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Statistical Study of the Trend of Foreign Trade Toward Equilibrium and Bilateralism*

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Introduction

Whenever we speak of the trend of world trade toward compensated exchanges, we can quite easily mix up two of the trends which the present analysis is trying to distinguish; namely, the trend toward equilibrium and that toward bilateralism. If the deficit and surpluses of trade balances in different countries were cut relative to the amounts exchanged, this could indicate that capital movements and invisible items would lose their relevance within the current account balance, whereas the equilibrium should consequently be assured solely through the exchange of commodities. In such a case it does not really matter if the equilibrium of the balance of trade is reached separately with each country or as a result of the clearance between deficits and surpluses of the specific balances. In other words, the trend toward equilibrium does not necessarily mean the abandoning of triangular exchanges.

On the other hand, bilateralism does not necessarily entail the equilibrium of trade balances. Let us take a country which is, for instance, confident of earning a considerable amount of foreign currency from tourist receipts. A policy of bilateral exchange would fix a specified relative margin for the deficit of the balance of trade of this country and at the same time the stated policy would be used to reproduce that very margin in its trade with each and every country. In fact a great number of clearing and payment agreements resulted in the disequilibrium rather than the equilibrium of trade.

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We propose to examine, on a statistical basis, whether in recent years these two trends, the one toward equilibrium and the other toward bilateralism of exchanges, have manifested themselves and, if so, to what degree. First, we find a method to calculate the trend toward equilibrium on a world scale, while later we shall analyse the trend toward bilateralism in some of the major countries.

1. The trend toward equilibrium on a world scale

The simplest way to compare the degree of equilibrium which the single balances of trade have reached, is to take the absolute difference between imports and exports and then divide it by the total amount of international trade of the country in question.

Let i_p and e_p be respectively the imports and exports of country p, the index of equilibrium of its balance of trade would be:

$$n = \frac{| i_p - e_p |}{i_p + e_p} \cdot 100.^{1}$$

This index varies from 0 (in the case of perfect equilibrium where $i_p = e_p$) to 100 (in the case of perfect disequilibrium where $i_p = 0$ or $e_p = 0$).

The general index N of equilibrium of all the balances of trade is thus obtained from the weighted mean of all national indexes:

$$N = \frac{\Sigma | i_p - e_p |}{\Sigma | i_p + e_p |} \cdot 100 = \frac{\Sigma | i_p - e_p |}{I + E} \cdot 100$$

where I is world imports and E stands for world exports. The numerator $\Sigma | i_p - e_p |$ is simply the sum of deficits and surpluses in the balance of trade of all countries.

[1] We often employ the following ratios

$$n'_1 = \frac{i - e}{i} \cdot 100 \text{ and } n'_2 = \frac{e - i}{e} \cdot 100,$$

according to whether the balance of trade is positive or negative. In fact the above indexes have real meaning since they indicate both the quota of imports not covered by exports and the quota of exports not cleared by imports. Our index, however, is more handy when we need to measure disequilibrium whatever its positive or negative nature. It is nevertheless easy to see that between n' and our index n the simple relation persists:

$$n' = \frac{2n}{100 + n} \cdot 100$$

The figures for world trade from 1925 to 1938 are given in the table below:

Table 1

(millions of gold dollars)

Years	$\Sigma \mid i_p - e_p \mid$ (1)	$I + E$ (2)	$N = \frac{(1)}{(2)} \cdot 100$
1925	8,698	62,872	13.9
1926	6.605	61,888	10.7
1927	7,605	65.048	11.7
1928	7.625	67,582	11.3
1929	6,390	68,606	9.3
1930	6.879	55,558	12.4
1931	6,549	39,704	16.5
1932	4,471	26,868	16.7
1933	3,762	24,224	15.6
1934	3,506	23,314	15.1
1935	3,259	23,802	13.7
1936	3,660	25,722	14.3
1937	4,643	31,592	14.7
1938	3,860	27,736	13.9

In 10 out of 13 cases the annual variations of $\Sigma \mid i_p - e_p \mid$ and $I + E$ have the same sign, and in 7 cases the variation of $\Sigma \mid i_p - e_p \mid$, even if it varies in the same direction, turns out to be greater than $I + E$; consequently our index varies in the same way as our two basic numerical series. On the other hand, in six cases our index varies in the opposite way to that of world trade, both when the movements of world trade and $\Sigma \mid i_p - e_p \mid$ diverge (1928-1929, 1929-1930, 1934-1935) and also when, by moving in the same direction, the variation of world trade is greater than $\Sigma \mid i_p - e_p \mid$ (1927-1928, 1931-1932, 1932-1933).

