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INTERNATIONAL DIFFERENCES IN CAPITAL FORMATION AND FINANCING

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IN THIS PAPER we compare trends in capital formation and financing in a number of countries whose economies are organized as business systems. The data are scanty, particularly for periods long enough to provide historical perspective in viewing problems of economic growth. Diversity of definitions affects the comparability even of the current estimates, and the figures must be examined critically before they can be used. Under these circumstances a portion of the ensuing discussion is devoted to questions of definition, to provide unequivocal guides to the figures; and, on the principle that some rough order of magnitudes is better than complete ignorance, the qualifications detailed below are disregarded in the attempt to draw some inferences from the data.

The paper falls into three major sections. In the first we deal with the proportion of domestic capital formation to national product. We emphasize domestic capital formation first because, as historical experience suggests, domestic investment precedes foreign. We discuss the proportion to national product, an over-all measure of economic activity, to avoid complicating the comparisons by differences in absolute units.

The second section is devoted to consideration of foreign investment, i.e. the foreign-based component of *total* capital formation. From these data we can determine the shares of domestic capital formation contributed by foreign and domestic sources; or, conversely, the share of total domestic savings flowing, on net balance, abroad. By combining the data on foreign investments with those on domestic capital formation discussed in Section 1, we can derive the proportion of total capital formation to total national product.

In the third section we deal with the various sources of capital formation financing. Unlike the data on international capital movements and domestic capital formation, of which a stock, if varied and patchy, has accumulated because of long-standing interest, the data on various channels of domestic financing of capital formation are exceedingly meager. Yet the topic must be considered

explicitly and available data or hints utilized, so that at least the relevant questions which may serve to guide future inquiry can be adequately formulated.

In order not to interrupt the discussion we have put all the tabular material into Appendix A. The data-minded student will probably find this appendix the most valuable and important part of the paper, and the text partly a guide to the tables and partly a tentative summary of the conclusions they suggest.

1. *Proportion of Domestic Capital Formation to National Product*

QUESTIONS OF SCOPE

Domestic capital formation as measured here comprises additions to construction (including residential), to producers' durable machinery and equipment, and to business and government inventories. Some of the available estimates exclude some of the items: e.g. most of them exclude changes in government inventories, and some of the long-term estimates also omit changes in business inventories. In some estimates the definition of producers' equipment is not explicit, and the question arises whether, for example, military tools in the hands of government and small hand tools, etc., are included. But, by and large, it is this total that, with varying degrees of grossness and netness in the additions, is approximated in the estimates of capital formation.

No *standard* definition of capital formation exists at present; and I doubt whether one is desirable now. The definition given here—which includes government capital represented by military weapons and construction, and excludes consumer durable goods other than housing—can easily be defended. On the other hand, cogent arguments can be found for the definition that excludes the former and includes the latter—which Raymond W. Goldsmith used in his recent study of saving,[1] a concept identical on a nationwide basis with capital formation.

However defined, the customary measures of capital formation tend to underestimate the true volume. They exclude most investment of resources in clearing land and in other improvements made by farmers' own labor—an important component in earlier periods—and current outlay on research and market promotion—an important component in later periods.

[1] Raymond W. Goldsmith, *A Study of Saving in the United States*, Princeton University Press, 1955.

Even more important than the differences among current definitions and the omissions just noted is the much wider range possible when the relevance of capital formation to different analytical purposes and problems is considered. If capital means tools directly employed in the economic process of production under business and even public auspices, should residential construction—quantitatively an important component of capital formation as defined here—be included? In what sense does housing help to augment the material product, except in the rather tenuous one of yielding imputed (or monetary) net rent? For a society bent on forcing the pace of its economic growth, with particular emphasis on industrialization, residential construction hardly seems to be bona fide capital, comparable with railroad equipment, blast furnaces, or even inventories. By the same rule, some additions to public capital, e.g. those designed for social services to individuals, may also seem to be more in the nature of consumption than capital formation. It is at least conceivable that under conditions of forced economic growth and industrialization, capital—and hence capital formation—may be viewed as limited to plant, equipment, and inventories that are directly serviceable as tools.

However, for some purposes neither this narrow definition of capital and of its formation nor the one used in the estimates here but a much wider one may be more pertinent. For example, if a long-term rise in national product per capita or per worker is taken to describe economic growth, it may be desirable to define capital as means, and capital formation as all uses of current product, that contribute to such rises. In other words, domestic capital formation would include not only additions to construction, equipment, and inventories within the country, but also all other expenditures except those necessary to sustain output at existing levels. It would include outlays on many items now comprised under consumption, e.g. outlays on education, recreation, and material luxuries that contribute to the greater health and productivity of individuals, and all expenditures by society that serve to raise the morale of the employed population.

This exposition of the wide scope possible for capital formation leads to two observations. First, changes in scope will yield different levels and trends in the estimates. Both the contrasting levels of the proportion of capital formation to national product in different countries and their trends based on a wide definition will be different from those based on a substantially narrower one. This will also be

true of the structure of financing: the financing of capital formation more narrowly defined is distributed among various sources in an entirely different way from that of capital formation of much wider scope.

Second, the choice of a definition must obviously be guided by the major use to which the resulting measures are to be put. One can escape this choice only by preparing estimates corresponding to the widest possible definition, and by providing details on components so that narrower totals can be constructed. In this paper we do not and cannot use the widest definition, and can justify our choice merely on the grounds of practical expediency.

Our interest here is in the comparative economic growth of nations. In pursuit of that interest it would have been best to use the wider definition suggested above. The measures used here and in many other statistical studies, which correspond to the narrower definition, present an incomplete, and therefore somewhat misleading, picture of differences between developed and underdeveloped economies or between the early and later phases in the growth of developed economies. Not only capital formation, in its narrower sense, but also consumer expenditures, whose contribution to the increased productivity of the population varies as the consumption structure varies, are fundamental to the understanding of economic growth and its phases. Capital is what capital does: it raises the capacity for economic production. The minor share that capital formation as now measured constitutes of national product, particularly on a net basis, in both developed and underdeveloped countries is far from a true measure. It is hardly informative to say that net capital formation is, on the average, 10 to 15 per cent of national product in the leading industrial nations and 5 per cent or less in the underdeveloped ones. It would be more telling if we could say that the productivity-raising outlays in a developed country are about half of its national product (as they well may be) but only a few per cent in an underdeveloped country. Even more important, with the broader definition of capital we would have to examine carefully all newly produced resources and select, classify, and measure those that contribute in any way to greater productivity. We thus would get a better view of the conditions under which capital, in the narrower sense of the term, is most effectively utilized.

Unfortunately, the available data do not permit the use of the wide definition of capital formation. A narrower definition had to be employed because the whole stock of available estimates barely

suffices to measure it even for enough countries and periods to permit some broad inferences—at least within the limits of time and effort that can be devoted to this paper. Thus only a part of what is wanted can be measured.

The present definition corresponds to the accepted concept of national product. Durable consumer goods other than construction are excluded because to treat such goods as a "business," and include their value under capital goods and the imputed income from them under national product, did not seem warranted. Military equipment is included because it is analogous to a variety of protective capital goods included under business capital formation: there seems to be no good reason for excluding munitions while including fences (and, for that matter, business structures which provide protection from the weather).[2]

GROSS AND NET

According to the definition used here, domestic capital formation comprises additions to the stock of goods within the country in the hands of business and government, and housing in the hands of consumers. These additions can be measured gross, i.e. as the total newly turned out, or net of current consumption. Estimates for both gross and net capital formation are used below: the former are gross of current consumption of *durable* capital (construction and equipment), the latter are net of it. Changes in inventories are taken on a net basis in *both*.

We discuss gross capital formation, in addition to net, for several reasons. First, consumption of durable capital over a year or even over a somewhat longer period is difficult to estimate. This may explain the erratic behavior of differences in the estimates of consumption among various countries. Second, the consumption estimates for the business sector are based upon depreciation allowances, and to that extent reflect a source of capital formation financing that may or may not be used, depending upon conditions. Third, individual home-owners tend to disregard the allowance for depreciation, and thus view savings as gross of that item. To the extent that such practices convert the consumption estimate into a measure of means of financing gross capital formation—means that are indissolubly

[2] This is based upon a heroically simple assumption. A more realistic alternative would have involved trying to determine how much military investment is "defensive" and how much "aggressive." Inclusion of the latter would require inclusion under national product of the yield of aggression. The difficulties of such an approach need not be stressed.

merged with "net" savings—a study of gross capital formation and its financing may be more fruitful than one of net. Finally, "replacement" of a capital good is rarely merely substituting for one tool another of the same quality: after all the price adjustments possible, $100 in 1929 prices spent in 1939 would have meant better equipment or a more suitable structure than $100 in 1929 prices spent in 1909. For all these reasons the concept of *gross* capital formation is at least as important as that of *net*, and may even be more useful for some purposes.

In discussing current capital consumption we used the term "*durable* capital assets" without defining it. Since its scope affects the magnitude of capital consumption, it should be noted that repairs and maintenance are included in some of the estimates used here and excluded from others. For the countries where these outlays are included under gross capital formation, current consumption presumably is larger relatively than for others (e.g. the United States and countries following the practice of the Organisation for European Economic Co-operation) where an attempt is made to exclude them on the grounds that they are usually treated as current expenses and are not subject to the postponable depreciation allowance.

But this item is minor compared with two questions concerning the turnover of durable capital assets: Should the gross flow of such assets include not only newly produced assets, but also those that were placed on the market and changed hands during the year? Should the study of financing include the financing not only of the new gross total of capital goods, but also of the turnover of existing ones?

The reason for these questions lies in the relation between mobility of capital and its contribution to productivity, and thus to economic growth. The ease with which existing capital goods can change hands in a better adjustment to needs is as important in many ways as the addition of newly produced capital. Such shifts of capital goods may or may not require external financing. But since we distinguish durable assets because we recognize that their current consumption is not an unequivocal act of disappearance and gives rise to sources of financing, we should be consistent and recognize that such assets—because they are durable and continue to exist as capital goods—can change hands and hence better serve their purposes. The existence or absence of financial and other facilities for such shifts is, therefore, an important matter. For this reason we

repeat: Should we not deal with the gross supply on the market of at least the durable capital goods—instead of new gross capital formation alone—and search for the sources and mechanisms of the correspondingly gross savings that are employed to finance such a flow? The statistical difficulties involved here are obvious, and there is no point in dwelling on them.

The extension of gross capital formation to gross capital supply, like the wider scope of capital formation suggested earlier, may well throw more light on the problems of economic growth. For one major difference between developed and undeveloped countries, or between the early and later phases of developed countries, probably lies in the facilities provided for mobility—in its economic sense—of existing capital goods. If the data were available, it would be quite useful to gauge the volume of all durable capital goods changing hands during the year—distinguishing between those already existing and those newly produced—and to trace the flow of savings—including the proceeds of sales, just as we include the depreciation allowance under the present concept of gross savings—through the various channels in the financing of the total durable capital turnover.

But the data are even scantier for this purpose than for the analysis of consumption suggested in the preceding section. Here, as in other macro-economic measurement, we have to be satisfied with already "netted" out, comprehensive aggregates. These have their invaluable uses; but, unfortunately, they reveal little about the whole mechanism of flows and offsetting counterflows that is so important for our understanding of how the net result was effected, and why it is so different from time to time and place to place.

THE STATISTICAL EVIDENCE

Tables I-1 to I-3 in Appendix A relate to the gross and net proportions of domestic capital formation to national product. It would have been more logical to use domestic product. But total national product series are more readily available, particularly for the longer periods; and for all the countries covered in the tables the difference, in the long run, between total and domestic product was well within a few per cent of either. No sizable error is introduced, therefore, by treating the proportions as if they relate to either total or domestic product.[3]

[3] This statement would probably be much less justified if our records included truly "colonial" areas, economies in which income outflows to foreign enterprises loom large relative to total product.

Table I-1 gives, for a relatively large number of countries, the proportion of domestic capital formation to national product for a single pre-World War II year (usually 1938) and for a post-World War II period. Table I-2 shows the proportion, for a much smaller number of countries, in the 1920's. Table I-3 comprises much longer records, but for only a few countries. The evidence cannot be summarized easily, partly because of discrepancies in details of definition and treatment. A far more important limitation lies in the sensitivity of the capital formation proportion to short-term conditions, and it is difficult, therefore, to infer long-term levels from short-term data. The figures for 1938, a year marking a depression whose impact varied considerably in the several countries, are of uncertain value in determining longer-term levels of differences. Even the averages for the post-World War II period may well be atypical, since they must have been affected by the extraordinary efforts in some countries to repair war ravages and the no less extraordinary difficulties in many other countries in the way of such efforts. For the longer-term levels and trends in capital formation proportions we must rely much more on Tables I-2 and I-3, but even those must be used warily. Moreover, our conclusions may be modified when a fuller range of adequate data becomes available.

With this warning, we state what seem to be the major statistical findings suggested by the tables and comment on their rationale.

1. Except for the depressed decade of the 1930's, the long-term proportion of net domestic capital formation to net national product ranges from about 5 to about 15 per cent. The proportion for Sweden in the first decade is the only one clearly below the 5 per cent level (Table I-3, C); and there are scarcely any long periods in which the ratio is significantly in excess of 15 per cent. This range would persist if domestic net product were used as a denominator, since the latter would be smaller for those countries whose net domestic capital formation proportions are well below 15 per cent (e.g. England and France), and might be larger for those whose net domestic capital formation proportions are higher (e.g. Sweden in later decades, the United States, and Canada).

In speculating about the reasons for this range, we can assume that the lower limit of the long-term proportion of net domestic capital formation would be zero or close to it. Unless output could somehow be maintained while extraordinary economy in the use of capital was practiced, the gradual exhaustion of the domestic stock

of capital would force reduction of domestic production.[4] Serious domestic capital depletion, over the long run, and a consequent long-term decline in output have occurred in history. But for those countries within the orbit of Western civilization for which we have long-term records back to the middle of the nineteenth century, the series which *exclude* the war periods do not reveal such situations.

Furthermore, given some growth of total population and some tendency toward preservation of a countrywide capital-output ratio, the lower limit of the proportion of net capital formation to net product would be significantly above zero. Assume that the country's population is growing at 1 per cent per year, that it requires a constant supply of final output per capita, and that the prevailing ratio of domestic capital stock to annual output is from 2.5 to 1, to 5 to 1. Unless this ratio can be changed significantly, the net domestic capital formation required will constitute 2.5 to 5 per cent of the national product—sufficient to increase the capital stock necessary to produce the greater *total* (but constant per capita) output required. Since residential housing and closely related facilities are a substantial part of capital formation, and since, under the assumed conditions of constant output per capita, economies in the use of capital (which would depress the capital-output ratio) are unlikely (they usually develop in a technologically progressive climate associated with *rising* per capita output), the illustration suggests that even in underdeveloped countries the mere growth of population would limit the lower level of the net capital formation proportion unless the per capita output were allowed to decline. In the countries covered in our tables both population and per capita output increased; and the low net domestic capital formation proportions are for early preindustrialization periods (Sweden), or for later periods of development when retarded growth at home permits limited use of domestic capital, and savings are in fact channeled abroad (England and France).

The upper limits on the long-term proportion of net domestic capital formation to net product can best be explained in terms of

[4] This argument should be qualified in view of the possible *omissions* in customary measures of capital formation, but such omissions are likely to be only minute fractions of national *product*. Another possible qualification—that in advanced and growing societies the mere replacement of capital increases productivity—does not apply to conditions where net capital formation is close to zero over long periods. For this occurs only in societies where economies are stagnant; and in them technical progress that explains the capacity-raising incidence of mere replacement is absent. This comment applies also to the next paragraph.

the limits on net savings proportions within a country and on the relative amount of foreign capital that the country can secure. Both groups of factors are discussed more appropriately in Section 2, "Foreign Investment and Total Capital Formation Proportions." It is sufficient to indicate here that there are obvious limits to which domestic saving for security can be rationalized and to which inequality in income distribution can originate savings beyond the "rational" security limit; and that the supply of foreign savings is affected by political conditions and by the small amount of capital available for foreign investment relative to the demand of the would-be borrowers.

2. The long-term proportion of gross domestic capital formation to gross national product ranges from about 10 to about 25 per cent. There is only one case below the lower limit (Sweden in the first decade, Table I-3, C); and the few exceptions above the upper limit are mostly in the unusual post-World War II period.

While one would assume that some relation exists between the range for the net domestic capital formation proportion and that for the gross, theoretically one could derive a markedly different set of limiting values for the latter from the former. Given a long-term proportion of net domestic capital formation to net product of 5 per cent as an observed lower limit, one must infer that the corresponding lower limit for the gross proportion is above 5 per cent. Similarly, an observed upper limit of 15 per cent for the net proportion implies a higher one for the gross proportion. One would therefore expect the long-term proportion of gross domestic capital formation to gross product to range from above 5 to above 15 per cent. But a range from 10 to 25 rather than from 7 to 75 suggests that there are certain limits upon variations in the factors that relate net and gross capital formation proportions.

These factors are the share of capital formation subject to depreciation, i.e. in the present definition the share accounted for by construction and durable equipment; the length of life of durable capital assumed in estimating depreciation; and the rate of growth of product, assuming that the proportion of capital formation to product over the past period has been constant. The role of these factors is suggested by the following equation:[5]

$$\frac{D_0}{G_0} = af\left[\frac{1-(1+r)^{-n}}{nr}\right]$$

[5] For its derivation see Appendix B—part of the analysis carried through in the National Bureau's study of capital formation and financing.

where

D_0 = depreciation during time unit 0
G_0 = gross national product during time unit 0
a = proportion of depreciable gross capital formation to total gross capital formation—assumed constant during the past
f = proportion of gross capital formation to gross national product—assumed constant in the past
r = rate of growth of gross national product, per time unit—assumed constant in the past (so that the link relative of successive annual GNP's is $[1 + r]$)
n = number of time units in life span of depreciable capital—assumed constant, with depreciation calculated along a straight line.

