INTERNATIONAL MONETARY FUND

Research Department

Effect of Exchange Depreciation on the Value of
Europe's Exports to the Dollar Area

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August 18, 1949

1. Introduction

The purpose of this memorandum is to study the effect of depreciation in
a particular field. It should be said from the outset, however, that the im-
portance of a number of other factors on the volume and value of the exports
from Europe to the dollar area is likely to be much greater than that of de-
preciation. It follows from this that even though I attach relatively minor
importance to depreciation as a measure to increase exports of Europe to the
Western Hemisphere, I do not imply that these exports cannot increase con-
siderably. The following non-price factors are the most important:

(a) Fluctuation in income and activity in the United States.

(b) Exploitation of the existing markets in the Western Hemisphere
by appropriate export drives.

(c) Discrimination in favor of European products by Latin American
countries which are short of dollars. Discrimination of this
sort has increased very greatly the exports of many Western
European countries to Argentina. 1/

As mentioned, however, the purpose of this memorandum is not to forecast
changes in Europe's exports to the Western Hemisphere but to make a guess at
the difference in exports which could be obtained by a change in the exchange
rate assuming all other factors to be equal. It should be said from the outset
that the assignment involves the making of very many bricks with hardly a wisp
of straw. Presumably we want the bricks badly enough to justify their con-
struction even on this shaky basis. In any case they should be handled with
constant awareness of their fragility.

We treat the main part first, qualifications subsequently.

1/ The fact that most of the trade of Europe with both Argentina and Brazil is
now on the basis of payments agreements means that for most of Europe
these countries are not in the dollar area.

2. Main Part

The effect of depreciation on the balance of payments may be analyzed in three steps.

Step 1. The elasticity of demand in the importing country with respect to the delivered price should be known for each commodity. Let us call this elasticity e and define it (for convenience) as a positive figure

$$e = - \frac{dx}{x} \cdot \frac{p_D}{dp_D}$$

where x is the quantity exported and p_D the delivered price in dollars, at retail for consumers goods and at wholesale for producers goods.

Step 2. The delivered price should be related to the export price f.o.b. the exporting country in dollars. Let f be the elasticity with respect to the export price (p) then

$$f = - \frac{dx}{x} \cdot \frac{p}{dp}$$

$$\text{and} \quad \frac{f}{e} = \frac{dp_D}{p_D} \cdot \frac{p}{dp} = k$$

Clearly f is always smaller than e (k < 1) on account of non-proportional costs of handling, transportation, etc., in the widest sense of the word including specific duties.

Step 3. The (point) elasticity of the export value (in terms of dollars) is less than f by unity. Let us call this elasticity g and the export value X:

$$g = - \frac{dX}{X} \cdot \frac{p}{dp} = f - 1$$

If we measure arc elasticities for finite price changes, the formula for the elasticity of the export value becomes:

$$g' = f(1 - \frac{\Delta p}{p}) - 1$$

If we know e and k for each commodity i, we can compute an average elasticity $\bar{g}$ for all commodities as follows:

$$\bar{g} = \frac{\sum X_i(k_i e_i - 1)}{\sum X_i}$$

It is perhaps not too difficult to obtain for each commodity, or for exports as a whole, reasonable estimates for k. The real difficulty lies in estimating e.

It is clear that e will depend on the nature of the commodity and the share that the particular country we consider has in the total market for this or similar commodities. The following rough estimates take into consideration only the first of these two factors. We may perhaps assign all commodities to three categories:

1. Commodities with a low degree of individualization.
2. Commodities with a medium degree of individualization.
3. Commodities with a high degree of individualization.

To this first group we might assign an elasticity (e) of, say, 4, to the second of 2, and to the third of unity. This is not to deny that there are commodities with elasticities higher than 4 or lower than 1; but on the average for the group the figures indicated appear reasonable. [This feeling is based on measurements on the elasticity of demand for wheat of various countries of origin in the United Kingdom, where figures in the order of 6 were found for small fluctuations in relative prices, and on studies on the elasticity of demand for various Dutch export products which yielded figures between .5 and 10, centered around 2.]