It follows that the index of disequilibrium of commercial exchanges does not display a regular trend during the course of the business cycle. Sometimes it follows the economic trend: they both declined in 1925-26 and increased in 1926-27; they increased again from 1935 to 1937 while they decreased from 1937 to 1938. Or they may also be inversely correlated, as they are when our index declines from 1927 to 1929 before increasing rapidly from 1929 to 1932.

These observations lead us to the conclusion that *the trend of the index has not been influenced by the ups and downs of the business cycle, but rather by the intensity of fluctuations.*

We then calculated the percentage of annual variations in world trade ($I + E$) and drew a curve representing all the values thus obtained, without taking into account the signs indicating the direction of variations with respect to the previous year. The result shown in Diagram I is striking: without any exception, both the index of disequilibrium and the curve of the annual variations of world trade vary in the same direction from 1925-26 up to 1938. Putting Diagram I into simple words, we are led to the following conclusion: any given $x + 1$ annual variation in world trade relative to year x which is greater (whether upwards or downwards) than the variation for year x relative to year $x-1$, leads to an increase in the index of disequilibrium of world trade between years x and $x + 1$ and viceversa.

Therefore, major contractions and expansions in world trade are always concentrated within a limited number of years and thus cause the curve of annual variations to rise (curve 2) and help increase disequilibrium of the balance of trade within each country. On the other hand, disequilibrium decreases when the movement flattens, and international trade is stabilized at a given level — whether low or high.

The above observations can be compared to a phenomenon which is often found in the field of economics, the social sciences generally, and in physiology. Just as a heavy increase (or decrease) leads to disproportions, so a sudden halt in such an increase tends to reduce the disproportions.

Examining in detail the annual variations of our index, the most interesting episode is represented by its steep rise from 1929 to 1931. If we look at Diagram I, it can be seen that between the above-mentioned dates world trade decreased by 42.1% while the sum of deficits and surpluses increased by 2.5%. We can explain this anomaly by the fact that the international amortization of outstanding obligations and interest payments did not decrease as rapidly as world trade, so that disequilibria of commercial exchanges necessary for the transfer of those payments, had to be maintained at all costs. In fact, between 1929 and 1931, the *surpluses* alone increased — from 1,913 millions to 2,331 millions of gold dollars (and this is in spite of the decline of prices in exported raw materials mainly suffered by the countries which enjoyed a positive balance of trade) — while the total of deficits (in millions of gold dollars) decreased from 4,477 to 4,218.[2]