The constancy assumptions refer to the period included in n.

To illustrate the results one can derive from this equation, we provide a few values for the fraction that modifies af in the equation and that reflects the combined effects of the life period of durable capital and the rate of growth of gross national product (which is quite close to the rate of growth of net product).

Value of n in Years	Value of r: .01	.03	.05
20	.90	.74	.62
30	.86	.65	.51
40	.82	.58	.43

Using this table, we can easily calculate some examples. For instance, if we assume that f, the gross capital formation proportion, is .25 (i.e. at the upper limit), that a is .8 (allowing about a fifth for net changes in inventories), that r is about 3 per cent per year, and that the average life of durable capital is 40 years (a combination of a longer life for construction and a shorter one for producers' durable equipment), the ratio of capital consumption to gross national product is $.8 \times .25 \times .58$, or 11.6 per cent. The ratio of net capital formation to gross national product is then 13.4 per cent; and to net national product, 15.2 per cent. This, of course, is only one way by which an upper limit of 15 per cent for the net capital formation proportion can be translated into one of 25 per cent for the gross, although the values used in this example are, in fact, close to the United States experience (except that f is closer to 22 per cent, and n closer to 30 years, yielding a net capital formation proportion of about 12 per cent).

For a slowly growing country whose gross national product rises

only 1 per cent per year and whose gross capital formation proportion is about 10 per cent (i.e. at the lower limit), if a is .8 and n is 40, the ratio of depreciation to gross national product is .0656; of net capital formation to gross national product, .0344; and of net capital formation to net national product, .037, or 3.7 per cent. A somewhat lower a, even if combined with a lower n, would yield a 5 per cent level for the proportion of net capital formation to net product.

In the above examples the upper and lower limits of the gross capital formation proportion have been connected with those of the net capital formation proportion. It would obviously be easy to link a value below the upper limit for the latter with one at the upper limit for the former, or a value above the lower limit for the latter with one at the lower limit for the former. By expanding the brief table given above to cover other values of r and n and varying a and f, we could derive various combinations of the gross and net capital formation proportions.

Such variations are of little interest since our data on the empirical values for the several constants used are so scanty; and such analysis would take us far afield anyway. But two inferences suggested by the illustrative discussion above are relevant here.

First, the lower the rate of growth of national product, the higher the relative weight of depreciation in gross capital formation and the lower that of net capital formation derived as residual. This suggests that in underdeveloped countries, where growth of national product is moderate, where the life span of durable capital assets may be short because of rapid physical deterioration even in the absence of the competitive pressure that produces obsolescence of capital goods in the more developed countries, and where the relative share of net change in inventories is not necessarily larger than in the developed countries, a fairly substantial proportion of gross capital formation to gross national product may be accompanied by an insignificant net capital formation proportion. Thus if n is 20, a is .8, and the gross capital formation proportion is 20 per cent, an r of .01 yields a net capital formation proportion of only slightly over 6 per cent; an r of about .5 per cent per year yields a net capital formation proportion, under the same conditions, of less than 5 per cent; and when r is 0, the proportion is actually .04 divided by .84, or 4.8 per cent. In that case it is limited to net additions to inventories, since there are no *net* additions to the stock of durable capital. By and large, differences in

the gross capital formation proportion among developed and underdeveloped countries may be relatively much smaller than those in the net; and the former tend to underestimate the differences among countries in the share of income constituting net additions to the capital stock.

The second inference bears upon the effect of acceleration or retardation in the rate of growth of national product. With other factors constant, acceleration means a reduction in the weight of depreciation, a higher ratio of net to gross capital formation, and a higher net capital formation proportion corresponding to a given gross capital formation proportion. Retardation has the opposite effect—it increases the relative weight of depreciation and widens the gap between the gross and net capital formation proportions.

3. At some phase in the growth of a developed country within the last two centuries there must have been a substantial rise in the capital formation proportions. Given an increase, or constancy, or at least a substantial resistance to decline in the capital-output ratios, a rise in the capital formation proportions is a necessary consequence of the acceleration in the rate of population growth in the older countries, if per capita product does not decline. In fact, of course, the growth phases to which we refer are characterized by accelerated population growth (in older countries), by increases in per capita output far greater than those observed previously, and often even by rises in the capital-product ratios—all three factors implying a rise in the capital formation proportions. For reasons just suggested, the rise in the net capital formation proportion is likely to be more pronounced on a relative basis, and sometimes even on an absolute basis, than that in the gross.

Unfortunately, only the record for Sweden reaches back into the period of rising capital formation proportions; and only the gross proportion can be measured for those early decades, since the net is derived by arbitrary assumptions (which probably underestimate the true levels). But we may infer, by comparison with the current situation in underdeveloped countries, that the period of rising capital formation proportions marked the shift from the preindustrial to the modern era in all the old countries and even in some of the young, relatively "empty" countries settled by emigrants from the Western European orbit (Canada and other former British dominions, if not necessarily the United States).

What the few long series do reflect are the high capital proportion levels reached some time after the acceleration in the rate of

growth occurred; and the declines, usually gradual but sometimes abrupt, from these levels. In the United States, Canada, the United Kingdom, France, and Denmark the capital formation proportions tend to decline—abruptly in the United States and Denmark after World War I. In Sweden they tend to rise during the first decades, declining toward the end of the period covered. Also in the United States and Canada the relative importance of depreciation increases, as expected, and causes a greater decline in the net capital formation proportion than in the gross. But the relation of the two series is quite different in the United Kingdom, and we are at a loss to decide whether it is because of some peculiarities of the estimating procedure or whether it reflects genuine differences in durable capital consumption practices or in the composition of the total capital stock.

One should note that, at least in the United States and Denmark, there are indications of factors other than retardation in the rate of growth of national product that explain the greater decline in the net capital formation proportion than in the gross proportion. These additional factors are the shortening of the average life of durable capital, due largely to the more rapid growth of producers' equipment than of construction, and the apparent increase in capacity to turn out more product with the same *net* stock of durable capital, a decline in the ratio of net capital stock to output. The latter trend may be explained in turn by the greater share of depreciation associated with a decline in the rate of growth of product, since "replacement" means substituting more effective equipment (even when valued in constant prices); and the growth of the share of "replacement" in total capital stock means growth of the proportion in which constancy in value is accompanied by increased efficiency.

To sum up: The preceding comments suggest a long secular swing in the capital formation proportion—its *up* phase occurring presumably some time after the rise in the rates of growth of national product and of population (in the older countries), and, perhaps, also after that in the rate of growth of per capita product; and its *down* phase emerging at different dates in different countries, and with different degrees of abruptness associated with the disruptive effects of wars and revolutions. The domestic capital formation proportions rise to upper levels of about 25 per cent for gross and 15 per cent for net (with lower ratios for the countries that channel much of their savings abroad); and the rise in the net capital formation

proportion is relatively, and sometimes even absolutely, greater than that in the gross, and it may well appear earlier in the record. In the decline from the upper levels, the net capital formation proportion drops more markedly than the gross, and possibly earlier. Unfortunately, the data are not sufficient to permit us to outline this secular swing effectively or to relate it properly to similar secular swings in the growth of population and product.

2. *Foreign Investment and Total Capital Formation Proportions*

THE LINKING OF FINANCING WITH CAPITAL FORMATION

We now consider the share of domestic capital formation financed from foreign sources, and in this connection study also the proportion of total capital formation (countrywide savings) to national product. But before examining the data, we deal briefly with the major difficulties in linking any source of financing with real capital formation that must be recognized to avoid misinterpretation of the estimates.

The basic problem is that, for any active economic agent, funds from different sources are mingled in one pool out of which all activities are financed. It is, therefore, essentially arbitrary to link a specific category of funds with a specific type of use—in our case, capital formation.

This difficulty can be discerned even in the case of a person who borrows on mortgage, presumably to construct a house. On the surface there is a clear and unequivocal link between a source of finance and an item of real capital formation. But closer examination may reveal that the individual in question took a trip abroad in the same year that he borrowed the money, and spent an amount out of savings equal to his mortgage. He borrowed the money to build a house rather than to go abroad because it was easier and more "respectable" to borrow with a tangible asset as security. Can we say unequivocally that in this case capital formation was financed by borrowing rather than by savings?

If this difficulty emerges for a single economic agent, even when there is a seeming connection between an act of financing and an act of capital formation, it is much greater for the broad groups we must deal with in using the available data. The larger the group, the greater the opportunity for intermingling both sources of funds and types of uses. But this difficulty is seldom recognized. The literature and data relating to international capital flows point out

the influence of a complex of both political and economic conditions on such flows but go on with misleading ease to estimate net changes in them as a "share" of capital formation. To illustrate: Before World War I, the Russian government borrowed heavily in international markets, primarily from France. Were data on real capital formation in Russia available, it would be possible to compare its net foreign borrowing with domestic capital formation and conclude that x per cent of the latter was "financed" from abroad. (Indeed, these are the percentages and the comparisons that are given in Appendix A.) But the Russian government may actually have spent a good part of this borrowed money on police, on the organization of pogroms, and on the state church; and the direct financing of capital formation may have been provided from other sources. The assignment of capital funds imports to capital formation within the country is thus arbitrary. To put it more precisely, it is based on the implicit assumption that, given fluidity of funds, there is a causal connection between sources of funds recognized as long-term savings and uses of resources classified as additions to stocks (i.e. capital formation). By and large, there is a closer association between capital funds and capital formation than between other funds and capital formation: inability to secure capital funds would inhibit capital formation much sooner than it would consumption. But this is a very broad association and subject to the qualification that, for any specific group of capital funds, the links with capital formation may be quite weak. In the present connection this qualification should be stressed particularly when a government borrows capital from a foreign country. For governments can obtain funds on either a short- or a long-term basis for uses that have little connection with capital formation, whereas individuals and private firms must often show some evidence of use in terms of fixed assets that may serve as security. Moreover, in foreign capital movements, government borrowing is particularly subject to political considerations that not only have little relation to capital formation, but in a sense may be inversely related to it—as the experience of foreign loans not only to Russia but to many other countries with governments inimical to economic progress testifies. Unfortunately, it is impossible to analyze here the uses to which such loans were put or to estimate the amounts that did finance capital formation within the borrowing countries. The association between flow of funds and capital formation must be made in broad terms for the larger ag-

gregates for which data are available, with allowance for the qualification just indicated.[6]

Two other qualifications must be indicated. The first flows from the "netness" of the financing estimated in the available data. It is almost never possible to measure the gross flow of funds corresponding to the gross capital turnover suggested in Section 1. Net capital imports or exports—the only estimates we have for comparison with domestic capital formation—tend to understate greatly the importance of the flows of goods and payments across boundaries. Theoretically, it is possible to have zero or close to zero net capital

[6] The argument set forth in this and the preceding paragraph can be clarified in a restatement suggested by Moses Abramovitz, as follows:

1. In an economy in which commodity stocks are constant and savings positive, the net import of capital will simultaneously offset or "finance" all three of the following differences as aggregates: (a) value of products or resources used *minus* value of products produced domestically; (b) value of net additions to capital stock *minus* net domestic savings; (c) value of imported goods and services, including factor payments, *minus* value of exported goods and services, including factor receipts. All this is implied by the usual definitions of national income, saving, investment, and consumption.

2. Viewed as aggregates, therefore, capital imports do not finance capital formation any more than they do consumption or imports of capital goods or consumer goods. The securities against which capital is borrowed are not significant because there is no uniform connection between the form in which a loan is made and the use made of the proceeds. And even if it were true that the proceeds of foreign loans were, in the first instance, expended to purchase or produce capital, it would still be true that other resources would thereby be released for non-investment purposes.

3. Nevertheless, there is good reason to compare net capital imports with total capital formation. For when investment expenditures tend to exceed domestic savings, a number of related processes are set in motion which tend to close the investment-savings gap, some by increasing saving, but others by inhibiting investment: (a) Real income and domestic real savings tend to increase without a rise in prices. Insofar as this occurs, it implies the existence of unemployed resources easily drawn into production. (b) Money prices, money incomes, and money savings rise. In the course of this inflationary process, domestic real savings also tend to increase as a result of various expenditure lags and redistributions of income. (c) The domestic money market and the domestic commodity markets get tighter. These developments tend to check investment. (d) The tightness of the money market, however, is relieved to the extent that foreigners are induced to hold claims against the home country. The tightness of the commodity markets is relieved to the extent that an import surplus is generated, which also increases the supply of claims to be held by foreigners. In short, the check to investment is relieved to the extent that capital imports are stimulated.

4. The volume of net capital imports in a period, therefore, represents an unequivocal contribution to the increase in the supply of capital assets during the period. It is only unequivocal, however, in the sense that capital imports make *some* contribution. We cannot say how large the contribution is because we do not know how much smaller the increase in capital would have been in the absence of capital supplied from abroad.

balances, with huge volumes of international goods and payments flows. Large imports may not be possible without financing by foreign sellers, or by the financial institutions servicing them. Large exports may not be possible without financing by the domestic sellers or their financial institutions. But the destination of exports and the identity of the beneficiaries of domestic financing may be quite different from the origin of imports and the identity of the foreign creditor. It may well be that if the selling countries are not willing to finance imports, a given country cannot enjoy either the imports or the contribution which they may make to capital formation and growth. Of course, this is a corollary of the statement made earlier that "net" totals reveal neither the underlying flows and counterflows nor the importance of this mechanism to the processes of capital formation and economic growth. But it is particularly appropriate in connection with net capital imports and exports because there are so many opportunities for diverse flows and considerable offsetting in the position of any country vis-à-vis the rest of the world.

The second qualification relates to the use of total debt outstanding, either domestic or foreign, gross (i.e. with both debt and counterclaims shown separately) or net. In using such data to estimate the relative importance of the corresponding source of funds in financing past capital formation, we face a problem, because debts may be revalued through default or cancellation; and the face or market value of the debt at any given time may not reflect the actual magnitude of funds made available at the time the loans were made and the securities issued. Furthermore, even if there are no defaults, no sales of original debt issues at less than face value, etc., a cumulative total of capital formation makes sense only after its several parts have been reduced to a common price level; and that can be done if the shares per time unit of real capital formation are reflected in the data or if the total of tangible assets is revalued periodically, with the changes in bases of valuations inferred from changes in price levels. For the cumulative total of debt, no general deflation is possible: the estimates of gross and net debt issues at successive dates are indispensable. It is for this reason that the cumulative debt totals are used sparingly in the following discussion and primarily to indicate the geographical distribution of international capital lending.

THE EVIDENCE ON CAPITAL IMPORTS AND EXPORTS

In Tables II-1 to II-4 net capital imports or exports are shown as shares of net domestic capital formation, gross domestic capital formation, net national product, and gross national product. The numerator is net after capital inflows and outflows have been balanced out. For some countries and periods estimates of both inflows and outflows are available. It may seem illogical to compare a *net* capital movement with gross totals; and it is true that, theoretically, part of capital consumption, which enters gross capital formation and gross national product, must be credited to the foreign owners of capital and debited to domestic users. But in fact additions to domestic depreciation reserves or replacements of domestic capital do not add to the claims of foreign owners; and it is reasonable to include among the possible sources of financing of domestic gross capital formation the total depreciation charge, net domestic savings, and net capital imports.

The evidence on the shares of foreign investment in domestic capital formation and in national product conveys the following impressions:

1. Both net and gross domestic capital formation are sensitive to short-term changes; and the former, particularly, can drop to zero or a negative quantity in a depressed year. Hence, a fraction in which capital formation is the denominator can be quite erratic when calculated for a single year or a short period. For this reason the evidence in Table II-1, which relates to a single year and to the exceptional post-World War II period, is only of limited value. We must rely primarily on Tables II-2 and II-4, particularly the latter.

These tables show that for some creditor and some debtor countries the proportions of capital exports or imports to domestic capital formation were quite substantial. In the United Kingdom the share of net capital exports in domestic net capital formation ranged from about a third to over nine-tenths, depending upon the estimate and particularly the period; and the share in domestic gross capital formation ranged from about a fifth to three-quarters. In France, the other major creditor country, the share of capital exports in domestic net savings ranged from a sixth to three-quarters. In the Netherlands the data for the 1920's alone show that the share of capital exports was about a seventh of net domestic capital formation and about a tenth of gross, and the shares may have been appreciably higher before World War I. For some debtor countries

also, the shares of capital imports in domestic capital formation were fairly substantial in the long run. In Sweden, in the early decades, the share of capital imports in domestic net capital formation ranged from a fifth to eight-tenths, and their share in gross from about a ninth to less than half (Table II-4, C); in Canada the share of capital imports in domestic net capital formation was close to a half in 1900-1920, and the share in gross from a quarter to a third (Table II-4, D); in Denmark, capital imports at their highest accounted for over a quarter of domestic net capital formation and about a sixth of gross, and for 1870-1904 were about a fifth of the former and less than a seventh of the latter (Table II-4, F). On the other hand, in the United States, capital imports did not account for sizable proportions of domestic capital formation (Table II-4, A). And, as will be indicated below, there is reason to suspect that the *available* data, because of a bias in their selection, tend to exaggerate the relative importance of capital imports and exports.

