# TERMS OF TRADE CHANGE AND INCOME TRANSFER FROM AGRICULTURE IN A PROGRAM OF INDUSTRIAL IMPORT SUBSTITUTION

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Scott M. Eddie

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Protection of a domestic manufacturing industry to encourage its expansion through import substitution is equivalent (in the absence of equal protection for agriculture) to a "tax" on agriculture[1/] to support the development of the industrial sector. To call this policy of biasing the intersectoral terms of trade to favor industry a typical strategy of underdeveloped countries would be, if anything, to understate its universality. The arguments for and against such a strategy are well known, and an approximation of the benefits to the industrial sector can be gleaned from the national accounts of many countries. What is much less well known, however, is the cost to the agricultural sector as a result of its being forced to trade at less favorable terms of trade than those provided by the world market. The purpose of this paper is to work out a simple methodology for measuring this cost and then to attempt an estimate of the cost in a particular case.

For most underdeveloped countries it is unfortunately true that data on domestic intersectoral trade flows are unavailable, except for scattered attempts to produce input/

output tables for isolated years. Time series of sufficient length and accuracy to give the researcher some confidence in his results simply do not exist. In a customs union which records the trade flows among its members, however, we could find time series of the requisite length to calculate the cost to a particular member of common tariffs causing a net bias in the terms of trade against its export products. In the case of a two-country customs union, in which one partner is predominantly industrial, while the other is primarily an agricultural producer, we have the basic conditions which would permit the estimation of at least a first approximation to the cost of a policy favoring import substitution in industrial goods.

The particular case chosen for analysis in this paper is that of Austria-Hungary, which fulfills the basic conditions stated above: a relatively much more industrialized partner (Austria) trading with an agrarian country (Hungary), having relatively reliable[2/] and lengthy time series (1882-1913) of the trade between them. The problem is analyzed from the point of view of the agricultural producer, Hungary. The processing of the available raw data yields two important by-products: (1) series on the terms of trade for Hungary,

both with Austria and with the world as a whole, and (2) some quantitative information relevant to the historical question whether the net advantage from the existence of the customs union accrued to the Austrians or to the Hungarians.[3]

The paper will be divided into four parts. The first two will present a brief outline of the tariff and trade history of Austria-Hungary and data on Hungarian terms of trade focusing on the period under review; these will be followed by the principal section, which describes the methodology of calculating the cost of altering the terms of trade and tabulates estimates of this cost. The final section will summarize the conclusions reached.

## I

The Hungarian War of Independence in 1848/49 led directly to the establishment of the Austro-Hungarian customs union. After defeating the Hungarians, the government of Franz Josef attempted to transform Hungary into a mere province of Austria; one of the principal measures adopted was the lifting of the customs barrier between the two countries in 1850.[4] Later, war with the Prussians and

threats of revolt in the Italian provinces forced Franz Josef to seek an accommodation with the Hungarians, resulting in the Compromise of 1867, which gave Hungary autonomy in her internal affairs but provided for a common external policy and the continuation of the customs union. This agreement, decennially renewed, formed the basis of Austrian-Hungarian relations until the collapse of the Empire in World War I.

The era of Dualism, inaugurated with the signing of the Compromise of 1867, began auspiciously for the Hungarians.[5] Good harvests in Hungary when those in the rest of Europe were poor led to strong demand for Hungarian grain at good prices.[6] New railways had begun to make possible large shipments of grain to the West, and competition from North America was not yet the serious problem it soon became. This export-led prosperity, coupled with a desire to keep down the cost of a wide range of imports necessary for an economic development program heavily committed to infrastructure projects, convinced the Hungarians that their best interests lay in promoting free trade.

The depression of 1873 led to a weakening of this conviction, although the Dual Monarchy continued its

essentially free-trade policies until 1878. Even then, it was only over the objections of the Hungarians that the Autonomous Tariff of 1878--following the failure to reach a trade agreement with Germany in 1877--introduced protection for wool and cotton, raised some existing duties on manufactured goods, and required payment of duties in gold.[7]

German policy became rapidly more protectionist in character. Tariffs on agricultural products were introduced in Bismarck's tariff act of 1879, followed in 1887 and 1890 by sharp increases in duties on grain. Yet another round of raises in German duties came in 1902, this time including a wide range of manufactured goods.[8]

German trade policy set the pattern which Austria-Hungarian policy closely followed. The Austrian tariffs were raised in 1882, to produce an "almost slavish ... parity"[9] with the German tariffs of 1881; another raise in 1887 duplicated the levels of the German tariffs of 1885. The 1887 duties lasted until the law of 1906 which raised agricultural duties still further. Within this law, which remained in effect until the end of the period under review, industrial tariffs stayed mostly unchanged. Thus the final step in the pre-War tariff increases was almost exclusively

an increase in agricultural duties--strong evidence of the vigor with which Hungarian farmers had come to embrace the protectionist idea.[10]

The Hungarians might have pressed harder for more liberal trade agreements with other nations, had not the Austrian market grown at a rapid pace during the decades immediately preceding World War I. Hungary was able to replace lost outside markets not only by trade diversion, as a result of rising tariffs around the Empire, but also by catering to the internal expansion of the Imperial market. Thus Hungary was able to increase its total exports, even in the face of increasing protection in the rest of Europe and stiff competition from overseas producers. This point will be discussed in greater detail in the following paragraphs.

Austria's dominant position in Hungary's external trade is illustrated in Table 1. At the opening of the period under review, something more than four-fifths of all imports (by value) came from Austria, and Hungary sent more than 70% of her exports to Austria. The direction of trade changed but slowly: Hungary gradually turned a bit

more to other sources for her imports (despite the protective tariffs) to reduce Austria's share in the Hungarian market slightly, while the Hungarian share in the Austrian market remained virtually constant.[11]

Table 1

AUSTRIAN SHARE[a] IN HUNGARY'S FOREIGN TRADE

| 5-Year Average centered on | Mean Share of Imports From Austria (Per Cent) | Mean Share of Exports to Austria (Per Cent) |
|---|---|---|
| 1885 | 83 | 72 |
| 1890 | 85 | 73 |
| 1895 | 80 | 75 |
| 1900 | 78 | 72 |
| 1905 | 76 | 72 |
| 1910 | 74 | 75 |

[a] Imports from, or exports to, Austria relative to total imports or exports respectively, in value terms at current prices.

Source: These and all subsequent trade data (unless otherwise cited) are taken or calculated from statistics appearing in Magyar Statisztikai Közlemények (Hungarian Statistical Reports), új sorozat (new series), vol. LXIII (Budapest: 1923).

Table 2 presents some data concerning the composition of Hungarian trade, and how it changed over the period. Agricultural produce[12/] accounted for more than half of all exports, and we can see that the decline of farm products' share in total exports is entirely accounted for by the relative fall in major grains exports (wheat, rye, barley, oats, corn). The diversion of grain exports into the protected Austrian market shows up as a smaller relative decline in the share of grains in exports to Austria. If a further stage of processing is considered--namely, making flour out of wheat and other grains--we find that "raw" agricultural products plus flour accounted for about two-thirds of all Hungarian exports both at the beginning and the end of the period. Thus the characterization of Hungary as predominatly a producer of agricultural goods is in accord with the observed export data.

On the import side, we see Hungary importing primarily industrial or manufactured goods---over four fifths of the entire value of imports, and reaching 90% of imports from Austria by the end of the period. Of particular importance throughout the period were cotton and woolen textile goods, which made up a quarter or more of total imports, and about 30% of imports from Austria.

Table 2

SHARES OF SELECTED COMMODITY GROUPS[a] IN THE VALUE OF HUNGARIAN TRADE[b]

| | EXPORTS | | | |
|---|---|---|---|---|
| | Total Export | | Exports to Austria | |
| | 1883/87 Average | 1909/13 Average | 1883/87 Average | 1909/13 Average |
| Agricultural Exports | 56% | 51% | 61% | 56% |
| Major grains | 21% | 16% | 23% | 20% |
| Slaughter & draft animals | 17% | 16% | 20% | 19% |
| Animal products | 4% | 5% | 3% | 3% |
| Flour | 12% | 14% | 10% | 17% |

| | IMPORTS | | | |
|---|---|---|---|---|
| | Total Import | | Imports from Austria | |
| | 1883/87 Average | 1909/13 Average | 1883/87 Average | 1909/13 Average |
| Manufactured goods[c] | 86% | 83% | 88% | 90% |
| Cotton yarn & textiles | 15% | 15% | 18% | 19% |
| Woolen yarn & textiles | 13% | 9% | 13% | 11% |
| Iron & iron goods | 4% | 6% | 4% | 7% |
| Machinery & parts | 2% | 2% | 5% | 5% |
| Items of common consumption[c] | 57% | 50% | 59% | 56% |
| Agricultural producers' goods[c] | 6% | 4% | 3% | 4% |
| Agricultural machinery & fertilizers | 1% | 2% | 1% | 1% |

[a] See appendix for list of commodities included in each group.

[b] At current prices.

[c] Overlapping categories.

It is apparent from Table 2 that the broad character of Hungarian trade did not undergo any radical change between the 1880's and the years just before the outbreak of the Great War. A slight shift toward more processing before export shows up in the data presented (flour and animal products exports increase their share of total exports slightly, while grains and animals show a small decline), but it is very slight. Some small reduction is also noted in the relative amount of industrial goods, and a somewhat larger drop in the classification "items of common consumption." These are probably manifestations of the modest industrialization undertaken in Hungary during the Dual Monarchy period.

Although the composition of imports and exports showed little trend during the period, there was a steady growth in the level of trade, with imports growing somewhat faster than exports. The extra growth in imports was concentrated near the end of the period: The balance of trade figures show about an equal number of deficit and surplus years from 1882 through 1894; there follow four deficit years, then seven surplus years in a row (beginning in 1899), and at the end, deficits in eight of the last nine years of the pre-War period. Using 1909/13 average prices as weights, the

growth in the total exports (1883/87 average compared to 1909/13 average) amounted to 2.7% per annum, compared to a rate of 3.8% for imports. As implied by the data on shares of trade, the average rate of growth of exports to Austria was identical to that for the total, while the imports from Austria grew slightly less rapidly than imports as a whole.

Agricultural exports grew more slowly than all exports, averaging 2.4% annual growth from 1883/87 to 1909/13. The major grains only showed a 0.7% average annual export increase, although exports of grains to Austria rose at a 1.4% annual rate. Imports of manufactures grew at virtually the same rate as the total, as we would naturally expect. Thus the picture of trade we observe for the period under review is one of modest growth in the quantity of exports and imports, with the somewhat faster growth of imports leading to chronic balance of trade deficits in the later years just before the War. Within this pattern of growth, the composition of trade changed only slightly.