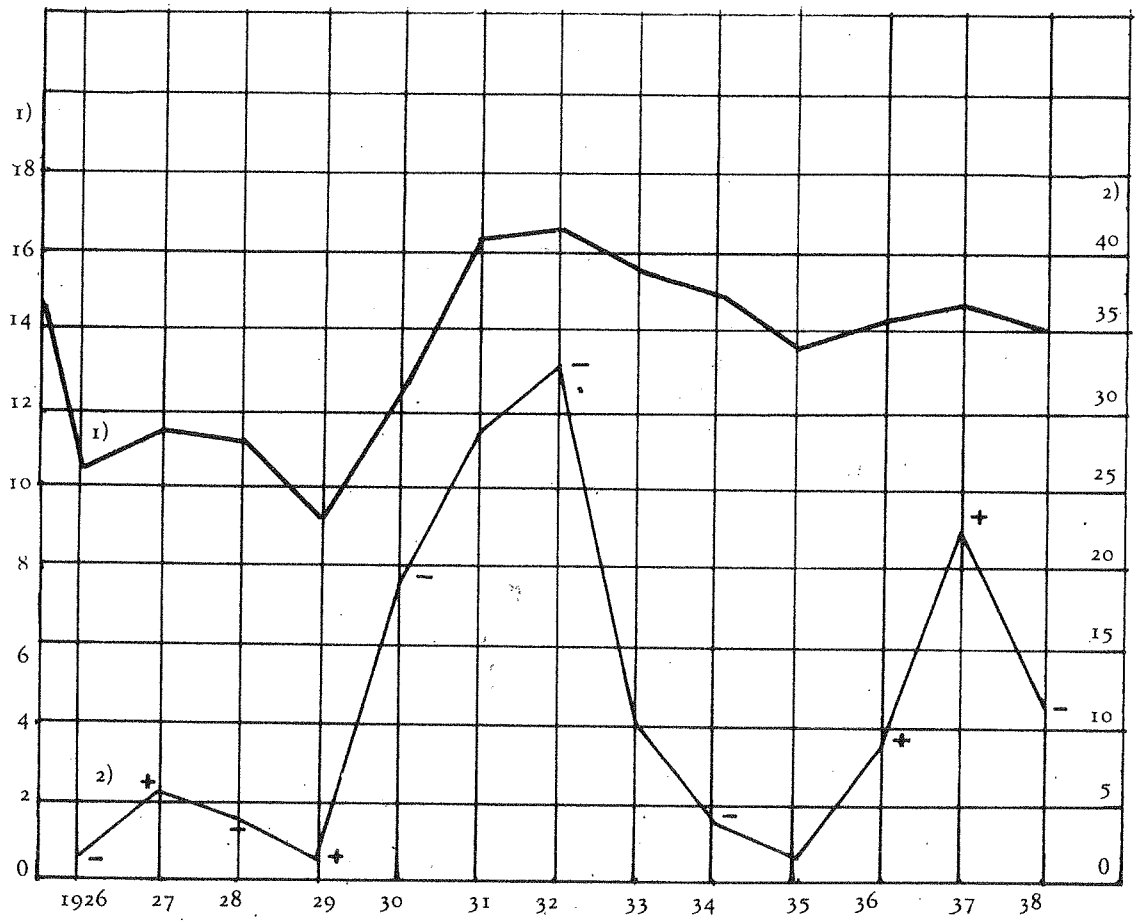
In other words, not only did the other items in the current account balance not contract at the same rate as commodity trade, but other capital

[2] If world imports were equal to world exports, the summation of all deficits would be equal to the summation of all surpluses. As a matter of fact, exports are always smaller than imports, mainly because import prices include freight. It is however extremely rare for the summation of deficits and surpluses not to move in the same direction.

Diagram I

—— *Trade Balance Disequilibrium Index*

—— Annual variations of commodity trade (in nominal terms)



Positive or negative signs peculiar to the thin curve indicate whether world trade (in value) has expanded or contracted relative to the previous year.

movements were also added which triggered a one-way movement of commodities. Let us recall as an example the case of Germany's abnormal surpluses in 1930 and 1931.

So far we have only analysed the cyclical and annual movements of our index. As far as the *trend* is concerned our figures allow us only a negative conclusion, namely that for the years we have examined, a clear trend toward the equilibrium of external accounts is not apparent. On the contrary, we can state that disequilibrium has increased, although we still ought to consider whether the higher level of our index, due to the rapid increase which occurred in 1930-31, is stable or transitory. It is quite interesting to note that in 1938 our index regained its 1925 value, the base year of our observations.

The absence of a decisive trend toward world-wide equilibrium can be explained by the following:

1) the desperate efforts made by deficit countries to bring their external accounts back to equilibrium were offset by equally strenuous measures made by surplus countries to keep and possibly increase their positive balance; provided that the efforts made by deficit countries were been frustrated by their own economic policy;
2) even if there exists a decrease in disequilibrium either in a single country or a group this can bring about a disorganization in the trade of another group of countries and consequently an increase in global disequilibrium.

2. The trend toward bilateralism

In order to study the trend toward equilibrium on a world scale, we have examined the national disequilibrium indexes of all the balances of trade as the terms of an elementary statistical series in which the index of disequilibrium is just one of the many characteristics. To make a contrast with this analysis, which we can freely label as a macrocosmic one, we now propose to examine the national index of disequilibrium as the average of an elementary series whose terms will be made up of the relative deficits and surpluses of a given country's specific balances in its commercial relations with all the other countries taken individually. We shall also adopt another characteristic of this series, namely the index of bilateralism. This we shall consider as being the higher or lower concentration of terms around its average.