2. As indicated above, the long-term proportions of domestic net and gross capital formation to national product vary within moderate limits—from somewhat less than 5 to about 15 per cent for the former, and from somewhat less than 10 to about 25 per cent for the latter. Since capital imports and exports are in turn fractions of domestic capital formation, their long-term share in national product is small. In the 1920's, capital imports and exports ranged from less than 1 to about 2 per cent of national product (Table II-2). In the interwar period, i.e. from about 1921 to 1938, capital imports and exports ranged from less than 1 to about 2.5 per cent of national income (Table II-3). In the longer records in Table II-4, about the highest ratios shown are 6 to 7 per cent for capital exports in the United Kingdom in the decade before World War I, and over 9 per cent for capital imports in Canada in 1901-1910. But most shares in national income or gross national product are well below 5 per cent.

It should be stressed that there is no arithmetical necessity for a low ratio of capital imports or exports to either domestic capital formation or national product. Theoretically, a country could have net capital exports substantially in excess of its domestic capital formation or could import, in the long run, capital not only equal to but in excess of its domestic capital formation (implying domestic consumption larger than net national product). It is economic and related factors that limit the volume of capital movements across the

boundaries to fractions of domestic capital formation and to still smaller fractions of national product.

3. The fact that the available records exaggerate the relative importance of international capital flows, when viewed against the larger canvas of the world economy, is a natural reflection of the correlation between the importance of such capital movements and the effort to collect data about them. These long-term records are either for the most prominent international creditor countries (England and France) or for the most prominent international debtor countries, in the sense that the importance of capital imports was greatest for them (Canada, Sweden, and Australia). Of the creditor countries omitted from the records, only the Netherlands, and only for limited periods, might have shown proportions of capital exports to domestic capital formation and national product as high as those for the United Kingdom; and of the debtor countries omitted, only Argentina, New Zealand, and perhaps one or two others might have shown proportions of capital imports to domestic capital formation and national product as high as those for Canada, Sweden, and Australia. Other missing creditor countries, e.g. Germany and Switzerland, would probably have shown much lower proportions of capital exports to domestic capital formation and national product than the United Kingdom and France.[7] Among the debtor countries the larger units, e.g. the United States and Japan, enjoyed capital imports that were only minor fractions of domestic capital formation and minute percentages of national product. In most of the debtor countries of any size not covered by the record, the share of capital imports—not necessarily in net capital formation but in gross and particularly in national product—must have been quite low indeed.

Another interesting aspect of the long-term record is its concentration on a period when, judging by the scanty data available for earlier and later decades, the relative importance of international capital movements may have been at its highest. From 1870 to 1914,

[7] Herbert Feis comments on Germany: "In some periods, the early seventies and middle eighties in particular, more than one-tenth, perhaps as much as one-fifth of the savings of the country made a choice of foreign employment. But that movement did not grow with the volume of savings in the nineties and after the turn of the century. From 1900 to 1914 less than one-tenth, rather than more, of current savings went abroad despite the appeal of undeveloped lands, the exertion of the Government in behalf of foreign enterprise, the great growth of the overseas banking system and commerce." *Europe, the World's Banker, 1870-1914*, Yale University Press, 1930, pp. 61-62. Quoted by permission.

particularly in the twenty years preceding the outbreak of World War I, both the phase of development of the creditor countries and international conditions seem to have been most favorable to capital exports; and the demand for foreign capital by potentially suitable debtor countries seems to have been at its strongest. At any rate, the three major creditor countries—the United Kingdom, France, and Germany —were at the height of their international lending power between 1870 and 1914; and the conditions of the would-be borrowing countries—the dominions of the British Empire, the United States, Japan, and a few Latin-American countries—warranted demand for foreign capital. The summary of the long-term record in Table II-4 is thus largely for a limited period in which the importance of international capital movement may have been greater, in relative terms, than either in the preceding or in the following decades.[8]

4. These comments suggest that international indebtedness in 1914 was the result of capital imports and exports during a period that, historically speaking, was most favorable to international capital movements. The picture, presented in *International Capital Movements during the Inter-War Period*,[9] can be introduced by a brief quotation from that source: "The chief capital exporting countries before World War I were the United Kingdom, France and Germany. At the outbreak of the war, their foreign long-term investments represented about three-fourths of all outstanding international investments. Over a period of forty years—from 1874 to 1914—the foreign long-term investments of these three countries had grown from $6,000 million to $33,000 million. Available information suggests that the total of their combined capital exports during this period slightly exceeded the difference of $27,000 million between the two estimates. Losses due to defaults and bankruptcies, particularly during the period of falling prices before the mid-1890's,

[8] Total international capital indebtedness in the early 1930's was higher than in 1913 or 1914. But this was shortly after the crest of the large capital movements of the 1920's. Table II-3 indicates that a reverse flow, from the debtor to the creditor countries, took place during the 1930's. While total international indebtedness at the end of the 1930's may have still been absolutely higher than in 1914, it is highly unlikely that its proportions to the volumes of output in current prices and to the world total of capital formation at the end of the 1930's were equal to those in 1913-1914. I am strongly inclined to believe that the relative importance of international capital was at a peak in the 1910-1913 period, and that the share of international indebtedness in the total of world real capital was significantly higher in 1913 than at any previous or subsequent time within the last two centuries.

[9] United Nations, October 1949. Quotation is from page 1.

and the probable net increase in short-term credits granted may explain this fact."

Total international long-term debt in 1913/1914 was estimated to be $44 billion, including $3.5 billion in gross credits for the United States (*ibid.*, p. 2). Excluding the latter, the sum of net credits of creditor countries amounted to $40.5 billion. In mid-1932, international debts (including political) were estimated by Julius Hirsch to be about 307 billion German marks, of which 55 billion were short-term.[10] Assuming that short-term indebtedness was the same proportion of long-term in 1913/1914 as in 1932, which may be an overestimate, we add about a fifth to $40.5 billion and get a grand total of about $49 billion for total international debt. This was the cumulative result of international capital investments over a period of at least half a century when the movement was at its height.

The relative size of this total depends upon the base with which one compares it. In 1912 the value, in current prices, of total *reproducible* wealth in one debtor country alone, the United States, was $94 billion.[11] The annual rate of net capital exports was well below $1 billion per year for the preceding half century. (Much of this, of course, was advanced when money had a higher purchasing power than in 1914.) The annual rate of domestic gross capital formation in the United States alone was, in current prices, over $3 billion from 1869 to 1914; and its national product close to $15 billion per year on the average. It is impossible to estimate the world product and capital formation over the same period; but it seems reasonable to guess that international capital movements even at their height accounted for only a limited fraction of world gross capital formation and a minor fraction of total world output.[12]

[10] Carl Iversen, *Aspects of the Theory of International Capital Movements*, London, Oxford, 1935, pp. 336-337.

[11] *Income and Wealth, Series II*, Simon Kuznets, editor, Cambridge, Eng., Bowes & Bowes for International Association for Research in Income and Wealth, 1952, Table 1, p. 306.

[12] During the period under discussion, the net capital exports were just about equal to, or not much in excess of, the income on the outstanding foreign investments. In other words, the net additions can be viewed as retention by the debtor countries of the income earned by investments extant at the beginning of each period, although, of course, funds did shift and specific debtor countries did not necessarily "retain" their earnings on borrowed capital. In this connection we quote from the United Nations report already cited: "While the growth in the investments of the three (major creditor) countries was not uniform, it was steady and, considering the three countries together, appears to have been close to the yield (interest, dividends and profits) of the investments. Over the entire period (i.e. from 1874 to 1914), the total of the estimated capital exports from the three countries practically equalled their

In addition to these limitations upon relative size, there was also the peculiar distribution of capital exports. Table II-5 shows the geographical distribution of foreign investments by the three main creditor countries on the eve of World War I. Political factors seem to have weighed heavily in determining the distribution. Of the total foreign investment by the United Kingdom, almost half was in the Empire, the largest amounts in Canada and Australia; another fifth was in the United States; and only about 5 per cent was in Asia and Africa, outside of the Empire. Of French foreign investment, about half—in Russia, Turkey, the Balkan states, Austria-Hungary, and the colonies—was dominated by political considerations. Of German foreign investment, the politically motivated share—going to Austria-Hungary, Turkey, Russia, and the Balkan states—was over a third. One could naïvely argue that, even from the viewpoint of a man living at the end of the nineteenth and the beginning of the twentieth century, a rationally conceived distribution of foreign investments would certainly have allocated larger shares to the United States, to the English-speaking colonies, to many European countries, to Japan, and to selected Latin-American countries. The rationale of large capital flows to Russia, Turkey, Austria-Hungary, and the Balkans, in view of their shaky governmental and social structures, was certainly not economic. The point is that no matter what limited international capital funds were available, only part flowed into the channels of warranted economic demand for capital formation.

5. We cannot adequately explain here why financing of capital formation out of foreign funds was so restricted in scope, even under the exceptionally favorable conditions of the half century from the 1870's to World War I. But we can say that among the forces at play, those that should be emphasized are the following: the factors that limited the proportional magnitude of savings in all countries, even in those sufficiently advanced economically to be potential capital exporters; the draft upon such savings for domestic capital formation, to provide houses for the growing population and capital to operate the domestic economy; and the general limitation of the horizon of the entrepreneur or the investing institution, which made

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aggregate income from the investments. The average annual income—at least towards the end of the period—was about 5 per cent. . . . 'Financial' payments (capital yields and capital movements) tended to offset each other in the balance of payments of the countries, taken as a group, that were creditors on balance, and accordingly also in those which, on balance, were debtors" (p. 1).

domestic placement of funds seem preferable to the troubles and uncertainties of investment in foreign places. The limited domestic savings and the minimum demand for domestic capital formation probably explain in large part the small number of net capital creditor countries. For some of these, e.g. France, *post facto* analysis suggests that savings became available for foreign use because of limitations upon domestic investment and peculiarities of the methods of financial institutions for the mobilization and placement of savings, rather than because of any excess of domestic savings over investment opportunities at home. The latter might have developed with more dynamic entrepreneurial leadership and a better organization of apparatus for domestic financing.[13] Since in most countries, particularly those economically developed, the social order kept consumption growing *pari passu* with national output and hence kept the domestic savings proportion down, and since there was a minimum need for domestic capital formation, there were obvious limits to the total net volume of capital exports that these leading countries could generate.

True, there were factors that limited demand also. In most countries, political and social conditions were hardly conducive to the absorption of large, long-term capital imports. In these countries, economically *warranted* demand was quite limited because the political and social situation was not stable—again from the viewpoint of intelligent contemporaries.

Yet it can be argued that the limitations on demand were far less important than those on supply. By and large, the absorptive capacity of the United States and Canada and of other countries with relatively stable political and social systems and considerable opportunities for growth (Japan, Australia, New Zealand, and some Latin-American countries) would seem to have been quite sufficient to employ all the capital exports generated by the creditor countries, and probably much more. This rough judgment is supported by the rapid growth in the absolute volume of capital formation in these countries and their obvious capacity to sustain a much larger volume of payments on their international indebtedness than they actually made. To put it briefly, if perhaps too drastically: prior to World War I the volume of international capital exports was restricted primarily because the *supply* of savings available was

[13] See the stimulating discussion in Harry D. White's *The French International Accounts, 1880-1913*, Harvard University Press, 1933, particularly Chaps. XII and XIII.

limited. The situation may have changed significantly after World War I: during recent decades the limitations on the economically warranted demand for foreign capital have become more prominent, whereas, with the emergence of the United States as a potential net creditor, the limitations on the capacity to lend have become less conspicuous.

6. In the United Kingdom and France there appears to have been a rise in the proportionate importance of capital exports until the two decades before World War I. But with this war came a major break for both of these creditor countries and for Germany too. During the interwar period they recovered somewhat, only to suffer a more drastic collapse during World War II. This picture of the culmination in 1914 of the development of international capital flows, and of the sharp breaks thereafter, only strengthens the impression of the extent to which the whole network was shot through with political aspects, so that a change in the latter could produce so sharp and complete a reversal.

In the debtor countries capital imports tend to become less important as time passes and the country grows; and this trend is sharply accentuated by war whenever the debtor country is outside the area of armed conflict. In Sweden, Canada, Germany, the United States, and Australia there is a clear downward trend in the share of capital imports, pointing toward an eventual reversal of their positions from debtor to creditor nations. If data were available for the earlier decades of the nineteenth century, we would probably have found a similar process operating in some of the older European countries. We would have seen them starting as international debtors and becoming creditors by the last half or quarter of the nineteenth century.

Because of the emphasis placed on the limited magnitude of capital imports and exports and on the factors that may have caused this restriction, it may be well to repeat the qualifications on the significance of these measures. These are *net* balances and hence limited in size, and one should not infer that their significance in the development of the various countries has been correspondingly limited. The composition of foreign security and asset holdings is never the same as that of domestic security and asset holdings. The foreign investors are able to, and often do, support or complement the domestic capital market where it is weak and where, therefore, the cost of finance might become impossibly high without a foreign contribution. For several countries—primarily the smaller ones with-

in the economic orbit of such large capital exporters as the United Kingdom, and to some extent those within the economic orbit of France—favored by political conditions, the import of such capital was of decisive significance in development. Even for the large capital-importing countries (the United States and Japan and earlier in the nineteenth century France and Germany) the receipt of goods from the economically advanced areas, financed in part by loans, provided opportunities for economic growth and prevented internal strains that might otherwise have developed. Granted the relative smallness of the share that outside funds contributed to the financing of capital formation in such large countries, the very possibility of extensive economic intercourse with the more developed economies was significant; and the net capital imports that were received were all the more valuable because they were a small balance of a much larger gross flow. It may well be that the satisfactory economic growth of underdeveloped countries of any size depends in part upon a combination of relatively small capital imports associated with much larger gross flows of commodities and services to and from developed countries. We cannot dismiss the suggestion that although the past record for the large debtor and would-be debtor countries shows relatively insignificant net capital imports, the process of which these imports were the net result was an important factor in economic growth. This statement has obvious bearing upon current discussion of the needs of underdeveloped countries for capital imports: however acute such needs may seem, the need for larger gross flows of commodities and services across the boundaries may be greater.

THE TOTAL CAPITAL FORMATION (SAVINGS) PROPORTION

By adding the share of capital imports or exports in national product to the share of domestic capital formation, we get the share of total capital formation, or of countrywide savings, in total national product. From the estimates given in Tables II-1, II-2, and II-4, three major conclusions can be reached. First, for the countries covered, which are primarily developed or semideveloped economies (although there are a few underdeveloped countries in Table II-1), the shares of net savings in net national product vary from somewhat over 5 to about 15 per cent. The corresponding range for the shares of gross savings in gross national product is from somewhat over 10 to about 25 per cent. In both cases the limits are close to those observed for the shares of net and gross domestic

capital formation. The estimates for several countries omit net changes in inventories and thus understate the proportion of savings. But the adjustment for this omission is slight and would not significantly affect the limits stated.

Second, at least within the range of countries covered, a larger per capita income is not consistently accompanied by a larger proportion of long-term net capital formation or savings to national product. The United States and Canada have the highest per capita income. Yet in Table II-2 the Netherlands shows a distinctly higher ratio of net capital formation to product (17.4 per cent) than the United States (12.7 per cent). In Table II-1 the net capital formation proportions for the United States and Canada, for the post-World War II period, are 13.5 per cent and 15.2 per cent respectively. Finland, Australia, and New Zealand all have higher proportions than the United States. If we could include the major underdeveloped countries, which presumably have low net capital formation proportions, the positive association between the levels of per capita income and the savings-income proportion might be raised. Nevertheless, it is significant that the correlation between the per capita income and the savings-income ratio is not likely to be high, even if it is positive, when countries with low per capita incomes are excluded. Cross-section comparisons of the level of income and the savings proportions among countries are thus not likely to show as close a positive correlation as would similar comparisons among income groups within each country.

Third, the long-term records for several countries in Table II-4 reveal that secular rises in per capita income are *not* accompanied by rises in the proportion of net capital formation or savings to national product. In the United States, Canada, and Denmark the proportion either declines slightly or is stable throughout. In Sweden it rises until the second decade of the twentieth century, but then declines. In other words, the relation over the long period between the movements of income and of the savings-income ratio is quite different from that observed in cross-section analysis between levels of income and the proportion of savings to income within a country.

The possible reasons for the limits set to the long-term savings-income proportion and for the failure of that proportion to rise with the secular rise in real income per capita have already been discussed, in reference to the experience of the United States.[14] But

[14] Simon Kuznets, "Proportion of Capital Formation to National Product," *American Economic Review, Proceedings*, May 1952, pp. 508-526, particularly pp. 509-513 and 521-524.

we list here again the major factors involved because they may shed some light on differences in the savings-income ratio among developed and underdeveloped countries, and among the several phases in the growth of the developed countries. Also, further thought suggests the need for reformulating some of the earlier analysis of the "rational" savings of lower income groups.

