Use of a Theoretical Model to Study Some Problems of Foreign Borrowing

J. Herbert Purth

The development of backward countries is one of the main objects of American foreign lending. In this connection, the first question concerns the amount of capital to be newly invested, and the length of time over which the investment program is to be distributed. Once the annual sum of required new investment is determined, certain other problems arise: how much of the necessary capital can be expected to come from domestic sources; how is the remainder, to be met by foreign sources, to be repaid; and how will the investment program affect the country’s national income.

In the case of one particular country, for which a long-range investment study has been undertaken, an attempt has been made to answer those questions by means of a model, based upon the known characteristics of the economy at the time of the program’s start and upon estimates of probable changes within the next ten years. The problem of economic fluctuations was disregarded, constant prices were assumed, and conditions further simplified by postulating linear progressions in all cases in which such a postulate was consistent with other data. It was also assumed that all new capital would be used for productive purposes, i.e., for the ultimate production of consumers’ goods and services. The model therefore was not meant to show the year-by-year changes likely to occur, but merely to indicate the general trend which might be expected in the absence of disturbing factors.

The country must remain unnamed since the lending policy of the United States in regard to this country is still under discussion.
The evaluation of the expected increase in national income was tackled first because domestic savings as well as the development of the balance of payments depend upon changes in national income. It was tempting to use multiplier analysis in this connection, but this attempt was given up because of the uncertainty of "leakages" and the impossibility of deciding over what period the investment multiplier might be expected to exercise its full force. The model was based, therefore, upon available empirical studies showing the relationship between changes in national income and national capital. Two such studies were used, one by Colin Clark and the second by E. H. Stern.2/

The Clark formula shows the relation between income per occupied person (y) and capital per occupied person (x) as follows: \( \log y = 2.884 - 1.108 \log x + 0.323 (\log x)^2 \). Differentiating that formula, we find:

\[
\begin{align*}
1/y \cdot \frac{dy}{dx} &= \frac{1}{x} \cdot (0.323 \cdot 2 \log x) / x \\
\frac{dy}{dx} &= \frac{y}{x} \cdot (0.646 \log x - 1.108) \\
y &= \frac{y}{x} (0.646 \log x - 1.108) dx
\end{align*}
\]

Solving this equation on the basis of \( y = 300 \) (the figure assumed by Clark in the case of the country in question), \( \frac{dy}{dx} = 0.249 \) dx. On the basis of this formula, it might thus be expected that the income per occupied worker would increase by about 25 dollars for each 100 dollars per worker invested.3/

Clark's formula has the great advantage that it expresses the increment in terms of occupied persons, and therefore permits one to take into consideration the influence of an increase in the labor force. Clark points out, however, that his formula is based upon comparison of countries with very different economic conditions, and that the data do not even refer to the same period for all countries. He cautions rightly against applying his formula for deriving the ratio of changes in national income as a result of changes in the national capital for any single country. For these reasons, the Stern formulas appear to be preferable since they are derived from changes in national income and capital for individual countries. Their shortcomings lie in the fact that Stern has made no effort to separate an increase in income due to growth in capital per worker from an increase due to an increase in the labor force, and that none of the countries he considers is exactly comparable to the country for which the problem in question has arisen.

Nevertheless, his formulas can be adjusted so as to exclude the probable effect of an increase in the labor force, and when this is done, a reasonably close resemblance to the Clark formula appears. Stern's formula for the United Kingdom for the period 1924-32 relates

2/ Economics, August 1945, p. 160.
3/ The monetary unit chosen by Clark is the dollar of purchasing power for the average period 1925-34.
net national output \((y)\) with national capital employed \((x)\) \({1\over 2}\) by the equation:

\[
x = 3.27y + 4,660\]

\[
\therefore y = (x - 4,660)/3.27 = 0.306x - 1,425
dy = 0.306dx
\]

In order to eliminate the influence of the increase in the labor force during that period, it is assumed that the increase in the labor force was proportionate to that in the total population, and that without any increase in capital the national income would have changed in about the same proportion as the labor force. The increase in population during the 14 years in question was 5.7 per cent, and so the increase in national income to be attributed to the increase in capital is estimated at \(dy = 0.306dx/105.7 = 0.29dx\).

For the Union of South Africa in the period 1922-38, the Stern formula gives the following results:

\[
x = 1.89y - 349
\]

\[
y = (x + 349)/1.89 = 0.53x + 185

dy = 0.53dx
\]

The increase in population during approximately the same period (1921-37) was 41 per cent, and so the formula has to be adjusted as follows: \(dy = 0.53dx/141 = 0.376dx\).

