factor cost, deflated by PDI
PDU UK retail price index, 1880 = 1.
PDI Italian wholesale price index, 1880 = 1.

Notes:

Numbers in parentheses are t-statistics
SE is standard error of the estimate
DW is Durbin-Watson statistic
$\bar{R}^2$ are corrected for degrees of freedom

the homogeneous form of equation (1) is used, or whether the import and domestic price term have different elasticities.[21]

Elasticities for specific commodities, in spite of understandable variation, further illuminate the nature of « reciprocal demand ». Comprehensive tests of price and income elasticities for individual comodities are presented in Tables 6 and 7 (Appendix I).

Values for price elasticities, a_2, are summarized in Table 2. It will be noted that most commodities exported by Italy were

TABLE 2.

PRICE ELASTICITIES, a_2

	U.K. demand for I goods	*I demand for U.K. goods*
$a_2 < -1$	Lemons and oranges, Olive oil	Cotton yarn, Cotton piece goods, both plain and printed, Iron hoops, Oil seed, Sugar
$-1 \leq a_2 < 0$	Sulphur, Chemical essences, Silk mfrs., Marble, Wine, Wool, Almonds	Hardware, Pig iron, Linen, Worsted stuffs
$a_2 \geq 0$	Liquorice juice	Coal, Bar iron

TABLE 3.

INCOME ELASTICITIES, a_1

	U.K. demand for I goods	*I demand for U.K. goods*
$a_1 > 1$	Lemons and oranges, Almonds, Cheese, Silk mfrs.	Coal, Pig iron, Alkalai
$0 < a_1 \leq 1$	Chemical essences, Marble	Cotton yarn, Cotton piece goods (both), Hardware, Iron hoops, Linen, Bar iron, Oil seed, Sugar, Worsted stuffs
$a_1 < 0$	Sulphur, Liquorice juice, Olive oil, Wine	

[21] The equality of elasticities hypothesis is tested for the parameters on line 10 and rejected at the 5% level. The same is true for the Italian equation in line 12. The use of relative or separate prices is the only difference between specifications for which parameters appear in lines 11 and 12. In the constrained case, import demand is inelastic, and in the unconstrained case, it is unit elastic. The domestic price elasticity estimate (substitute goods) is over 2, while that for import prices is only .67; these differ significantly at the 1% level.

We are asserting *a priori* that the cross price elasticity of demand by Italy between U.K. and other European goods is zero. With additional data on prices and trade volumes however, it will be possible to estimate a complete system of demand equations disaggregating by country of origin.

sensitive to price but inelastically demanded by U.K. importers. By contrast, half of Italian imports were elastically demanded. Such asymmetry was properly identified by Prebisch as undesirable, especially from the balance-of-payments standpoint.

Values for income elasticities, a_1, in Tables 6 and 7 (Appendix I) are summarized in Table 3. These show unexpected variation, and, in many instances, even the wrong (negative) sign. During the four to five decade period for which these results were obtained, manufactured imports from the U.K. to Italy declined in volume while GNP and industrial production grew; hence, in the estimated equations, they appear to be inferior goods. Substitution for U.K. imports, due in large measure to Italy's growing economic base as well as to British competitors, were largely responsible for this phenomenon. However, basic materials — coal, pig iron, and alkalis — all have high income elasticities from 1.6 to 5.7 (Table 7). Obviously these were inputs to the growing Italian economy.

The results for income elasticities for various imports of each country show great diversity. Those with $a_1 < 0$ are largely food products, although three of the four commodities for which $a_1 > 1$ are also food products. Whether Spain and France competed with Italy in the U.K. market in these products is an hypothesis we cannot test here, although there is ample historical evidence to support it.[22] While the Italy - U.K. results exhibit a majority of positive income elasticities, those for four commodities are not presented here because none that was estimated was satisfactory, and these results also were characterized by $a_1 < 0$.

These estimates of the parameters of disaggregated and total demand equations do not necessarily invalidate the Prebisch conjecture that income elasticities of the periphery are high. From Italy's standpoint, we would have to consider additionally Italy's import demand elasticity vis-à-vis all advanced countries. However, our evidence does bring to light a significant aspect overlooked by the Prebisch school. The variety of market situations for specific commodities does include—over a longer period—definite attractive

[22] Ministero D'Agricoltura e Commercio, *Bollettino delle notizie agrarie*, Roma, 1891.

as well as detrimental situations. And if on balance the net outcome is harmful to the periphery, manifesting itself in a declining share of the net gains from trade and chronic payments deficits, perhaps part of the blame should be placed on the underdeveloped market mechanism and unwise policies in the lagging economies themselves.

6. Conclusions and Broader Implications.

The commercial interaction between Great Britain, a major industrial leader, and Italy, a lagging partner on the periphery, affords an opportunity to observe several trends during a dynamic century of European economic development.

From the standpoint of the Prebisch thesis, the initial long period of improving terms of trade for Italy is unexpected. It may well be that the monopolistic market structure and the peculiarities of price and income elasticities that are claimed responsible for the Prebisch results did not assert themselves yet. When prices were subject to greater international competition and were more flexible before 1860, the periphery managed to improve its gains from trade.

The classicists like Torrens and Keynes were not entirely right in claiming that the terms of trade were bound to turn against the industrial leaders like Great Britain. Their conclusion would have been applicable in our case mainly to a mild tendency of some British imports prices to turn adversely in the second half of the last century, while the overall terms of trade seem to have deteriorated slightly in the last quarter of the nineteenth century. Such a trend, which would have been favourable for Italy, did not assert itself sufficiently, and, if we add the Prebisch results for the twentieth century, that trend apparently continued to show deteriorating terms for the peripheral countries.

It is rather instructive that favourable circumstances which occur at times in the world markets seem to be insignificant in relation to fundamental trends. Although the Napoleonic wars created additional demand for the exports of the periphery, just as World War I and World War II for the Latin American countries, such temporary opportunities could not reverse the

long-term trends. Similarly, although Italian unification, like other economic unions, had probably favourable consequences both for internal economic development and for external bargaining power, the long period of deteriorating terms of trade was a manifestation of the more complex global tendencies that asserted themselves in international markets.

Although the study of the commercial terms among two countries offers an opportunity for intensive analysis of the nature of trade of both partners, the importance of the developments involving other factors in the world markets cannot be overlooked. The induction of other peripheral countries into the world markets since the second half of the nineteenth century most likely contributed to the declining terms of trade of Italy. Moreover, Italy's overall deteriorating commercial position vis-à-vis Great Britain did not simply correspond to a clearcut over-all improvement for the latter because the U.K. had to face rising competition from the rapidly upcoming industrialized rivals like Germany, France and the United States.

From the more practical standpoint, it is desirable to identify the specific reasons for the observed secular trends as reflected in the T indexes. Thus, the more detailed study of the components of trade and of the variety of elasticities for different commodities raised the interesting question why the periphery has failed to take advantage of numerous advantageous situations. However, although estimates of aggregate price elasticities of demand for imports are useful, they tend to overlook the relevance of supply and the shifts in demand. On the other hand, the statistically significant estimates of income elasticities of demand suggest that both the business cycle and the rates of growth of GNP exert a significant influence on the terms of trade.[23]

One final consideration must be kept in mind. Our analysis, like those of Prebisch, Imlah, Kindleberger and others, merely tries to explain how economic development (in the sense of change in income and preferences as well as in production and technology)

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[23] A theoretical exposition of the importance of rates of growth on the terms of trade can be found in SÖDERSTEN, *op. cit.*

affects the conditions of trade, specifically, the relative prices and volumes of exports and imports. Such an approach elucidates the nature of trade as well as the reasons for the changing conditions in the balance of payments or trade policies pursued by governments.

However, we thus reach a point where it becomes desirable to evaluate directly the more intricate question of how the changing terms underlying international trade affect the rate of economic development of the trading partners; especially of the peripheral country. Still to be investigated is the question: to what extent did Italy's improving terms of trade stimulate her economic growth before 1860, and the deteriorating and fluctuating terms of trade hinder her economic development in the subsequent decades? The improving "gains" during that first long period of trade for Italy hardly corresponded to the backward condition of that peripheral country. On the other hand, although Italy's subsequent deteriorating terms can be regarded as disadvantageous, it cannot be argued that the country ceased to benefit from trade. The extent to which the spurts and slowdowns in growth depended on Italy's terms of trade and the related balance of payments has yet to be studied more intensively.

APPENDIX I

TIME SERIES OF DATA AND INDEXES

TABLE 4.

TOTAL VALUES OF FOREIGN TRADE BETWEEN ITALY AND U.K.