The savings-income proportion of individuals is the main determinant of the ratio of net savings to net product—particularly in countries organized under the business system. In these countries, because the economic role of governments is, by definition, fairly well circumscribed, financing by governments of capital formation out of taxes or other levies is quite limited except in war years. For obvious reasons the legislative bodies will not permit the use of the compulsory apparatus of taxation to finance capital formation, except for distinctly specified and well-defined purposes; nor will they permit the executive branches to accumulate reserves that might finance capital formation independently of the periodic appropriation power of legislatures. Likewise, organized business enterprises, corporate or individual, can contribute relatively little to the *net* savings of the country because they are always under pressure to distribute a large fraction of their net earnings, and their earnings are, in the long run, a fairly limited fraction of the total net output of the nation. In the United States, for example, in "normal" periods, when government's capacity for net capital formation out of revenues was at its peak, its share in net country-wide savings was about a seventh; that of corporations and other business enterprises was about a quarter; and that of individuals was at least six-tenths of country-wide net savings. There is no reason to assume that in other business economies the proportionate importance of individuals' savings in the total of domestic savings is much lower. The major source of the limitation of the country-wide savings-product proportion therefore lies in the limits to the long-term level of the savings-income ratio for individuals.

The long-term savings-income proportion for individuals is restricted partly by factors that operate to keep down the share of total income received by the upper income groups—the "automatic" savers—and partly by those that limit the savings-income proportion for the masses of income recipients whose savings represent an effort that has to be planned on some rational considerations governing the distribution of limited income between consumption and provision for the future.

In economies that enjoy satisfactory rates of growth, the very dynamics of the growth process holds down the relative proportion of income received by the upper income groups. If we allow for no shifting and assume continuity of an initial top group (and its descendants), that group's share in country-wide income is likely to be kept down by a lower than country-wide rate of growth of service income per capita; and because of a lower rate of increase in number, the initial top group and its descendants will form, as time passes, a declining proportion of the given ordinal top group in the population. If we allow for the shifting which necessarily accompanies significant economic growth and follows from changes in the identity of industries and occupations that are growing most rapidly, we find that the identity of entrepreneurs and of others who enjoy large incomes changes from one period to the next. Such shifts in identity mean that the captains of industry, the successful practitioners of rapidly growing professions or arts, the millionaires of today, are not likely to be those of tomorrow; nor are the latter likely to be the sons of the former. This mobility prevents the cumulation of successive large gains by one group of individuals and tends to hold down the inequality in the distribution of assets and incomes.[15]

For the mass of income recipients, whose savings must be based upon a rational weighing of future security against current consumption, the limit to the savings-income ratio is imposed by this very balancing of the present versus the future. In the paper cited above, illustrative examples were given based on the assumption of a perpetual annuity yielding a consumption level upon retirement equal to half that during the twenty-five years (out of a forty-year working life) when positive savings would be made. These illustrations suggest that provision of such security calls for a savings-income ratio of from 8 to 20 per cent *over the period of working and earning life*, depending upon the assumed interest yield on savings. If we add the incomes of the retired (their savings are zero), the nationwide savings-income ratio is even lower—how much lower depends upon the proportion of retired to active income recipients and the assumed difference in their incomes.

Another simplified model worth exploring calls for enough savings to cover living expenses for the years of retirement. If annual expenses per unit are assumed to be the same for the working and retirement periods, the savings-income ratio is equal to the ratio

[15] For an exploration of the factors affecting level and trends in shares of upper income groups see Appendix C.

between years of retirement and years of work and retirement. Thus if working life is set at 45 years, and the retirement period at 15, total income earned in 45 years must be spent in 60 years, and the implied savings-income ratio for each unit *through its working life* is 33 per cent of income. If the number of working units is three times the number of units retired, the nationwide savings for the two groups combined are zero, since the gross savings of the working units are fully offset by the dissavings of the retired. But with a growing population the ratio of working population to the retired is larger than the ratio of years of work to years of retirement. Furthermore, the estimated years of retirement, underlying these full *security* calculations, is probably nearer the maximum than the average; and actual realized dissavings by the surviving retired class would thus be significantly less than those implied in the calculation. Another qualifying element is provision for an estate at death, although for the mass of income recipients this is not a major consideration. These comments suggest that savings-income ratios for the mass of income recipients are largely governed by the effects of population growth on the ratio of working units to retired, by the effects of growth in per capita income on the lag in expenditures of retired persons behind those of the younger and still active income recipients, and by the possible overestimate of the length of the retirement period. If all these considerations are valid, the savings-income ratio for the group of income recipients below the level of the "automatic" savers is not likely to be high.[16]

The two groups of factors just discussed may operate differently in underdeveloped countries. Inequality in the distribution of income may well be greater than in the developed countries, particularly those that grew rapidly in the period under observation (e.g. the United States, Canada, Australia, and Sweden). All other conditions being equal, this inequality would tend to yield a higher savings-income ratio. On the other hand, in the underdeveloped countries greater stability in the composition of upper income groups makes for a higher relative consumption level for the rich; the per capita income of the mass of the population is quite low; the rate of population growth, and hence the excess of possible savers over dissavers, is much smaller; and most important, under the family system that predominates, the older generation is supported directly by the younger. While in and of itself, the large family system theoretically

[16] In Appendix D, I have attempted to explore the implications of this model.

should not affect the relative volume of real savings in the economy, in practice it tends to "invest" any surplus resources in the younger generation rather than in some form of "capital formation" that can be entered in our statistical tables. Thus the savings for the mass of the population in the underdeveloped countries are likely to be much lower than in developed countries—even relative to income. Indeed, in these countries savings of groups below the top are probably close to zero and perhaps often negative. The depressing effects of factors determining savings of the mass of income recipients may well outweigh significantly the raising effects of the greater inequality in the size distribution of income. A large part of the savings of the upper income groups may therefore be offset by dissavings of the lower income groups, causing even greater inequality in the distribution of assets and income unless some other major factors intervene.

The savings-income ratios are somewhat higher—at least when related to per capita income—in the older developed countries (e.g. the Netherlands and the United Kingdom before World War I) than in the more rapidly growing and socially fluid countries (e.g. the United States and Australia). This difference may be due to a greater inequality in the size distribution of income in the former countries as well as a lesser internal economic mobility.

The comments above bear upon the *level* of the aggregate savings-income share, but the factors stressed concern only indirectly the long-term *trend* of such shares over time. The main factors operative in the latter connection are the ones that shape consumer responses to rises in income levels, factors which in a free and fluid society exercise pressure toward higher consumption levels. With such pressures upon the mass of income recipients, as well as upon most of the upper groups; with institutional changes that tend to reduce the saving propensities—urbanization, lessening importance of the individual entrepreneur, and the like—stability or even a slight decline in the savings-income proportion for individuals in the developed countries is hardly surprising. In recent decades egalitarian economic legislation, by reducing the share of the "automatic" savers, may also have influenced this movement. Implicit in our definition of an economy under the aegis of business enterprises are the freedom and, in a sense, the sovereignty of the ultimate consumer. It is the consumer's response to the technological changes accompanying economic growth that brings about higher levels of possible material enjoyment. It is the pacesetter in the

continuous race between the rise in per capita consumption and the rise in per capita output—in which the former is not necessarily the loser.

3. *Types of Capital Formation Financing*

The various ways in which capital formation is financed are obviously important in that they determine its magnitude and structure. In some cases the stock of capital goods used by the productive enterprise is increased by the user's own efforts, e.g. a farmer who hacks out and sets up fence posts barters labor for capital. In other cases money savings are used to "finance" the acquisition of a capital good. If savings are used, the purchaser, whether an individual or a business firm, may finance the acquisition out of his own funds or may seek external sources of financing. If external financing is provided, it may take the form of a privately arranged loan between individuals or of an issue of debt or equity securities on the public investment markets, or it may involve the use of bank credit. Furthermore, external financing may be arranged either directly by the owner of funds or through an intermediate financial institution (insurance company, bank, building and loan association, etc.) to which the owner of funds has delegated responsibility for placement and management of his assets. Finally, savings motivated by security may finance only conservative investment whereas other savings may be available for venture capital financing.

Of the five dichotomies of financing suggested—money and barter, external and internal, private and public, immediate and intermediate, security and venture—some are interrelated. Obviously, barter financing as defined here can be only internal. Likewise, internal financing can be only private since it takes place within the confines of the capital-user unit. External financing, on the other hand, can be either private or public, immediate or intermediate. And both external and internal financing may be security- or venture-motivated. It is hardly necessary to dwell on these taxonomic niceties. But it is necessary to understand that these distinctions are important to the functional relation between savings, capital formation, and economic growth. Clearly, the forms of financing that function most efficiently are those that can channel savings to effect the maximum volume of real capital formation that has a structure most conducive to increased productivity of the economy. The extent to which savings flow freely or are restricted by their owners or the

intermediary agents who handle them and the extent to which they are directed toward the venturesome rather than the more secure uses have great bearing on the contribution of capital formation to economic growth.

Most of the distinctions apply equally to the financing of capital imports and exports and of domestic capital. For the former, however, they cannot be used profitably because there are almost no data on the various sources of financing capital flows across boundaries and, more important, because these flows are, in large part, dictated by political considerations. We therefore omit foreign financing of domestic capital formation and confine the discussion of types of financing to domestic sources of savings, relating them to *total* net and gross capital formation (the equivalents of net and gross domestic savings).

But even for total capital formation and its counterpart, country-wide domestic savings, discussion of trends in types of financing must be conjectural for the most part. The one study I know of containing data from which long-term trends in various types of savings and financing can be derived is a recent one for the United States by Raymond W. Goldsmith.[17] The scattered data for some countries for recent years in the national accounts tables cover too short a period to be instructive and are often distorted by peculiarities of definition, particularly of government and corporate savings. Even Goldsmith's record for the United States (Table III), which covers over half a century, is so affected by war and postwar conditions that it does not reveal any clear-cut long-term trends.

As a poor substitute for the missing substantive findings we present several conclusions reached after reflection on the possible trends in the relative importance of various types of capital formation financing in developed countries with business systems. These conjectures—that is actually all they are—we attempt to keep within reasonable bounds by referring to the main institutional features of economic growth in these countries.

1. To measure capital formation produced within an enterprise by its own forces is difficult, if not impossible. Although we have no estimates for this type of activity—classified here as "barter financing"—we cannot deny that it is widespread wherever individually operated, small-scale agriculture or handicrafts prevail. In growing countries which expanded over what was virtually virgin territory (e.g. the United States, Canada, Australia, and many Latin-Amer-

[17] Goldsmith, *op. cit.*

ican countries) this type of *net* capital formation may have been quite large during the period of extensive expansion, both absolutely and relative to total capital formation. In the older underdeveloped countries, where agriculture still plays a dominant part, the maintenance of capital, and therefore barter financing of *gross* capital formation at least, may also be substantial.

It follows that in the developed countries the trend in the share of barter financing in total capital formation, gross or net, must definitely have been downward after extensive expansion had slowed down or come to an end, and after the relative shares of agriculture and other industries somewhat removed from the complex network of the money and credit system had declined. Moreover, the share of barter-financed capital formation in gross, and perhaps also in net, capital formation is probably much higher in underdeveloped than in developed countries.

2. Theoretically, barter can also be used for external financing, but this type of financing would hardly be significant. We can therefore assume that external financing can emerge only with the help of money and similar means for systematic and extended transactions among different economic units.

But if flow of money and money funds are the precondition of external financing, their very fluidity creates difficulty in properly identifying and distinguishing external and internal financing. As already indicated, to link a specific source of funds with a specific use is purely arbitrary. Thus even if, for a single enterprise, both the depreciation reserves and gross value of physical assets accounts show offsetting changes, it does not follow that an item of durable capital equipment was internally financed. In the actual transaction, the capital goods seller may have advanced credit to the firm, but the latter may have used it in turn to finance some of its customers. Only by the convention of association of long-term sources with long-lived capital can we decide that internal financing was used in this instance.

A more important point, particularly for statistical measurement, is that "internality" and "externality" are relative concepts. In the above example the question was whether financing was internal for the given firm. However, what is external to a firm may be internal to an aggregate for an industry, and what is external to an industry may be internal to a broader aggregate, and so on. For a country as a whole, only foreign sources are external; all other financing of capital formation is, by definition, internal. And for the world as

a whole there can be no external financing. The basic unit used to determine internal and external financing must, therefore, be clearly stated before the differences can be discussed. For our purposes this unit is the ultimate smallest ownership unit using a specific capital good. Thus a man borrowing funds to build a house for himself is, to the extent of the loan, receiving "external" financing, although the lender may be another individual and although for individuals as a whole this transaction is internal. Likewise, a firm whose accumulated depreciation reserves are used by another firm in the same industry is treated as a lender, engaged in "external" financing. The important distinction between external and internal financing is *not* that the former involves, and the latter does not involve, extensive operations by financial institutions. (A person financing his own house internally may still need to call upon scores of financial institutions to honor his checks or claims.) The difference is rather that with internal financing the prospective user of the capital good can make all necessary decisions, whereas with external financing the approval of the lender must be obtained.

In conjecturing about the long-term trends in the distribution between internal and external financing, the residential housing component of capital formation must be distinguished from the other major component, business capital. For residential and related housing in the United States, there is some evidence that the share of *external* financing rose in the long run, say since the 1870's and even since the 1900's, and that, correspondingly, the share of internal financing declined. These trends are observed in both net and gross additions to the stock of housing. The chief reason for these movements is obvious: in the earlier decades facilities for external financing were, if not absent, so limited that individuals could not easily get long-term credit to finance the construction or purchase of homes; but with the development of financing facilities this situation was eased and credit was extended more readily. Offhand, I would expect that a similar trend developed in countries whose growth was not unlike that of the United States, e.g. Canada and perhaps Australia. For other countries I hesitate even to guess.

The trends in the financing of business capital formation may well have been different. In the early decades of the nineteenth century, before the corporate form of organization had begun to develop and before security markets with broad coverage had been established, much of the financing must have been internal. At any rate, it is difficult to envisage as large a proportion of external financing in the

early decades as in the later years, which saw the development of modern methods for mobilizing large amounts of small savings and channeling them to the major capital-using enterprises. It was largely the railroads and, later, the other public utilities that provided the schools in which the methods of widespread external financing were learned (with some simpler lessons gleaned from the building of canals and turnpikes). Our supposition is, then, that the share of external financing in both net and gross business capital formation showed a secular rise, generally from the second to the last quarter of the nineteenth century (with some differences in the initial and terminal dates in the several countries).

However, this upward trend may have reached its peak in the early twentieth century when the expansion of the giant corporations may have reached its limit. The concomitant rise in the relative importance of the capital consumption allowance, a possible source of internal financing, may have prevented a possible further rise in the share of external financing in gross capital formation and may have even caused a reversal. In recent decades the share of external financing in *gross* business capital formation may have declined while its share in net capital formation may have risen.

To summarize, the rough picture suggested is a long-term swing in the share of external financing in business capital formation: for the gross ratio a sustained rise over several decades culminating early in the twentieth century, followed perhaps by a decline; for the net ratio a rise through the nineteenth century and into the twentieth, with no indication of a decline as yet. The share of undistributed profits of business enterprises in net capital formation, i.e. the share of internal financing, probably did not rise during the period studied.

Unfortunately, the data for the United States in Table III cannot be presented as evidence in support of these conjectures. All they show is that the shares of government in both net and gross savings rise somewhat and those of unincorporated enterprises decline. But the shares of savings by individuals other than farmers, which are probably the chief source of *external* financing, and the shares of savings by business, which are probably the chief source of *internal* financing, show no pronounced trends since the early twentieth century. There *is* some sign of a rise in the business share and of a decline in individuals' share in *gross* savings. But this is slight corroboration of our conjectures.

3. The distinction between private and public is applicable largely

to external financing; and there is little doubt that, in the process of economic growth, opportunities for public financing of capital formation have increased enormously and that, in consequence, the proportion of external funds that flowed through publicly organized channels must have grown at the expense of the share of flows through private channels. It seems quite likely that the proportion of publicly financed to *total* capital formation, whether for personal use (residential housing) or for business use, increased significantly in the long run. The development of the organization for the mortgage financing of residential housing and the development of the security markets for the financing of business capital formation by public utilities and large corporations both serve to strengthen this inference.

The causal relation between this trend in public external financing and the growing contribution of savings and capital formation to economic growth can hardly be exaggerated. The development of a financial organization that mobilized accumulated funds, that directed them into the channels that—against the background of the economy as a whole—seemed most promising, and, finally, that had the power—unaware though the active agents may have been of it—to create money and to generate forced savings was fundamental to economic growth in the developed countries. This extension of economic inventions, embodied in the financial system and in the legal forms of business organization and of business transactions, prevented, or at least minimized, the danger of widespread hoarding, on the one hand, and of misuse of savings, on the other. Without this organization, accumulated savings might have been misdirected, if only because the lender had to have the security of personal knowledge of the borrower or had to be near the place of investment in order to exercise some control over the use of his funds. One striking difference today between developed and underdeveloped countries is precisely in the extent to which the latter lack a well-organized, publicly established system for channeling savings into those types of capital formation that are recognized by the country-wide free market as being the most promising.

I know of no data by which the relative importance of private and public flows of savings into capital formation can be measured. Consequently, the magnitude of the trend so strongly suggested by history must also remain an unknown quantity. Nor can I say that the trend has run its course—that the proportion of external financing flowing through public channels has reached its maximum in most

developed countries. It is quite possible, however, that this point has been reached in the United States.

4. The growth and relative importance of intermediate financial institutions in channeling external financing to capital-users will be discussed by Goldsmith, and there is little need to dwell upon them here. By and large, one would expect the share of these institutions in external financing, and for that matter in total financing of capital formation—certainly net and perhaps even gross—to show a definite upward trend. This appears to have been true for the United States, and may well characterize developments in other countries, particularly if financial intermediaries are defined to include governments (with their responsibility for funds of social security systems, soldiers' insurance, etc.).