Since the country in question is far less industrialized than the United Kingdom, but far more developed than the Union of South Africa, it is fair to assume that the relation for that country would lie somewhere between these two extremes. In order to be conservative, and in view of the fact that the Clark formula gives a relation somewhat lower than the Stern formulas, the ratio for the country in question has been estimated at \(dy = 0.30dx\). This means that for every 100 dollars per worker newly invested, national income per worker is expected to increase by about 30 dollars.

This formula in turn has to be readjusted to permit the estimate of the increase in national income due to the increase in the labor force expected to occur within the next ten years. This increase has been estimated at 13 per cent for the country in question. National income at the beginning of the period was about 8.33 n (the symbol n denoting the amount to be invested in each year). In the tenth year of the program, national income is expected to be increased by 9 \(\times 0.30\) n due to the increase in capital on the basis of the formula developed in the preceding paragraph, so that it would amount to about 11.03 n if the increase in the labor force were disregarded. Including that increase, national income would be 11.03 n \(\times 1.13\) or about 12.47 n. The total increase of about 4.16 n would amount to almost exactly 50 per cent of the national income at the beginning of the period.

1/ In the original, the symbols \(y\) and \(x\) are used in reverse order. Figures are in millions of pounds sterling.

2/ It is assumed that the increase in capital raises (real) income in the year following the inflow.
Domestic savings were about 4 per cent of national income at the beginning of the period, and have been estimated to increase by about 16 per cent of the increase in income. During the first year, they are therefore assumed to be about 0.23 n, and during the tenth year about 0.99 n. This means that during this last year practically the entire amount of new investment would be covered from domestic sources. National income is expected to increase during the intervening period almost linearly, and in this case total new investment during the period would be covered to about 65 per cent from domestic sources, and to about 35 per cent by capital inflow from abroad. Since total new investment during the period would be 10 n, domestic savings are thus expected to reach about 6.5 n. For the particular country with which the study deals, the inflow of foreign capital is expected to include reparation deliveries as well as credits. The country's reparation claims (net of the amount needed for reconstruction purposes) are estimated at about 0.5 n. Foreign credits are therefore calculated at 0.35 \times 10 n minus 0.5 n, or about 3 n.

It is estimated that foreign credits will be repaid in such a manner that the yearly service charges, including both interest and capital instalments, amount to about 5 per cent of the credit outstanding.\(^1\) During the first year, the charges on foreign credits would thus be 5 per cent of 0.67 n (n minus 0.33 of domestic funds), or about 0.03 n, and these would gradually increase until they reached 5 per cent of 3 n, or about 0.15 n during the tenth year. At the end of the period, the charges on foreign credits would thus represent only about 3.6 per cent of the increase in national income.

The transfer of these charges into the creditor country will depend mainly upon the ability of the debtor country to maintain an adequate export surplus.\(^2\) The exports of the country in question regularly amount to about 11 per cent of its national income, and are expected to increase in the same ratio as the national income. During the tenth year of the period, exports are therefore estimated to be about 0.11 \times 12.47 n, or about 1.47 n. The service charges on the new debt of 0.15 n annually would thus amount to about 1.1 per cent of total exports. Since in pre-war years imports were about 20 per cent lower than exports, the charges on the new credits could be met without difficulty as long as imports did not increase more rapidly than national income or exports.

The division of the increased national income among the various classes of the domestic population cannot be estimated without additional assumptions. If charges on domestic capital are computed at the same level as those upon foreign credits, they would amount to about 0.3 n at the end of the period. This would mean that the increase in national income of about 4.14 n minus 0.13 n (charges on foreign debt) and minus 0.3 n (charges on domestic capital), or a remainder of about 3.68 n, would be available as additional income to labor and management. By making further assumptions as to the country's social policy, the share of labor can be estimated and the rise in labor income as compared to the pre-war level computed.

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\(^1\) This represents a maturity of 31 years at 3 per cent interest.

\(^2\) The terms exports and imports cover all current receipts and expenditures in the country's balance of international payments, excluding debt charges.
Currency and Foreign Exchange Conditions in Post-war Poland

Hans J. Dernburg

A uniform zloty currency of the Polish National Bank (Narodowy Bank Polski) is now circulating in the Polish state, having been introduced into the following three regions:

(1) The former Government General, where during the occupation period the zloty currency of the Bank Polski, Poland's pre-war central bank, had been exchanged for the zloty currency of the German-sponsored Bank Hiwisjny in Cracow at the rate of one to one. For the end of 1944, the circulation of the "Cracow zloty" has been estimated at 12 to 15 billion zlotys.