To make our analysis plausible, let us take as a single example the case of a country whose global balance of trade is in equilibrium. This equilibrium may stem either from the equilibrium of its individual trade balances or

from the clearing between deficits and surpluses of its balances. It is then clear that in both cases the commercial system adopted by the country in question is either bilateral or multilateral. If we consider the more general case in which a country has a negative (or positive) balance, we can say that bilateralism will subsist if its specific balances are all negative (or positive) approximately to the same extent; while on the other hand a system of triangular exchanges will exist if the specific balances show both relevant deficits (surpluses) or very small deficits (surpluses) or even surpluses (deficits). *The dispersion of specific series of surpluses and deficits* — measured in relative terms — *in relation to their average* — *represented by the relative general surplus or deficit* — *is thus more than a simple statistical characteristic: it is the economic indication of the index of trade bilateralism.*

Let I and E be the country's total imports and exports, and $D = (I - E) / (I + E)$ the relative general deficit. Let $i_1, i_2, \ldots i_n$ and $e_1, e_2, \ldots e_n$, be the quantity of imports from, and exports to, all trading partners, and $d_k = (i_k - e_k) / (i_k + e_k)$ the amount of deficit a country has with another country. Should there be a surplus, the value of d_k will be negative. By using the "standard deviation" to measure the dispersion of our series with each deviation being weighted according to the relevance of the country's foreign trade, our index of bilateralism would be:

$$e = \frac{\Sigma \mid d_k - D \mid \cdot (i_k + e_k)}{I + E} \cdot 100 \qquad (1)$$

The above index varies from 0 to 100. In case of perfect bilateralism, we have $d_1 = d_2 = \ldots = d_n = D$, and consequently $e = 0$. On the other hand, there would be a total absence of bilateralism if the global balance of trade were in equilibrium, where all imports come exclusively from one country and all exports go exclusively to another. In this case the index would be 100.

However, in order to facilitate our calculations, as well as to stress certain properties of our index, we shall transform it as follows:

$$e = \frac{\Sigma \left| \frac{i_k - e_k}{i_k + e_k} - \frac{I - E}{I + E} \right| \cdot (i_k + e_k)}{I + E} \cdot 100$$

$$= \frac{\Sigma \mid (i_k - e_k)(I + E) - (i_k + e_k)(I - E) \mid}{(I + E)^2} \cdot 100$$

$$= \frac{\Sigma \mid 2E \cdot i_k - 2I \cdot e_k \mid}{(I+E)^2} \cdot 100$$

$$= \frac{\Sigma \mid E \cdot i_k - I \cdot e_k \mid}{I \cdot E} \cdot \frac{2I \cdot E}{(I+E)^2} \cdot 100$$

$$= \frac{1}{2} \frac{\Sigma \mid E \cdot i_k - I \cdot e_k \mid}{I \cdot E} \cdot \frac{4I \cdot E}{(I+E)^2} \cdot 100$$

$$= \frac{1}{2} \Sigma \left| \frac{i_k}{I} - \frac{e_k}{E} \right| \cdot \frac{(I+E)^2 - (I-E)^2}{(I+E)^2} \cdot 100$$

$$e = \frac{1}{2} \Sigma \left| \frac{i_k}{I} \cdot 100 - \frac{e_k}{E} \cdot 100 \right| \cdot (1 - D^2) \qquad (1a)$$

The index thus transformed allows us to make the following remarks:

1) It is much easier to calculate. Actually

$$\frac{i_k}{I} \cdot 100$$

and

$$\frac{e_k}{E} \cdot 100$$

are the ratios between our imports and exports with country k and our total imports and exports. These percentages are easy to detect; besides they are also available in several national statistical publications and the League of Nations' Economic Service computes and then publishes them every year for each individual country in its Annual Review of World Trade. Moreover, in the case of a positive balance, equation (1*a*) has the advantage of remaining unchanged; indeed D^2 is always positive.

2) In the case of perfect equilibrium $I = E$ and $D = 0$, the index of the two formulae becomes:

$$1' = \frac{\Sigma \mid i - e \mid}{2I} \cdot 100 = \frac{\Sigma \mid i - e \mid}{2E} \cdot 100$$

and consequently, in this case, the index of bilateralism stands to country x's trade as the index of trade disequilibrium stands to world trade.