The factor k might be put at .8 for producer goods and .67 for consumer goods. 1/ We would then find the following derived elasticities, with the arc elasticity g' based on an assumed reduction in export prices by 25 per cent:

	e	f	g	g'
A. Producer goods				
Category 1	4	3.20	2.20	1.40
2	2	1.60	0.60	0.20
3	1	.80	-0.20	-0.40
B. Consumer goods				
Category 1	4	2.67	1.67	1.00
2	2	1.33	0.33	0
3	1	0.67	-0.33	-0.50

1/ Based on assumed spread of 200 per cent between p and p_D for consumer goods, of which half proportional to changes in p; and on a spread of 50 per cent for producer goods, of which nearly half proportional to changes in p.

It appears from this table that a value of e of about 2 or more (and not 1 as is usually assumed) is required for g' to be positive for a depreciation in the order of magnitude of 25 per cent.

Now if it is true, as seems plausible, that the bulk of Western Europe's exports to the Western Hemisphere consists of goods in categories 2 and 3, it would follow that the effect of depreciation by one country on the net value (in dollars) of its exports to the Western Hemisphere can at best be slightly positive and may even be slightly negative.

An attempt was made actually to assign each commodity to one of six categories indicated (A1, A2, A3, B1, B2, B3) for the exports from France to the United States, Canada, Argentina and Brazil in 1948. The following are some examples of the classification chosen.

A1. Cotton and wool yarns, inorganic chemicals, raw metals.
A2. Machinery, organic chemicals, textile tissues.
A3. Precision instruments, munitions.
B1. No item seemed to fit this classification.
B2. Wines, cheese, motor cars, watches, clothing, laces.
B3. Liqueurs, works of art.

Applying to the total of each of these groups the values indicated for g' in the above table, we found the net average elasticity $\bar{g}'$ as follows:

	$\bar{g}'$
United States	−0.03
Canada	+0.02
Argentina	+0.38
Brazil	+0.35

The higher figures for Argentina and Brazil are due primarily to large exports of yarns to these countries, which have been classified in category A1.[1] If these figures were accurate they would indicate that depreciation would not significantly affect the dollar value of exports to the United States and Canada, and would increase by about one-third of the percentage of depreciation the value of exports to Argentina and Brazil. Roughly speaking total French exports to the Western Hemisphere were $160 million in 1948, of which half went to the United States and Canada. Assuming that the elasticities for

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[1] If any considerable part of trade should be classified as A1 or B1, the calculation rapidly becomes more uncertain. There is no basis for assigning an elasticity of 4 to these categories rather than, say, 6. If e were 6, g' would become 2.6 for A1 and 2.0 for B1.

Argentina and Brazil apply also to the other countries of Latin America (which together accounted for one-fourth of French exports to the Western Hemisphere), it might be inferred that a 25 per cent reduction in French export prices would lead to an increase in Western Hemisphere exports by

$$\frac{1}{2} \times \frac{1}{3} \times \frac{25}{100} \times 160 \text{ million} = 7 \text{ million dollars}$$

A rough inspection of the statistics of other Western European countries would lead to the belief that the elasticities are somewhat similar for all of them (except, perhaps, for Norway), since exports of machinery, semi-manufactured textiles, specialized chemicals, rather individualized consumer goods are important constituents of their exports to the Western Hemisphere. On the whole their exports fall in the A2 and B2 categories; for all, therefore, $\bar{g}'$ is likely to be small.

3. Qualifications

The following are some qualifications which are given as such, rather than as integral elements of the analysis, partly because they are believed to be of minor quantitative significance and partly because their separate treatment facilitates the understanding of the first part.

(1) The method does not make adequate allowance for commodities of which large quantities could be sold at somewhat lower prices but which are at present not imported at all or imported in very minor quantities only. Thus, for instance, Danish butter could be sold in almost unlimited quantities in the United States if its price were brought below that of American butter. Somewhat similarly there is probably a very large elasticity for French wines for a price change sufficient to bring its retail price down to, say, $1 a bottle. In general, elasticities may be low for price changes which are not sufficient to make the product fully competitive with those of other suppliers (especially domestic suppliers in the United States) but much greater after the price has passed a certain critical value. Also the elasticity may be higher in the longer run - if the price differential is maintained - than in the short run. There does not seem to be any systematic way to make allowance for effects of this sort, except on the basis of specific knowledge of individual commodities. The fact, though, that most Western European countries have already made considerable headway in regaining their prewar markets in the Western Hemisphere (see Table) gives some justification to the belief that perhaps effects of that nature are not likely to be of very great importance generally. Clearly this is the weakest point in our knowledge.