(2) The territories which the Germans had annexed from Poland during the war and where they had exchanged the zloty currency of the Bank Polski for reichsmark currency at the rate of one mark for two zlotys. For the end of 1944, the circulation of reichsmark currency in this region may be estimated at the equivalent of 9 to 11 billion Cracow zlotys.1

(3) The formerly German territories east of the Oder-Neisse rivers now under Polish administration where reichsmark currency was the traditional medium of exchange. Monetary circulation in this area may have reached at the end of 1944 the equivalent of an estimated 8 to 10 billion Cracow zlotys.2

Total monetary circulation in the three regions making up the present Polish monetary area may thus have amounted to 29 to 36 billion zlotys at the end of 1944; the lower figure is probably closer to reality than the higher figure. During the liberation period, the Russian armies issued occupation ruble currency at the rate of one ruble = one zloty, but the amount issued does not seem to have been significant.

Beginning in January 1945 with the exchange of the currencies circulating in the area of the former Government General, all the currencies mentioned (zlotys of the Bank Hiwisjny, reichsmarks, and occupation rubles) were exchanged for the zloty notes of the new Polish National Bank which now constitute the only medium of exchange and legal tender of the new Poland. While the ruble currency was exchanged in full at the rate of one to one, zlotys of the Bank Hiwisjny in Cracow and reichsmarks were withdrawn under conditions which reduced currency circulation very drastically. The upper limit for the exchange of zlotys in the Government General was 500 zlotys per person; somewhat higher amounts were permitted for business undertakings (except in the western part of the Government General). The exchange took place at the ratio one to one. Zloty notes in excess of the amount permissible for exchange were deposited compulsorily with the authorities. The

1/ The lower figures for the areas in which reichsmark currency circulated take into account the flight of money coincident with the departure of Germans during the later stages of the war and the early occupation period.
upper limit for the exchange of reichsmarks in the territories formerly annexed by Germany was fixed at 500 reichsmarks, and the parity between the zloty and the mark was fixed at two reichsmarks to one zloty. All physical persons 18 or more years old were entitled to that exchange, with the exception of German citizens and citizens of German-allied nations. No special provisions were made for business enterprises. As in the case of the exchange of zloty notes, the German marks in excess of the amount admissible for exchange were placed in blocked accounts. After the Poles assumed administration of the territories east of the Oder-Neisse river, reichsmark currency circulating therein was exchanged for the new zloty currency reportedly under the same conditions. If former German citizens were excluded from the exchange in these territories also, the exchange operation must have amounted to a virtual repudiation of all existing currency.

In view of the extremely high prices existing in Poland, the exchange operation as a whole has deprived the people—possibly permanently—of practically all their currency reserves. In the former Government General, the cost of a pound of butter in January 1945 was 250 zlotys, so that in this region a person could have salvaged from the exchange not more than the equivalent of two pounds of butter. Where reichsmark currency was exchanged, the holder would have received no more than the equivalent of a single pound of butter.

Into the vacuum created by the exchange operation, a considerable volume of new currency has been pumped. Statements of the new Polish central bank have not yet been made available, but a Polish estimate places the circulation of zloty notes for November 1945 at 12 billion zlotys. Considering current high prices, however, the volume of notes reported does not appear high as compared with pre-war standards. The cost-of-living index has recently reached about 8,000 (on a base of 1938 = 100); at this level of prices, 12 billion zlotys would be worth no more than 1.75 million zlotys at 1938 prices. This figure may be compared with a circulation of 1.9 billion zlotys in 1938.