## II

Having surveyed the course of the volume and composition of Hungary's trade with the world, we can now turn to

the more central question of the changes in prices at which this trade took place, i.e., what happened to the terms of trade between the 1880's and the First World War?

The terms of trade (net barter terms of trade unless otherwise specified) can have two values -- the "domestic" terms of trade within the customs union and the "world" or free-market terms of trade. The former will differ from the latter by the amount of distortion caused by tariffs and other trade restrictions. Therefore, in each case two separate terms of trade indexes have been calculated -- one (the "domestic") using the unit values of exports and imports from the Hungarian trade statistics, the other using "world" prices -- the proxy for world prices being the average unit values from British trade data of the same period.[13/]

Table 3, in its several parts, contains the principal descriptive results of the terms of trade calculations. It includes not only the overall terms of trade (all exports against all imports), but several partial measures as well, i.e., the ratio of price indexes for various subsets of all imports and all exports.[14/]

It should be emphasized here that the changes in value of the terms of trade indexes represent relative changes in price ratios compared to a base period, so that an observation that the "world" terms of trade and the "domestic" terms of trade are equal in a given year does not mean that the ratio of export prices to import prices in the "world" is the same as the ratio of export prices to import prices "domestically". A simple example should make this clear: Suppose there is a single export good, X, and one import good, M. Let $p_0^{xd}$ be the domestic price of the export good in the base year, $p_1^{mw}$ be the world price of the import good in year 1, and so forth. Assume the following (a result, say, of a 50% ad valorem duty on the import good):

$$p_0^{xd} = 1,\ p_0^{xw} = 1$$

$$p_0^{md} = 3,\ p_0^{mw} = 2$$

and

$$p_1^{xd} = 2,\ p_1^{xw} = 2$$

$$p_1^{md} = 9,\ p_1^{mw} = 6.$$

The "domestic" net barter terms of trade in year 1, if the base year = 100, is (2/1) ÷ (9/3) x 100 = 66 2/3. The "world" terms of trade is (2/1) ÷ (6/2) = 66 2/3. Thus, compared to the base year, the relative changes in export/import price ratios are identical, but the ratios themselves are different:

$P_0^{xw} / P_0^{mw} = 1/2$, while $P_0^{xd} / P_0^{md} = 1/3$, and

$P_1^{xw} / P_1^{mw} = 2/9$, whereas $P_1^{xd} / P_1^{md} = 1/3$.

The differences of course arise because the bases which are set equal to 100 are different in the two cases. A correction of the terms of trade indices for this difference in bases will be essential to the calculations in section III of this paper. For the present, however, the problem of different bases is presented merely as a reminder to help avoid confusion in interpreting the data in Table 3.

From Table 3, the first immediately apparent result is that for the overall terms of trade (all exports vs. all imports), the movements in "domestic" price ratios and "world" price ratios are nearly identical. There is

Table 3.-NET BARTER TERMS OF TRADE[a/]

A. All Exports Against All Imports

| | Total | | Trade with Austria | |
|---|---|---|---|---|
| | World Prices | Domestic Prices | World Prices | Domestic Prices |
| 1883 | 77.9 | 79.0 | 64.6 | 65.9 |
| 1884 | 75.3 | 75.6 | 67.0 | 67.4 |
| 1885 | 74.2 | 74.3 | 66.1 | 66.3 |
| 1886 | 73.7 | 73.3 | 68.0 | 67.7 |
| 1887 | 72.8 | 72.2 | 66.8 | 66.2 |
| 1888 | 81.6 | 81.0 | 69.0 | 68.6 |
| 1889 | 76.3 | 75.8 | 69.8 | 69.2 |
| 1890 | 75.8 | 75.6 | 69.6 | 69.4 |
| 1891 | 81.6 | 82.1 | 77.7 | 78.2 |
| 1892 | 79.1 | 78.7 | 75.0 | 75.1 |
| 1893 | 85.0 | 85.1 | 78.4 | 78.4 |
| 1894 | 85.0 | 84.8 | 76.4 | 76.2 |
| 1895 | 85.2 | 84.6 | 81.1 | 80.3 |
| 1896 | 87.7 | 87.0 | 86.2 | 85.2 |
| 1897 | 95.4 | 94.8 | 93.1 | 92.1 |
| 1898 | 100.8 | 100.1 | 96.7 | 95.8 |
| 1899 | 86.8 | 86.1 | 85.0 | 84.2 |
| 1900 | 86.3 | 85.9 | 80.5 | 80.1 |
| 1901 | 85.1 | 84.7 | 78.9 | 78.5 |
| 1902 | 84.5 | 84.6 | 82.0 | 82.3 |
| 1903 | 89.1 | 89.6 | 85.1 | 85.7 |
| 1904 | 94.2 | 94.7 | 90.1 | 90.6 |
| 1905 | 94.2 | 94.6 | 90.0 | 90.5 |
| 1906 | 89.7 | 89.9 | 83.8 | 84.0 |
| 1907 | 91.4 | 91.8 | 89.2 | 89.5 |
| 1908 | 95.3 | 95.6 | 93.3 | 93.5 |
| 1909 | 99.0 | 99.0 | 99.0 | 99.0 |
| 1910 | 95.1 | 95.4 | 94.0 | 94.2 |
| 1911 | 102.6 | 102.9 | 103.2 | 103.3 |
| 1912 | 104.7 | 104.5 | 105.2 | 105.1 |
| 1913 | 97.1 | 96.8 | 97.6 | 97.4 |

[a/] 1909/13 average = 100 (Fisher index).

Table 3.-NET BARTER TERMS OF TRADE[a] (Continued)

B. Agricultural Exports Against All Imports

| | Total | | Trade with Austria | |
|---|---|---|---|---|
| | World Prices | Domestic Prices | World Prices | Domestic Pric |
| 1883 | 87.3 | 76.7 | 69.7 | 67.2 |
| 1884 | 84.7 | 74.0 | 72.5 | 67.8 |
| 1885 | 81.9 | 73.2 | 70.3 | 66.5 |
| 1886 | 78.6 | 73.6 | 69.8 | 68.2 |
| 1887 | 73.9 | 69.2 | 65.7 | 64.2 |
| 1888 | 73.1 | 69.9 | 68.5 | 66.0 |
| 1889 | 70.4 | 71.9 | 67.9 | 68.6 |
| 1890 | 74.2 | 74.5 | 69.6 | 70.4 |
| 1891 | 75.3 | 79.9 | 72.3 | 78.3 |
| 1892 | 75.1 | 77.9 | 73.5 | 75.8 |
| 1893 | 74.7 | 81.6 | 72.4 | 78.3 |
| 1894 | 71.2 | 82.5 | 66.6 | 75.7 |
| 1895 | 72.0 | 79.5 | 68.2 | 74.8 |
| 1896 | 77.6 | 81.1 | 76.5 | 78.2 |
| 1897 | 83.2 | 88.8 | 83.1 | 85.8 |
| 1898 | 85.0 | 91.2 | 83.9 | 86.9 |
| 1899 | 82.7 | 83.5 | 81.1 | 79.9 |
| 1900 | 83.3 | 79.5 | 81.0 | 76.2 |
| 1901 | 85.9 | 80.0 | 83.7 | 75.8 |
| 1902 | 91.8 | 84.3 | 92.7 | 82.3 |
| 1903 | 91.8 | 87.7 | 91.6 | 84.8 |
| 1904 | 90.3 | 89.3 | 89.1 | 86.7 |
| 1905 | 92.9 | 93.1 | 92.6 | 89.0 |
| 1906 | 88.5 | 85.9 | 86.3 | 83.1 |
| 1907 | 92.9 | 91.8 | 90.7 | 89.8 |
| 1908 | 93.2 | 94.4 | 91.6 | 93.3 |
| 1909 | 96.8 | 97.2 | 97.8 | 98.1 |
| 1910 | 95.1 | 93.7 | 94.2 | 93.1 |
| 1911 | 98.8 | 103.9 | 98.8 | 105.2 |
| 1912 | 105.6 | 106.4 | 105.8 | 105.8 |
| 1913 | 103.4 | 96.5 | 103.7 | 96.1 |

[a] 1909/13 average = 100 (Fisher index).

Table 3.-NET BARTER TERMS OF TRADE[a/] (Continued)

C. Major Grains Exports Against All Imports

| | Total | | Trade with Austria | |
|---|---|---|---|---|
| | World Prices | Domestic Prices | World Prices | Domestic Price |
| 1883 | 82.0 | 61.9 | 72.3 | 55.0 |
| 1884 | 78.2 | 59.5 | 72.3 | 55.0 |
| 1885 | 77.6 | 57.1 | 71.9 | 52.8 |
| 1886 | 78.0 | 59.1 | 73.6 | 55.5 |
| 1887 | 73.2 | 54.0 | 68.9 | 51.0 |
| 1888 | 74.4 | 55.2 | 71.8 | 52.6 |
| 1889 | 76.6 | 57.6 | 73.9 | 55.5 |
| 1890 | 76.9 | 60.0 | 74.5 | 57.8 |
| 1891 | 85.0 | 71.9 | 83.9 | 71.4 |
| 1892 | 85.9 | 62.8 | 83.7 | 61.9 |
| 1893 | 82.2 | 73.6 | 80.0 | 70.1 |
| 1894 | 73.6 | 72.5 | 69.2 | 66.3 |
| 1895 | 72.8 | 69.5 | 70.8 | 67.2 |
| 1896 | 79.4 | 70.5 | 78.1 | 68.3 |
| 1897 | 81.4 | 81.9 | 79.9 | 79.3 |
| 1898 | 89.7 | 88.6 | 86.6 | 85.3 |
| 1899 | 82.8 | 76.2 | 80.4 | 74.1 |
| 1900 | 87.7 | 74.0 | 85.7 | 71.7 |
| 1901 | 88.5 | 78.2 | 85.8 | 75.2 |
| 1902 | 90.9 | 78.0 | 90.4 | 77.4 |
| 1903 | 90.0 | 78.1 | 88.5 | 76.3 |
| 1904 | 88.6 | 84.2 | 87.3 | 82.7 |
| 1905 | 92.4 | 88.1 | 91.1 | 86.0 |
| 1906 | 86.7 | 75.3 | 85.8 | 73.9 |
| 1907 | 93.1 | 86.7 | 92.3 | 85.7 |
| 1908 | 101.8 | 100.8 | 99.7 | 99.0 |
| 1909 | 106.0 | 107.6 | 105.9 | 107.6 |
| 1910 | 94.7 | 88.0 | 94.7 | 87.7 |
| 1911 | 93.5 | 100.4 | 93.9 | 100.8 |
| 1912 | 105.5 | 107.5 | 105.5 | 107.6 |
| 1913 | 100.8 | 94.3 | 100.9 | 94.6 |

[a/] 1909/13 average = 100 (Fisher index).