(2) It has been assumed that the supply in exporting countries is infinitely elastic for exports to the Western Hemisphere. This involves a slight element of overestimation of the effects of depreciation. There are some commodities, such as Belgian steel exports, for which demand is very elastic but supply very inelastic. Here the limiting factor is supply and the relevant elasticity for our purposes is at best unity.

(3) It has been assumed that export prices will fall by the full percentage of depreciation. This involves some overestimation of the absolute magnitude of g'. To take account at least of the prices of imported raw materials, it would be necessary to reduce all values found for g' by some 25 per cent. This would make the positive values of g' smaller but the negative values larger (i.e. nearer to zero). The net effect would not be considerable.

(4) No account has been taken of price adjustments by competitors. We should, however, take account of the facts that:

> (a) at constant exchange rates competing suppliers are likely to reduce their prices; and may push for increased tariffs or other impediments to increased imports;

> (b) that important competing suppliers may devalue at the same time. This is particularly important in the Latin American market where a good deal of the competition is between different European suppliers.

The effect of these competing price adjustments is much more serious than the factor mentioned under (3). The effect of the latter was to reduce prices by less than the degree of depreciation; the effect under this number is to reduce the price spread by less than the degree of price reduction. It is therefore equivalent in effect to a reduction in the elasticity e and may therefore have a very considerable negative effect on g'. Thus if the average price of competitive suppliers were reduced by half of the price reduction of the country under consideration, this would be tantamount to a value of e under A2 and B2 of 1 instead of 2; i.e., the net effect for these commodities would be as if they belonged to categories A3 and B3, respectively.

(5) Additional quantities exported will require additional imports of raw materials. This is an important correction if one studies the total balance of payments of a country. Since, however, the bulk of the imports required will not come from the Western Hemisphere the effect on the dollar balance of payments is not great.

4. Summary

We may sum up as follows:

(1) The net effect of depreciation on the balance of payments of most Western European countries on account of exports to the Western Hemisphere is likely to be as follows:

(a) negligible to slightly positive if the country depreciates alone;

(b) probably negative if all Western European countries depreciate jointly;

(c) significantly positive if depreciation would bring important commodities for which a large potential market exists within a competing price range. Past evidence of the modest effect of depreciation on exports would not seem to warrant the assumption that there are always many commodities in this category.

Table — Percent of Total Imports from Specified Countries
1938 and 1948

Importing Country and Year	Belgium	Denmark	France	Italy	Netherlands	Norway	U. K.
United States							
1938	2.1	.2	2.8	2.1	1.6	.8	6.0
1948	1.3	.1	1.0	1.3	.6	.5	4.0
Canada							
1938	0.9	–	0.9	0.4	0.6	0.1	17.6
1948	.5	.4	.5	.3	.2	.04	11.4
Mexico							
1938	1.8	–	3.6	1.8	.9	–	3.6
1948 (10 mos)	.5	n.a.	.5	1.6	n.a.	n.a.	3.1
Argentina							
1938	7.0	.2	4.7	6.1	1.8	.7	20.1
1948 (6 mos)	9.4	n.a.	2.3	5.6	.6	.6	10.0
Brazil							
1938	4.1	.7	3.0	1.7	1.0	.3	10.5
1948 (7 mos)	2.5	.1	2.5	2.2	.4	.6	9.9
Chile							
1938	1.0	4.9	1.9	2.9	1.0	–	9.7
1948	1.2	.1	.9	1.7	.3	.5	6.6
Uruguay							
1938	2.1	2.1	2.1	4.2	2.1	–	18.7
1948	4.4	.1	2.6	3.1	1.1	.3	12.6

Sources of basic data: 1938,   League of Nations, Network of World Trade, 1942.

1948, Current trade reports of various countries.