The cost-of-living index (1938 = 100) rose under German occupation to 7,000 in May 1944. After reaching a peak in the liberation period of 21,000 in January 1945, it dropped to 13,022 in March and 8,241 in August 1945 (latest available figure). The drop in prices has not been attributed to deflationary financial measures but mainly to improved transportation, which has permitted the movement of more ample supplies to markets. The cost-of-living index numbers reflect prices on the free market, which under the system prevailing in Poland is not a "black market." The Polish Government attempts to regulate only some 20 per cent of the national food supply. This portion is sold at the fixed low prices for rationed goods, while the remaining 80 per cent finds its way into the unregulated free market at very much higher prices. For example, a pound of butter on the free market cost 250 zlotys in January 1945 and 120 zlotys in August, compared with the rationed price of 35 zlotys. This dual price structure, which is also characteristic of other countries in the Russian orbit, undoubtedly affects the validity of the reported index numbers in evaluating the price level as a whole.
The degree of inflation indicated for Poland by various data has not been reflected in any formal shift in foreign exchange quotations for the złoty. Before the war, the ruble and the złoty were at par and both were valued roughly at 19 United States cents on the basis of the official rate of $1 = 5.30 rubles. These relationships continued as the basis for financial transactions in the liberation and early post-liberation period. The exchange of German currency for złoty currency at the rate of 2 reichsmarks = 1 złoty is in line with the rate of 2 reichsmarks = 1 ruble at which the Russians introduced Allied military mark currency in occupied Germany. All these rates were out of touch with reality. They overvalued the złoty against the reichsmark and probably also against the ruble, and the cross rate of 5 złotys to the dollar greatly overvalues the złoty against the dollar.

No exchange rates between the złoty and other currencies have yet been established to cover all transactions with foreign countries. However, internal rates have been set for special transactions with respect to the dollar, the pound sterling, and the Swedish krone. A rate of 100 złotys to the dollar has been established for remittances from abroad through individuals and of 110 złotys for remittances through charitable institutions. The rate of 100 złotys to the dollar is also the diplomatic rate. Warsaw black market rates for dollar notes are considerably higher and show a rising tendency. Dollar notes were traded at 250 to 300 złotys for the dollar in early October, 450 złotys in mid-December 1945, and 480 to 560 złotys in early January 1946. Rates in provincial centers are even higher.

It should be realized, however, that under the present conditions external exchange rates have little practical importance. Poland's foreign trade has become a state monopoly and most of her post-war foreign trade has been conducted on the basis of barter agreements. Such agreements have been concluded with six countries—the U.S.S.R., Sweden, Denmark, Norway, Hungary, and Romania. An external exchange rate for the złoty does not enter these agreements. The Russian-Polish agreement is transacted in terms of pre-war rubles or złotys. The agreements with Sweden, Denmark, and Norway are transacted in the three respective krona currencies, those with Hungary and Romania in United States dollars. In general, export and import trade with each agreement country will be of equal value. The agreements with Norway and Sweden, however, contemplate a balance in favor of Poland to be made available in krona currencies freely convertible into dollars. Although an external złoty exchange rate does not enter the agreements, an underlying internal rate becomes apparent, nevertheless, when the prices agreed upon with the foreign country are related to domestic prices. A fictitious illustration may explain the point. Let us assume that under the Polish-Romanian agreement Poland agrees to exchange 1 ton of coal valued for purposes of the agreement at 8 dollars against 4 bushels of wheat at 2 dollars per bushel, and let us further assume that the Polish domestic price for coal is 2,400 złotys per ton and that for wheat 1,000

1/ This cross rate is based on the rate of 2 reichsmarks = 1 złoty and the rate of 10 reichsmarks to the dollar at which Allied military marks were introduced by the Americans in Germany.
2/ Further agreements are expected for Austria, Czecho-Slovakia, Finland, Italy, and Switzerland.
zlotys per bushel. In this case, the underlying exchange rate in connection with Polish coal exports may be considered 300 zlotys per dollar, while that for Polish wheat imports may be considered 500 zlotys per dollar. This fictitious illustration suggests that under barter conditions different real exchange values may underlie the trade in different goods, and that different rates may prevail for imports and exports.

In this connection, the following statement of the Polish Finance Minister made in August 1945 may be recalled:

"For the time being ours will be only an internal and closed currency. We have no intention of circu-
lating it abroad, nor do we see any need for it at present. We do not intend to establish general foreign exchange rates of the zloty, but when necessary we shall fix--ad hoc or for a certain period of time--a special rate of exchange for individual transactions or groups of transactions, for example for the duration of an agreement with a foreign country.

"The rate of exchange will be determined in the first place by comparing the values of goods covered by the transaction on both sides calculated in the respective currencies. We can thus apply different rates of exchange for different transactions with the same country. This will not prove difficult, inasmuch as foreign trade has become a state monopoly and will be based principally on compensatory agreements."

The intention to establish differing rates of exchange has since been denied but the statement discloses the completely different exchange conditions which may prevail when a country's trade is based principally on barter arrangements.