3) Ordinarily the $(1-D^2)$ coefficient differs very little from 1. Let us consider a country with a very heavy deficit in its balance of trade, so that its imports are twice its exports: in this case $D = (2-1)/(2+1) = 1/3$ and $1-D^2 = 8/9$. We can thus gather that, for normal values of deficits or surpluses, the coefficient $1-D^2$ brings only a very slight correction to the figures obtained by calculating the expression

$$\frac{1}{2}\Sigma \left| \frac{i}{I} \cdot 100 - \frac{e}{E} \cdot 100 \right| .$$

We can also say that our index constitutes an indicator of bilateralism only when $(1-D^2)$ does not deviate too much from 1. Indeed, the notions of both triangularism and bilateralism imply that the quantity of imports and exports are equal. Even if at the beginning of our analysis we asserted that there was a need to make a clear distinction between equilibrium and bilateralism, we do not intend to dissociate the two concepts entirely.

4) The relevant term of the formula (1*a*) is then

$$\frac{1}{2}\Sigma \left| \frac{i_k}{I} \cdot 100 - \frac{e_k}{E} \cdot 100 \right| .$$

For each country, the smaller the deviation between the two percentages thus obtained and the total quantity of imports and exports, the smaller the above expressions will be, and the more bilateral the trading system will be.

The present commercial policies of many countries tend or are directed toward a heavier concentration of relative deficits or surpluses in their specific balances around the related global deficit (or surplus). We recall the case of Turkey which tried to achieve the ratio of 5/4 between its exports and imports with all its trading partners. Whenever such a ratio is maintained, all imports coming from a foreign country are entirely unrestricted. In the opposite case all imports are subject to import quotas or other kinds of restrictions.[3] But even without explicitly considering the notion of bilateralism in the way we have developed in the construction of our index, negotiators of commercial treaties make use of it whenever they speak about percentages of total imports and exports rather than of

[3] See the survey on "Exchange control in Turkey" presented at the International High Studies Conference (p. 41).

absolute data. To balance these percentages does not mean balancing trade between the two countries; it means precisely to correlate the relative deficit (surplus) of a specific balance with the relative global deficit (surplus).

Before the present analysis was undertaken, the Economic Service of the League of Nations in its *Review of World Trade* tried to measure bilateralism (see *Review of World Trade*, 1933, pp. 61 ff, 1933, pp. 65 ff, 1934, pp. 70 ff).

For this purpose, the League's publication divides the trading system of a country such as, for example, that of Great Britain, into three parts:

1) the general deficit;
2) the summation of all deficits and surpluses resulting from specific balances minus 1). This is what the League's survey refers to as triangular commodity trade;
3) what remains is the sum of all exports directed towards those countries which Great Britain has deficits with, and all imports from those countries with which Britain's balance of trade is positive, i.e. a bilaterally cleared trade.

The ratio between this third figure and Britain's total trade is the League of Nations' index of bilateralism. In the case of perfect equilibrium in the global balance of trade, this index coincides exactly with ours (save for the fact that, whereas our index varies from 100 to 0, the League's index varies from 0 to 100). Since we do not have perfect equilibrium, however, the difference is relevant. Thus the League's index does not take any account of the concentration of specific deficits (surpluses) around the global deficit (surplus). To give a practical description of the inadequacies of the League's index under specific circumstances we shall consider the following example. Let us take a country's trade over a two-year period of trading relations with just two countries:

	Year 1		Year 2	
	imports	*exports*	*imports*	*exports*
country 1	125	125	150	100
country 2	175	75	150	100
Total	300	200	300	200

From year 1 to year 2 the League's index of bilateralism would remain unchanged, thus giving in year $1 = (2 \times 125 + 2 \times 75)/500$ and in year $2 = (2 \times 100 + 2 \times 100)/500$; while in year 2, our index would show perfect bilateralism ($1 = 0$) as opposed to incomplete bilateralism in year 1 ($1 = 20$). It is then clear that from year 1 to year 2 our country's bilateralism has actually increased considerably and thus our suggested index proves to be "more correct".