From our standpoint the major significance of this trend is the transfer of responsibility for the choice of investment, and hence indirectly of capital formation, from the individual saver to an institutional agent. The extent to which it affects the type of capital formation favored could be suggested only by a careful examination of financial intermediaries—of their investment policies, of their rules and methods of operation, and of their adaptability to long-term changes in conditions. I do not feel competent to undertake such an analysis.

5. These comments obviously bear on the whole complex of problems raised by the distinction between security-motivated savings and those available for financing venture capital. The distinction is important not only for individuals' savings—those of the lower income groups are assumed to be primarily security-motivated and those of the top income groups are assumed to be more readily available for financing venture capital. It is also relevant to corporate savings; the latter are quite large, particularly if taken gross of capital consumption allowances. Without any knowledge of the investment practices of individual savers at various income levels, of business corporations in different industries, and of financial intermediaries, it is not easy even to make conjectures.

Offhand, one might argue that if, as we suggest, the shares of internal financing and of private financing declined and the share of external financing through financial intermediaries rose, the proportion of savings available for truly risky and venturesome capital formation probably declined. But it is easy to exaggerate the bearing of these trends upon the supply of funds for venture capital. In the first place, *external* financing, private or public, was rarely

available for truly risky capital formation—except when the latter was supported by some public guarantee or privileged status (e.g. as in the case of railroads). The genuinely experimental ventures, the spark plugs of technological change, were financed internally. (We include here loans from relatives, friends, etc.) If external funds have never really served true venture capital, the trends in their share of financing are not relevant here; they are not necessarily less effective now than they were in the past in extensions of tested new ventures.

Second, the decline in the share of internal financing in capital formation may not have been any greater than the recession in the relative needs for venture capital formation that accompanies economic development. More important, the growth in size and economic strength of business units increased their command over internal financing (particularly if gross savings are considered) and may well have made for a greater ease in allocating a larger proportion of internal funds to exploratory and venturesome uses. It is conceivable that in many developed countries the long-term shifts from the personal and individual to the institutional type of organization were accompanied by an increase in economic power and reserves and by a growing conviction, based on past experience, of the value of exploratory and venturesome uses of funds to stimulate the improvement of old and the discovery of new methods of production, types of goods, and devices for organizing economic activity. It may therefore be misleading to translate trends in form of organization into trends in character of function discharged; a less venturesome type of organization may still operate more daringly. At any rate, this question, which has been discussed to some extent (e.g. by Schumpeter and Galbraith in connection with the effects of monopolistic organization on the performance of the capitalist system in the United States), needs further serious consideration.

The comments in this section were colored largely by the experience of the United States,[18] and my conjectures about trends were derived from general knowledge of institutional changes in the process of growth of our business economy. Some of these suppositions would probably have to be modified, perhaps not decisively,

[18] In fact, they are based partly on Goldsmith (*op. cit.*), partly on past and current studies of the National Bureau of Economic Research relating to trends in capital formation and financing in the United States.

to fit the experience of other business economies. Inferences about the structure of financing in underdeveloped countries can be made easily. One would expect to find many of the features that characterized the early phases of the trends in the developed countries: larger shares of "barter" and internal financing; and within external financing, larger shares of private than of public, of immediate than of intermediate, but not necessarily of venturesome than of security-motivated, financing. But further speculation is pointless. Our chief purpose in writing this section was to suggest plausible inferences that might indicate the directions that further thinking and exploration should take. Because data are practically nonexistent, we could not present a summary of evidence that would be acceptable, even one subject to limitations of scope and accuracy similar to those indicated in the first two sections.

APPENDIX A

Statistical Tables

TABLE I-1

Proportions of Domestic Capital Formation to National Product, Recent Years

COUNTRY	DGCF AS % OF GNP		DNCF AS % OF NNP	
	1938	*1947-1952*[a]	*1938*	*1947-1952*[a]
1. United States	11.3	17.9	2.2	11.6
2. Canada	14.9	22.5	4.5	15.0
3. United Kingdom	10.4	13.3	[b]	[b]
4. France	[b]	18.6[c]	[b]	9.2[c,d]
5. Germany, F.R.	19.2[e]	23.2[f]	[b]	[b]
6. Italy	18.9	20.5[g]	11.3	13.1[g]
7. Ireland	8.8	14.3	6.7	12.0
8. Netherlands	11.1	24.5[g]	1.7	15.7[g]
9. Belgium[h]	[b]	16.1[f]	[b]	[b]
10. Denmark	13.7	17.6	[b]	[b]
11. Norway	21.5	30.9	6.9	16.0
12. Sweden	18.8	19.6	[b]	[b]
13. Austria	[b]	21.1[f]	[b]	15.3[f]
14. Portugal[h]	12.8	13.1	[b]	[b]
15. Greece	12.7	17.0	[b]	[b]
16. Iceland[h]	[b]	30.5	[b]	[b]
17. Finland[h]	22.6	30.0[f]	[b]	22.6[f]
18. Australia	21.9	30.8	17.0	26.8
19. New Zealand	19.2	23.4	13.6	18.7
20. Philippines	[b]	10.6	[b]	6.8
21. Ceylon[h]	5.6	10.0	[b]	[b]
22. Southern Rhodesia	[b]	[b]	[b]	44.9
23. Chile	12.9[i]	13.2[j]	8.8[i]	10.3[j]
24. Guatemala	[b]	10.8	[b]	[b]
25. Honduras	8.7	13.0	3.1	8.4
26. Mexico[h]	9.7[k]	14.0[j]	3.9[k]	7.5[j]
27. Peru	[b]	23.1	[b]	10.9

[a] Percentages of totals for the period.
[b] No data.
[c] Data for 1949-1952.
[d] Unadjusted for depreciation on government capital.
[e] Data for 1936.
[f] Data for 1948-1952.
[g] Data for 1947-1951.
[h] Capital formation excludes changes in stocks.
[i] Data for 1940.
[j] Data for 1947-1950.
[k] Data for 1939.

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TABLE I-1 (cont.)

Lines	Source
1-16	*Statistics of National Product and Expenditure, 1938, 1947 to 1952*, Organisation for European Economic Co-operation, Paris, 1954.
17-27	*Statistics of National Income and Expenditure*, Statistical Paper, Series H, No. 6, United Nations, August 1954.

All underlying totals are in current prices. In this and subsequent tables:
DGCF = Domestic Gross Capital Formation
DNCF = Domestic Net Capital Formation
GNP = Gross National Product
NNP = Net National Product
NDP = Net Domestic Product

TABLE I-2

Proportions of Domestic Capital Formation to National Product, the 1920's

Country	*Period*	*DGCF as % of GNP*	*DNCF as % of NNP*
United States	1925-1930	19.8	12.0
Great Britain	1924-1930	13.0	5.4
France	1927-1930	9.8(8.4)	7.0(5.6)
Germany	1925-1930	15.5	8.2
Netherlands	1925-1930	19.4	15.3
Switzerland	1925-1930	19.3	12.7

Source: All underlying data are in current prices.

The percentages are arithmetic means of percentages for single years, except for the allowance for inventories in France, which is based on the net changes in short-term credit balances for the period as a whole. The figures in parentheses are for shares excluding inventories.

The underlying estimates of capital formation are from J. Marschak and W. Lederer, *Kapitalbildung*, London, William Hodge, 1936, supplemented for Germany by those in "Kapitalbildung und Investitionem in der deutschen Volkswirtschaft, 1924 bis 1928," *Vierteljahrshefte für Konjunkturforschung*, Sonderheft 22, Berlin, 1931. For Switzerland they are based on money flows. The underlying estimates of net national product are from Colin Clark, *Conditions of Economic Progress*, 2nd ed., London, Macmillan, 1951, except those for the Netherlands which are from *Het Nationale Inkomen van Nederland, 1921-1939*, Central Bureau of Statistics.

TABLE I-3

Proportions of Domestic Capital Formation to National Product, Long Series

A. United States

Decade	*DGCF as % of GNP*	*DNCF as % of NNP*	*Depreciation as % of DGCF*
1. 1869-1878	21.7	13.9	42.8
2. 1879-1888	21.0	13.8	39.7
3. 1889-1898	22.9	14.6	43.0
4. 1899-1908	21.5	12.8	46.5
5. 1909-1918	19.4	10.7	50.1
6. 1919-1928	20.6	8.8	62.4
7. 1929-1938	14.8	2.3	86.7
8. 1939-1948	28.5	11.4	67.8
Average, lines 1-4	21.8	13.8	43.0
Average, lines 5-8	20.8	8.3	66.8

Source: The percentages are based on decade estimates in current prices. These estimates, prepared by the National Bureau of Economic Research, are revisions and extensions of the series published originally in Simon Kuznets' *National Product since 1869* (National Bureau of Economic Research, 1946). The revisions and extensions were completed recently for the study of capital formation and financing, and will be published in the summary volume of that study.

B. United Kingdom

Decade	*DGCF as % of GNP*	*DNCF as % of NNP*	*Depreciation as % of DGCF*
1870-1879	10.5	8.7	18.8
1880-1889	9.2	7.4	21.2
1890-1899	9.7	7.9	20.5
1900-1909	10.6	8.8	18.7
1904-1913	9.4	7.6	21.0

Source: The percentages are based on decade averages in current prices. The underlying data are estimates of capital formation (excluding changes in inventories) prepared by A. K. Cairncross and cited by J. H. Lenfant in "Great Britain's Capital Formation, 1865-1914," *Economica*, May 1951, pp. 151-168; and changes in inventories estimated by E. H. Phelps Brown and S. J. Handfield-Jones in "The Climacteric of the 1890's: A Study in the Expanding Economy," *Oxford Economic Papers*, New Series, October 1952, p. 305. The national product estimates are those of A. R. Prest, "National Income of the United Kingdom, 1870-1946," *Economic Journal*, March 1948, pp. 31-62.

For 1923-1939, Colin Clark estimates *net* domestic additions to capital to be 20 billion I.U. (*The Conditions of Economic Progress*, 2nd ed., London, Macmillan, 1951, p. 494). For Great Britain, excluding Ireland, the approximate total national income for the same period is 374 billion I.U. (see *ibid.*, p. 63). The ratio of net domestic capital formation to national income for 1924-1939 is, then, about 5 per cent.

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TABLE I-3 (cont.)

C. Sweden

Decade	*DGCF as % of GNP*	*DNCF as % of NNP*	*Depreciation as % of DGCF*
1861-1870	6.3	3.8	(42)
1871-1880	9.6	5.8	(42)
1881-1890	11.6	7.1	(42)
1891-1900	14.8	8.6	45.9
1901-1910	18.7	12.2	40.0
1911-1920	21.0	14.1	38.3
1921-1930	19.7	11.9	45.2

Source: The percentages are based on decade averages in current prices. Based on estimates in Eric Lindahl, Einar Dahlgren, and Karin Kock, *National Income of Sweden, 1861-1930*, London, King, 1937, Parts One and Two, particularly the details in Part Two.

The underlying totals of capital formation exclude changes in inventories.

Depreciation was not given for the first three decades and we assumed that it formed 42 per cent of domestic gross capital formation. Net national product was adjusted to exclude the imputed income on consumers' durables other than houses. Gross national product was computed as the sum of net national product and depreciation.

A comparison of the estimates in this table (and in Table II-4,C), relating to gross domestic and total capital formation proportions, with a new set based upon recent and still unpublished work of Dr. Olof Lindahl provides fair confirmation of the levels and trends shown here. The new estimates suggest somewhat lower capital formation proportions, but the trend movements are about the same.

D. Canada

PERIOD	DGCF AS % OF GNP		DNCF AS % OF NNP		DEPRECIATION[a] AS % OF DGCF	
	Incl. Inv.	*Excl. Inv.*	*Incl. Inv.*	*Excl. Inv.*	*Incl. Inv.*	*Excl. Inv.*
Buckley						
1. 1901-1910	27.5	23.8	19.4	15.3	36.4	42.1
2. 1911-1920	22.7	19.8	14.1	10.9	44.0	50.5
3. 1921-1930	19.2	17.4	10.2	8.2	52.2	57.6
4a. 1926-1930	21.1	18.5	12.4	9.4	47.4	54.1
Firestone						
4b. 1926-1930		21.2		12.5		47.1
5. 1931-1940		13.8		4.2		72.7
6. 1941-1950		16.9		9.9		45.9

[a] Assuming that depreciation was 10 per cent of gross national product (following Buckley) for lines 1-5.

Source: Based on averages in current prices for specified periods.

Lines 1 to 4a based on estimates in K. A. H. Buckley's "Real Investment in Canada, 1900 to 1930," doctoral thesis, London School of Economics, manuscript, June 1950, pp. 119 and 178.

Lines 4b to 6 based on estimates of domestic capital formation and gross national product for 1926-1940 by O. J. Firestone in *Private and Public Investment in Canada, 1926-1951*, Ottawa, Department of Trade and Commerce, 1951. Product and depreciation estimates since 1941 are from successive publications on National Accounts of the Dominion Bureau of Statistics, particularly for 1941-1948, 1942-1949, and 1950.

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TABLE I-3 (cont.)

E. France

Period	*Domestic Net Savings*[a] (*billions of francs*)	*National Income*[b] (*billions of francs*)	*DNCF as % of NNP*
1853-1878	1.90	22.2	8.5
1878-1903	1.37	29.6	4.6
1903-1911	2.04	36.2	5.6

[a] René Pupin in *La Richesse de la France devant la Guerre* (Paris, Marcel Rivière, 1916), p. 111, gives estimates of average annual total savings (private, after deduction of losses) as follows: for 1853-1878, 2.20 billion francs; for 1878-1903, 2.04 billion francs; and for 1903-1911, 3.50 billion francs. From these are subtracted estimates of net foreign investment. Harry D. White in *The French International Accounts, 1880-1913* (Harvard University Press, 1933), pp. 121-122, shows net foreign investment balance at the beginning of 1880 to be 9 billion francs. On the assumption that the net outstanding balance was close to zero in 1853, the annual average of net capital exports, 1853-1880, was about 0.30 billion francs. White's estimates of net capital exports as revised by Carl Iversen in *Aspects of the Theory of International Capital Movements* (London, Oxford, 1935), p. 344, are: for 1880-1903, 0.67 billion francs, and for 1903-1911, 1.46 billion francs.

[b] Colin Clark, *The Conditions of Economic Progress*, 2nd ed., London, Macmillan, 1951, p. 80.

F. Denmark

Period	*DGCF as % of GNP*	*DNCF as % of NDP*	*Depreciation as % of DGCF*
1. 1870-1879	13.6	9.5	33.6
2. 1880-1889	12.1	7.9	37.4
3. 1890-1899	14.7	10.7	30.8
4. 1900-1909	15.6	10.6	36.2
5. 1905-1914	14.6	9.4	39.2
6. 1915-1920	10.3	3.2	70.8
7. 1921-1929	10.8	5.4	52.5
8. 1930-1939	13.6	8.7	39.8
9. 1940-1946	9.9	4.3	58.8
10. 1947-1952	17.0	9.7	47.6
Average, lines 1-4	14.0	9.7	34.5
Average, lines 4, 5, 7, 8	13.7	8.5	41.9

Source: All percentages are based on decade averages in current prices. Capital formation excludes net changes in inventories. The underlying estimates by Kjeld Bjerke are given in "The National Product of Denmark, 1870-1952," *Income and Wealth, Series V*, Cambridge, Eng., Bowes & Bowes for International Association for Research in Income and Wealth, in press. The ratios are to gross national product and to net domestic product. Depreciation includes the net balance of foreign factor payments.

The averages do not cover the 1915-1920 and 1940-1950 periods in order to exclude the extraordinary effect of war.

TABLE II-1

Proportions of Foreign Investment to Domestic Capital Formation and to National Product, and of Total Capital Formation to National Product, Recent Years

COUNTRY	FOREIGN INVESTMENT AS % OF DGCF		FOREIGN INVESTMENT AS % OF DNCF		FOREIGN INVESTMENT AS % OF GNP		FOREIGN INVESTMENT AS % OF NNP		GCF AS % OF GNP		NCF AS % OF NNP	
	1938	*1947-1952*[a]	*1938*	*1947-1952*[a]	*1938*	*1947-1952*[a]	*1938*	*1947-1952*[a]	*1938*	*1947-1952*[a]	*1938*	*1947-1952*[a]
1. United States	13.2	10.2	76.3	17.0	1.5	1.8	1.6	2.0	12.8	19.7	3.8	13.5
2. Canada	14.3	.8	53.6	1.3	2.1	.2	2.4	.2	17.1	22.7	6.9	15.2
3. United Kingdom	−10.4	−4.0	[b]	[b]	−1.1	−.5	[b]	[b]	9.3	12.8	[b]	[b]
4. France	[b]	−.6[c]	[b]	−1.4[c,d]	[b]	−.1[c]	[b]	−.1[c,d]	[b]	18.5[e]	[b]	9.1[c,d]
5. Germany, F.R.	0[e]	−1.0[f]	[b]	[b]	0[e]	−.2[f]	[b]	[b]	19.2[e]	22.9[f]	[b]	[b]
6. Italy	−5.2	−14.3[g]	−9.4	−24.4[g]	−1.0	−2.9[g]	−1.1	−3.2[g]	17.9	17.5[g]	10.3	9.9[g]
7. Ireland	−5.0	−64.4	−6.8	−78.6	−.4	−9.2	−.5	−9.5	8.4	5.1	6.2	2.6
8. Netherlands	27.8	−19.7[g]	204.4	−34.5[g]	3.1	−4.8[g]	3.4	−5.4[g]	14.2	19.7[g]	5.1	10.3[g]
9. Belgium[h]	[b]	2.2[f]	[b]	[b]	[b]	.4[f]	[b]	[b]	[b]	16.5[f]	[b]	[b]
10. Denmark	11.4	−8.9	[b]	[b]	1.6	−1.6	[b]	[b]	15.3	16.0	[b]	[b]
11. Norway	6.7	−14.2	24.7	−33.3	1.4	−4.4	1.7	−5.3	22.9	26.5	8.6	10.7
12. Sweden	−2.3	−.1	[b]	[b]	−.4	−.02	[b]	[b]	18.4	19.6	[b]	[b]
13. Austria	[b]	−22.6[f]	[b]	−33.5[f]	[b]	−4.8[f]	[b]	−5.1[f]	[b]	16.3[f]	[b]	10.2[f]
14. Portugal[h]	−51.1	−55.5	[b]	[b]	−6.5	−7.3	[b]	[b]	6.2	5.8	[b]	[b]
15. Greece	−25.3	−76.7	[b]	[b]	−3.2	−13.1	[b]	[b]	9.5	4.0	[b]	[b]
16. Iceland[h]	[b]	−25.6	[b]	[b]	3.6	−7.8	[b]	[b]	[b]	22.7	[b]	[b]
17. Finland[h]	6.1	5.8[f]	[b]	8.5[f]	1.4	1.7[f]	[b]	1.9[f]	24.0	31.8[f]	[b]	24.6[f]
18. Australia	−11.9	−5.7	−16.3	−6.9	−2.6	−1.8	−2.8	−1.9	19.3	29.0	14.2	24.9
19. New Zealand	−13.6	2.7	−20.7	3.6	−2.6	.6	−2.8	.7	16.6	24.0	10.7	19.4
20. Philippines	[b]	−35.1	[b]	−56.7	[b]	−3.7	[b]	−3.9	[b]	6.9	[b]	3.0

(cont. on next page)

TABLE II-1 (cont.)