Dual Currency in Hungary

The Hungarian Government, in an attempt to bring some order into the monetary chaos, has established a "tax pengő," the value of which will be computed daily on the basis of changes in prices in a way similar to the computation of the dollar exchange rate. This new currency will therefore be stable both in terms of domestic purchasing power and of dollars. No notes or coins denominated in that currency will be issued, however. It will be merely an accounting unit, the use of which will be compulsory for computing taxes, repaying savings deposits, and making out bills to be discounted by the National Bank. For all other transactions, either tax pengő or ordinary pengő may be used. Commercial banks now charge 10 to 15 per cent daily for loans in ordinary pengő, a rate that corresponds approximately to the daily expansion of the currency and its devaluation in terms of goods and foreign exchange.
The experiment repeats an action taken in Hungary in February 1924, when the appreciating crown was supplemented by a "savings crown." That measure did not have appreciable results, but it was applied for only four months and the shortness of the period precluded a final judgment on its merits. This time the introduction of the tax pongó may help to increase tax receipts, which in recent months have covered only 5 per cent of all government expenditures. It will not materially affect certain other basic causes of the Hungarian inflation, among which is the diversion of a very large share of the nation's industrial production from domestic markets by the Russian occupation authorities. Such diversion has been estimated to account for as much as 90 per cent of the output of certain industries. As in 1924, only international action is likely to restore the Hungarian monetary system. The "tax pongó" may, however, play a certain role as the precursor of a stabilized currency unit.

Japanese Deficit Financing

A. B. Hersey

Allied Headquarters in Tokyo last week refused the Japanese Government permission to borrow 14 billion yen from the Bank of Japan. According to newspaper reports, the requested sum represented the fiscal deficit during November and December. The precise terms of the directive are not available. The Japanese Government was told to balance its budget as soon as possible and in the meantime was apparently forbidden to borrow from other banks as well as from the Bank of Japan.

The immediate occasion for this directive was an application from the Japanese Government under an order of November 24 which forbade it to borrow or extend credit without permission of Allied Headquarters.

The sum of 14 billion yen involved in the recent application, supposedly as the deficit for a two-month period, was just one-sixth of the originally budgeted deficit for the fiscal year April 1945-March 1946, which had called for total expenditures of nearly 162 billion yen and revenues of not quite 15 billion yen. The request for 14 billion yen from the Bank of Japan appears at first glance unexpectedly large for two reasons.

In the first place, Japanese Government projections of the national income and of its allocation between the governmental deficit, private capital formation, and consumer expenditures had indicated a much smaller gap between taxes and governmental expenditures than was apparently called for by the fiscal budget, not only for the current fiscal year but also in the preceding year 1944-45. The fiscal budget may have included expenditures that would be made and financed outside Japan, or there may have been other undisclosed reasons for the discrepancy. In 1944-45, for example, the budgeted deficit was 58 billion yen while the national-income-and-savings program called for only 33½ billion yen of government expenditures to be net out of "savings" (including purchases

1/ Including "general account" expenditures of 27 billion yen and emergency military expenditures of 85 billion yen, less duplications of 10 billion yen.
of bonds by the banks). Because of the progress of inflation, the lower of these two figures was probably exceeded. The actual increase in the national government's long-term debt during fiscal 1944-45 is roughly estimated at 40 to 50 billion yen.1/

<table>
<thead>
<tr>
<th>Fiscal year ending March 31</th>
<th>Deficit spending National savings plan</th>
<th>Actual increase, long-term debt</th>
<th>Outstanding debt, end of fiscal year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1942-43</td>
<td>Budget 17.4</td>
<td>17.0</td>
<td>15.0</td>
</tr>
<tr>
<td>1943-44</td>
<td>26.6</td>
<td>21.0</td>
<td>22.1</td>
</tr>
<tr>
<td>1944-45</td>
<td>58.2</td>
<td>33.5</td>
<td>40-50%</td>
</tr>
<tr>
<td>1945-46</td>
<td>84.1</td>
<td>47.2</td>
<td>?</td>
</tr>
</tbody>
</table>

Following this line of reasoning, and allowing for an acceleration of the inflationary increase in costs during 1945, the national savings plan estimate of deficit spending in the current fiscal year, which was only 47 billion yen (as against the budget deficit of 84 billion yen), would undoubtedly have been surpassed had the war continued. However, if the growth of the government debt has actually averaged as much as 5 to 7 billion yen since last March, there must have been a considerable growth of various types of relief and emergency expenditures to fill the gap left by disappearing munitions expenditures. Black market prices have of course been mounting rapidly, but it is not known how greatly the costs of goods and services purchased by the Government have been affected. Occupation costs have averaged less than 200 million yen a month.