Table 3.-NET BARTER TERMS OF TRADE[a/] (Continued)

D. Major Grains and Flour Exports Against All Imports

| | Total | | Trade with Austria | |
|---|---|---|---|---|
| | World Prices | Domestic Prices | World Prices | Domestic Price |
| 1883 | 89.2 | 65.7 | 77.9 | 57.9 |
| 1884 | 86.5 | 61.6 | 79.1 | 56.7 |
| 1885 | 84.3 | 57.2 | 77.6 | 52.8 |
| 1886 | 80.1 | 61.5 | 75.3 | 57.6 |
| 1887 | 76.9 | 58.4 | 72.2 | 54.9 |
| 1888 | 77.9 | 58.2 | 75.1 | 55.6 |
| 1889 | 78.8 | 60.1 | 75.9 | 57.6 |
| 1890 | 80.3 | 61.8 | 77.7 | 59.4 |
| 1891 | 84.6 | 71.5 | 83.4 | 70.7 |
| 1892 | 92.3 | 65.9 | 90.0 | 64.6 |
| 1893 | 90.9 | 72.6 | 88.2 | 69.5 |
| 1894 | 80.4 | 71.7 | 75.5 | 66.2 |
| 1895 | 74.6 | 67.9 | 72.4 | 65.7 |
| 1896 | 78.1 | 70.3 | 76.8 | 68.3 |
| 1897 | 81.7 | 85.7 | 80.0 | 83.0 |
| 1898 | 94.0 | 96.9 | 90.4 | 92.8 |
| 1899 | 92.3 | 76.9 | 89.4 | 74.7 |
| 1900 | 86.8 | 72.6 | 84.9 | 70.6 |
| 1901 | 87.7 | 77.0 | 85.0 | 74.0 |
| 1902 | 89.6 | 78.9 | 89.1 | 77.9 |
| 1903 | 89.6 | 77.6 | 88.1 | 75.8 |
| 1904 | 89.2 | 86.2 | 87.7 | 84.5 |
| 1905 | 92.5 | 85.3 | 91.0 | 83.3 |
| 1906 | 87.7 | 72.6 | 86.7 | 71.5 |
| 1907 | 88.5 | 85.3 | 87.7 | 84.6 |
| 1908 | 97.0 | 101.2 | 94.9 | 99.1 |
| 1909 | 103.3 | 112.4 | 103.0 | 112.2 |
| 1910 | 98.8 | 92.6 | 98.7 | 92.3 |
| 1911 | 96.3 | 99.5 | 96.7 | 99.7 |
| 1912 | 100.9 | 101.0 | 101.1 | 101.2 |
| 1913 | 100.6 | 93.4 | 100.7 | 93.9 |

[a/] 1909/13 average = 100 (Fisher index).

Table 3.-NET BARTER TERMS OF TRADE[a/] (Continued)

E. Agricultural Exports Against Imports of Manufactures

| | Total | | Trade with Austria | |
|---|---|---|---|---|
| | World Prices | Domestic Prices | World Prices | Domestic Prices |
| 1883 | 98.1 | 68.1 | 88.0 | 69.8 |
| 1884 | 92.0 | 77.2 | 85.1 | 75.8 |
| 1885 | 89.8 | 79.0 | 83.1 | 76.6 |
| 1886 | 86.5 | 80.5 | 80.5 | 77.6 |
| 1887 | 80.9 | 75.1 | 75.1 | 72.2 |
| 1888 | 81.8 | 77.9 | 78.3 | 74.8 |
| 1889 | 79.1 | 81.6 | 77.9 | 79.2 |
| 1890 | 82.7 | 85.2 | 79.2 | 81.7 |
| 1891 | 85.6 | 94.6 | 82.8 | 92.6 |
| 1892 | 83.6 | 90.3 | 82.9 | 87.7 |
| 1893 | 74.4 | 85.8 | 74.5 | 84.9 |
| 1894 | 71.5 | 86.2 | 70.9 | 83.4 |
| 1895 | 75.5 | 86.0 | 72.7 | 82.2 |
| 1896 | 80.8 | 87.5 | 80.2 | 84.6 |
| 1897 | 86.2 | 96.6 | 87.8 | 94.7 |
| 1898 | 85.1 | 96.1 | 87.2 | 94.6 |
| 1899 | 83.0 | 87.6 | 83.7 | 85.6 |
| 1900 | 81.8 | 85.1 | 81.5 | 83.3 |
| 1901 | 83.3 | 84.6 | 83.9 | 82.6 |
| 1902 | 89.1 | 89.7 | 92.2 | 89.4 |
| 1903 | 90.0 | 94.3 | 91.7 | 92.7 |
| 1904 | 89.3 | 96.4 | 90.3 | 95.4 |
| 1905 | 91.0 | 99.7 | 92.7 | 97.1 |
| 1906 | 86.8 | 86.2 | 86.3 | 85.0 |
| 1907 | 91.7 | 90.9 | 91.1 | 90.3 |
| 1908 | 91.0 | 91.8 | 90.5 | 91.7 |
| 1909 | 94.7 | 95.1 | 95.6 | 96.0 |
| 1910 | 94.5 | 93.1 | 93.9 | 92.7 |
| 1911 | 99.5 | 104.3 | 99.4 | 105.4 |
| 1912 | 106.9 | 107.1 | 107.0 | 106.4 |
| 1913 | 104.3 | 97.9 | 104.3 | 97.4 |

[a/] 1909/13 average = 100 (Fisher index).

Table 3.-NET BARTER TERMS OF TRADE[a] (Continued)

F. Agricultural Exports Against Imports of Items of Common Consumption

| | Total | | Trade with Austria | |
|---|---|---|---|---|
| | World Prices | Domestic Prices | World Prices | Domestic Prices |
| 1883 | 89.6 | 67.8 | 78.7 | 65.0 |
| 1884 | 82.4 | 75.9 | 76.2 | 75.4 |
| 1885 | 80.5 | 78.0 | 74.9 | 76.9 |
| 1886 | 82.0 | 82.7 | 75.6 | 80.1 |
| 1887 | 79.3 | 79.4 | 72.7 | 76.3 |
| 1888 | 77.8 | 80.3 | 74.8 | 77.9 |
| 1889 | 76.1 | 84.6 | 75.1 | 82.9 |
| 1890 | 76.6 | 85.6 | 74.9 | 84.4 |
| 1891 | 77.2 | 92.4 | 76.0 | 92.6 |
| 1892 | 80.1 | 92.5 | 81.7 | 92.6 |
| 1893 | 76.9 | 93.2 | 78.2 | 94.2 |
| 1894 | 76.1 | 94.4 | 75.6 | 92.0 |
| 1895 | 79.7 | 94.1 | 77.6 | 91.1 |
| 1896 | 85.2 | 94.8 | 85.2 | 92.8 |
| 1897 | 91.5 | 106.4 | 94.4 | 105.7 |
| 1898 | 94.2 | 109.8 | 96.1 | 107.9 |
| 1899 | 93.6 | 100.3 | 93.6 | 97.3 |
| 1900 | 91.5 | 95.9 | 90.1 | 92.9 |
| 1901 | 91.1 | 95.2 | 91.3 | 91.6 |
| 1902 | 97.5 | 100.1 | 99.4 | 97.6 |
| 1903 | 96.8 | 103.8 | 98.1 | 100.5 |
| 1904 | 95.3 | 105.9 | 95.7 | 103.1 |
| 1905 | 97.7 | 110.9 | 98.7 | 106.2 |
| 1906 | 93.5 | 93.0 | 92.2 | 90.6 |
| 1907 | 97.4 | 95.1 | 95.6 | 93.0 |
| 1908 | 94.6 | 93.0 | 93.9 | 92.4 |
| 1909 | 98.7 | 97.6 | 99.4 | 98.0 |
| 1910 | 95.6 | 93.7 | 94.4 | 93.2 |
| 1911 | 97.7 | 102.0 | 97.5 | 103.3 |
| 1912 | 105.8 | 105.6 | 105.8 | 105.0 |
| 1913 | 101.9 | 98.4 | 102.7 | 98.1 |

[a] 1909/13 average = 100 (Fisher index).

Table 3.-NET BARTER TERMS OF TRADE[a/] (Continued)

G. Agricultural Exports Against Imports of Agricultural Producers' Goods

| | Total | | Trade with Austria | |
|---|---|---|---|---|
| | World Prices | Domestic Prices | World Prices | Domestic Prices |
| 1883 | 140.6 | 93.7 | 106.2 | 92.5 |
| 1884 | 111.1 | 85.8 | 98.3 | 79.0 |
| 1885 | 114.0 | 94.0 | 91.1 | 85.0 |
| 1886 | 120.4 | 104.3 | 95.7 | 91.6 |
| 1887 | 118.5 | 91.2 | 94.9 | 81.2 |
| 1888 | 121.1 | 93.9 | 95.2 | 81.4 |
| 1889 | 113.9 | 98.1 | 90.9 | 89.8 |
| 1890 | 109.8 | 100.1 | 93.9 | 86.7 |
| 1891 | 113.2 | 101.9 | 99.1 | 91.2 |
| 1892 | 108.5 | 104.2 | 96.7 | 92.5 |
| 1893 | 90.9 | 86.0 | 77.7 | 78.1 |
| 1894 | 85.9 | 83.1 | 73.0 | 72.2 |
| 1895 | 83.3 | 85.4 | 74.4 | 72.8 |
| 1896 | 82.9 | 87.0 | 80.9 | 74.7 |
| 1897 | 84.3 | 85.8 | 84.3 | 79.4 |
| 1898 | 83.8 | 89.6 | 84.8 | 82.7 |
| 1899 | 87.9 | 91.0 | 86.4 | 82.5 |
| 1900 | 84.6 | 85.1 | 79.1 | 79.3 |
| 1901 | 86.7 | 86.2 | 82.3 | 78.9 |
| 1902 | 89.5 | 87.4 | 89.4 | 82.8 |
| 1903 | 88.5 | 90.6 | 88.1 | 88.3 |
| 1904 | 91.4 | 91.1 | 90.2 | 89.8 |
| 1905 | 92.4 | 93.5 | 93.9 | 91.9 |
| 1906 | 94.2 | 90.3 | 90.5 | 88.1 |
| 1907 | 99.3 | 99.0 | 97.2 | 95.3 |
| 1908 | 96.6 | 96.3 | 96.7 | 95.5 |
| 1909 | 98.5 | 100.7 | 99.3 | 99.8 |
| 1910 | 99.5 | 101.7 | 97.6 | 100.0 |
| 1911 | 100.8 | 103.1 | 100.4 | 104.6 |
| 1912 | 100.8 | 99.8 | 101.2 | 99.6 |
| 1913 | 99.6 | 92.2 | 100.7 | 93.0 |

[a/] 1909/13 average = 100 (Fisher index).

hardly a year in which the two terms of trade calculations differ by more than one percentage point. Given the possibility of errors in the data and conceptual and methodological problems in the use of the prices from which the indexes are calculated (see appendix B for a discussion), the small differences observed cannot be significant.