COUNTRY	FOREIGN INVESTMENT AS % OF DGCF 1938	FOREIGN INVESTMENT AS % OF DGCF 1947-1952[a]	FOREIGN INVESTMENT AS % OF DNCF 1938	FOREIGN INVESTMENT AS % OF DNCF 1947-1952[a]	FOREIGN INVESTMENT AS % OF GNP 1938	FOREIGN INVESTMENT AS % OF GNP 1947-1952[a]	FOREIGN INVESTMENT AS % OF NNP 1938	FOREIGN INVESTMENT AS % OF NNP 1947-1952[a]	GCF AS % OF GNP 1938	GCF AS % OF GNP 1947-1952[a]	NCF AS % OF NNP 1938	NCF AS % OF NNP 1947-1952[a]
21. Ceylon[h]	−56.4	−12.7	[b]	[b]	−3.2	−1.3	[b]	[b]	2.4	8.7	[b]	[b]
22. Southern Rhodesia	[b]	[b]	[b]	−77.1	[b]	[b]	[b]	−34.6	[b]	[b]	[b]	10.3
23. Chile	−5.3[i]	−5.5[j]	−8.1[i]	−7.2[j]	−.7[i]	−.7[j]	−.7[i]	−.7[j]	12.2[i]	12.4[j]	8.1[i]	9.6[j]
24. Guatemala	[b]	5.4	[b]	[b]	[b]	.6	[b]	[b]	[b]	11.4	[b]	[b]
25. Honduras	16.7	−16.0	48.8	−25.8	1.4	−2.1	1.5	−2.2	10.1	10.9	4.7	6.3
26. Mexico[h]	26.2[k]	−4.1[j]	69.7[k]	−8.2[j]	2.6[k]	−.6[j]	2.7[k]	−.6[j]	12.3[k]	13.4[j]	6.6[k]	6.9[j]
27. Peru	[b]	−8.2	[b]	−20.0	[b]	−1.9	[b]	−2.2	[b]	21.2	[b]	8.7

[a] Percentages of totals for the period.
[b] No data.
[c] Data for 1949-1952.
[d] NNP and NCF unadjusted for depreciation on government capital.
[e] Data for 1936.
[f] Data for 1948-1952.
[g] Data for 1947-1951.
[h] Capital formation excludes changes in stocks.
[i] Data for 1940.
[j] Data for 1947-1950.
[k] Data for 1939.
Source: Same as for Table I-1.

TABLE II-2

Proportions of Foreign Investment to Domestic Capital Formation and to National Product, and of Total Capital Formation to National Product, the 1920's

Items	*United States, 1925-1930*	*Great Britain, 1925-1930*	*France, 1927-1930*	*Germany, 1925-1930*	*Netherlands, 1925-1930*	*Switzerland, 1925-1930*
Foreign investment as % of						
Domestic NCF	5.1	26.9	31.2	—24.3	14.4	7.7
Domestic GCF	2.8	9.7	20.8	—1.2	10.7	4.5
NNP	.7	1.3	2.0	—.8	2.0	.9
GNP	.6	1.2	2.0	—.8	2.0	.9
Total CF as % of NP						
Net, of NNP	12.7	6.6	9.0	7.4	17.4	13.6
Gross, of GNP	20.4	14.1	11.7	14.7	21.4	20.2

Source: Same as for Table I-2.

TABLE II-3

Capital Exports (+) and Imports (−)
Compared with National Income, 1921-1938
(*capital movements, millions of $; national income, billions of I.U.*)

COUNTRY[a]	CAPITAL MOVEMENTS, TOTALS *1921-1929* (1)	*1930-1938* (2)	*1921-1938* (3)	CAPITAL MOVEMENTS PER YEAR *1921-1938* (4)	NATIONAL INCOME PER YEAR[b] (5)	CM PER YEAR AS % OF NI PER YEAR (6)
A. Creditors						
France	+3,037	−94	+2,943	+163.5	12.53	+1.30
Netherlands	+414	−127	+287	+15.9	2.884	+.55
Sweden	+303	+104	+407	+22.6	1.941[c]	+1.16
Switzerland	+327	−379	−52	−2.9	1.556 (1924-1938)	−.19
United Kingdom (1921)	+3,425	−893	+2,532	+148.9	23.38 (1924-1938)	+.64
United States	+5,990	−4,964	+1,026	+57.0	75.92	+.08
B. Developed & semideveloped debtors						
Argentina	−806	−272	−1,078	−59.9	3.95 (1935)	−1.52
Australia (1938)	−1,332	−58	−1,390	−81.8	3.233 (1921-1937)	−2.53
Canada	+43	+70	+113	+6.6	5.102 (1921-1937)	+.13
Czechoslovakia (1921-1924, 1938)	+208	+70	+278	+21.4	3.5 (1925, 1929, 1937)	+.61
Denmark	−112	+65	−47	−2.6	1.512 (1925-1938)	−.17
Finland (1921)	−32	+190	+158	+9.3	.711 (1924, 1926, 1929, 1938)	+1.31
Germany (1921-1923; 1936-1938)	−3,965	+460	−3,505	−292.1	19.85 (1925-1935)	−1.47
Japan (1937-1938)	−1,031	+346	−685	−42.8	8.85 (1921-1936)	−.48
Latvia (1921, 1938)	−6	+26	+20	+1.25	.361 (7 scattered years, 1925-1938)	+.35
New Zealand	−189	−13	−202	−11.2	.962 (1925-1938)	−1.16
Norway (1921-1922)	−131	+24	−107	−6.7	.731 (1923-1938)	−.92
Union of South Africa (1921-1922, 1938)	−268	−37	−305	−20.3	1.371 (1923-1937)	−1.48

(cont. on next page)

TABLE II-3 (cont.)
(*capital movements, millions of $; national income, billions of I.U.*)

COUNTRY[a]	CAPITAL MOVEMENTS, TOTALS *1921-1929* (1)	*1930-1938* (2)	*1921-1938* (3)	CAPITAL MOVEMENTS PER YEAR *1921-1938* (4)	NATIONAL INCOME PER YEAR[b] (5)	CM PER YEAR AS % OF NI PER YEAR (6)
C. Underdeveloped debtors						
Bulgaria	−48	+13	−35	−2.7		
Hungary (1921-1922, 1938)	−297	+3	−294	−19.6	1.231 (1924-1936, 1938)	−1.59
India (1921-1922)	−386	+155	−231	−14.4		
Lithuania (1921-1923, 1938)	+18	+5	+23	+1.6		
Netherlands Indies (1921-1924)	+160	+217	+377	+26.9		
Poland (1921-1922, 1938)	−332	+20	−312	−20.8	4.55 (1926, 1928, 1929, 1938)	−.46
Yugoslavia (1921-1923, 1925, 1937-1938)	−26	−82	−108	−9.0	1.48 (1925, 1929, 1938)	−.61
Recapitulation						
A countries	+13,496	−6,353	+7,143			
B countries	−7,621	+871	−6,863			
C countries	−911	+331	−600			
Sums						
All capital exports	+13,925	+1,768	+8,164			
All capital imports	−8,961	−6,919	−8,351			
Discrepancy to balance	−4,964	+5,151	+187			

[a] Years for which capital movements are not available are given in parentheses.

[b] Years included are given in parentheses.

[c] Average of real product per worker (1921-1938) multiplied by number of workers (average for 1920, 1930, and 1940).

Column — Source

1-4 Derived from *International Capital Movements during the Inter-War Period*, United Nations, October 1949, Table 1, pp. 10-12. Only those countries were included here for which at least five years out of a nine-year period were reported.

5 From Colin Clark, *The Conditions of Economic Progress*, 2nd ed., London, Macmillan, 1951.

TABLE II-4

Proportions of Foreign Investment to Domestic Capital Formation and to National Product, and of Total Capital Formation to National Product, Long Series

A. United States

DECADE	FOREIGN INVESTMENT AS % OF *DNCF*	*DGCF*	*NNP*	*GNP*	TOTAL CAPITAL FORMATION *Net as % of NNP*	*Gross as % of GNP*
1. 1869-1878	—10.7	—6.2	—1.5	—1.3	12.3	20.4
2. 1879-1888	—3.0	—1.8	—.4	—.4	13.4	20.7
3. 1889-1898	1.1	.6	.2	.1	14.7	23.1
4. 1899-1908	8.8	4.7	1.1	1.0	13.9	22.5
5. 1909-1918	25.4	12.7	2.7	2.5	13.5	21.9
6. 1919-1928	21.1	7.9	1.9	1.6	10.7	22.2
7. 1929-1938	24.6	3.3	.6	.5	2.8	15.3
8. 1939-1948	10.0	3.2	1.1	.9	12.5	29.5
Average, lines 1-4	—1.0	—.7	—.2	—.2	13.6	21.7
Average, lines 5-8	20.3	6.8	1.6	1.4	9.9	22.2

Source: Same as for Table I-3, A.

B. United Kingdom

Items	*1870-1879*	*1880-1889*	*1890-1899*	*1900-1909*	*1904-1913*
Foreign investment as % of					
Domestic NCF (I)	54.2	78.8	46.2	51.1	95.8
Domestic NCF (C-L)	34.4	51.5	29.1	38.3	84.0
Domestic GCF (I)	44.0	62.1	36.7	41.6	75.6
Domestic GCF (C-L)	27.9	40.6	23.1	31.1	66.3
NNP (I)	4.7	5.8	3.6	4.5	7.3
NNP (C-L)	3.0	3.8	2.3	3.4	6.4
GNP (I)	4.6	5.7	3.6	4.4	7.1
GNP (C-L)	2.9	3.7	2.2	3.3	6.3
Total capital formation as % of NP					
Net, of NNP (I)	13.4	13.2	11.5	13.3	14.9
Net, of NNP (C-L)	11.7	11.2	10.2	12.1	14.0
Gross, of GNP (I)	15.1	14.9	13.3	15.0	16.6
Gross, of GNP (C-L)	13.4	12.9	12.0	13.9	15.7

Source: See notes to Table I-3, B. The lines marked C-L use estimates of net capital exports shown by Cairncross-Lenfant. Those marked I are based on estimates by Albert H. Imlah, in "British Balance of Payments and Export of Capital, 1816-1913," *Economic History Review*, Vol. v (1952), No. 2, pp. 208-239.

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TABLE II-4 (cont.)

C. Sweden

DECADE	FOREIGN INVESTMENT AS % OF *DNCF*	*DGCF*	*NNP*	*GNP*	TOTAL CAPITAL FORMATION *Net as % of NNP*	*Gross as % of GNP*
1861-1870	—49.8	—28.9	—1.9	—1.8	1.9	4.5
1871-1880	—46.9	—27.2	—2.7	—2.6	3.1	7.0
1881-1890	—79.4	—46.1	—5.6	—5.4	1.5	6.3
1891-1900	—20.7	—11.2	—1.8	—1.7	6.8	13.1
1901-1910	—27.2	—16.3	—3.3	—3.1	8.9	15.7
1911-1920	9.9	6.1	1.4	1.3	15.5	22.3
1921-1930	10.8	5.9	1.3	1.2	13.2	20.9

Source: Same as for Table I-3, C.

D. Canada

PERIOD	FOREIGN INVESTMENT AS % OF *DNCF*	*DGCF*	*NNP*	*GNP*	TOTAL CAPITAL FORMATION *Net as % of NNP*	*Gross as % of GNP*
Buckley (incl. inventories)						
1901-1910	—48.2	—30.7	—9.4	—8.4	10.1	19.1
1911-1920	—43.2	—24.2	—6.1	—5.5	8.0	17.2
1921-1930	—10.7	—5.1	—1.1	—1.0	9.1	18.2
1926-1930	—18.2	—9.6	—2.2	—2.0	10.1	19.1
Firestone (excl. inventories)						
1926-1930	—17.5	—9.3	—2.2	—2.0	10.3	19.3
1931-1940	39.6	10.9	1.7	1.5	5.9	15.3
1941-1950	20.6	11.2	2.0	1.9	11.9	18.7

Source: See notes to Table I-3, D. Foreign investment, 1926-1941, from *Public Investment and Capital Formation*, Ottawa, Dominion-Provincial Conference on Reconstruction, 1945.

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TABLE II-4 (cont.)

E. France

Period	Domestic Net Savings (billions of francs)	Net Capital Exports (billions of francs)	NCE as % of DNS
1853-1878	1.90	.30	16
1878-1903	1.37	.67	49
1903-1911	2.04	1.46	72

Period	National Income (millions of francs)	Capital Exports per Year (millions of francs)	CE as % of NI
1853-1878	22,200	300.0	1.4
1880-1889	28,000	486.5	1.7
1890-1899	29,500	648.0	2.2
1900-1909	35,500	1,367.5	3.9
1910-1913	38,500 (1911)	1,329.0	3.5

Source: Same as for Table I-3, E.

F. Denmark

PERIOD	FOREIGN INVESTMENT AS % OF DNCF	DGCF	NDP	GNP	TOTAL CAPITAL FORMATION Net as % of NDP	Gross as % of GNP
1. 1870-1879	−9.3	−6.2	−.9	−.8	8.6	12.8
2. 1880-1889	−29.4	−18.4	−2.3	−2.2	5.6	9.8
3. 1890-1899	−23.5	−16.3	−2.5	−2.4	8.2	12.3
4. 1900-1909	−23.4	−14.9	−2.5	−2.3	8.1	13.3
5. 1905-1914	−8.4	−5.1	−.8	−.7	8.6	13.9
6. 1915-1920	−106.5	−31.1	−3.5	−3.2	−.2	7.1
7. 1921-1929	+7.4	+3.5	+.4	+.4	5.8	11.1
8. 1930-1939	+22.8	+13.7	+2.0	+1.9	10.7	15.5
9. 1940-1946	+218.7	+90.1	+9.5	+9.0	13.9	18.9
10. 1947-1952	−14.6	−7.7	−1.4	−1.3	8.3	15.7
Average, lines 1-4	−21.4	−13.9	−2.1	−2.0	7.6	12.1
Average, lines 4, 5, 7, 8	−.4	−.7	−.2	−.2	8.3	13.5

Source: Same as for Table I-3, F.

(cont. on next page)

TABLE II-4 (cont.)

G. Australia

Period	National Income (1) (millions of £)	Capital Imports (−) or Exports (+) per Year (2)	CI or CE as % of NI (3)
1. 1871-1880		−4.06	
2. 1881-1890	152 (1886)	−16.18	−10.6
3. 1891-1900	190 (1892, 1894, 1898)	−6.31	−3.3
4. 1901-1910	273	+1.75	+.6
5. 1911-1920 (10.5 years)	398	−15.74	−4.0
6. 1921-1930 (9.5 years)	732	−25.03	−3.4

Column 1 Source

Line

4 Colin Clark, *The Conditions of Economic Progress*, 2nd ed., London, Macmillan, 1951, p. 140, average of 1901-1903 and 1913-1914.

5 *Ibid.*, 1913-1914 through 1920-1921; 1911 and 1912 assumed to be £300 million each.

6 *Ibid.*, 1921-1922 through 1929-1930.

2 & 3 Extrapolated from 1901-1903, by income in New South Wales, for 1892, 1894, and 1898 (line 3) and 1886 (line 2). Figures for New South Wales from *ibid.*, p. 145.

Column 2 Carl Iversen, *Aspects of the Theory of International Capital Movements*, London, Oxford, 1935, p. 402.

H. Japan

Period	National Income (billions of yen) (1)	Capital Imports (−) or Exports (+) per Year (millions of yen) (2)	CI or CE as % of NI (3)
1868-1895		negligible	negligible
1896-1913	2.81	−83.3	−3.0
1914-1919	7.97	+405.2	+5.1
1920-1929	11.63	−277.2	−2.4

Column Source

1 Shigeto Tsuru, "Long-Term Changes in the National Product of Japan since 1878," in *Income and Wealth, Series III*, Milton Gilbert, editor, Cambridge, Eng., Bowes & Bowes for International Association for Research in Income and Wealth, 1953.