British Pounds Sterling

Year	U. K. Imports	U. K. Exports	X-M	Year	U. K. Imports	U. K. Exports	X-M
1815	553,367	1,650,404	1,097,037	1865	3,034,408	5,445,581	2,411,173
1816	455,248	1,367,757	912,509	1866	3,656,107	5,812,173	2,156,066
1817	1,087,924	1,975,175	887,251	1867	3,272,708	4,826,710	1,554,002
1818	1,438,578	2,635,126	1,196,548	1868	4,208,084	4,979,613	771,529
1819	1,396,395	2,427,760	1,031,365	1869	4,009,093	6,118,827	2,109,734
1820	1,277,688	2,037,257	759,569	1870	4,225,340	6,505,365	2,280,025
1821	1,524,898	1,739,647	214,749	1871	5,591,315	6,294,737	703,422
1822	1,560,824	2,645,342	1,084,518	1872	4,601,457	6,557,538	1,956,081
1823	1,451,819	2,071,750	619,931	1883	4,263,132	7,444,195	3,181,063
1824	1,979,235	2,221,653	242,418	1874	4,037,121	6,369,609	2,232,488
1825	3,115,815	1,589,484	-1,526,331	1875	5,172,218	6,766,698	1,594,480
1826	1,605,525	1,712,029	106,504	1876	4,615,352	6,689,402	2,074,050
1827	1,913,447	1,660,295	- 253,152	1877	4,450,036	6,218,612	1,768,576
1828	2,525,021	1,884,893	- 657,128	1878	3,615,967	5,363,818	1,738,205
1829	2,090,181	1,891,667	- 198,514	1879	3,615,967	4,983,676	1,367,709
1830	1,687,120	2,660,152	973,032	1880	3,843,316	5,432,908	1,589,592
1831	2,981,630	1,893,718	-1,087,912	1881	3,802,976	6,630,859	2,287,883
1832	1,575,626	1,762,413	186,787	1882	3,867,338	6,480,258	2,612,920
1833	1,798,512	1,889,465	90,953	1883	3,926,312	7,121,948	3,195,636
1834	2,552,535	2,677,249	124,714	1884	3,865,490	6,994,114	3,128,624
1835	1,675,991	1,862,651	186,660	1885	3,638,208	6,627,165	2,988,957
1836	2,683,165	2,364,839	- 318,326	1886	3,215,315	6,092,470	2,877,155
1837	1,879,057	1,865,351	- 13,706	1887	3,515,989	7,794,177	4,278,188
1838	2,408,183	2,377,934	- 30,249	1888	4,511,281	5,762,941	1,251,660
1839	2,510,249	1,575,264	- 934,976	1889	4,185,667	7,113,040	2,927,373
1840	2,972,678	2,188,242	- 784,436	1890	4,044,752	7,757,862	3,713,110
1841	2,500,143	2,065,966	- 434,177	1891	4,606,147	8,296,560	1,690,413
1842	3,234,851	2,083,925	-1,150,926	1892	4,595,152	5,564,487	969,335
1843	2,830,457	2,599,068	- 231,389	1893	4,243,189	5,206,758	963,569
1844	2,701,587	2,095,837	- 605,750	1894	4,715,544	5,555,312	839,768
1845	2,770,059	2,072,482	- 697,577	1895	4,416,669	5,545,966	1,129,297
1846	2,948,517	2,754,565	- 193,952	1896	4,582,077	5,357,250	775,173
1847	2,778,963	1,982,950	- 796,013	1897	5,737,511	5,596,900	- 140,611
1848	1,675,776	2,155,910	480,134	1898	4,540,632	5,647,707	1,107,075
1849	2,159,622	2,912,805	753,183	1899	5,406,605	6,985,916	1,579,311
1850	2,101,760	2,840,044	738,284	1900	6,919,529	8,772,114	1,852,585
1851	2,437,913	3,193,352	755,439	1901	5,455,236	7,612,562	2,157,326
1852	1,651,690	2,781,747	1,130,057	1902	5,211,295	7,409,984	2,198,689
1853	2,214,965	2,680,609	465,644	1903	5,286,122	7,801,211	2,515,089
1854	2,675,615	2,386,752	- 288,863	1904	4,401,622	8,371,354	3,969,732
1855	2,732,468	2,597,343	- 133,125	1905	6,341,876	8,892,876	2,551,000
1856	2,899,155	3,490,789	591,634	1906	6,568,901	11,164,645	4,595,744
1857	2,634,344	3,693,992	1,059,648	1907	6,618,205	14,135,150	7,515,945
1858	2,618,932	4,204,704	1,585,772	1908	6,241,446	15,028,127	8,786,681
1859	2,874,171	3,697,307	823,136	1909	6,265,300	12,141,594	5,876,294
1860	3,015,458	4,592,726	1,577,268	1910	6,458,736	12,530,583	6,071,847
1861	2,954,681	5,509,737	2,555,056	1911	6,949,184	13,212,429	6,263,245
1862	3,102,051	5,138,554	2,036,503	1912	8,239,364	14,007,790	5,768,426
1863	2,824,096	5,981,522	3,157,426	1913	8,127,213	14,610,057	6,482,844
1864	2,590,841	5,734,763	3,143,922				

TABLE 5.

U.K. - ITALY TERMS OF TRADE WITH VOLUMES, AND PRICE INDEXES FOR EXPORTS AND IMPORTS, 1817-1913

Year	U.K. Exports to Italy			U.K. Imports from Italy		
	Current Value	Volume Relative (1880=100)	Price Relative (1880=100)	Current Value	Volume Relative (1880=100)	Price Relative (1880=100)
1817	1,975,175	13.9	248.8	1,087,924	16.2	157.9
1818	2,635,126	17.9	262.5	1,438,578	17.8	183.0
1819	2,427,760	17.1	252.0	1,396,395	19.1	156.9
1820	2,037,257	16.6	217.9	1,277,688	25.1	120.3
1821	1,739,647	15.6	199.5	1,524,898	30.9	113.9
1822	2,645,342	24.0	197.2	1,560,824	26.8	136.3
1823	2,071,750	19.9	186.2	1,451,819	24.9	137.6
1824	2,221,653	23.0	173.4	1,979,235	40.1	115.0
1825	1,589,484	15.5	182.9	3,115,815	50.7	138.3
1826	1,712,029	18.2	168.4	1,605,525	27.2	127.9
1827	1,660,295	18.9	157.8	1,913,447	33.3	115.1
1828	1,884,893	22.4	151.2	2,542,021	42.8	126.2
1829	1,891,667	22.7	149.3	2,090,181	35.9	131.9
1830	2,660,152	29.8	161.0	1,687,120	30.7	130.4
1831	1,893,718	23.5	144.6	2,981,630	59.3	117.8
1832	1,762,413	24.3	130.4	1,575,626	31.4	116.4
1833	1,889,465	25.6	132.3	1,793,512	28.1	144.6
1834	2,677,249	34.7	138.2	2,552,535	37.6	148.9
1835	1,862,651	22.5	148.1	1,675,991	21.3	178.0
1836	2,364,839	31.4	134.1	2,683,165	33.9	181.7
1837	1,865,351	25.4	129.7	1,879,057	26.5	161.6
1838	2,377,934	35.8	117.5	2,408,183	30.6	178.8
1839	1,575,264	22.4	123.6	2,510,240	32.3	174.4
1840	2,188,242	35.5	109.3	2.972.678	37.3	181.9
1841	2,065,966	33.5	108.4	2,500,143	33.1	169.9
1842	2,083,952	35.1	99.4	3,234,851	44.9	163.1
1843	2,599,068	46.3	93.5	2,830,457	43.6	147.3
1844	2,095,837	37.4	93.5	2,701,587	38.0	160.0
1845	2,072,482	33.2	103.9	2,770,059	40.7	152.2
1846	2,754,565	45.6	100.7	2,948,517	44.3	143.4
1847	1,982,950	33.4	99.2	2,778,963	36.6	169.1
1848	2,155,910	44.4	81.1	1,675,776	26.9	137.2
1849	2,912,805	60.9	79.3	2,159,622	33.3	146.0
1850	2,840,044	55.1	86.0	2,101,760	31.7	148.0
1851	3,193,352	69.0	77.4	2,437,913	33.3	164.1
1852	2,781,747	56.6	81.6	1,651,690	23.7	153.3
1853	2,680,609	53.5	83.6	2,214,965	29.1	169.7
1854	2,386,752	45.4	88.2	2,675,615	31.4	196.8
1855	2,597,343	52.8	82.5	2,732,468	31.7	190.3
1856	3,490,789	66.5	83.0	2,899,155	33.9	191.3
1857	3,693,992	66.3	88.0	2,634,344	29.4	193.1
1858	4,204,704	76.6	86.2	2,618,932	33.9	168.8
1859	3,697,307	65.1	92.7	2,874,171	48.7	121.6
1860	4,592,726	78.8	93.5	3,015,458	32.6	192.4
1861	5,309,737	87.8	97.7	2,954,681	45.6	132.3
1862	5,138,554	74.2	88.6	3,102,051	44.6	148.4
1863	5,981,522	70.5	110.4	2.824,096	39.4	148.2