Next, we can observe that the relative change in the overall terms of trade series is greater for the goods traded with Austria than for the trade as a whole. The difference between a value of 78 or 79 for terms of trade in 1883 (total trade), compared to 65 or 66 for trade with Austria, probably is significant. Because it says that the prices of Hungary's exports to Austria relative to prices of its imports from Austria (based on 1909-13 average quantity weights) improved more than did the same ratio for total trade, we can probably conclude that on balance over the period, Austro-Hungarian tariff policy was somewhat more favorable to Hungary's exports than to Austria's. This result is not sensitive to the difference in quantity weights implied by the choice of a different base period: The terms of trade calculated by using

1883-87 average quantity weights yield a nearly identical result:

| | Total Trade | | Trade with Austria | |
|---|---|---|---|---|
| | World Prices | Domestic Prices | World Prices | Domestic Prices |
| 1883 | 100 | 102 | 97 | 99 |
| 1913 | 127 | 127 | 147 | 146 |

Thus we see that using either base period,[15] the terms of trade -- whether at world or domestic prices -- improved by about 25% for total trade, but by about 45% for trade with Austria.

The difference is striking -- indeed, disturbing. For, given the weight of Austria in total trade, it implies that Hungary's terms of trade with the world outside the Empire customs union actually declined. A look at Table 4 will confirm this suspicion, but it will also reveal that the analysis runs afoul of an index number problem. While both a base-weighted and current-weighted index of terms of trade decline over the period, a decomposition of these indexes into some of their major component parts (see Table 4) will show that the two indexes are apparently

aggregations of offsetting index number problems, since there are wide differences between the partial terms of trade indices for two major commodity groups within the export total.

Table 4. Net Barter Terms of Trade[a] for Hungarian Trade with All Countries Except Austria

| Five-Year Average Centered on | All Exports vs. All Imports Index | | Agricultural Exports except Grain vs. All Imports Index | | Major Grains vs. All Imports Index | |
|---|---|---|---|---|---|---|
| | Base Weight | Current Weight | Base Weight | Current Weight | Base Weight | Current Weight |
| 1885 | 108 | 115 | 81 | 165 | 60 | 116 |
| 1890 | 115 | 129 | 81 | 148 | 64 | 108 |
| 1895 | 107 | 114 | 93 | 135 | 85 | 125 |
| 1900 | 99 | 117 | 93 | 117 | 86 | 112 |
| 1905 | 99 | 111 | 110 | 108 | 87 | 99 |
| 1910 | 101 | 98 | 99 | 95 | 101 | 101 |

[a] 1909-13 average = 100.

When the terms of trade are broken down into their two principal components, the price indexes for exports and imports, the reasons for the divergences in the terms

of trade calculations become more apparent. Tables 5 and 6 present five-year averages of indexes of both price and quantity of some important categories of exports and imports, with the indexes for Austrian trade and trade with the rest of the world given separately. When the two forms of each index -- one using weights of the base period, 1909-13, and the other using weights of the current year -- are compared, a striking pattern emerges. For all exports and all imports, the base-weighted and current weighted-indexes of both price and quantity for Austrian trade move quite closely together, but there are large differences in the two index forms for non-Austrian trade -- on the order of a factor of two by the time we reach back to the 1883-87 average.

These results imply that the composition of trade with Austria changed relatively little, but that the composition of the trade with the rest of the world underwent rather radical change. The implied change for imports from the outside is in the direction we would expect: Because the import quantity index using end-year (i.e., base period) price weights rose less than the index using current-year weights, we can deduce a shift away from

Table 5.-INDEXES OF PRICES[a/] OF SELECTED CATEGORIES OF TRADED GOODS, 1909/13 AVERAGE = 100

| Commodity Group | Trade with | Index Weights | Five-Year Average Centered on 1885 | 1890 | 1895 | 1900 | 1905 | 1910 |
|---|---|---|---|---|---|---|---|---|
| All Exports | Austria | Base | 96 | 91 | 84 | 82 | 86 | 99 |
| | | Current | 82 | 81 | 78 | 80 | 85 | 98 |
| | Rest of World | Base | 133 | 134 | 97 | 88 | 93 | 99 |
| | | Current | 71 | 84 | 70 | 79 | 90 | 96 |
| All Imports | Austria | Base | 138 | 123 | 100 | 97 | 98 | 100 |
| | | Current | 128 | 115 | 97 | 95 | 95 | 99 |
| | Rest of World | Base | 123 | 117 | 91 | 89 | 94 | 98 |
| | | Current | 62 | 65 | 62 | 68 | 82 | 98 |
| Agricultural Exports Except Grains | Austria | Base | 107 | 99 | 85 | 80 | 87 | 98 |
| | | Current | 93 | 91 | 81 | 78 | 87 | 98 |
| | Rest of World | Base | 100 | 94 | 85 | 83 | 104 | 97 |
| | | Current | 102 | 97 | 83 | 80 | 88 | 93 |
| Major Grains Exports | Austria | Base | 72 | 72 | 70 | 74 | 79 | 101 |
| | | Current | 71 | 70 | 69 | 73 | 78 | 100 |
| | Rest of World | Base | 74 | 74 | 78 | 76 | 82 | 100 |
| | | Current | 72 | 70 | 77 | 76 | 81 | 99 |
| Imports of Manufactured Goods | Austria | Base | 125 | 110 | 96 | 96 | 96 | 101 |
| | | Current | 115 | 96 | 84 | 81 | 87 | 100 |
| | Rest of World | Base | 330 | 111 | 97 | 104 | 105 | 99 |
| | | Current | 73 | 29 | 29 | 26 | 58 | 99 |

[a/] Domestic prices

Table 6.-INDEXES OF QUANTITIES[a/] OF SELECTED CATEGORIES OF TRADED GOODS, 1909/13 AVERAGE = 100

| mmodity Group | Trade with | Index Weights | Five-Year Average Centered on 1885 | 1890 | 1895 | 1900 | 1905 | 1910 |
|---|---|---|---|---|---|---|---|---|
| l ports | Austria | Base | 53 | 66 | 75 | 83 | 90 | 98 |
| | | Current | 45 | 59 | 69 | 80 | 89 | 97 |
| | Rest of World | Base | 70 | 72 | 83 | 95 | 98 | 98 |
| | | Current | 37 | 46 | 59 | 85 | 95 | 95 |
| l ports | Austria | Base | 39 | 47 | 61 | 65 | 77 | 96 |
| | | Current | 36 | 44 | 59 | 63 | 75 | 96 |
| | Rest of World | Base | 46 | 43 | 65 | 71 | 77 | 93 |
| | | Current | 23 | 24 | 44 | 54 | 67 | 92 |
| gricultural xports Except rains | Austria | Base | 49 | 61 | 69 | 77 | 84 | 94 |
| | | Current | 42 | 56 | 65 | 75 | 83 | 94 |
| | Rest of World | Base | 42 | 51 | 70 | 91 | 96 | 106 |
| | | Current | 43 | 52 | 68 | 87 | 88 | 101 |
| ajor Grains xports | Austria | Base | 68 | 84 | 94 | 101 | 106 | 101 |
| | | Current | 68 | 83 | 92 | 100 | 105 | 100 |
| | Rest of World | Base | 310 | 446 | 281 | 234 | 219 | 104 |
| | | Current | 300 | 419 | 280 | 234 | 216 | 104 |
| mports of anufactured oods | Austria | Base | 44 | 54 | 70 | 76 | 86 | 97 |
| | | Current | 40 | 47 | 61 | 65 | 77 | 96 |
| | Rest of World | Base | 38 | 65 | 95 | 126 | 147 | 92 |
| | | Current | 13 | 16 | 29 | 32 | 52 | 92 |

a/Using domestic price weights.

imports which were becoming relatively more expensive toward those which were becoming relatively less expensive. This is confirmed by a look at the two price indexes for imports for the rest of the world -- the index using the 1909-13 weights fell, while that using current-year weights rose, implying a relative reduction over the period in the quantities of those goods whose prices rose relative to the others.

This shift in composition of imports from countries outside the Austro-Hungarian Empire was most pronounced in the area of manufactured goods, as Tables 5 and 6 show. So far as Hungary's exports were concerned, her principal exports of grain (especially the premier export crop, wheat) to the outside world declined to about one-third of the 1883-87 level by 1908-12, in response to a money price increase on the order of 30% and perhaps an even greater movement in the terms of trade. At the same time, the prices of other agricultural exports held relatively steady, leading to something like a 2½-fold increase in exports of these goods outside the Monarchy. We can therefore conclude that in respect to Hungary's trade with the outside world, both sides of the trading relationship behaved in

an economically rational manner, buying a larger share of the goods which became relatively cheaper and a smaller share of those which became relatively more expensive.

The data on trade with Austria, on the other hand, are more consistent with another hypothesis -- probably no less rational than the first -- that Empire trade and tariff policy was aimed toward preserving the status quo with respect to the goods traded between Hungary and Austria. Total exports to Austria approximately doubled (in terms of 1909-13 average prices), a growth which was almost exactly matched by the growth in non-grain agricultural exports. Grain exports to Austria increased only some 50%, no doubt because grain prices rose more than other prices, so there was some change in the composition of trade with Austria. This composition shift, however, was nowhere near to being on a scale comparable to that which occurred in trade with countries outside the Empire. Both total imports and imports of manufactured goods from Austria increased by about 2½ times during the period, indicating that in the large, at least, the policy seemed to be balanced, i.e., it tried to preserve both the Austrian market for Hungarian agricultural exports and the Hungarian

market for Austrian exports of manufactures. This is in accord with the essentially reactive nature of Empire trade policy which was discussed in section II.

The index number problem referred to above will require the addition of a longer list of qualifiers to the conclusions of parts III and IV than would otherwise be necessary.

## III

Having developed the two sets of terms of trade indices, we may now turn to the estimation of the "cost" to one sector or producer of having the prices at which it trades skewed to favor another sector or producer. The analysis will be developed using the familiar geometric tools of the standard two-good, two-country model of international trade.

We begin with a two-country customs union. One country exports primarily agricultural products (A-goods) and the other exports mainly manufactured items (M-goods). Assume that both A-goods and M-goods are also available from other countries outside the customs union ("the world").

and that both members of the customs union are small in relation to total world demand and supply of these goods, so that in trade with the world they are price takers.[16] The problem will be viewed throughout from the point of view of the agrarian producer, which we shall designate country A.