2 E. P. Reubens, "Foreign Capital and Domestic Development in Japan," paper presented at Social Science Research Council Conference, Spring 1952.

TABLE II-5

Geographical Distribution of Foreign Investments, Three Main Creditor Countries, Eve of World War I

UNITED KINGDOM	% of Total	FRANCE	% of Total	GERMANY	% o Tot
Empire	47.3	Colonies	8.9	Europe	53.
Canada	13.7	Europe (incl. Asiatic		Austria-Hungary	12.
Australia	11.1	Turkey)	61.1	Turkey (in Asia)	7.
South Africa	9.8	Russia	25.1	Russia	7.
India & Ceylon	10.1	Turkey	7.3	Balkan States	7.
Other Europe	2.6	Balkan States	5.6	Spain & Portugal	7.
		Austria-Hungary	4.9	Rest	10.
United States	20.0	Spain & Portugal	8.7		
		Rest	9.5	Latin America	16.
Latin America	20.1				
Argentina	8.5	Latin America	13.3	U.S. & Canada	15.
Brazil	3.9				
Rest	7.7	Egypt, Suez, South		Africa (incl.	
		Africa	7.3	German colonies)	8.
Europe	5.8				
Russia	2.9	U.S. & Canada	4.4	Asia (incl.	
Rest	2.9			German colonies)	4.
		Asia	4.9		
Rest of world	6.7			Rest of world	2.
Total	100.0	Total	100.0	Total	100.
	(£3.76 bill.)		(45.0 bill. francs)		(23.5 bill. marks

Source: Herbert Feis, *Europe, the World's Banker, 1870-1914*, Yale University Press, 193(pp. 23, 51, and 74.

TABLE III

Distribution of Net and Gross Savings among Saver Groups, United States, Selected Periods since 1897
(*percentage shares*)

PERIOD	PERSONAL			BUSINESS CORPS.	GOVT. (INCL. NONPROFIT CORPS.)
	Nonagric. Individ.	*Farmers*	*Uninc. Business*		
			In Net Savings		
1897-1906	61.2	1.3	5.8	25.1	6.6
1907-1916	70.0	—5.8	3.6	23.9	8.3
1920-1929	62.8	—2.1	3.4	20.4	15.5
1920-1939	96.6	.9	—3.5	.6	5.3
1946-1949	51.8	7.2	1.4	25.3	14.3
			In Gross Savings (at Replacement Prices)		
1897-1906	43.3	8.1	8.4	33.5	6.8
1907-1916	46.1	3.8	6.0	35.6	8.4
1920-1929	40.2	4.1	6.3	36.5	12.9
1920-1939	42.8	6.6	4.9	35.8	9.9
1946-1949	36.1	8.0	4.4	36.8	14.6

Source: Based on averages of estimates (national accounting approach), in current prices, prepared by Raymond W. Goldsmith in *A Study of Saving in the United States* (Princeton University Press, 1955). Excludes savings embodied in consumer durable goods and in military goods.

APPENDIX B

Share of Depreciation in Gross Capital Formation and in Gross National Product and the Relation between Gross and Net Capital Formation Proportions

NOTATION

C_0 = net reproducible capital at beginning of time unit 0
G_0 = gross national product during time unit 0
P_0 = net national product during time unit 0
D_0 = depreciation during time unit 0
r = rate of growth of gross national product per time unit
f = proportion of gross capital formation to gross national product
a = proportion of depreciable gross capital formation to total gross capital formation
n = number of time units in life of depreciable capital

ASSUMPTIONS

We assume that:

1. The terms r, f, a, and n are constant. In calculating the stock of depreciable capital, such constancy has to be assumed for the finite period of n time units since no such capital that is older than n units survives. In calculating the stock of nondepreciable capital, the constancy must be assumed for an infinite number of time units since such capital never perishes and hence is accumulated from time immemorial.

It should be noted that the constancy assumed here is applied rigidly to facilitate the derivation of equations which are largely sums of geometric progressions. In application in empirical analysis, however, absolute invariance of these rates and proportions from one time unit to the next need not be implied: we can treat these rates and proportions as averages for the n time units (or as an average characterizing the capital stock at a given time) in which the weights have been so set as to yield a result identical with that yielded by a geometric progression applied to an invariable set of ratios or proportions.

2. The term r is positive. Unless it is, the stock of nondepreciable capital will have to be either infinitely large or determinable on grounds that cannot be defined by simple assumptions.

3. The absolute magnitudes—gross and net national product, depreciation, and capital stock—are all in constant prices.

4. Depreciation is calculated on a straight-line basis.

Derivation of Depreciable Capital Stock as a Sum of Past Depreciated Gross Capital Formation

Time Unit (1)	*GCF during Time Unit* (2)	*Fraction of (2) Entering Capital Stock, C_0* (3)	*Product of Entries in Columns 2 and 3 Unfolded as Sums* (4)	(5)	(6)	.....	
$-n$	$\frac{fG_0}{(1+r)^n}$	$a\cdot\frac{1}{n}$	$\frac{fG_0}{(1+r)^n}\cdot\frac{a}{n}$				1 term
$-n+1$	$\frac{fG_0}{(1+r)^{n-1}}$	$a\cdot\frac{2}{n}$	$\frac{fG_0}{(1+r)^{n-1}}\cdot\frac{a}{n}$	$+\ \frac{fG_0}{(1+r)^{n-1}}\cdot\frac{a}{n}$			2 terms
$-n+2$	$\frac{fG_0}{(1+r)^{n-2}}$	$a\cdot\frac{3}{n}$	$\frac{fG_0}{(1+r)^{n-2}}\cdot\frac{a}{n}$	$+\ \frac{fG_0}{(1+r)^{n-2}}\cdot\frac{a}{n}$	$+\ \frac{fG_0}{(1+r)^{n-2}}\cdot\frac{a}{n}$		3 terms
.	.	.	.	.	.		.
.	.	.	.	.	.		.
.	.	.	.	.	.		.
.	.	.	.	.	.		.
.	.	.	.	.	.		.
-2	$\frac{fG_0}{(1+r)^2}$	$a\cdot\frac{n-1}{n}$	$\frac{fG_0}{(1+r)^2}\cdot\frac{a}{n}$	$+\ \frac{fG_0}{(1+r)^2}\cdot\frac{a}{n}$	$+\ \frac{fG_0}{(1+r)^2}\cdot\frac{a}{n}$	$+\ \cdots\cdots$	$(n-1)$ terms
-1	$\frac{fG_0}{(1+r)}$	$a\cdot\frac{n}{n}$	$\frac{fG_0}{(1+r)}\cdot\frac{a}{n}$	$+\ \frac{fG_0}{(1+r)}\cdot\frac{a}{n}$	$+\ \frac{fG_0}{(1+r)}\cdot\frac{a}{n}$	$+\ \cdots\cdots$	n terms

Sums of columns beginning with column 4 $\quad \frac{a}{n}\left[\frac{fG_0}{r}-\frac{fG_0}{r(1+r)^n}\right]+\frac{a}{n}\left[\frac{fG_0}{r}-\frac{fG_0}{r(1+r)^{n-1}}\right]+\frac{a}{n}\left[\frac{fG_0}{r}-\frac{fG_0}{r(1+r)^{n-2}}\right]+\cdots\cdots\frac{a}{n}\left[\frac{fG_0}{r}-\frac{fG_0}{r(1+r)}\right]$

The number of sums above is n. Their sum is

$$\sum\sum=\frac{nafG_0}{nr}-\frac{afG_0}{nr}\left[\frac{1-(1+r)^{-n}}{r}\right]=\frac{afG_0}{r}\left[\frac{nr-1+(1+r)^{-n}}{nr}\right]$$

EQUATIONS

The basic procedure for deriving the equations is set forth in the accompanying summary, which shows the cumulative sum of depreciated capital (the stock of depreciable capital) but which can also be used to derive the other terms in the necessary equations. The arrangement demonstrates that the stock of capital at any given time is a sum (or a sum of sums) of geometric progressions over a period of finite n units for depreciable capital or of an infinite number for nondepreciable capital.

The stock of depreciable capital at the beginning of time unit 0 is thus equal to

$$\frac{afG_0}{r} \cdot \frac{nr - 1 + (1+r)^{-n}}{nr}$$

For n time units the accumulation of nondepreciable capital (from column 4 of the summary) is equal to

$$\frac{(1-a)fG_0}{r} \cdot [1 - (1+r)^{-n}]$$

But this is the cumulation of nondepreciable capital over n time units—the life of depreciable capital. At the beginning of the nth time unit preceding time unit 0 there already existed some nondepreciable capital which, by definition, persisted to time unit 0. Obviously, the cumulation of nondepreciable capital must be derived for a much larger number of time units. If for simplicity's sake we assume that this number is infinite and *provided* that r is larger than 0, i.e. positive, the stock of nondepreciable capital at the beginning of time unit 0 becomes

$$\frac{(1-a)fG_0}{r}$$

If r is negative, the stock of nondepreciable capital would be infinitely large—since a negative r extended over an infinity of time would mean that gross national product started declining from an infinitely high level and was accompanied by an infinitely large stock of capital.

Hence, on the assumption that r is positive, we can write the equation for the stock of capital at the beginning of time unit 0 as follows:[1]

[1] It is apparent that if *all* capital is nondepreciable—which means that gross and net capital formation are identical—equation 1 becomes

$$(1) \qquad C_0 = \frac{afG_0}{r} \cdot \frac{nr - 1 + (1+r)^{-n}}{nr} + \frac{(1-a)fG_0}{r}$$

It should be noted that the tabular arrangement, and hence the resulting equation, is based on the rule that capital formation during a given time unit is not subject to depreciation until the following time unit; that such capital formation is, as it were, concentrated toward the end of the time unit. A modification to assume that capital formation during a given time unit is subject to depreciation from the beginning of that unit, rather than from the beginning of the next, could easily be introduced.

From column 4 of the tabular arrangement we can also derive the equation for depreciation or capital consumption for time unit 0, D_0, on the assumption, we repeat, that it is calculated on a straight-line basis.

$$(2) \qquad D_0 = \frac{afG_0}{nr} \cdot [1 - (1+r)^{-n}]$$

SHARE OF DEPRECIATION IN GROSS CAPITAL FORMATION

If during time unit 0 the gross capital formation proportion equals f, the constant proportion assumed for the past, the share of depreciation in gross capital formation can be defined as

$$(3) \qquad \frac{D_0}{fG_0} = \frac{a[1 - (1+r)^{-n}]}{nr}$$

$$C_0 = \frac{fG_0}{r}$$

where

$G_0 = P_0 =$ national product

$f =$ *gross* or *net* capital formation proportion

$r =$ rate of growth in gross national product or net national product;

or, to put it differently: if we assume that $b =$ net capital formation proportion and $r' =$ rate of growth in P_0,

$$C_0 = \frac{bP_0}{r'}$$

and the capital-output ratio is obviously

$$\frac{C_0}{P_0} = \frac{b}{r'}$$

directly proportional to the net capital formation proportion and inversely proportional to the rate of growth in net national product.

This is a much simpler presentation than the one followed, but we prefer the latter because it permits us to define and analyze elements in the transition from gross to net capital formation.

The following conclusions can be derived:

1. The share of depreciation in gross capital formation is not affected by the value of f as long as f is assumed constant. In other words, if all other determinants are kept constant, the share of depreciation in gross capital formation is the same whether the constant gross capital formation proportion is 10, 15, or 50 per cent.

2. The share of depreciation in gross capital formation is directly proportional to a, the ratio of depreciable to total capital formation.

3. An increase in r will lower the share of depreciation in gross capital formation, since it will increase the denominator on the right-hand side of equation 3 more than the numerator. Thus, with $a = .75$ and $n = 40$, a change in r from say .03 to .05 will lower the share of depreciation in gross capital formation from .433 to .322. Conversely, a decline in r will raise the share of depreciation in gross capital formation.

4. An increase in n will lower the share of depreciation in gross capital formation and vice versa. The increase in the denominator of the fraction on the right-hand side of equation 3 is only partly offset by the increase in the numerator. Thus, with $a = .75$ and $r = .05$, a change in n from 20 to 40 will lower the share of depreciation in gross capital formation from .467 to .322.

5. Changes in the share of depreciation in gross capital formation produced by changes in either r or n are proportionally smaller than the latter. Changes in a alone are exactly proportional to changes in the shares.

These rather simple conclusions assume considerable interest in view of the trends suggested by the empirical evidence, at least for the United States. The rate of growth in gross national product, r, tends to decline; the average life of depreciable capital, n, tends to become shorter; and the proportion of depreciable to total gross capital formation, a, tends to be constant or perhaps increase slightly. If these findings are valid, all three variables in equation 3 raise the share of depreciation in gross capital formation.

SHARE OF DEPRECIATION IN GROSS NATIONAL PRODUCT

This share is given by the following equation:

$$\frac{D_0}{G_0} = \frac{af[1 - (1 + r)^{-n}]}{nr} \tag{4}$$

All the conclusions regarding the effects of changes in a, n, and r stated above apply here. The only modification is the addition of f

to the numerator of the fraction on the right-hand side of the equation. Thus the share of depreciation in gross national product is a direct function of f and changes in the latter would result in equal proportional changes in the former.

The comment concerning the effects of the determinants, as observed in the experience of the United States, on the share of depreciation in gross capital formation applies also to their effects on the share of depreciation in gross national product. The gross capital formation proportion, f, has on the whole been constant. Consequently, the decline in r and n and the rise, if slight, in a could raise the share of depreciation in gross national product.

RELATION OF NET TO GROSS CAPITAL FORMATION PROPORTIONS

Given differences or changes in n, r, or a, there will be different and changing relations between the gross and net capital formation proportions. To derive the latter from the former, we subtract depreciation from both the numerator (gross capital formation) and the denominator (gross national product). From equations 3 and 4 it is clear that depreciation forms one fraction of gross capital formation and another of gross national product; and the difference between the two varies with the changes in a, r, n, and f. However, it is important to state the relation between gross and net capital formation proportions explicitly.

From equation 3 it is apparent that *net* capital formation is

$$(5)\quad fG_0\left\{1-\frac{a[1-(1+r)^{-n}]}{nr}\right\}=fG_0\left\{\frac{nr-a[1-(1+r)^{-n}]}{nr}\right\}$$

Since net national product, P_0, equals G_0 minus D_0,

$$(6)\ P_0=G_0-\frac{afG_0}{nr}[1-(1+r)^{-n}]=G_0\left\{\frac{nr-af[1-(1+r)^{-n}]}{nr}\right\}$$

Hence b, the proportion of net capital formation to net national product, can be defined as

$$(7)\qquad b=f\left\{\frac{nr-a[1-(1+r)^{-n}]}{nr-af[1-(1+r)^{-n}]}\right\}$$

Equation 7 indicates clearly the relation between f and b. So long as r is positive and f is less than 1, the coefficient of f in equation 7 will be less than 1; and b will always be smaller than f.

APPENDIX C

Levels and Trends in Income Shares of Upper Income Groups

THE PROBLEM

Given top income groups, with their high savings-income ratio, would the assumption of persistent identity of the members and their descendants at the upper levels result in an upward trend in the shares of upper groups in country-wide income? Offhand, the answer might be in the affirmative, for two somewhat different reasons.

The first is the effect of concentration of savings. Since upper income groups save higher proportions of their income than lower groups, savings are more unequally distributed than income. This might mean that the upper groups accumulate income-yielding assets more rapidly than the lower groups. If so, there would be a greater concentration of such assets in the hands of a small group at the top, wider inequality in the distribution of property income, and, other conditions being equal, a rise in the shares of the given upper groups in *total* income. However, some reflection forces a modification of the argument. The distribution of income-yielding assets is already unequal at the initial date of the period for which an upward trend in upper income shares might be inferred. Since the upper income groups hold a larger than average proportion of income-yielding assets, they receive a larger than average share of property incomes. Therefore, the concentration of savings would result in an increasing concentration of income-yielding assets *only* if the inequality in the distribution of savings were wider than that in the distribution of *property* income, and, hence, wider than the inequality in the distribution of income-yielding assets.

But with this modification, the argument is valid and indeed suggests a mechanism operating to raise the income shares of upper income groups. To begin with an empirical example: during 1919-1938 the top 5 per cent of the total population in the United States accounted for 54 per cent of property income (see Simon Kuznets, *Shares of Upper Income Groups in Income and Savings*, National Bureau of Economic Research, 1953, Table 3, p. 18). If sample data permit any judgment, we can put the average share of the top 5 per cent in total savings (of individuals) during the same decades at about two-thirds (*ibid.*, Chap. 6, esp. pp. 182 ff.). If we assume these figures are continuous, the proportional additions to property holdings by the top 5 per cent group would be steadily greater than

those by the income groups below the top to *their* holdings. The 5 per cent group holds only 54 per cent of assets—assumed the same as their share in property income—but accounts for two-thirds of current savings, i.e. of net *additions* to assets. Hence, the share in total wealth of the top 5 per cent would tend to increase; and, other conditions being equal, so would their share in total property income. If the country-wide proportion of property to total income does not decline, and the distribution of service income is assumed unaffected, the share of the top 5 per cent in *total* income would increase. If this share rises, the proportion of total savings accounted for by the top 5 per cent might also rise; and the chain process would start operating again—to increase the concentration of income-yielding assets, to raise the shares of the top groups in property and in total income, and so on. The process is not without limits: at some point a rise in the share of upper groups in total income may not result in further concentration of savings. But so long as inequality in the distribution of savings is *wider* than that in the distribution of property income and of income-yielding assets, there would be, unless other factors intervened, a trend toward a higher share of upper groups in property and hence in total income.