Results

We have calculated the index of trade bilateralism from 1929 to 1937 for the following countries: Great Britain, Germany, Belgium, the Netherlands and Sweden, the results of which are given below.

Table 2

Indexes of bilateralism

	GB	*Germany*	*The Netherlands*	*Belgium*	*Sweden*
1929	25.8	25.2	23.7	22.3	25.6
1930	25.0	26.1	27.3	22.3	26.9
1931	24.9	29.0	31.0	25.3	31.6
1932	24.3	28.5	28.3	24.8	29.1
1933	24.3	28.9	24.9	23.2	26.7
1934	22.8	28.8	24.1	20.8	22.6
1935	21.2	22.8	22.6	22.5	18.0
1936	19.2	17.8	23.0	22.8	19.2
1937	17.5	21.5	21.2	20.8	18.2

The series of data are reproduced in Diagram II; let us recall that a decrease in our index (downward slope) indicates a growth of bilateralism.

We have selected those countries which by their very economic structure are in a way paramount in international trade. Not only have these countries undertaken a considerable amount of triangular trade, but this trade was also directed at a great number of countries, thus facilitating the clearing of erratic fluctuations. It is possible, then, from the variations in each country's index, to get an insight into the general trend of international trade. This is particularly true for Great Britain whose foreign trade, if disaggregated by country, presents just one double-digit figure, namely that for U.S. imports which generally account for 11% of global British exports.

It is precisely the British index, due to its constantly decreasing trend, which indicates the most remarkable strengthening of bilateralism. On the other hand we do not record any alleviation of the British trade deficit; despite fluctuations in both directions, in 1937 the deficit — if related to total trade — was higher than in 1929. Thus, whether induced by policy, by natural evolution, or by an exogenously imposed trend, the British trade deficit shows a tendency to follow an increasingly even distribution over each specific balance. Furthermore, in 1913 the British index was 29.5 —

which is far higher than postwar levels; despite the fact that in 1913 there were fewer independent countries and consequently fewer opportunities for triangular trade than nowadays.

The general trend toward bilateralism is clearly apparent from the diagram. More specifically, if we compare the two prosperity years 1929 and 1937 we get a smaller value of our index for all countries examined.

Conversely, if we consider that the world index, as shown above, had decisively increased between 1929 and 1937, we may once again stress the fact that within certain limits the trend toward bilateralism is independent of the trend toward equilibrium. *Only within certain limits*: for wild fluctuations in the tendency toward equilibrium are more likely to bring about a trend toward bilateralism. Thus in 1931 we may observe that nearly all of our indexes reached their peak, i.e. bilateralism was at its lowest, while in the same period disequilibrium in trade accounts was heavily accentuated.