The lines $O_A$ and $O_M$ in Figure 1 represent the offer curves from the two members of the customs union of A-goods and M-goods respectively. Initially we observe overall balanced trade at point X, in which $A_0$ of A-goods exchange for $M_0$ of M-goods. The primarily agrarian producer, country A, receives $M'_0$ from its partner, country M, and $M'_0 - M_0$ from the world, and exports $A'_0$ to its partner and $A'_0 - A_0$ to the rest of the world. The domestic (i.e., internal to the customs union) terms of trade are represented by the slope of line $OT_D$; these terms are different from the ratio of world prices because of differential ad valorem tariffs on the two goods. Since we have assumed balanced trade to begin with, the slope of the line $OT_D$ can be used to measure both the ratio of prices (net barter terms of trade) or the ratio of quantities (gross barter terms of trade). In a later part of this

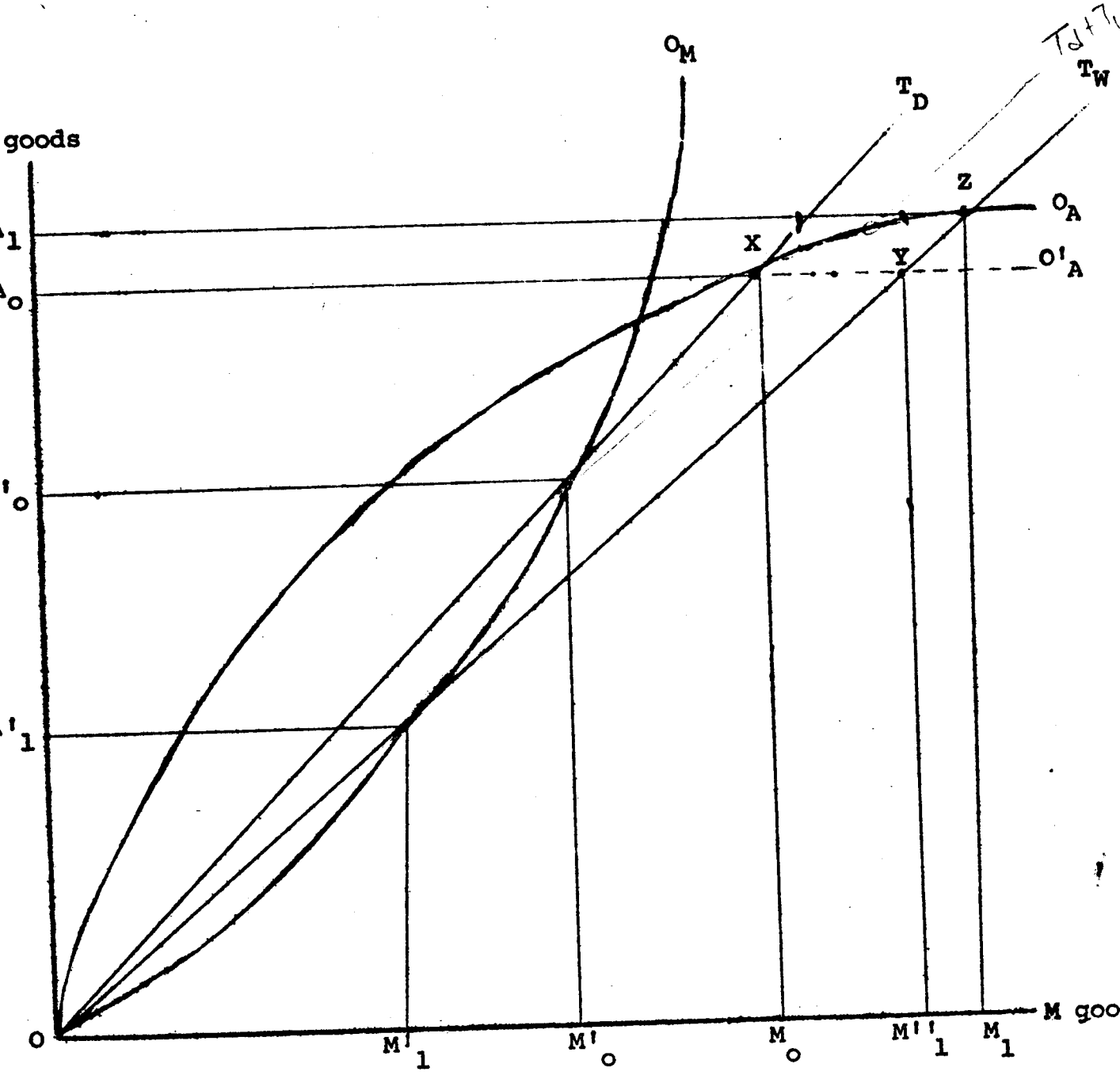


Figure 1

section we will relax the assumption of balanced trade, which will call for a separate treatment of these two measures of the terms of trade. Unless otherwise specified, "terms of trade" means the net barter terms of trade.

If country A could trade freely with the world, it could exchange its A-goods for M-goods at a more favorable set of relative prices given by the slope of line $OT_W$, the world terms of trade. It would then trade $A_1$ of its produce for $M_1$ of the M-goods (Point Z in Figure 1). Thus the cost to country A of having to trade at the rigged set of prices is $M_o - M_1$ (the amount of extra M-goods it would have received in free-trade equilibrium) minus $A_o - A_1$ (the extra amount of its own produce which it would have to give up in moving from the restricted-trade to the free-trade equilibrium position).

Let $T_D$ equal $P_A^D/P_M^D$, the ratio of domestic prices of the two goods, and let $T_W$ equal $P_A^W/P_M^W$, the world price ratio. Since trade is assumed balanced,

$$P_A^D A_o = P_M^D M_o \quad \text{and} \quad P_A^W A_1 = P_M^W M_1$$

Therefore, $M_o = T_D \cdot A_o$ and $M_1 = T_W \cdot A_1$

The cost or loss to the A-producer (call it L), in terms of its own goods, is then

$$L = (M_1 - M_o) - (A_1 - A_o) = A_1(T_W - 1) - A_o(T_D - 1) \qquad (1)$$

If we knew the elasticity of the offer curve, $O_A$, we could determine the value of $A_1$, which we could then use to calculate the cost. Typically, the problem is solved by implicitly or explicitly assuming the offer curve is perfectly inelastic beyond point X,[17] so that under the free-trade prices, we would observe $A_o$ of A-goods exchanging for $M_1''$ of M-goods, at point Y. It is one of the purposes of this paper to test the hypothesis that the short-run elasticity of the offer curve $O_A$ is zero, and to adjust the calculation accordingly. The methodology and results of this test are presented in a later part of this section.

Assume for the present that we have estimated the elasticity of the curve $O_A$ with respect to the terms of trade, and let E denote this elasticity. Then the average elasticity over the arc from X to Z can be expressed as

$$E = \frac{A_1 - A_o}{A_1 + A_o} \cdot \frac{T_W + T_D}{T_W - T_D} \qquad (2)$$

Let $R = \frac{T_W+T_D}{T_W-T_D}$. Solving for $A_1$, we find that

$$A_1 = A_o \left( \frac{\frac{R}{E} + 1}{\frac{R}{E} - 1} \right) = A_o \left( \frac{R + E}{R - E} \right) \quad (3)$$

Substituting the value of $A_1$ into equation (1), we find that the loss to the A-producer can be expressed as follows:

$$L = A_o \left[ \left( \frac{R + E}{R - E} \right) (T_W - 1) - (T_D - 1) \right] \quad (4)$$

In the case of E=0, equation (4) reduces to

$$L_o = A_o \left[ T_W - T_D \right] \quad (4a)$$

We cannot merely plug in the values of $T_D$ and $T_W$ from Table 3, however, as was pointed out earlier. Since the slopes of the terms of trade lines in Figure 1 now represent ratios of prices, and we must represent the difference between these price ratios at any given time, the domestic and world terms of trade must first be reduced to a common base; the two different bases used in the process of setting each set of terms of trade = 100 in some reference period must first be reconciled. We could adjust either of the terms of trade series. It would be conceptually somewhat better to adjust the do-

mestic terms of trade to the world price base, since these world prices are by assumption free-trade prices determined by competition.

From the point of view of the A-goods exporter, its terms of trade at any time, t, are calculated according to the following formulas, in which the subscript 0 denotes the base period:[18]

$$\left(T_D\right)_t = \frac{\sum_A \left(P_D^A\right)_t Q_0^A}{\sum_M \left(P_D^M\right)_t Q_0^M} \div \frac{\sum_A \left(P_D^A\right)_0 Q_0^A}{\sum_M \left(P_D^M\right)_0 Q_0^M} \tag{5}$$

and

$$\left(T_W\right)_t = \frac{\sum_A \left(P_W^A\right)_t Q_0^A}{\sum_M \left(P_W^M\right)_t Q_0^M} \div \frac{\sum_A \left(P_W^A\right)_0 Q_0^A}{\sum_M \left(P_W^M\right)_0 Q_0^M} \tag{6}$$

We need to derive an adjusted domestic terms of trade index (better, perhaps, to call it an adjusted price ratio index)

$$\left(T_D\right)_t^{adj} = \frac{\sum_A \left(P_D^A\right)_t Q_0^A}{\sum_M \left(P_D^M\right)_t Q_0^M} \div \frac{\sum_A \left(P_W^A\right)_0 Q_0^A}{\sum_M \left(P_W^M\right)_0 Q_0^M} \tag{7}$$

This adjusted index is therefore

$$\left(T_D\right)_t^{adj} = \left(T_D\right)_t \cdot \left( \frac{\sum_A \left(P_D^A\right)_o Q_o^A}{\sum_M \left(P_D^M\right)_o Q_o^M} \Big/ \frac{\sum_A \left(P_W^A\right)_o Q_o^A}{\sum_M \left(P_W^M\right)_o Q_o^M} \right) \tag{8}$$

or merely the domestic terms of trade in year t times the ratio of the two bases. It is this adjusted index which must be used in calculating the loss from skewed terms of trade to sector A given in equation (4) or (4a).

After adjusting the price ratios to a common base, we have yet to deal with the problem of an import or export surplus. Fortunately, under reasonable assumptions about how the surplus arises, the problem is not as difficult as might first appear. Figure 2 presents the case of an import surplus; an excess of exports over imports can be portrayed in analogous fashion, except for changes in the points where offer curves and price lines intersect the axes.