Table 5. (*continued*)

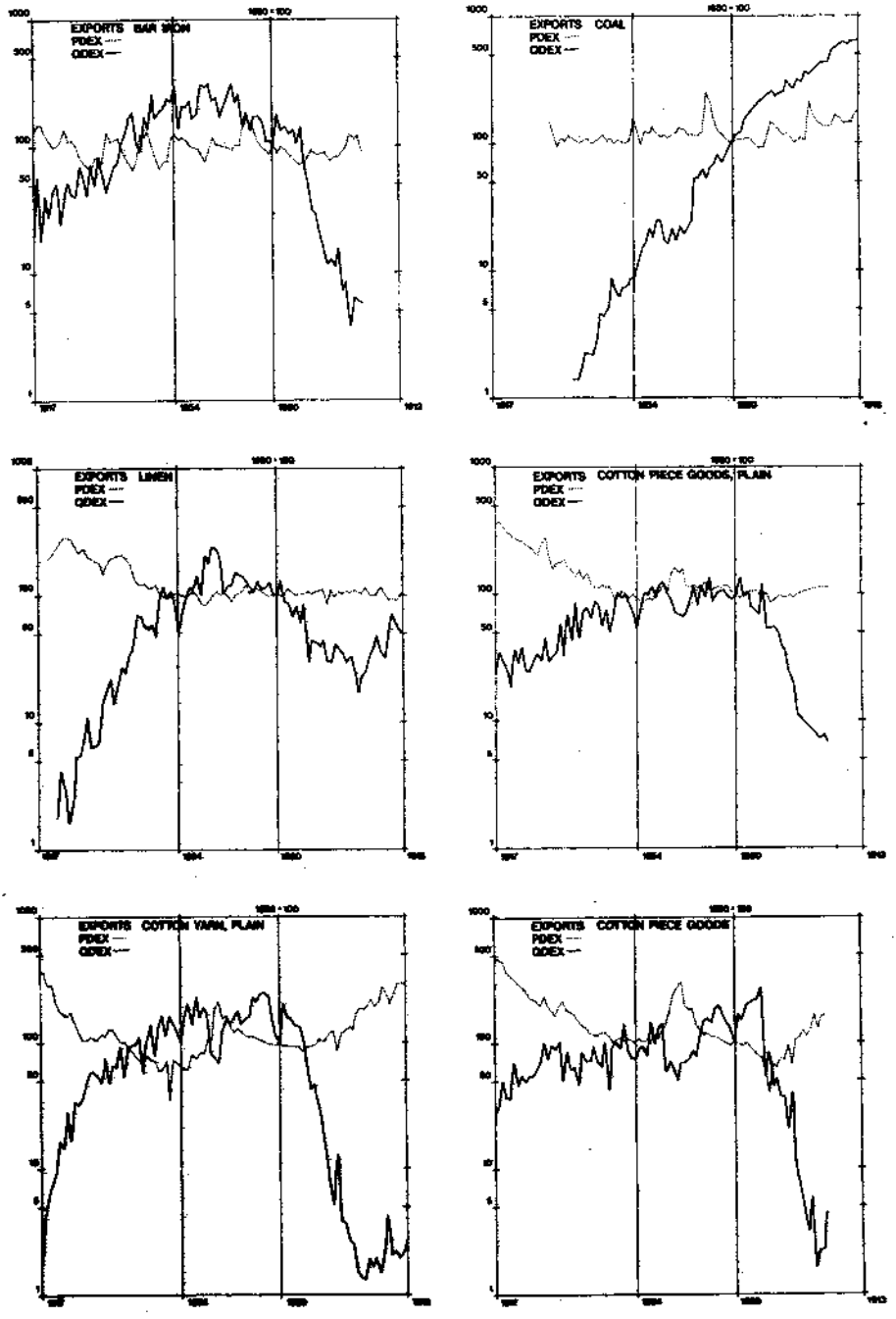
Year	U.K. Exports to Italy			U.K. Imports from Italy		
	Current Value	Volume Relative (1880=100)	Price Relative (1880=100)	Current Value	Volume Relative (1880=100)	Price Relative (1880=100)
1864	5,734,763	62.6	122.8	2,590,841	32.3	171.9
1865	5,445,581	57.5	126.3	3,034,408	38.9	164.9
1866	5,812,173	60.6	135.6	3,656,107	55.3	135.8
1867	4,826,710	61.0	111.6	3,272,708	55.1	128.1
1868	4,979,613	64.2	112.7	4,208,084	65.3	135.7
1869	6,118,827	81.3	106.5	4,009,093	62.8	127.7
1870	6,505,365	83.1	120.4	4,225,340	84.6	119.8
1871	6,294,737	100.6	111.7	5.591,315	121.8	117.8
1872	6,557,538	94.4	126.4	4,601,457	96.0	123.0
1873	7,444,195	102.2	133.1	4,263,132	95.6	113.7
1874	6,369,600	91.4	127.1	4,037,171	88.9	115.7
1875	6,766,698	106.2	116.3	5,172,218	109.7	114.0
1876	6,689,402	112.1	108.9	4,615,352	104.0	111.3
1877	6,218,612	104.1	108.8	4,450,036	102.1	111.5
1878	5,363,838	94.8	103.1	3.625,633	85.9	108.8
1879	4,983,676	94.4	96.5	3,615,967	92.8	100.4
1880	5,432,908	100.0	100.0	3,843,316	100.0	100.0
1881	6,630,859	127.4	95.3	3,802,976	99.2	99.3
1882	6,480,258	121.5	96.0	3,867,338	101.1	99.4
1883	7,121,948	134.4	94.8	3,926,312	103.9	97.4
1884	6,994,114	137.8	92.5	3,865,490	103.3	90.5
1885	6,627,165	136.5	87.3	3,638,208	95.7	94.7
1886	6,092,470	134.8	80.8	3,215,315	87.8	93.5
1887	7,794,177	174.7	80.0	3,515,989	100.2	89.9
1888	5,762,941	110.7	85.1	4,511,281	124.7	83.5
1889	7,113,040	134.6	89.8	4,185,667	115.4	84.3
1890	7,757,862	110.6	113.2	4,044,752	100.4	87.3
1891	8,296,560	129.5	72.6	4,606,147	113.1	89.6
1892	5,564,478	103.4	80.7	4,595,152	113.7	86.5
1893	5,206,758	81.9	96.1	4,243,189	104.0	82.4
1894	5,357,250	127.7	68.4	4,715,544	119.7	75.3
1895	5,545,966	88.6	92.1	4,416,669	105.8	80.8
1896	5,357,250	90.5	86.9	4,582,077	123.2	77.4
1897	5,596,900	121.0	78.7	5,737,511	151.3	76.1
1898	5,647,707	114.9	87.0	4,540,632	118.9	77.3
1899	6,985,916	131.9	93.7	5,406,605	140.2	78.5
1900	8,772,114	124.5	137.2	6,919,529	155.7	90.7
1901	7.612,562	131.8	117.0	5,455,236	123.7	90.6
1902	7,409,984	145.4	101.3	5,211,295	115.9	90.5
1903	7,801,211	159.0	98.2	5,286,122	113.3	94.7
1904	8,371,354	173.0	97.7	4,401,622	98.2	93.4
1905	8,892,876	225.1	95.5	6,341,876	135.0	98.1
1906	11,164,645	267.7	100.8	6,568,901	140.3	97.8
1907	14,134,150	302.5	113.0	6,618,205	136.6	101,2
1908	15,028,127	329.5	110.3	6,241,446	129.7	100.5
1909	12,141,594	273.3	104.4	6,265,300	130.7	99.2
1910	12,530,583	274.1	105.7	6,488,736	133.7	100.1
1911	13,212,429	279.3	109.1	6,949,184	135.1	106.3
1912	14,007,790	272,7	119.4	8,239,364	154.5	110.5
1913	14,610,057	269,2	126.9	8,127,213	145.9	115.8

Table 5. (*continued*)