The second reason why the Japanese Government's request for 12 billion yen from the Bank of Japan might be considered unexpectedly high is that a large part of the growth of the debt, at least up to March 1945, was absorbed by the postal savings system. For example, in the fiscal year 1943-44, postal savings increased by 6 billion yen while the Government debt grew by 22 billion yen. In 1944-45, postal savings increased 11 billion yen. The absorption of Government bonds by corporations and other investors, other than the banks and postal savings system, appears also to have been at least as large as the amounts taken by postal savings. Some of the purchases of bonds by banks were also based on growing time deposits, partly representing payroll deductions and other "forced savings." If it is now necessary for the Government to borrow as much as 7 billion yen a month from the banks (or from the Bank of Japan alone), real cash savings of wage earners and business would appear to have dried up altogether.

1/ The increase in a 20-month period from March 31, 1944, to November 30, 1945, was about 92 billion yen. Balancing the rise in costs due to inflation against the decline in war production in 1945, it seems reasonable to assume that something like half the increase occurred in the 12 months through March 1945.
2/ According to the Japanese Minister of Finance in an interview on December 3, 1945.
If this is what has happened, it may be explained by the collapse of industrial production and the high prices now ruling in black markets. Perhaps the Government's savings campaign has broken down completely. The groups now enjoying excess cash income are likely to be limited to farmers and others selling on the black markets.

Early accounts of the first draft of the budget for 1946-47 are not very enlightening. General taxation is expected to raise 8.9 billion yen and other unidentified revenues an additional 7 billion yen. Expenditures in the ordinary budget are placed at 12.6 billion yen, but this includes "sums needed for the relief of Japanese repatriates, for the readjustment of local finances, for reparations and indemnities, ... for the coal subsidy, for wage increases, for the rail freight subsidy" and for "insurance and other welfare measures because of the suspension of the military pension system." Early plans called for indemnities of the order of magnitude of 50 to 100 billion yen to business corporations for loss of their properties abroad and for war damage, but Allied Headquarters has agreed only to the payment of 3.4 per cent interest on certain indemnities to munitions companies estimated at a sum of 46.4 billion yen.

The consolidation of accounts in one general fund has been ordered and an audit of Government finances will be undertaken. Meanwhile, Allied Headquarters has imposed a limit of 2 billion yen a month on spending by the Japanese Government.
Effect of Income Changes on American Imports

Randall Hinshaw

It is now well established that the volume of American imports is sensitive to changes in the level of American national income, and moves with income in a consistent pattern. It is not so clear that this is also true of the various import subdivisions or of individual commodities. While it can be assumed that there is no uniformity in the degree to which different types of imports respond to income changes, one would hope that the behavior of any particular import with respect to income were reasonably consistent so that, given the level of national income, one might obtain at least a rough notion of the amount of the item that would be imported.

The ensuing study is concerned with the relation between the level of real national income and the volume of various types of imports, as grouped by the Department of Commerce. The Department of Commerce divides imports into five categories: (1) crude materials, (2) crude foodstuffs, (3) manufactured foodstuffs, (4) semi-manufactures, and (5) finished manufactures. Imports of these groups for selected years are shown in Table 1.

### Table 1

**American Imports by Groups for Selected Years**

(Millions of Dollars at Actual Prices)

<table>
<thead>
<tr>
<th></th>
<th>1929</th>
<th>%</th>
<th>1932</th>
<th>%</th>
<th>1937</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude Materials</td>
<td>1,559</td>
<td>35.4</td>
<td>358</td>
<td>27.1</td>
<td>971</td>
<td>32.3</td>
</tr>
<tr>
<td>Crude Foodstuffs</td>
<td>539</td>
<td>12.2</td>
<td>233</td>
<td>17.6</td>
<td>413</td>
<td>13.7</td>
</tr>
<tr>
<td>Manufactured Foodstuffs</td>
<td>424</td>
<td>9.6</td>
<td>174</td>
<td>13.1</td>
<td>440</td>
<td>14.6</td>
</tr>
<tr>
<td>Semi-Manufactures</td>
<td>985</td>
<td>20.1</td>
<td>217</td>
<td>16.4</td>
<td>634</td>
<td>21.1</td>
</tr>
<tr>
<td>Finished Manufactures</td>
<td>994</td>
<td>22.6</td>
<td>341</td>
<td>25.7</td>
<td>591</td>
<td>18.2</td>
</tr>
<tr>
<td>Total Imports</td>
<td>4,399</td>
<td>100</td>
<td>1,523</td>
<td>100</td>
<td>3,010</td>
<td>100</td>
</tr>
</tbody>
</table>