We assume that the import or export surplus is either a grant of aid, or a temporary phenomenon that will need to be offset in a later period by an equivalent surplus in the opposite direction. Assume further that

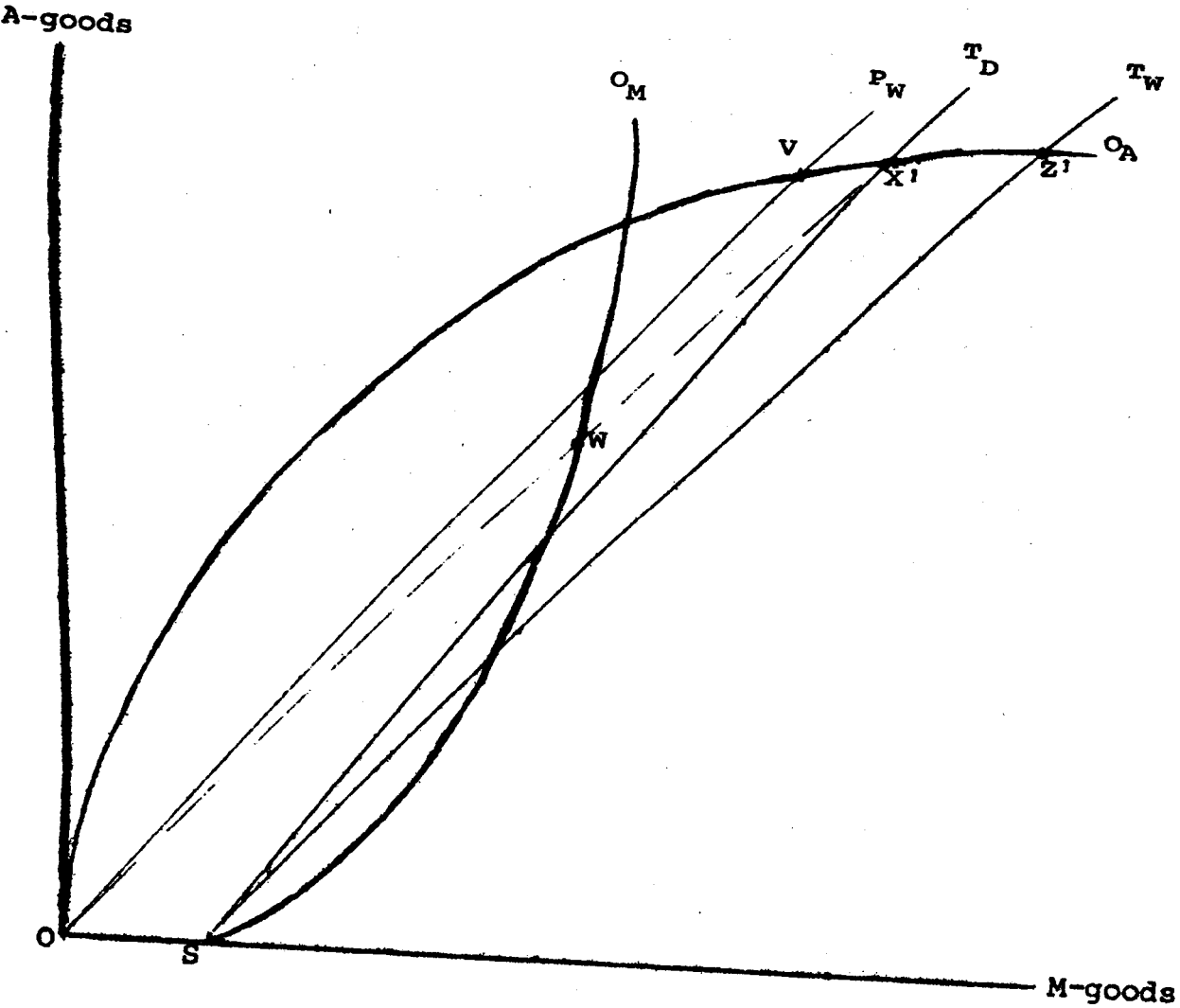


Figure 2

the size of the surplus is independent of the absolute level of either imports or exports, as the case may be. This can be depicted graphically by moving the intercept of the offer curve $O_M$ from the origin to a point such as S, which then represents an import surplus of M-goods of a magnitude equal to the distance OS. After the size of the surplus has been given, the price lines will also intercept the M-goods axis at S. Therefore in the particular short-run case depicted in Figure 2, the slopes of the lines $ST_D$ and $ST_W$ represent only the ratio of prices, i.e., the net barter terms of trade. The gross barter terms of trade at the observed trade point X' will be given by the slope of the line OWX'. We assume further that the import surplus, S, would be available either from the customs union partner, country M, or from the world, even under the conditions of free trade.[19/]

Under the foregoing assumptions, the calculation of the loss to the A-producer from having the terms of trade rigged against it can proceed exactly as outlined earlier for the case of balanced trade. Given data for the level of imports and exports, the terms of trade

(adjusted), and the elasticity of the offer curve for A-goods,[20] we can then determine the loss for any short-run period.[21] These losses can then be tabulated separately or cumulated at an appropriate interest rate to represent a total cost over the period.

What, then, of the elasticity of the offer curve, $O_A$? A standard econometric model for the estimation of both short-run and long-run price elasticities of supply as developed by Nerlove[22] lends itself well to the estimation of the elasticity of the offer curve with respect to the terms of trade. Since Nerlove and others, including the author of this paper, have used and explained this model elsewhere,[23] only the barest outline will be presented below.

The model assumes that suppliers set their production according to their expectations of the price that will prevail in any period, and that this expectation is based on past prices. These expectations are adjusted each period to reflect actual price changes. Thus supply at any time, t, designated as $Q_t$, is a function of the expected price, $EP_t$.

$$Q_t = f(EP_t) \qquad (9)$$

The expected price in any period is the expected price of the previous period plus correction factor which is assumed to be a constant proportion, $\beta$, of the difference between the expected price of the previous period and the actual price of the same period, $AP_{t-1}$.

$$AP_t = EP_{t-1} + \beta(AP_{t-1} - EP_{t-1}) \qquad (10)$$

Assuming (9) to be a linear relationship, and combining (9) and (10) gives, after some algebraic manipulations, an estimating equation of the following form:

$$Q_t = aQ_{t-1} + b \cdot AP_{t-1} + K + v_t \qquad (11)$$

in which $a = (1-\beta)$, b equals the product of $\beta$ and the price coefficient from equation (9), K is a constant term, and $v_t$ a residual.[24/]

If we let Q equal the quantity of exports of A-goods, and AP equal the actual terms of trade facing the A-producer, equation (11) will provide an estimate of the short-run elasticity of the A offer curve with respect to the terms of trade at any time, t. If equation (11) is estimated in logarithmic form, the coefficient, b, will be the elasticity directly, which amounts to assuming constant

elasticity of the short-run offer curve over the relevant range of trade positions. Both linear and log estimations were made, with the log-form estimates being presented below in Table 7. The advantage of computational simplicity offered by a constant elasticity form of the offer curve was not contradicted by the results of the two estimation procedures, since both the linear and logarithmic equations gave nearly identical results.

In the case of constant short-run elasticity of the offer curve, equation (4) for the arc elasticity may be restated as follows:

$$E = \frac{A_1 - A_o}{A_o} \cdot \frac{T_D}{T_W - T_D} \tag{12}$$

Therefore,

$$A_1 = A_o \left[ E\left( \frac{T_W}{T_D} - 1 \right) + 1 \right] \tag{13}$$

Substituting the value of $A_1$ from (12) into equation (1), and performing some manipulations, we arrive at the following formula for the "loss:"

$$L = A_o \left( T_W - T_D \right) \left[ 1 + E\left( \frac{T_W - 1}{T_D} \right) \right] \tag{14}$$

The response of exports in the short run, according to Table 7, was rather inelastic. The highest elasticity observed was on the order of 1/3, and no elasticity coefficient could be found to be statistically significant at the 5% level of confidence (t-test), although all but one were significant at 20% or better. The explanatory power of the equation form used was weak for grains exports, although it fit the pattern of all agricultural exports and of all exports very well. The problems thus raised are not, it turns out, very serious for the calculations of the loss to the exporting sectors presented below in Table 8. Although the values presented in Table 8 are calculated using the various estimated values for the elasticity of the export offer curves with respect to terms of trade change, a separate calculation -- not here tabulated -- using zero elasticity does not alter the calculated values of the loss except in the third digit. Thus for the particular data being used, the estimation of the magnitude of income transfer from the exporting sector as a result of changed terms of trade is not sensitive to a difference in the elasticity of the offer curve -- at least so long as that difference is confined to the range of zero to 34%.

The loss, or transfer of income from the exporting sectors, as calculated from equation (14) and detailed in Table 8, has several interesting implications. The first, which is immediately evident, is that for Hungarian exports taken as a group, there was very little loss. The indexes tabulated are expressed as a percentage of the real volume of the given year's exports at 1909/13 average prices. For all exports, this figure exceeds 3% for only 2 of the 31 years. Since the author would be the last to claim that the data and the calculations were accurate within $\pm$3%, the figures presented can probably be regarded as not essentially different from zero. The direction of movement of the indexes may be important, however. The numbers tend to become larger as the period progresses, which would be consistent with the observation from a previous section that Austro-Hungarian tariffs increased over the period and allowed the domestic terms of trade to stray farther from the levels dictated by world prices. The calculations using 1883/87 average price weights also showed positive losses in every year, with rather larger values. This is also consistent with the earlier statement that Hungarian exporters and importers adjusted the composition of the goods traded to changes in relative prices.

When some of the subgroups are examined, however, the divergences are more striking. The loss to agricultural exporters as a group is much more apparent. This loss tended to fluctuate around 10% until the turn of the century, after which it rose considerably. The burden of this "tax" on the agricultural sector was not shared equally, however. Although the exporters of the principal grain crops seemed to bear their share of the burden in the earlier years of the period under reveiw, the situation changed sharply in the mid-nineties. After 1894, the string of negative losses in the major grains column represents actual gains for the grain producers, i.e., Austro-Hungarian tariff policy allowed grain producers to enjoy terms of trade which were generally improving relative to the free-market terms of trade for grains. This is especially pronounced after 1906, when the last sharp increases in tariffs on grain were introduced into the customs law.

The broad effects of the terms of trade changes inside the Empire customs union are thus apparent: A bias against agriculture in general, thus favoring non-agricultural products, but with the politically-dominant

Table 7

Estimation of the equation[a/] $\log Q_t = a \log Q_{t-1} + b \log P_{t-1} + K$
1883 - 1913

| Q | a | T-value | b | T-value | Signif. level of b* | K | $\bar{R}^2$ |
|---|---|---|---|---|---|---|---|
| All exports | | | | | | | |
| Total | .84 | 9.97 | .34 | 1.57 | 15% | -.83 | .89 |
| To Austria | .83 | 9.42 | .23 | 1.42 | 20% | -.24 | .91 |
| Agricultural exports | | | | | | | |
| Total | .75 | 6.66 | .32 | 1.55 | 15% | -.31 | .81 |
| To Austria | .74 | 7.04 | .33 | 1.88 | 10% | -.28 | .86 |
| Major grains exports | | | | | | | |
| Total | .28 | 1.54 | .11 | .88 | 40% | 2.82 | .07 |
| To Austria | .46 | 2.75 | .23 | 1.67 | 15% | 1.44 | .46 |

[a/] Q in base-weighted index form, 1909-13 average = 100

P is terms of trade, base-weighted index form, with 1909-13 average = 100.