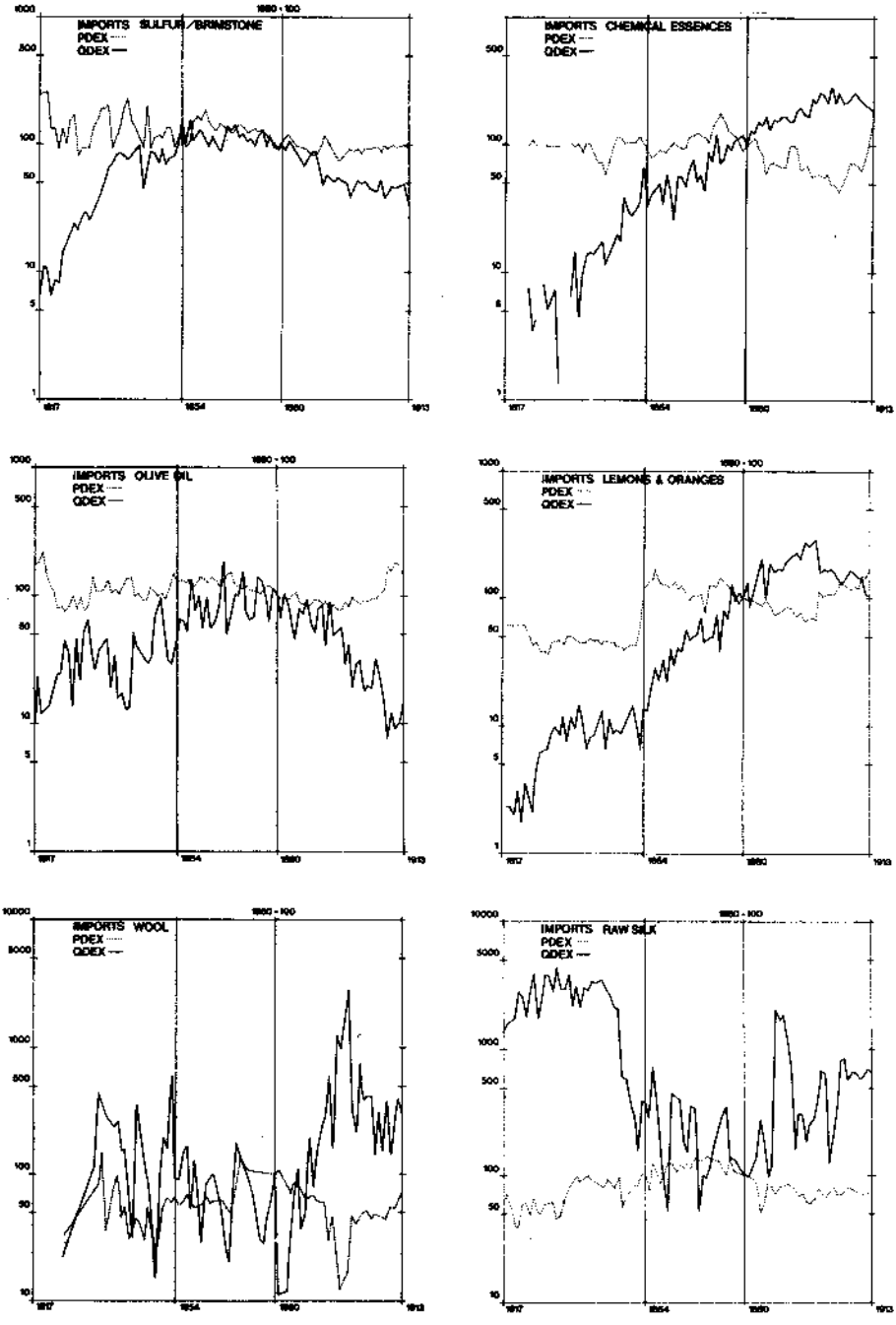
	Total Volume Relative	U.K. Net Barter Terms of trade with Italy	U.K. Gross Barter Terms of trade with Italy	Total gain from trade	Market or trade balance	Market gain from trade
1817	33.6	157.6	85.9	53.0	135.4	45.6
1818	44.0	143.4	100.7	63.2	144.5	63.7
1819	41.8	160.6	89.5	67.2	143.8	60.2
1820	36.3	181.1	66.3	65.8	120.1	43.6
1821	34.1	175.1	50.6	59.8	88.8	30.3
1822	46.1	144.6	89.9	66.6	130.0	59.9
1823	38.0	135.3	80.3	51.4	108.6	41.3
1824	44.0	150.8	57.6	66.4	86.8	38.2
1825	45.2	132.2	30.8	59.8	40.7	18.4
1826	34.7	131.7	67.2	45.7	88.5	30.7
1827	36.3	137.0	56.9	49.8	78.0	28.4
1828	46.0	119.7	52.4	55.1	62.8	28.9
1829	41.9	113.1	63.6	47.4	72.0	30.2
1830	47.0	123.4	97.2	58.0	120.1	56.4
1831	48.8	122.7	39.8	60.0	48.9	23.9
1832	35.3	112.0	77.5	39.6	86.8	30.7
1833	39.8	91.5	91.4	36.4	83.6	33.3
1834	55.9	92.7	92.6	51.9	85.9	48.1
1835	38.3	73.8	105.9	31.8	88.1	33.7
1836	54.2	73.8	92.8	40.0	68.5	37.1
1837	40.0	80.2	96.3	32.1	77.3	30.9
1838	51.6	65.7	117.6	33.9	77.3	39.9
1839	44.0	70.8	69.4	31.2	49.2	21.6
1840	55.0	60.0	95.3	33.0	57.3	31.5
1841	48.3	63.7	101.3	30.8	64.6	31.2
1842	56.3	60.9	78.2	34.3	47.6	26.8
1843	58.3	63.4	106.3	37.0	67.5	39.4
1844	51.8	58.4	98.6	30.2	57.6	29.8
1845	51.5	68.2	81.5	35.1	55.7	28.6
1846	60.0	70.2	103.0	42.1	72.3	43.4
1847	51.9	58.6	91.1	30.4	53.4	27.7
1848	41.1	59.1	165.3	24.3	97.8	40.2
1849	54.6	54.3	183.0	29.6	99.4	54.3
1850	53.2	58.1	173.9	30.9	101.1	53.8
1851	60.6	47.2	206.9	28.6	97.6	59.2
1852	47.9	53.2	238.8	25.5	127.2	60.9
1853	52.8	49.3	184.3	26.0	90.9	48.0
1854	54.9	44.8	144.7	24.6	64.9	35.6
1855	57.6	43.4	166.7	25.0	72.3	41.7
1856	69.0	43.4	196.1	29.9	85.1	58.7
1857	68.2	45.5	225.8	31.1	102.9	70.2
1858	73.6	51.0	226.1	37.6	115.5	85.0
1859	70.8	76.2	133.7	54.0	101.9	72.2
1860	81.9	48.5	241.7	39.8	117.4	96.2
1861	91.3	73.9	192.8	67.5	142.5	130.2
1862	88.6	59.7	166.5	52.9	99.4	88.1
1863	94.9	74.5	179.1	70.7	133.5	126.7
1864	89.6	71.4	194.2	64.0	138.7	124.4
1865	91.5	76.5	147.9	70.1	113.3	103.7
1866	102.0	99.8	109.8	101.9	109.6	111.9

Table 5. (*continued*)

	Total Volume Relative	U.K. Net Barter Terms of trade with Italy	U.K. Gross Barter Terms of trade with Italy	Total gain from trade	Market or trade balance	Market gain from trade
1867	87.3	87.1	110.8	76.0	96.5	84.3
1868	98.7	83.1	98.3	82.0	81.7	80.6
1869	109.3	83.4	129.5	91.2	108.1	118.1
1870	115.7	100.4	98.2	116.2	98.7	114.2
1871	126.3	94.7	82.5	119.7	78.2	98.8
1872	120.3	102.8	98.3	123.7	101.7	121.7
1873	127.8	117.1	106.9	149.7	125.2	160.1
1874	112.7	109.9	102.7	123.9	112.9	127.3
1875	128.3	102.0	96.7	130.9	98.7	126.6
1876	121.9	97.8	107.7	119.3	105.4	128.6
1877	114.9	97.5	102.0	112.1	99.4	114.3
1878	97.0	94.7	110.4	91.9	104.6	101.5
1879	92.6	96.0	101.7	88.9	97.6	90.4
1880	100.0	100.0	100.0	100.0	100.0	100.0
1881	113.7	96.0	128.4	109.2	123,3	140.3
1882	112.3	96.6	120.1	108.5	116.0	130.3
1883	120.7	97.4	129.3	117.5	126.0	152.1
1884	117.9	102.1	133.3	120.5	136.2	160.7
1885	111.5	92.1	142.6	102,7	131.4	146.6
1886	100.8	86.4	153.5	87.2	132.7	133.8
1887	122.6	89.0	174.4	109.1	155.3	190.4
1888	111.3	101.9	88.7	113.6	90.5	100.8
1889	120.6	106.5	116.6	128.4	124.2	149.8
1890	124.0	129.5	110.1	160.6	142.7	177.0
1891	117.6	81.0	114.5	95.3	92.8	109.2
1892	109.6	93.2	90.9	102.2	84.8	93.0
1893	102.0	116.6	78.7	119.0	91.8	93.7
1894	111.1	90.8	106.6	100.8	96.8	107.6
1895	107.7	113.9	83.7	122.8	95.4	102.8
1896	107.8	112.2	73.4	121.1	82.4	88.9
1897	121.2	103.4	79.8	125.4	82.6	100.1
1898	110.2	112.5	96.5	124.0	108.5	119.6
1899	133.8	119.4	93.9	159.8	112.1	150.1
1900	168.2	151.2	79.8	254.4	120.7	203.1
1901	140.8	129.1	106.3	182.0	137.3	193.5
1902	136.0	111.9	125.2	152.3	140.1	190.7
1903	141.1	103.6	140.0	146.2	145.1	204.8
1904	137.6	104.5	175.8	143.9	183.8	253.1
1905	164.2	97.3	166.3	159.9	162.0	266.0
1906	192.0	103.1	190.4	198.0	196.4	377.1
1907	224.8	111.6	220.9	251.1	246.7	554.9
1908	230.5	109.7	253.4	253.0	278.2	641.4
1909	200.4	105.2	208.7	210.9	219.7	440.3
1910	206.7	105.6	204.5	218.3	216.0	446.5
1911	220.6	102.6	206.3	226.5	211.8	467.4
1912	242.5	108.0	176.2	262.0	190.3	461.7
1913	248.2	109.6	184.1	272.2	201.9	501.3