It will be noted that while the proportions in which the various categories were imported were roughly the same in 1937 as in 1929, the pattern was substantially different in 1932. As will soon become clear, this shift in the proportions is largely explained by changes in the level of American real income.

Chart 1 shows the relation of American national income (at constant prices) to the total volume of American imports for the period 1920-37. Both variables are expressed as indexes on a 1937 base. It is clear from a cursory inspection of this chart that, over the period studied, a given percentage change in the level of real national income was accompanied by approximately the same percentage change in the volume of total imports. That is to say, the income elasticity of demand for imports was about unity. As calculated in the conventional manner, the income elasticity obtained from this data is actually 1.00.
Also of interest from a statistical point of view is the marginal propensity to import, which is the fraction of an increment of income spent on imports. For the period covered in Chart 1, this was found to be .041. The latter information may be translated into the statement that an increase of 1 dollar in the national income may be expected to result in an increased expenditure of about 4 cents on imports.

Since the Department of Commerce publishes volume indexes for each of the import subdivisions, it is possible to examine the relationship between real income and each of these variables. Charts 2 through 6, which are constructed in the same way as Chart 1, show the various relationships. Owing to special circumstances, the periods covered are not in all cases exactly the same. Thus the year 1919, while included in Charts 2 through 5, is not included in Charts 1 and 6, because the low imports of finished manufactures in that year largely reflected the effect of the war on European exports. Similarly, in Chart 3, the years 1935-37 are omitted because of the drought, which resulted in very high imports of foodstuffs. Finally, the years 1938 and 1939 were included in Charts 3 and 4 (Chart 3 also includes 1940), since the advent of war showed little tendency to affect imports of foodstuffs. In the case of the other items, the behavior after 1937 appears to have been substantially altered by the approach of hostilities.

It is clear at a glance that the response of these various import categories to income changes was by no means uniform. For example, it is apparent that imports of crude foodstuffs were relatively insensitive to (though definitely affected by) changes in national income, while imports of semi-manufactures were highly sensitive to income changes. That is to say, the income elasticity of demand for crude foodstuffs is low, while the income elasticity of demand for semi-manufactures is high. In the case of the other groups, the corresponding elasticities are more nearly in the neighborhood of unity, but even here there is considerable variation. The respective income elasticities and other information are shown in Table 2.

| TABLE 2 |

| RELATION BETWEEN INCOME AND IMPORTS, BY GROUPS |

<table>
<thead>
<tr>
<th>Period Covered</th>
<th>Income Elasticity</th>
<th>Marginal Propensity to Import</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude Materials</td>
<td>1919-37</td>
<td>.781</td>
</tr>
<tr>
<td>Crude Foodstuffs</td>
<td>1919-40/</td>
<td>.406</td>
</tr>
<tr>
<td>Manufactured Foodstuffs</td>
<td>1919-39</td>
<td>1.139</td>
</tr>
<tr>
<td>Semi-Manufactures</td>
<td>1919-37</td>
<td>1.486</td>
</tr>
<tr>
<td>Finished Manufactures</td>
<td>1920-37</td>
<td>1.109</td>
</tr>
<tr>
<td>Total Imports</td>
<td>1920-37</td>
<td>1.000</td>
</tr>
</tbody>
</table>

1/ Excluding 1935-37, because of drought.
It will be seen that for the manufactured and partially manufactured items (manufactured foodstuffs, semi-manufactures, and finished manufactures), the income elasticity of demand is above unity, while for the crude items (crude materials and crude foodstuffs) the income elasticity of demand is less than unity. That is to say, for the former items, a change in the level of real income results in a more than proportionate change in the volume of imports, while for the latter items, a change in income induces a less than proportionate change in imports.

These results are substantially in accord with what would have been expected on a priori grounds. It is generally assumed that the income elasticity of demand for crude foodstuffs is low, and this is amply supported in the present analysis. It is also widely believed that the income elasticity of demand for manufactures is above unity. This is also shown to be the case. What is perhaps more striking is the still higher elasticity figure for semi-manufactures. The reason for this may be that imports of semi-manufactures are probably more sensitive to income and price expectations than are imports of finished manufactures.