* To nearest 5%.

'e 8. Loss* to Exporting Sector from Biased Terms of Trade, 1883-1913

| 'rade h | AGRICULTURAL EXPORTS | | | | MAJOR GRAINS EXPORTS | | | |
|---|---|---|---|---|---|---|---|---|
| | Total Trade Index[a] | Trade with Austria Index[a] | Total Trade Value[b] | Trade with Austria Value[b] | Total Trade Index[a] | Trade with Austria Index[a] | Total Trade Value[b] | Trade with Austria Value[b] |
| | 15.1 | 6.1 | 139 | 46 | 8.7 | 7.1 | 25 | 19 |
| | 12.9 | 6.3 | 119 | 48 | 6.8 | 6.1 | 19 | 16 |
| | 14.3 | 7.4 | 131 | 56 | 10.1 | 8.2 | 29 | 22 |
| | 15.1 | 7.7 | 139 | 58 | 9.2 | 7.6 | 26 | 21 |
| | 13.0 | 7.3 | 120 | 55 | 8.6 | 6.6 | 25 | 18 |
| | 12.5 | 7.3 | 115 | 55 | 11.6 | 9.0 | 33 | 24 |
| | 10.2 | 6.4 | 94 | 48 | 9.0 | 7.8 | 26 | 21 |
| | 13.6 | 7.5 | 126 | 57 | 8.1 | 7.3 | 23 | 20 |
| | 10.9 | 5.1 | 100 | 39 | 2.8 | 3.7 | 8 | 10 |
| | 13.0 | 7.8 | 119 | 59 | 13.6 | 12.3 | 39 | 33 |
| | 12.9 | 6.8 | 118 | 51 | 1.0 | 3.0 | 3 | 8 |
| | 10.9 | 4.4 | 100 | 33 | - 5.6 | - 2.4 | -16 | - 6 |
| | 9.3 | 4.5 | 85 | 34 | - 5.7 | - 3.1 | -16 | - 8 |
| | 10.9 | 6.2 | 101 | 47 | 0.9 | 3.6 | 3 | 10 |
| | 10.6 | 6.7 | 98 | 51 | - 9.9 | - 6.3 | -28 | -17 |
| | 10.4 | 6.6 | 96 | 50 | - 8.9 | - 5.9 | -25 | -16 |
| | 14.7 | 10.1 | 136 | 76 | - 3.6 | - 1.2 | -10 | - 3 |
| | 19.2 | 13.7 | 177 | 104 | 4.1 | 6.9 | 12 | 18 |
| | 21.7 | 16.7 | 200. | 126 | 0.0 | 2.8 | 0 | 7 |
| | 27.0 | 21.9 | 248 | 166 | 3.3 | 5.7 | 9 | 16 |
| | 23.9 | 17.8 | 220 | 135 | 1.9 | 4.3 | 5 | 12 |
| | 19.3 | 13.6 | 178 | 103 | - 5.6 | - 3.2 | -16 | - 9 |
| | 19.2 | 14.6 | 177 | 111 | - 9.2 | - 5.5 | -26 | -15 |
| | 20.8 | 13.9 | 191 | 105 | 1.5 | 4.5 | 14 | 12 |
| | 21.6 | 13.7 | 199 | 103 | - 6.1 | - 2.3 | -17 | - 6 |
| | 20.6 | 12.0 | 190 | 91 | -12.4 | - 9.1 | -35 | -25 |
| | 23.7 | 15.0 | 218 | 113 | -14.5 | -11.6 | -42 | -32 |
| | 24.8 | 16.1 | 229 | 122 | - 5.4 | - 2.4 | -16 | - 6 |
| | 19.3 | 9.8 | 178 | 74 | -23.3 | -20.4 | -67 | -55 |
| | 25.3 | 17.1 | 233 | 129 | -17.4 | -14.3 | -50 | -39 |
| | 33.0 | 25.1 | 305 | 190 | - 5.8 | - 3.4 | -17 | - 9 |

of exports, based on index of 1909-13 = 100.
prices (1 crown = 10d during the period under review).
sticities from Table 7.

Hungarian grain producers receiving special exception from the effects of this general policy.

## IV

This paper has attempted to present a simple methodology to deal with a question relevant to agricultural policy and general economic development strategy. Although the data used in testing the model are historical -- indeed, dealing with a political entity which no longer exists[25] -- it is the contention of the author that the basic conditions pertaining to the historical case pertain to many contemporary less-developed countries as well. The most important of these conditions are the large share of traditional agricultural commodities in the total volume of production and trade, and the relative inelasticity of supply of these agricultural goods, especially in the short run.[26]

On the other hand, although the methodology is simple, its applicability is limited by its data demands. To be used to calculate at least a first approximation to the transfer of income from agriculture as a result of biasing the intersectoral terms of trade within a

single country requires series on intersectoral trade flows, which are seldom found.[27]

To refer to the estimates of this paper as first approximations is a designation that must be carefully noted. Besides the problems arising from inaccurate data and the use of index numbers, the problem of transport cost has been swept under the rug.[28] Inclusion of transport cost is likely to reduce the apparent loss, since we could normally assume that the transport of goods to nearby internal markets is less expensive than to more distant external markets, and since the bulk/value ratio is usually higher for agricultural products than for manufactured goods, thus making transport a bigger share of the unit price of farm commodities. There are, of course, many exceptions to these general rules.

It is nevertheless fairly safe to conclude that, from the historical evidence at least, agriculture can be made to bear a large share of the burden of an industrialization program which is encouraged through artificially changing the terms of trade at which it must exchange its produce for manufactured goods.[29] It is further clear

that the burden can be selectively applied, and some particular farm products can be burdened less, or even favored. This is certainly not a surprising conclusion, nor a new one, since there is ample historical evidence from many countries that excise taxes on many goods or classes of goods have been used for a long time to divert resources from the production of these goods to other goods which are more favorably treated.

A final warning should be expressed, although it is perhaps redundant to do so. Although we have measured the burden put on agriculture by rigging the terms of trade against it, the non-agricultural sectors do not gain all that the farm sector loses. The methodology as presented needs to be modified in order to attempt an estimate of what share of agriculture's total loss is a deadweight loss to the economy through inefficient allocation of resources. It was evident that the composition of trade flows changed as a result of changing relative prices, which we would naturally expect. Since the allocation thus achieved is one which presumably attempts to maximize profit, but in response to a set of prices which are by definition non-competitive, the resources are not

being used efficiently. It can be suggested here, although the procedure has not been tried because of data and time constraints, that the gain to the favored sector could be measured using the same methodology, and the difference between this gain and the loss to the agriculture sector would approximate the deadweight loss through reduced economic efficiency.

## Appendix A

### Coverage of Commodity Groups

1. Major grains exports

   wheat
   rye
   barley
   oats
   corn

2. Agricultural machinery and fertilizers imports
   portable steam engines and tractors
   steam threshing machines
   reaping machines
   seeding machines
   other agricultural machinery
   plows and plow parts
   fertilizers

3. Agricultural exports
   raw tobacco
   wheat
   rye
   barley
   oats
   corn
   other grains
   fruits, vegetables, etc.
   other plants
   cattle
   sheep and goats
   pigs
   horses
   other slaughter and draft animals
   live poultry
   killed poultry
   milk and cream
   eggs
   raw hides
   feathers
   other animal products
   butter
   bacon

pork lard
other fats
oils from plants
hemp
flax
wool

4. Agricultural producer's goods imports
   cattle
   sheep and goats
   pigs
   horses and colts
   other slaughter and draft animals
   hardwood lumber
   softwood lumber
   nails and screws
   portable steam engines and tractors
   steam threshing machines
   reaping machines
   seeding machines
   plows and parts
   other agricultural machinery
   fertilizers

5. Items of common consumption imports
   cocoa
   tea
   coffee
   spices
   refined sugar
   tobacco, processed
   grain flour
   fruits and vegetables
   milk and cream
   eggs
   butter
   bacon
   pork lard
   other fats
   foods and beverages
   brown coal
   cotton yarn
   cotton cloth
   knitwear and hosiery

other cotton goods
woolen yarn
woolen cloth
other woolen goods
caps
men's clothes
women's clothes
other ready-made articles
glass and glassware
stoneware
pottery
sewing machines
musical instruments, clocks, toys, electro-mechanical articles, and lamps
table salt
tallow, soap, and wax goods
matches

6. Imports of manufactures
refined sugar
processed tobacco
flour
beer
other processed foods and beverages
lumber, hardwood
lumber, softwood
turning and carving materials
pharmaceuticals, perfumes, and supplies therefor
pigments and tannin
gums and resins
cottons
flax, hemp, jute goods
wool yarn
wool cloth
other wool goods
silk goods
clothing
brush and sieve goods
miscellaneous goods n.e.c.
paper and paper goods
rubber and goods thereof
canvas and goods thereof
leathers
fur goods
wooden goods

glass and glassware
stoneware
pottery
iron and steel
other metal goods
machinery and parts
vehicles
tools, etc.
salt
chemical reagents
varnishes and paints
tallow, soap and wax
matches
fertilizers

## Appendix B

### Notes on Prices Used in Terms of Trade Calculations

As stated in the main text, the terms of trade for Hungarian trade in domestic prices were calculated using unit values of imports and exports from official Hungarian trade data. The "world" prices came from British statistics, as published in the annual volumes of Statistical Abstract for the United Kingdom. No attempt was made to correct British prices for either tariff or transport differentials.

British prices had to be converted, however, to represent comparable units of measurement. In nearly all cases, these corrections involved changing the commodity units of British trade data into metric weight equivalents, since virtually all Hungarian data on volume of trade are expressed in metric centners (=100 kg.). Money values were converted to Austro-Hungarian crowns at the then-prevailing rate of exchange (1 crown = 10 d). The weight equivalents used to change British gallons, square yards, tuns, hundredweight, bushels, proof gallons, loads, barrels, hogsheads, etc., were taken insofar as possible

from the Annual Statement of the Trade of the United Kingdom (1935, vol. I; London: 1937). Conversion factors which were unavailable in this volume were taken from a standard English-metric equivalent table and from various United Nations (FAO for agriculture) weight equivalents for various commodities in international trade which are often expressed in other units.