Graph 4. Indexes of Prices (PDEX) and Volumes (QDEX) of U.K. Exports to Italy, 1817-1913.



Graph 5. Indexes of Prices (PDEX) and Volumes (QDEX) of U.K. Imports from Italy, 1817-1913.

TABLE 6.

COMMODITY INCOME AND PRICE ELASTICITIES: IMPORTS FROM ITALY TO U.K. BY COMMODITY[1]
Dependent Variable is lnM

Commodity (Sample)		Constant	ln(PM/PD)	ln(A/PD)	$\ln M_{-1}$	lnRHO	lnPM	lnPD	lnA	lnT	lnt	R^2	SE	DW
1. Brimstone (1872-1913)	(a)	1.716 (.661)	-.8045 (2.65)	-1.121 (15.0)		-.9820 (1.54)						.89	.14	1.70
	(b)	-.7434 (.491)	-.6186 (2.03)	-1.064 (16.4)						.1181 (2.23)		.90	.13	1.91
	(c)	-.9956 (.504)					-.6109 (1.97)	1.710 (5.36)	-1.047 (9.78)	.1145 (2.03)		.90	.13	1.91
	(d)	-2.260 (.816)				-1.642 (2.35)	-.8781 (2.70)	1.938 (5.96)			-.5558 (8.76)	.88	.15	1.65
2. Lemons & oranges (1872-1913)	(a)	-13.34 (2.83)	-2.116 (7.71)	1.674 (7.68)		-2.263 (1.96)						.65	.26	1.63
	(b)	-6.085 (7.42)					-1.415 (10.5)		.9582 (7.67)			.77	.21	2.12
	(c)	-8.737 (7.37)					-1.566 (11.6)		1.348 (7.63)	-.1520 (2.90)		.81	.19	2.36
	(d)	-2.429 (.662)					-1.190 (4.86)	-.9088 (1.81)	1.035 (4.25)	-.1832 (3.41)		.82	.19	2.45
4. Liquorice Juice (1872-1913)	(a)	9.158 (7.09)	.6334 (3.67)								-1.476 (8.63)	.63	.16	1.37
	(b)	3.018 (2.35)	.4733 (2.12)	-.3626 (2.92)	.4975 (3.36)							.69	.15	2.00
5. Olive oil (1872-1913)	(a)	-7.951 (3.90)	-2.117 (6.03)	-1.148 (5.77)								.84	.33	1.07
	(b)	5.208 (1.74)	-1.497 (4.54)	-2.007 (8.03)								.89	.28	1.48
	(c)	8.243 (1.76)					-1.435 (4.03)	1.432 (2.64)	-2.189 (6.66)			.88	.29	1.54
	(d)	7.727 (1.77)					-1.438 (4.238)	1.150 (2.10)	-2.142 (7.07)			.89	.28	1.51
6. Chemical Essences (1872-1913)		-2.769 (5.98)	-.2746 (2.53)	.6944 (8.95)								.78	.75	1.56
9. Silk Mfrs. (1872-1913)		21.51 (3.08)		4.752 (21.1)		-9.381 (4.58)						.95	.45	1.05
	(b)	15.99 (2.53)		2.617 (4.16)	.4336 (3.58)	-6.402 (3.23)						.96	.39	1.73/18.7
	(c)	16.33 (2.00)				-9.401) (4.62)		-4.148 (7.52)	5.083 (14.3)			.95	.44	1.08
	(d)	5.488 (.486)				-9.270 (3.07)	-1.396 (3.00)		3.792 (4.00)			.89	.62	.723

	(e)	16.66 (2.01)				-9.032 (4.19)	-.2148 (.599)	-3.3970 (6.19)	4.750 (6.84)		.95	.45	1.04
	(f)	14.02 (1.91)			.4178 (3.33)	-6.519 (3.24)		-2.442 (3.44)	2.833 (3.79)		.96	.40	1.71/19.8
10. Marble (1872-1913)	(a)	-2.809 (1.42)	-.6209 (3.44)	.6662 (6.89)		-1.187) (2.40)				.5289 (4.52)	.90	.11	1.93
	(b)	-4.283 (3.18)	-.6276 (2.67)	.5693 (4.27)	.4427 (3.53)						.82	.13	1.85/21.4
	(c)	-4.685 (3.53)	-.5772 (2.51)	.8067 (4.41)	.3374 (2.51)				.0574 (1.83)		.83	.13	2.00/28.0
	(d)	-3.009 (1.27)				-1.365 (2.31)	-1.365 (2.73)	.2901 (1.53)	.5627 (4.10)	.4936 (3.51)	.83	.13	1.65
11. Wine (1872-1913)	(a)	5.036 (4.14)	-.4785 (2.39)	-1.169 (12.5)							.81	.16	.97
	(b)	5.472 (3.15)					-.6870 (1.11)	.4679 (2.29)	-1.230 (6.311)		.81	.16	.93
	(c)	1.868 (1.09)			.4581 (3.20)			.4009 (2.25)	-.5448 (2.67)		.84	.14	1.99/37.7
12. Wool (1872-1913)	(a)	-57.13 (3.07)	-.6147 (1.83)			10.20 (2.18)				4.882 (3.65)	.44	.90	1.09
	(b)	-58.02 (3.95)				10.52 (2.92)	-.5853 (2.58)		3.249 (4.99)		.59	.78	1.37
	(c)	-57.18 (4.26)				16.13 (4.24)	.0815 (.265)	-3.832 (2.94)	3.139 (5.26)		.66	.71	1.49
		-52.49 (2.91)				10.26 (2.36)	-.6695 (2.53)			4.422 (3.40)	.48	.87	1.15
	(e)	-54.20 (3.29)				17.10 (3.73)	.1176 (.329)	-4.352 (2.98)	4.479 (3.77)		.57	.80	1.20
13. Almonds (1872-1913)	(a)	24.78 (3.13)		1.641 (2.62)		4.670 (2.31)			-2.134 (2.58)		.23	.44	1.73
	(b)	19.72 (2.53)				-6.470 (3.11)	-.9618 (2.15)		.1452 (.449)		.20	.45	1.57
16. Cheese	(a)	-22.35 (4.58)	-2.907 (3.38)	5.131 (9.65)							.68	1.1	1.03
	(b)	-38.41 (6.95)					-2.946 (2.88)		5.900 (7.70)		.66	1.2	.96
	(c)	-19.31 (2.78)			.4528 (3.79)		-2.135 (2.35)		2.990 (2.95)		.75	1.0	1.38/14.6
	(d)	-14.64) (3.02)	-2.055 (2.57)	2.945 (3.76)	.4235 (3.48)						.75	1.0	1.37/14.9

Symbols:

RHO = Spot exchange rate, lire/pound.
PM = Import price index, 1880 = 1.
PD = Domestic price index, 1880 = 1.
Italy: Wholesale price index.
U.K.: Wholesale price index.
A = Activity variable, GNP unless otherwise noted.
T = Tariffs, specific, lire/cwt.
I = Industrial production index, as noted.

Notes:

Lemons and oranges - A is earned income.
Liquorice juice - I is for food processing.
Olive oil - A in 5.b and 5.d is earned income.
Marble - I is for construction.
Wine - in 11.a and 11.b, A is earned income.
Wool - I is for textiles.
Almonds - Second A is earned income in 13.a, and in 13.b.

TABLE 7.