As previously noted, out of every additional dollar of national income, about 4 cents is spent on imports. Of this 4 cents, approximately 1 cent (see Table 2, column 3) is spent on crude materials, a little over a cent on semi-manufactures, a little less than 2 cents on finished manufactures, three-fifths of a cent on manufactured foodstuffs, and one-fifth of a cent on crude foodstuffs.

Because of differences in the income elasticity of demand for the various import groups, the proportions in which the groups are imported tend to vary from prosperity to depression. Thus crude foodstuffs, for which the income elasticity is low, formed a considerably higher percentage of total imports in 1932 than in 1929 or in 1937, while semi-manufactures, for which the income elasticity is high, formed a substantially lower percentage of total imports in 1932 than in the other two years.

It is tempting to use the equation obtained in computing the foregoing regressions to estimate the post-reconversion level of imports at full employment. Making estimates on this basis involves an almost reckless degree of extrapolation, but the results are of considerable interest if they are not taken too seriously. Everett Hagen and Nora Kirkpatrick have estimated that at full employment, and at 1944 prices, the United States would produce, after reconversion, a gross national product of 200 billion dollars. This would correspond to a net national product, at 1944 prices, of about 165 billion dollars. In terms of the 1937 level of prices, which is here used as a base, the Hagen-Kirkpatrick figure would correspond to a national income of 135 billion dollars (a real income 89 per cent greater than in 1937).

If past relationships between income and imports are applied to the much higher level of income here contemplated, the results are as shown in Table 3.
TABLE 3

ESTIMATED AMERICAN IMPORTS AT FULL EMPLOYMENT

(Millions of Dollars)

<table>
<thead>
<tr>
<th></th>
<th>1937 Import Prices</th>
<th>1944 Import Prices</th>
<th>Percentage Composition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude Materials</td>
<td>1,700</td>
<td>2,391</td>
<td>31.3</td>
</tr>
<tr>
<td>Crude Foodstuffs</td>
<td>466</td>
<td>655</td>
<td>8.6</td>
</tr>
<tr>
<td>Manufactured Foodstuffs</td>
<td>730</td>
<td>1,022</td>
<td>13.4</td>
</tr>
<tr>
<td>Semi-Manufactures</td>
<td>1,461</td>
<td>2,046</td>
<td>26.8</td>
</tr>
<tr>
<td>Finished Manufactures</td>
<td>1,084</td>
<td>1,517</td>
<td>19.9</td>
</tr>
<tr>
<td>Total Imports</td>
<td>5,322</td>
<td>7,730</td>
<td>100</td>
</tr>
</tbody>
</table>

5Total imports were estimated, not by adding the subdivisions, but by using a separate regression equation. Since the periods covered in the various estimating equations are not exactly the same, estimated total imports are not exactly equal to the sum of the estimated import groups.

The figure of 7.7 billion dollars for American imports at full employment is somewhat higher than other estimates that have been made in the recent past. In the Department of Commerce publication, Foreign Trade after the War (October 1943), a figure of 6.3 billion was suggested for the year 1948, and this figure was repeated in an article by one of the co-authors in the Survey of Current Business for November 1944.1 In the latter article, additional imports of 1 billion dollars were estimated to result in the event of "substantial" tariff reduction. A figure of 5 billion dollars for American imports in 1950 is offered in the National Planning Association report, America's New Opportunities in World Trade (November 1944), and an additional billion dollars in imports is estimated if certain recommended policies, including tariff reduction, are instituted. A year ago, I estimated post-reconversion American imports at 7 billion dollars.2 Neither the latter figure, nor the figure in Table 3, assume any change in American tariff policies.

It will be noted that, at full employment, estimated imports of crude foodstuffs comprise a much smaller proportion of total imports than at pre-war levels of income (particularly depression levels). This is in accord with the widely held theory that as real income grows, a smaller proportion of the total income is spent on food. From this, it is sometimes concluded that, as the real income of the world increases, the terms of trade of agricultural countries will tend gradually to deteriorate in relation to the industrial nations.

2/ "The Level of American Imports after the War," December 1944.
CHART 2

ANNUAL INDEX FIGURES, 1937 = 100

VOLUME OF CRUDE MATERIAL IMPORTS

U. S. REAL INCOME