In a very few cases, no approximate British equivalent for a traded commodity could be found, because of different commodity classifications used in the two countries' trade statistics. In such cases, the Hungarian price was used. The effect of this procedure was probably negligible, since the only commodities affected were those which represented only a tiny fraction of total Hungarian trade. Insofar as it has an effect, however, we cannot tell whether it would widen or narrow differences between the "world" and "domestic" terms of trade as calculated. This conclusion follows from the observation that for Hungary's principal export products (agricultural goods), it was much simpler to get nearly perfectly comparable goods classifications than it was for her primarily non-agricultural imports. But since it was the prices of some

of these imported goods which were raised relatively more throughout most of the period via increases in tariffs, it is probable (although not certain) that the denominator of the world terms of trade expression is raised slightly, thus slightly decreasing the value of the "world" price ratio. If the prices diverged increasingly as time passed, we would note larger decreases or smaller increases in "world" terms of trade than was actually the case.

No price in one country can be taken on faith to be for an exactly equivalent good in another country, however. Since the degree of disaggregation was limited by the published statistics, it is almost certain to be the case that some prices are meaningless when applied to Hungary. This problem is totally intractable; one can only put one's faith in the laws of probability and assume that such errors as exist in this regard tend to be offsetting. The degree of aggregation which exists in the published data presents another problem as well: if the composition of the individual goods within a category alters, changes in the unit values calculated for that category reflect both changes in goods prices and changes

in the commodity composition of that goods category. This problem is present in both the Hungarian and the British data, and could either magnify or reduce the observed change in the "price" compared to what might be considered the "true" price change. For this problem there is also no solution.

There is no need here to discuss at length the various other difficulties of time series comparison which are encompassed in the rubric of "the index number problem." Over a period of some three decades, it is a statistical certainty that new goods entered some trade categories, others became obsolete and dropped out, and that the composition of trade changed. It is also certain that these changes occured at different rates, in different magnitudes, at different times, and had their principal effects in different classes of goods as between the British and Hungarian trade figures. Thus, when looking at the estimates presented in the text, it is the doubter who should be believed and the believer who should be doubted.

So far as the relative credibility of the calculations is concerned, we should probably put more faith

in the estimates relating to Austrian trade than in the data referring to all of Hungary's foreign transactions. As the text pointed out, the increasing divorcement of prices inside the Empire from those outside led to a much greater change in the composition of Hungary's trade with the outside world than in the composition of her trade with Austria.

A final note of warning should be issued. There is no guarantee that British prices, even if they were for fully comparable items, necessarily represent market equilibrium ("shadow") prices. Precisely because much of Europe adopted protectionist measures, even though Britain did not, means that in some sense British prices could be viewed as representing trade in a residual after diversions caused by protectionist policies elsewhere had taken their toll. Had the world been a free-trade world, an entirely different set of relative prices might have prevailed. This is the same argument used in discussing the issue of imputations in national income accounting, e.g., for owner-occupied housing or for food and fuel produced and consumed on the farm. It is also the same warning that every student of international trade receives when he attempts

to hypothesize what is the "world" or free-market price of sugar, to name the most frequently-cited example. Whether a true shadow price of a given commodity might be above or below the British price is a matter of conjecture; therefore, one must on this ground as well take all numbers presented in this paper with the proverbial grain of salt.

## Footnotes

1/ And on all other sectors not equally favored with protection. For expositional simplicity this paper will confine itself to a two-sector model. The full amount of the "tax" does not accrue to the favored sector, of course, since there is some deadweight loss involved from a less efficient allocation of resources.

2/ An assessment of the reliability of the data can be found in Gustav Bokor, Geschichte und Organisation der amtlichen Statistik in Ungarn (Budapest: 1896), esp. pp. 69, 137, 183, 186-88.

3/ The methodology to be suggested is symmetrical, so that skewing the terms of trade to favor agriculture would result in a negative cost, i.e., a benefit to the agricultural partner, Hungary.

4/ Roland Kühne, Die Geschichte des ungarischen Getreidehandels und die Getreidepreisbildung in Oesterreich-Ungarn (Magyaróvár: 1911), 4.

5/ This section on the tariff and trade history is based primarily on the following two works: Josef Grunzel, Handelspolitik und Ausgleich in Oesterreich-Ungarn (Vienna and Leipzig; 1912), and Alexander von Matlekovits, "Die handelspolitischen Interessen Ungarns," in Beiträge zur neuesten Handelspolitik Oesterreichs ("Schriften des Vereins für Socialpolitik," vol. XCIII; Leipzig: 1901). Explicit footnote references will be made only for information taken from other sources.

6/ Alexander von Matlekovits, Die Zollpolitik der Oesterreich-ungarischen Monarchie und des deutschen Reiches seit 1868 und deren nächste Zukunft (Leipzig: 1891), 8.

7/ This amounted to a general 15-20% increase in tariffs, since the Austrian currency (still on a silver/paper standard) was selling at a discount.

8/ Asher Isaacs, International Trade: Tariff and Commercial Policies (Chicago: 1948), 341-47.

9/ Grunzel, 48.

10/ Since the Hungarian government was almost completely dominated by the rural magnates and the landed gentry, there was very close correspondence between national policy and the interests of this group.

11/ The peaks and troughs for the individual year series are as follows: Imports from Austria accounted for 86.5% of total value of imports in 1887 and 71.5% in 1913; exports to Austria provided 77.2% of total export earnings in 1895, but only 69.2% in 1883.

12/ The composition of this and the other commodity groups mentioned is detailed in appendix A.

13/ A discussion of the methodology and the pitfalls of this measure is presented in appendix B.

14/ The commodity composition of these subsets is enumerated in appendix A.

15/ Terms of trade were also calculated using base periods of 1895/99 average, 1900, and 1913. The same pattern and nearly identical relative changes were observed; we can conclude that the choice of base period is immaterial to the result.

16/ The partners can, however, raise the price of imported goods to their consumers via tariffs. Thus they are not price takers in the very strictest sense.

17/ This is what is involved in the oft-posed question, "What could our exports have bought if we could have traded at world prices?"

18/ Note that we have now changed to the use of a base-weight index, rather than the Fisher Index, for simplicity of exposition and computation.

19/ If this were not the case, and we assumed instead that free trade must be balanced trade, it is of course possible that the A-goods producer would prefer point X' (at less favorable terms of trade but with an import

19/ cont'd
surplus) over the balanced free-trade point, V, given by a line $OP_W$ with the same slope as $ST_W$, but passing through the origin. Point X' would be on a higher trade indifference curve than is point V.

The total net import surplus for Hungary during the entire period 1883-1913 amounted to only 653,000 crowns (uncorrected for price changes). This amounts to only about 1.7% of the total imports during the same period (again uncorrected for price changes). It would therefore seem that the assumptions made above about the origin and character of the import surplus are not unreasonable. In any case, a surplus so small in relation to total trade is not likely to be very significant.

20/ Since we have assumed country A small in relation to total world trade, the two terms of trade lines also represent the world offer curves of goods to country A ($T_W$ if there is free trade, $T_D$ if tariffs are imposed). Only in the unlikely case that offer curves $O_A$ and $O_M$ intersect at a point below the line $T_W$ would these terms of trade lines not be the effective offer curves of M-goods to country A. Since we have observed sizable trade with the world in every year of the period, we can rule out this possibility.

21/ Since the analysis is symmetric, this procedure will also reveal any gains, if the domestic terms of trade are actually skewed to favor the agricultural producer. As pointed out previously, the gains to one will be less than the loss to the other.

22/ Marc Nerlove, The Dynamics of Supply: Estimation of Farmers' Response to Price ("The Johns Hopkins University Studies in Historical and Political Science," series LXXVI, no. 2; Baltimore: 1958), esp. pp. 25-26 and 62-65.

23/ See for example Raj Krishna, "Farm-Supply Response in India-Pakistan: The Case of the Punjab Region," Economic Journal, LXXIII (September, 1963), 477-87; Walter P. Falcon, "Farmer Response to Price in A Subsistence Economy: The Case of West Pakistan," American Economic Review, LIV (May, 1964), 580-91; Merrill J. Bateman, "Aggregate and Regional Supply Functions for Ghanaian Cocoa," Journal of Farm Economics, XLVII (May, 1965), 384-

23/ cont'd
401; Clifton R. Wharton, Jr., "Malayan Rubber Supply Conditions," in The Political Economy of Independent Malaya, ed. T. H. Silcock (Canberra: 1963), 131-62; or S. M. Eddie, "Farmer Response to Price in Large-Estate Agriculture," University of the Philippines, Institute of Economic Development and Research Discussion Paper No. 69-15, August 22, 1969 (mimeo). A very useful and lucid exposition of the development and properties of distributed-lag models can be found in Kenneth F. Wallis, "Some Recent Developments in Applied Econometrics: Dynamic Models and Simultaneous Equation Systems," Journal of Economic Literature, VII (September, 1969), 771-96.

24/ A problem of possible autocorrelation of the residuals, $v_t$, arises from the form of the model used. Although there is some hesitation in using ordinary least-squares regression techniques to estimate the coefficients from equation (11), we follow here the conventional practice of adopting the ordinary least-square technique and presenting its results with reservations. The problems in so doing are summarized in Wallis, 773-75.

25/ Greater Hungary -- "The Lands of the Holy Crown of St. Stephen" -- enclosed about 325,000 square kilometers, with a population of some 21 millions according to the 1910 census. The Treaty of Trianon, which formalized the breakup of the Austro-Hungarian Empire, reduced Hungary to approximately one-third its former size, both in terms of area and population. See Bowden, Karpovitch, and Usher, An Economic History of Europe since 1750 (New York: 1937), 21; and Louis Loczy, A Geographical, Economic and Social Survey of Hungary (Budapest: 1919), 5n.

26/ The value of the long-run elasticity of the offer curve is considerably greater, of course, and can be calculated from the coefficients appearing in Table 7, as explained in the text. The short-run elasticity here discussed is not the elasticity of total production, but only of the marketed surplus. We would normally expect total production to respond even less elastically to changes in prices than does the marketed surplus.

27/ One country to which this difficulty might not apply is Pakistan. The methodology could perhaps be applied to East Wing-West Wing trade, which has been an issue of sustained controversy almost from the very founding of the Pakistani state.

28/ A good discussion of the difficulty of including a correction for shipping costs can be found in Charles P. Kindleberger, The Terms of Trade, (New York: 1956), Appendix A, 336-40. Since the present study lacked data even to make use of the sort of approximations Kindleberger suggests, the author is forced to be content with an inferior solution -- merely to mention the difficulty and warn the reader to view the figures skeptically.

29/ It should not be assumed, however, that it was only the Austrians who reaped the benefits of favorable terms of trade. Hungarian industrial producers enjoyed the same tariff protection. How much agriculture was "taxed" to support domestic Hungarian industrialization cannot be determined, however, since the data on internal trade within Hungary are not available. Similarly, there must also have been some losses visited on Austrian agricultural producers. Part of these losses undoubtedly accrued to the benefit of Hungary.