COMMODITY INCOME AND PRICE ELASTICITIES: IMPORTS FROM U.K. TO ITALY BY COMMODITY[1]
Dependent Variable is lnM

Commodity (Sample)		Constant	ln(PM/PD)	ln(A/PD)	$\ln M_{-1}$	lnRHO	lnPM	lnPD	lnA	lnT	lnI	$\bar{R}^2$	SE	DW
1. Coal (1862-1913)		-29.71 (4.11)		3.467 (5.76)		4.474 (2.47)					-.9693 (3.25)	.87	.41	.54
2. Cotton Yarn (1862-1913)	(a)	66.10 (6.52)	-1.569 (4.10)	-7.026 (11.0)		-11.24 (3.88)						.89	.66	.62
	(b)	65.13 (6.65)				-11.95 (4.23)	-1.989 (5.08)	10.01 (9.25)	-6.160 (8.54)			.89	.64	.84
	(c)	17.19 (2.705			.8532 (13.8)	-3.516 (2.27)		2.365 (3.21)	-1.365 (2.25)			.97	.36	2.22/18.1
	(d)	31.59 (7.24)					-1.845 (2.95)		-7.363 (6.90)	-.6370 (3.29)		.76	.97	.32
3. Cotton Piece Goods Plain (1862-1913)	(a)	52.52 (4.345	-1.436 (4.73)	-6.515 (9.55)		-7.747 (2.265)						.71	.78	.77
	(b)	54.73 (4.77)				-5.400 (1.58)	-1.585 (5.51)	3.949 (2.29)	-9.070 (7.05)			.74	.73	.76
4. Cotton Piece Goods Printed (1862-1896; 1902-1904)	(a)	28.30 (3.98)	-1.282 (2.58)	-4.003 (9.67)		-3.584 (1.82)						.74	.41	1.12
	(b)	18.92 (5.60)			.3640 (2.90)		-1.493 (3.40)	1.345 (1.67)	-4.667 (5.55)			.81	.34	1.73/17.4
5. Hardware & Cutlery (1862-1880; 1895-1913)	(a)	4.696 (4.00)	-.8849 (5.08)	-1.108 (4.02)	.4545 (4.33)							.85	.27	1.72/14.2
	(b)	4.817 (3.55)			.4983 (4.72)		-.8707 (4.23)	1.299 (2.06)	-1.158 (3.52)			.84	.26	1.85/15.4
6. Pig Iron (1862-1904)	(a)	-23.06 (8.92)					-1.100 (3.65)		5.692 (8.98)			.71	.45	.99
	(b)	-19.15 (6.00)					-.5721 (1.45)	1.285 (1.97)	4.655 (5.76)			.73	.44	1.05
7. Bar Iron (1862-1903)	(a)	67.28 (9.23)				-8.57 (3.85)		4.088 (3.69)	-9.587 (10.9)			.87	.47	.93
	(b)	23.22 (3.18)			.7466 (8.95)	-3.559 (2.20)	-.3186 (.863)		-2.198 (1.89)	-1.643 (2.00)		.95	.30	2.21/17.3
8. Iron hoops (1862-1880; 1883-1904)	(a)	18.23 (9.37)	-1.933 (4.08)	-4.347 (9.54)								.71	.52	.98

	(b)	21.05 (5.68)					-1.976 (3.93)	4.777 (3.31)	-5.089 (5.43)		.69	.53	.86	
9. Linen, Br. White (1862-1913)	(a)	11.36 (2.65)	-.9387 (2.86)	-.9112 (3.09)	.6358 (7.04)	-2.285 (2.08)					.87	.25	2.29/22.1	
	(b)	10.75 (2.56)			.6412 (6.69)	-2.050 (1.90)	-1.069 (2.33)	1.467 (2.75)	-.9613 (3.24)		.87	.23	2.25/22.9	
10. Oil Seed (1862-1913)	(a)	9.657 (6.38)	-1.991 (3.47)	-2.183 (4.99)						-.6292 (5.61)	.62	.64	.61	
	(b)	9.630 (4.55)					-2.064 (3.35)	4.213 (2.64)	-2.203 (4.33)	-.3903 (3.59)	.57	.69	.57	
11. Sugar (1862-1913)	(a)	22.22 (5.01)	-1.013 (1.88)	-5.491 (5.23)							.55	.75	.69	
	(b)	25.10 (5.36)					-1.239 (2.23)	5.511 (2.89)	-6.233 (5.57)		.54	.77	.65	
12. Worsted Stuffs (1862-1904)	(a)	51.16 (4.82)	-.6521 (4.02)	-1.359 (1.93)							.69	.57	.66	
	(b)	24.39 (3.68)	-.5161 (4.81)		.5030 (5.90)	-7.418 (3.66)					.82	.44	1.36/10.9	
	(c)	61.56 (6.72)				-11.85 (4.98)	-.4132 (2.90)	-3.108 (2.76)	-5.614 (5.301		.78	.48	.92	
13. Alkalai (1871-1913)	(a)	-10.40 (15.1)	-.9686 (4.72)	2.48 (15.9)							.89	.20	.71	
	(b)	-6.729 (3.49)	-.5239 (1.77)	1.604 (3.49)	.3682 (2.02)						.90	.19	.91/6.53	
	(c)	-9.347 (12.2)					-1.151 (5.45)	-1.870 (4.93)	2.220 (12.4)		.89	.20	.76	
	(d)	-6.035 (3.56)			.3623 (2.17)		-.6880 (2.34)	-1.281 (2.83)	1.432 (3.57)		.90	.19	.89/10.6	

Symbols:

RHO = Spot exchange rate, lire/pound.
PM = Import price index, 1880 = 1.
PD = Domestic price index, 1880 = 1.
Italy: Wholesale price index.
U.K.: Wholesale price index.
A = Activity variable, GNP unless otherwise noted.
T = Tariffs, specific, lire/cwt.
I = Industrial production index, as noted.

Notes:

Coal - I is for freight rate for coal, Cardiff-Genoa.

[1] The observations in Tables 6 and 7 should be qualified as follows: (1) The exchange rate (lire/pound), RHO, should have a positive sign in Italy-U.K. (Table 6) equations and it is almost uniformly negative. This calls into question some of the results, although excluding the exchange rate term does not affect the parameter values greatly. Inclusion of this term represents an attempt to deal with "devaluation" elasticities. (2) Tariff terms are included separately. Tariffs are specific, not *ad valorem*, and cannot be considered part of the import price. Only for lemons and oranges is the tariff term significantly negative in Table 6 while in Table 7, cotton yarn, bar iron and oil seed are sensitive to tariffs. (3) The second statistic reported under the column "DW" is Durbin's test for serial correlation in the presence of a lagged dependent variable, and it indicates rejection of the null hypothesis in every case. (4) Some equations in Tables 6 and 7 are presented without activity variables, yet they include the lagged dependent variable. This is justified on the hypothesis of an adjustment lag to price changes that manifests itself as a Koyck lag. (5) The price elasticity results might have adverse balance of payments implications for Italy, since an attempt to improve her balance of trade with the U.K. might have been frustrated by the inelasticity of demand for Italian exports. However, the impact on imports implied by the price elasticities presented here might well have resulted in an improvement in the trade balance.

APPENDIX II

SOURCES AND METHODS

Continuous data on the foreign trade of Great Britain and Italy between 1815-1913 have been taken from the British Customs Registers in the Public Record Office, London, and from the Annual Statements of Trade and Navigation in the British Parliamentary Papers. Foreign trade statistics in the Custom Registers have been classified by country and merchandise and contain data on the quantity and value of all comodities and the port from which the commodity was imported or exported.

The data on imports and exports in the Customs Registers have been compiled on a country basis. In the case of Italy the registers contain trade returns between Britain and the principal Italian States — Kingdom of Sardinia, Kingdom of Lombardy-Venetia,[1] Grand Duchy of Tuscany,[2] Papal States and the Kingdom of Naples and Sicily[3] before unification (1815-1869) and aggregate data for the new Kingdom of Italy following unification (1870-1913).

Trade returns for the individual markets — Sardinia, Lombardy-Venetia, Tuscany, Papal States and Naples and Sicily — have been combined into a composite series of imports and exports for Italy and the United Kingdom between 1815-1869 and these series have been linked with imports and exports for the period following unification, 1879-1913. By combining data for both pre- and post-unification periods, we have created a continuous,

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[1] British exports to Lombardy in the Customs Registers are combined with general exports to the Austrian Monarchy between 1815-1859 and have been excluded for this reason from the index. British exports to Lombardy in this period are negligible (except for contraband trade) because of high prohibitive tariffs within the Austrian territories. Imports from Lombardy (silk) are very important for British-Italian trade and therefore included in the index. Silk imports, however, are under-reported in the Customs Registers and adjusted in the data. Cf. Hofkammer Archive (Vienna) Banco Regist, 3-10 396/II, 1848; British Parliamentary Papers, *Report from the Select Committee on the Silk Duties*, Volume 19, Session 1831-1832; I. A. Glazier, « Il Commercio Estero del Regno Lombardo-Veneto dal 1815-1865, *Archivio Economico dell'Unificazione Italiana*, Vol. XV, Roma, 1968.