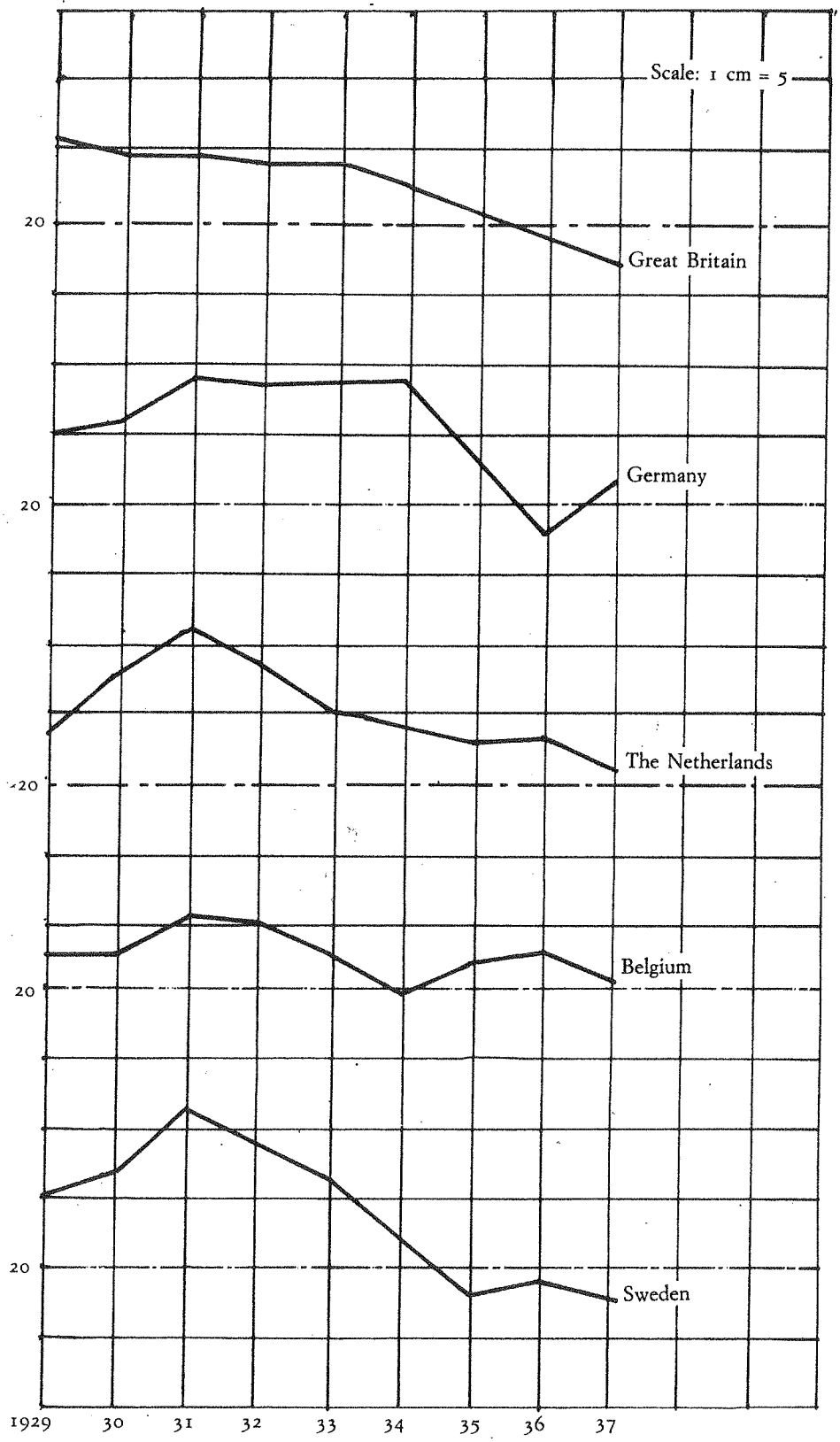
Finally, it is interesting to notice that our index has a very similar value for all countries we have examined thus far. Although Germany has adopted bilateralism as the dogma of her commercial policy, she has not managed to lower her index any more effectively than the other countries; furthermore even the interpretation of her trend presents greater inconsistencies than the British and the Swedish indexes.

Statistical explanations — Sources

1) *The trend toward equilibrium.* In order to calculate $\Sigma \mid i-e \mid$ we have used a table showing the value of foreign trade for each country in gold dollars. The table was published for the first time in the 1933-34 *International Trade Statistics* of the Economic Intelligence Service of the League of Nations (p. 194) starting from the year 1928; since then it has appeared regularly as an annex to the *Review of World Trade*. As for the years 1925 through 1927, the Economic Service of the League of Nations has placed at our disposal various series of data concerning the trade of several countries; these data were grouped under the entry "other countries" in the previous publications of the League of Nations: *Review of World Trade* from 1912 to 1926 and from 1926 to 1928.
2) *The trend toward bilateralism.* We have already mentioned that to calculate the indexes of bilateralism we have applied the formula (1*a*) which requires that figures concerning imports and exports be known. In the case of Germany, the above figures — in percentages — are published for a complete list of countries in the *Statistiches Jahrbuch*. As for the other countries, we have utilized the League of Nations'

Diagram II

Indices of bilateralism



International Trade Statistics, which also provides percentages together with absolute data for a country's trade with all its commercial partners. However, a major drawback of these data is that they reproduce an important entry, under the heading "other countries", which sometimes accounted for more than 15% of both British, Dutch and Belgian imports and exports. Now it is often with small countries that major disequilibria arise. This is why we were concerned to specify — by using national statistics of international trade — the percentage of imports and exports from or to certain countries which are not listed in the League of Nations' statistical accounts. We then estimated the weight of "other countries" to be approximately 5%.

Bergen, 1939