[2] Imports and exports between Britain and the Duchies of Modena and Parma are included in Tuscan data in the Customs Registers. There is no direct trade between Britain and the Duchies during the Austro-Modena-Parma Customs Union between 1854-1858.

[3] Separate statistical series exist in the Custom Registers for imports and exports between Naples and Sicily and the United Kingdom between 1815-1826 and 1861-1869 in addition to an aggregate series for both provinces with the United Kingdom between 1827-1860. We have combined the separate returns to form a single series on imports and exports between the Kingdom of Naples and Sicily and the United Kingdom for the period 1817-1869.

reasonably homogeneous statistical series on imports and exports between Britain and Italy over the long period 1815-1913.

A representative list of commodities and commodity groups have been compiled from approximately twelve hundred items in trade between Great Britain and Italy for the ninety-seven year period. Systematic data on annual commodity movements (quantities and values) have been collected for 200 imports, 156 exports and 50 re-exports. Imports in the enumeration are reported with minimum values of £ 2,000 and exports with minimum values of £ 10,000. Commodity groups having detailed subclassifications — e.g., textiles, metals, etc — are reported with minimum values of £ 1,000.

Annual volumes of Italian imports into the United Kingdom have been recalculated for the period 1815-1854 introducing current prices in place of official values in the Customs Registers. Adjustments of a related nature have been made in the import data for the years 1870-1913. Prior to 1904 imports into Britain were classified on a geographical basis — according to the country from which they were shipped rather than by country of actual origin or consumption. From the late nineteenth century a certain quantity of imports entered Britain via Antwerp, Rotterdam, etc., which were not recorded as of Italian origin. These transactions concerned in large part agricultural products — butter, cheese, eggs, raw and waste silk, wine and wool. We have attempted to correct for changes in the method of recording statistics and for under-reporting of imports, by constructing separate series for these commodities for the period 1870-1913 from Italian sources. Quantity and value figures are taken, after appropriate conversion, from the Italian Customhouse returns (*Movimento Commerciale del Regno d'Italia*) which are published annually after 1861. The annual values in the *Movimento Commerciale* would differ somewhat from Board of Trade values as they are calculated on the basis of prices at the Italian frontier, net of freight charges, shipping services and tariffs to British ports.

Annual import and export values in the Customs Registers (Grand-Totals) have been adjusted to conform to the changes that have been made in import and export data to enable us to check commodity coverage in the indexes. The percentage of trade covered by the indexes between 1817-1913 is generally quite high, with small variation from year to year. Export coverage ranges from 63 to 96% with the median at 84. Import coverage rangers from 53 to over 90% with the median at 86.[4]

A residual category for imports and exports is based on the difference between the Grand-Totals in the Customs Registers and the sum of the commodities in our enumerated lists.

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[4] Re-exports have not been dealt with at this stage of research as they represent very small values in the pre-unification decades. They are more significant in the late nineteenth century but remain in all years under 10% of general imports into Italy.

Imports and exports in the Customs Registers are expressed in legal units — centerweights, pounds, gallons, tons, etc. Conversion coefficients have been applied to commodities to assure homogeneous quantity series over the ninety-seven year period. For imports, silk (1817-1841), cotton wool (1817-1841), leather (1890-1894) and preserved fruit (1875-1899), have been converted from pounds to centerweights; corn (wheat, barley, oats, maize, etc.) from quarters to centerweights (1817-1869); flaxseed and linseed from bushels to quarters (1817-1853); olive oil from gallons to tons (1827-1841); wine from tons to gallons (1815-1827); hemp from centerweights to tons (1870-1889); woollen rags from tons to pounds (1895-1902) and sumach from tons to centerweights (1905-1910). For exports, woollen and worsted stuffs have been converted from pieces to yards (1817-1863), woollen and worsted yarns from centerweights to pounds (1817-1863), iron (except bar and pig) from centerweights to tons (1815-1844), brass manufactures, unwrought copper and tin from centerweights to tons (1885-1899), and oil seed from gallons to tons (1870-1884).

Value Series

Imports and re-exports in the Custom Registers are expressed in "official" values until 1853 and in current values starting in 1854. "Official" values are calculated according to English customs practice on the average price of imports prevailing in the year 1694. The "official" value of imports into the U.K. from the Italian states between 1815 and 1854 is therefore a sum of quantities with fixed weights based on the prices of 1694. These weights have been found by earlier investigators [5] to be unrealistic in terms of nineteenth century prices taking too little account of structural changes in trade which occur over long periods and were therefore replaced.

New volume series for the import index have been computed to keep as much precision as possible in the calculation of weights. Price series for the most important commodities imported from each of the Italian states have been calculated from current price data between 1815 and 1854. Current price data account for about 60% of the total import values for each region.

The Customs Registers contain two sets of figures on British export values — "official" values and "declared" or real values between 1815 and 1869. Declared or real values were compiled on the basis of declarations furnished by British merchants prior to shipment of goods. They have been found to be sufficiently close to market prices of the time so that we have used them in the export value series. Export values between 1815 and 1913 are then derived from the trade figures themselves.

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[5] Werner Schlote, *British Overseas Trade from 1700 to the 1930's*, English translation by W. H. Chaloner and W. O. Henderson, (Oxford, 1952), pp. 19-20.

Price Series

Quarterly price data for the more important commodities in value terms imported from the Italian states into the United Kingdom between 1815-1854 have been taken from the *London New Price Current* and the *London Mercantile Price Current*. Supplementary price data have been furnished from material published in the *Archivio Economico dell'Unificazione Italiana*. Price series after deduction of duties and drawbacks have been computed from the price currents for the following commodities: Tuscany — boracic acid, wheat, olive oil, raw silk, argol, maize, rags, lamb skins, sheep and lambs wool, and marble; Sardinia — raw and thrown silk, maccaroni, olive oil; Naples and Sicily — sulphur, liquorice juice, madder root, olive oil, sumach, wine, raw silk, argol, juice of lemons, essence of bergamot, essence of lemon, linseed, barilla, lemons and oranges, cream of tartar, wheat; Papal States — wheat, raw silk, maize, lamb skins, argol, hemp; Lombardy-Venetia — cream of tartar, sumach, corn, maize, hemp, raw and thrown silk.

The import price series have been adjusted to conform to the quantity measures in the Customs Registers. Quarterly price data are based on the average of the high and low price for a single week in each quarter. This is generally the first week of January, March, June and September.

Exports are recorded as f.o.b., imports are c.i.f. (cost, insurance and freight included in the valuation).

Volume Series

Volumes have been calculated by multiplying quantities of individual commodities imported or exported by the current prices of those commodities during an appropriate base year. We have tried to keep volume weights in relation to changes in the price structure by dividing long periods into shorter intervals.

In the regional indexes, 1817-1869, the following base years and intervals have been used: 1817-1825, 1823; 1824-1835, 1830; 1834-1846, 1840; 1845-1858, 1854; 1857-1869, 1865. Short periods overlap by one year and are linked to the final base 1854. For the combined index the long period 1817-1913 has been divided into four intervals with the following bases: 1817-1846, 1830; 1842-1871, 1854; 1867-1896, 1880; 1892-1913, 1905. Short periods overlap by five years and are linked to the final base 1880.

Statistical Tests

All commodity price and quantum index data were produced with the computer program, PINUP. United Kingdom net national income estimates are from Feinstein in B. R. Mitchell and P. Deane, *Abstract of British*

Historical Statistics (Cambridge, 1962). Italian national income estimates are from G. FUÀ, *Lo Sviluppo economico in Italia*, Vol. III, (Milano, 1969). The United Kingdom wholesale price index has been taken from the *17th Abstract of Labour Statistics of the United Kingdom*, (London, 1915). The Italian wholesale price index is from the *Sommario di statistiche storiche Italiane 1861-1955*, (Rome, 1958). Freight rates for coal and metals (Cardiff-Genoa 1855-1913) are from *Mitchell's Maritime Register*. Sterling-Lira exchange rates are from the *Corriere Mercantile* (Genoa), 1855-1860, and from the *Annuario Statistico Italiano* for 1861-1913. Import and export tariffs are from the *Parliamentary Papers* and the *Movimento Commerciale*.

BIBLIOGRAPHY

Primary Sources (Unpublished):

London. Public Record Office

Board of Customs and Excise. (Detailed registers of imports, exports and re-exports).

Customs 8/2-131. Exports of British Merchandise (by country), 1814-1890.
Customs 4/9-85. Import of British Merchandise (by country), 1814-1890.
Customs 10/1-85. Exports of Foreign and Colonial Merchandise (Re-exports), 1809-1890.

Foreign Office Archives. General Correspondence and Board of Trade Foreign Office Letters.

Sardinia:	FO 67 - 1771-1860
Naples and Sicily:	FO 700 - 1780-1860
Tuscany:	FO 79 - 1780-1860
Italian States:	FO 43 - 1795-1874
Italy:	FO 45 - 1861-1905
Austria: (Milan and Venice)	FO 7 - 1819-1847

Official Publications:

France. Ministère De L'Agriculture. *Du Commerce Et Des Travaux Publics: Annales du Commerce Extérieur.* 3ème Série des Avis Divers, Paris, 1840-1913.

Great Britain. Parliament. *Parliamentary Papers.* « Annual Statement of the Trade of the United Kingdom, 1815-1913 ».

———. Parliament. *Parliamentary Papers.* « Accounts Relating to the Trade and Commerce of United Kingdom, 1815-1913 ».

———. Parliament. *Parliamentary Papers.* « Commercial Reports: Annual 1872-1913 ».

———. Parliament. *Parliamentary Papers.* « Miscellaneous Series of Diplomatic and Consular Reports, 1886-1913 ».

———. Parliament. *Parliamentary Papers.* « Report from the Select Committee on the Silk Duties ». Volume XIX, Session 1831-1832.

Italy. Ministero di Agricoltura, Industria e Commercio. *Annali dell'Industria e del Commercio,* 1878-1913. Rome, 1879.

———. *Atti del Parlamento Italiano,* 1861-1913.

———. Ministero di Agricoltura, Industria e Commercio. *Bollettino di Notizie Commerciali,* 1860-1913. Rome, 1860-1914.

———. Ministero delle Finanze. Direzione Generale delle Gabelle. *Movimento Commerciale delle provincie dell'Italia settentrionale nel 1858.* Turin, 1862.

———. Direzione Generale delle Gabelle. *Movimento Commerciale del Regno d'Italia*, 1861-1875. Turin, Milan, Florence, 1864-1876.

———. Direzione Generale delle Dogane e delle Imposte Indirette. *Movimento Commerciale del Regno D'Italia, 1875-1913*. Rome, 1876-1914.

Special Studies:

BAIROCH, P. « European Foreign Trade in the XIX Century: The Development of the Value and Volume of Exports », (Preliminary Results). *The Journal of European Economic History*. Vol. II, N. 1, (Spring, 1973), 5-36.

BERNER, RICHARD. « Specifying Import Demand Functions ». Working Paper No. 7109. Université Catholique de Louvain. Institut des Sciences Économiques. 1971.

———. « An Empirical General Equilibrium Model of International Discrimination ». Unpublished Ph.D. dissertation, University of Pennsylvania, 1974.

BERTOLINO, A. « L'Attività degli stabilimenti inglesi di Marsala durante il Risorgimento ». *Rassegna storica del Risorgimento*, XXVII, 1940.

BOLCHINI, P. *La Gran Bretagna e la Formazione del Mercato Italiano*, (1861-1883). Genoa, 1968.

BOWRING, J. *Report on the Statistcs of the Italian States*. Sessional Papers, XVI. Great Britain, 1839.

BRUCCOLERI, G. *La Sicilia Di Oggi*. Rome, 1913.

BURSOTTI, G. *Biblioteca Di Commercio*. Naples, 1841-1846.

CAPANNA, A., and MESSORI, O. *Gli scambi Commerciali Dell'Italia Con l'Estero Della Costituzione Del Regno Ad Oggi*. Rome, 1940.

CAVOUR, C. *Scritti di Economia*, 1835-1850. Edited by F. Sirugo. Milan, 1962.

CLOUGH, S. B., and DE ROSA, L. *Storia Dell'Economia Italiana*. Bologna, 1971.

DA MILANO. « Industriali e commercianti di marmi inglesi a Carrara fra il 1820 e il 1870 ». *Atti del V Congresso Storico Toscano*, 1952.

DE CUGIS, C. *England and Italy a Century Ago*. 2 Vols. Milan, 1967.

DHRYMES, PHOEBUS. *Distributed Lags: Problems of Formulation and Estimation*. San Francisco: Holden-Day, 1971.

FENOALTEA, S. « Riflessioni sull'esperienza industriale italiana del Risorgimento alla prima guerra mondiale ». *Lo sviluppo Economico Italiano, 1861-1940*. Edited by G. Toniolo. Bari, 1973.

FUÀ, G. ed. *Lo Sviluppo economico in Italia*. Vols. II and III. Milan, 1969.

GAYER, A., ROSTOW, W. W., and SCHWARTZ, A. *The Growth and Fluctuations of the British Economy, 1790-1850*. 2 Vols. Oxford, 1953.

GERSCHENKRON, A. *Economic Backwardness in Historical Perspective*. Cambridge, 1962.

GILLE, B. « Les Investissements Français en Italie (1815-1914) ». *Archivio Economico Dell'Unificazione Italiana*. Ser. II, Vol. XVI. Turin, 1968.

GLAZIER, I. A., and BANDERA, V. N. « Terms of Trade between South Italy and the United Kingdom (1817-1869) ». *The Journal of European Economic History.* Vol. I, No. 2, (Spring, 1972), 7-36.

———. « Il Commercio Estero del Regno Lombardo-Veneto dal 1815-1865 ». *Archivio Economico dell'Unificazione Italiana*, XV, Rome, 1968.

HOFFMANN, W. G. *Das Wachstum Der Deutschen Wirtschaft Seit Der Mitte Des 19 Jahrhunderts.* Berlin, 1965.

IMLAH, A. H. *Economic Elements in the Pax Britannica.* Cambridge, 1958.

JANNACONE, P. *Prezzi E Mercati.* Turin, 1936.

KINDLEBERGER, C. P. *The Terms of Trade.* Cambridge: MIT Press and Wiley Publishing, 1956.

KORPELA, ASKO. *Effect of Tariffs on Imports to Finland.* Helsinki: Jakelu Kyriiri Oy, 1971.

KUZNETS, S. *Modern Economic Growth Rate, Structure and Spread.* New Haven: Yale University Press, 1966.

———. « Quantitative Aspects of the Economic Growth of Nations: X Level and Structure of Foreign Trade: Long-Term Trends ». *Economic Development and Cultural Change*, XV, Number 2, Part II, (January, 1967).

LEAMER, E. E. and STERN, R. M. *Quantitative International Economics.* Boston: Allyn and Bacon, 1970.

LUZZATTO, G. *L'Economia Italiana dal 1861 al 1914.* Milan, 1963.

MCCULLOCH, J. R. *Dictionary of Commerce and Commercial Navigation.* London, 1832.

MORI, G. *Studi di Storia dell'Industria.* Rome, 1967.

MORELLI, D. *Il Protezionismo Industriale in Italia dall'Unificazione del Regno.* Milan, 1920.

ORCUTT, GUY H. « Measurement of Price Elasticities in International Trade ». *Review of Economics and Statistics*, XXXII, No. 2 (May, 1950).

PREBISCH, R. « Commercial Policy in the Underdeveloped Countries ». *American Economic Review.* (Proceedings) May, 1959.

REDFORD, A. *Manchester Merchants and Foreign Trade.* Vol. I. Manchester, 1934.

ROMANI, M. *Storia Economica d'Italia nel Secolo XIX.* Parte I. Milan, 1968.

RICCHIONI, V. *Studi Storici di Economia dell'Agricoltura Meridionale.* Florence, 1968.

SAUL, S. B. « The Historical Development of Anglo-Italian Trade ». *Banca Nazionale del Lavoro Quarterly Review*, XXVII, 1953.

———. *Studies in British Overseas Trade, 1870-1914.* Liverpool, 1960.

SCHLOTE, WERNER. *British Overseas Trade from 1700 to the 1930's.* Translated by W. H. Chaloner and W. O. Henderson. Oxford, 1952.

SENSINI, G. *Le Variazioni dello Stato Economico d'Italia nell'Ultimo Trentennio del Secolo XIX.* Rome, 1904.

STRINGHER, B. « Gli Scambi con l'Estero e la Politica Commerciale Italiana dal 1860 al 1910 ». *Cinquant'anni di Storia Italiana.* Milan, 1912.

THEIL, HENRI. *Economics and Information Theory.* Amsterdam: North-Holland, 1967.

———. *Principles of Econometrics.* New York: John Wiley, 1971.

TREVELYAN, R. *Princes Under the Volcano.* New York: MacMillan Company, 1972.

United Nations, Development of Economic Affairs. *Instability in Export Markets of Underdeveloped Countries.* New York, 1952.