The second reason for assuming a rising trend in the income share of the top group is that its superior position enables its members, or their descendants, to occupy a continuously rising position in the ladder of *service* incomes. To the extent that high service incomes follow from long and expensive training or from a strategic ownership position—in short, from either *acquired* skill or influence—a given top income group is presumably in a position to provide, for its members and their descendants, the bases for further rises.

We find, in fact, little evidence of a secular rise in the share of upper income groups, at least in the decades covering economic growth beyond the first turbulent phases of industrialization. This appendix is devoted to the formulation of factors that offset such a trend and explain why the forces indicated above have not operated as consistently and as effectively as one would expect offhand. The offsetting factors are discussed under three heads: the demographic growth differentials that produce a situation in which the top ordinal group at the initial point in the period cannot ordinarily people, through its descendants, an identical top ordinal group a few decades later (the mixture ratio); the factors that affect the per capita income of a top group and its descendants, on the assumption of continuity; the effect of mobility, i.e. of the abandon-

ment of the assumption of continuity that is accepted in the discussion under the first two heads.

THE MIXTURE RATIO

Assume a group in the population in year 0, at the top of the size distribution of income. If we let M stand for population and indicate the year by the subscript on the left and the percentage group from the top by the subscript on the right, total population in year 0 is ${}_0M_{100}$ and the top 5 per cent group (which we deal with here for illustrative purposes) is ${}_0M_5$.

If population grew from year 0 to year n at an annual rate, p,

$$(1) \qquad {}_nM_{100} = {}_0M_{100}(1+p)^n$$

or

$$(1a) \qquad {}_nM_5 = {}_0M_5(1+p)^n$$

An assumption crucial to the analysis in sections 2 and 3 is now introduced: that the individuals in the upper income group in year 0 and their descendants remain at their high relative position, i.e. within the top 5 per cent. On this assumption will the top 5 per cent group of year n be completely peopled by members or descendants of the top 5 per cent group of year 0?

If we designate the rate of increase of the number in the top income group of year 0 by ap, their descendants, D, can be described by the following equation:

$$(2) \qquad {}_nD_{0^5} = {}_0M_5(1+ap)^n$$

The *mixture ratio*, i.e. the ratio to the total number in the top group of year n of the number in that group who are *not* descendants of the top group of year 0, can be defined as

$$(3) \qquad \frac{{}_nM_5 - {}_nD_{0^5}}{{}_nM_5} = 1 - \frac{(1+ap)^n}{(1+p)^n}$$

In industrially advanced and rapidly growing countries, like the United States, a may be assumed to be much less than 1—the rate of increase of the top income group is much lower than the rate of growth of total population. Two reasons can be adduced for this. First, the rate of *natural* increase is lower for the upper income group because its birth rate is appreciably lower. Second, total population may increase because of the excess of in- over out-migration. Immi-

grants, however, are preponderantly in the low income groups. The first reason operates in all countries whose economic development has reached the stage of reduced death rates, differential impact of family limitation, and declining birth rates. The second operates only in countries with net immigration; the effect for countries with net emigration is the opposite.

Obtaining quantitative values for the first factor requires more knowledge than we now have concerning differences in rate of natural increase between upper and lower income groups. That these differences are pervasive and substantial can be seen from recent sample studies of income and budgets for the United States, in which a negative correlation exists between size of family and per capita income of the unit.[1] As to the immigration factor, a rough calculation shows that in the United States, of the total increase of 93.1 million in population from 38.6 million in 1870 to 131.7 million in 1940, only 68.9 million or about 70 per cent can be attributed to the natural increase of the native born of 1870.[2] The value of .5 for a used in the illustrative calculations of the mixture ratio is fairly realistic for a country like the United States for the period since 1870; indeed, it may be somewhat too high.

These calculations in Exhibit I show, as equation 3 indicates, that the mixture ratio is a positive function of p and n and an inverse function of a. For a country like the United States where p, on a per decade basis, varies from 10 to 30 per cent, with the average since 1870 close to 20, over a period of say 5 decades the mixture ratio can be as high as .35.

Two inferences are suggested:

1. Under the assumption of long-term continuity of the relative position of initial upper income groups and their descendants, the failure of such groups to reproduce themselves at as high a rate as total population means that the income share of an upper group will tend to decline—unless per capita incomes of the initial top groups and their descendants grow at higher rates than the per capita income of total population; or unless the new groups drawn upon attain, again under assumption of a *continuity* of standing, by a greater growth of their per capita income, a relative income excess much higher than that of their initial ancestors.

[1] Simon Kuznets, *Shares of Upper Income Groups in Income and Savings*, National Bureau of Economic Research, 1953, pp. 157-159.

[2] *Income and Wealth, Series II*, Simon Kuznets, editor, Cambridge, Eng., Bowes & Bowes for International Association for Research in Income and Wealth, 1952, Tables 44 and 45, pp. 197 and 200.

EXHIBIT I

Illustrative Calculation of Mixture Ratios with Varying Values of p and n
Assumption: $a = .5$

	$p = .10$	$p = .20$	$p = .30$
		$n = 2$ (decades)	
1. $(1 + p)^n$	1.21	1.44	1.69
2. $(1 + ap)^n$	1.1025	1.21	1.3225
3. Line 2 ÷ line 1	.911	.840	.783
4. Mixture ratio (1 — line 3)	.09	.16	.22
		$n = 5$	
5. $(1 + p)^n$	1.610	2.488	3.713
6. $(1 + ap)^n$	1.276	1.610	2.011
7. Line 6 ÷ line 5	.793	.647	.542
8. Mixture ratio (1 — line 7)	.21	.35	.46
		$n = 10$	
9. $(1 + p)^n$	2.594	6.192	13.785
10. $(1 + ap)^n$	1.629	2.594	4.046
11. Line 10 ÷ line 9	.628	.419	.294
12. Mixture ratio (1 — line 11)	.37	.58	.71

2. Under the same assumption this pressure toward a decrease in the share of upper income groups will slacken as p, the rate of increase of total population, slackens and as a, which measures the relative difference between the initial top groups and total population in the rate of increase, approaches 1.

RELATIVE TRENDS IN PER CAPITA INCOME

Designate:

$_0I$ = total income, *per capita*, of total population in year 0
$_0I_u$ = total income, *per capita*, of upper group in year 0
$_0W$ = service income, *per capita*, of total population in year 0
$_0W_u$ = service income, *per capita*, of upper group in year 0
$_0R$ = property income, *per capita*, of total population in year 0
$_0R_u$ = property income, *per capita*, of upper group in year 0
g, g_u, g_w, g_{wu}, g_r, g_{ru} = rates of growth of these magnitudes, distinguished by the subscripts; the rates apply to both initial populations and their descendants.

By definition:

$$_0I = {}_0W + {}_0R\,;\quad {}_0I_u = {}_0W_u + {}_0R_u$$
$$_nI = {}_0W(1 + g_w)^n + {}_0R(1 + g_r)^n$$
$$_nI_u = {}_0W_u(1 + g_{wu})^n + {}_0R_u(1 + g_{ru})^n$$

We can express the proportional increase as a relative:

$$(4) \qquad (1+g)^n = \frac{{}_0W}{{}_0I}(1+g_w)^n + \frac{{}_0R}{{}_0I}(1+g_r)^n$$

$$(5) \qquad (1+g_u)^n = \frac{{}_0W_u}{{}_0I_u}(1+g_{wu})^n + \frac{{}_0R_u}{{}_0I_u}(1+g_{ru})^n$$

We can analyze g_r, the rate of growth of per capita property income, somewhat further:

$${}_0R = \frac{{}_0R'}{{}_0M} \text{ where } {}_0R' \text{ is total property income, year 0}$$
$${}_0M \text{ is total population, year 0.}$$

$${}_0R(1+g_r) = \frac{{}_0R'(1+g'_r)}{{}_0M(1+p)} \text{ where } g'_r \text{ is rate of increase in } {}_0R'$$
p is rate of increase in total population.

$$= {}_0R\frac{(1+g'_r)}{(1+p)}$$

$$(6) \quad {}_0R'(1+g'_r) = {}_0R' + ({}_0I'sy) \text{ where } {}_0I' \text{ is total income in year 0}$$
s is savings-income proportion
y is rate of yield on savings.

Hence,

$$(7) \qquad g'_r = \frac{{}_0I'}{{}_0R'}sy = \frac{{}_0I}{{}_0R}sy$$

$$(8) \qquad (1+g_r) = \frac{1+\frac{{}_0I}{{}_0R}sy}{1+p}$$

By analogy,

$$(9) \qquad (1+g_{ru}) = \frac{1+\frac{{}_0I}{{}_0R_u}s_uy_u}{1+ap}$$

If we assume that s, y, s_u, y_u, p, and ap are constant over the period n,

$$(10) \qquad (1+g)^n = \frac{{}_0W}{{}_0I}(1+g_w)^n + \frac{{}_0R}{{}_0I}\left[\frac{1+\frac{{}_0I}{{}_0R}sy}{1+p}\right]^n$$

$$(11) \qquad (1+g_u)^n = \frac{{}_0W_u}{{}_0I_u}(1+g_{wu})^n + \frac{{}_0R_u}{{}_0I_u}\left[\frac{1+\frac{{}_0I_u}{{}_0R_u}s_uy_u}{1+ap}\right]^n$$

Before considering the trends in per capita income for initial upper groups compared with those for total population, we explore the interrelations between s and y, and g_r and g_w, for total population under different assumptions (see Exhibit II). If the rates of

EXHIBIT II

Illustrative Relations

I. Between s and y II. Between g_r and g_w

	VALUE OF g			
	.01	.02	.03	.04
I. Assumptions: $p = .02$; $g = g_w = g_r$				
A. $\frac{{}_0R}{{}_0I} = .25$				
1. sy	.00755	.01010	.01265	.01520
2. s, if $y = .03$	.252	.337	.422	.507
3. s, if $y = .06$	.126	.168	.211	.253
B. $\frac{{}_0R}{{}_0I} = .20$				
4. sy	.00604	.00808	.01012	.01216
5. s, if $y = .03$	.201	.269	.337	.405
6. s, if $y = .06$	.101	.135	.169	.203
C. $\frac{{}_0R}{{}_0I} = .10$				
7. sy	.00302	.00404	.00506	.00608
8. s, if $y = .03$	.101	.135	.169	.203
9. s, if $y = .06$	.050	.067	.084	.101
II. Assumptions: $p = .02$; $s = .10$; $y = .05$				
A. $\frac{{}_0R}{{}_0I} = .25$				
10. g_r	0	0	0	0
11. g_w	.0133	.027	.040	.053
B. $\frac{{}_0R}{{}_0I} = .20$				
12. g_r	.0049	.0049	.0049	.0049
13. g_w	.011	.0238	.0363	.0488
C. $\frac{{}_0R}{{}_0I} = .10$				
14. g_r	.0294	.0294	.0294	.0294
15. g_w	.0078	.0190	.0301	.0412

growth in total, service, and property per capita income are assumed equal for a given rate of growth of population: (1) the higher the assumed rate of growth of income, the greater the implicit savings-income proportion; (2) for given rates of growth of income, the lower the rate of yield on savings, the higher the implicit savings-income proportion; (3) the greater the share of property income in total income, the higher the product of the required savings-income proportion and the rate of yield—since more is necessary to maintain such a ratio of property to total income; and (4) if we start with assumed s and y and let g_r and g_w differ, g_r will be inversely and g_w will be positively related to the initial proportion of property to total income for given values of g.

In terms of the experience of the United States, an annual p of somewhat less than .02, a g of about .03, and a ratio of property to total income of about .20 may be considered realistic; and a y of .06 may be assumed. These values in the illustrative calculations suggest a savings rate of .135. The actual value lies close to it.

We may turn now to the rates of growth of per capita income for the initial upper group and total population, as set forth in equations 10 and 11. The following relations are relevant:

${}_0W/{}_0I$ is definitely greater than ${}_0W_u/{}_0I_u$
${}_0R/{}_0I$ is definitely smaller than ${}_0R_u/{}_0I_u$
s_u is definitely greater than s

The first question is about the rates of growth of per capita service income of total population, g_w, and of the initial top group and its descendants, g_{wu}. It should be stressed that this is a ratio of total service income received by a group to *all* its numbers, including units that do not engage in service activities and their dependents. In general, g_{wu} may be assumed to be significantly smaller than g_w —for two reasons. First, the rise in per capita service incomes (wages and salaries, entrepreneurial income, etc.) is due to both inter- and intra-industry shifts—to the movement of the labor force toward the higher per capita income industries and to the rise in per capita service income within each industry. The inter-industry shift is bound to have a much larger effect on g_w than on g_{wu}: the members of the top group who derive service incomes are already likely to be in the higher paid industries. Since they are also likely to be in the higher paid positions, even the intra-industry rise may not have as great an effect on g_{wu} as on g_w.

Second, the proportion of gainfully engaged to all members of the top group is likely to decline—or at any rate fail to rise—even if the proportion for total population rises. Low reproduction rates and continuously high income position may cause a shift among the descendants of the initial top group toward women, because of their greater longevity as compared with men, which, combined with lack of pressure for gainful occupation, may result in an actual decline in the proportion of gainfully occupied. The combination of the factors just adduced may mean that the rate of increase in per capita service income of the initial top group is about half of that for total population—in the United States, inter-industry shifts alone account for about four-tenths of the over-all rise in net product per worker.[3]

The next question is about the rate of growth of per capita property income of total population, g_r, and that of the initial top group and its descendants, g_{ru} (see equations 8 and 9 in this connection). Two factors tend to make g_{ru} significantly larger than g_r : s_u, with which the rate of growth is positively related, is larger than s, and ap, with which the rate of growth is negatively related, is smaller than p. A third and important factor tends to make g_{ru} smaller than g_r : the ratio of property to total income, with which the rate of growth is negatively related, is larger for the upper group than for total population. Finally, there is the yield on accumulated savings, but no definite statement can be made whether y_u tends to be larger or smaller than y.

With this variety of factors, and one or two of them unknown, it seemed best to experiment with an illustrative calculation (see Exhibit III). The following ratios and coefficients were assumed, largely on the basis of the record for the United States from 1870 to 1940: an annual rate of growth of population of 2 per cent per year (somewhat high) and of per capita income of 1.5 per cent per year (somewhat low); an over-all savings-income proportion of 12 per cent and a yield of 6 per cent, both fairly realistic figures; a constant ratio of service to total income of 80 per cent (hence the equality of g, g_w, and g_r), which is also confirmed by whatever crude estimates of distribution of income by type we have. In addition, the following more conjectural ratios were used: $a = .5$, meaning that the rate of increase in number of the initial top group was half of the rate of increase of total

[3] *Ibid.*, p. 125.

EXHIBIT III

Illustrative Calculations in the Derivation of g_u
(Based on Equation 11)

Assumptions: $\frac{{}_0W}{{}_0I} = .80$, $p = .02$, $g = .05$, $s = .12$, $y = .06$, $g = g_w = g_r$,
$\frac{{}_0W_u}{{}_0I_u} = .60$, $ap = .01$, $g_{wu} = .5g_w$

	ASSUMED VALUES OF s_uy_u			
	$s_u = .30$ $y_u = .06$ .018	$s_u = .20$ $y_u = .06$ .012	$s_u = .20$ $y_u = .04$ .008	DERIVED s_uy_u
I. Derived g_u				
1. $(1 + g_{wu}) \frac{{}_0W_u}{{}_0I_u}$	.6045	.6045	.6045	.6045
2. $\frac{{}_0I_u}{{}_0R_u} s_uy_u$	.0450	.0300	.0200	
3. (1 + line 2) ÷ $(1 + ap)$	1.0347	1.0198	1.0099	
4. Line 3 × $\frac{{}_0R_u}{{}_0I_u}$	.41388	.40792	.40396	
5. Line 1 + line 4	1.01838	1.01242	1.00846	
6. g_u (line 5 − 1)	.01838	.01242	.00846	
II. s_uy_u needed to equalize g and g_u				
7. $(1 + g_u)$				1.015
8. Line 7 − line 1				.4105
9. Line 8 ÷ $\frac{{}_0R_u}{{}_0I_u}$				1.02625
10. Line 9 × $(1 + ap)$				1.03651
11. Line 10 − 1				.03651
12. s_uy_u (line 11 ÷ $\frac{{}_0I_u}{{}_0R_u}$)				.014604
III. g_{wu} needed to equalize g and g_u				
13. $(1 + g_u)$	1.015	1.015	1.015	
14. $(1 + g_{wu}) \frac{{}_0W_u}{{}_0I_u}$ (line 13 − line 4)	.60112	.60708	.61104	
15. $(1 + g_{wu})$	1.0019	1.0118	1.0184	
16. g_{wu}	.0019	.0118	.0184	

population, and $g_{wu} = .5g_w$, meaning that the rate of increase of per capita service income of the initial top group was half of the rate of increase of per capita service income for total population. Finally, the ratio of property to total income for the initial top group was set at 40 per cent—implying a larger group than the top 5 per cent. Within the framework set by these relatively realistic assumptions, s_u and y_u were permitted to vary.

The major conclusion suggested by these calculations is that

a rate of growth of per capita income of the initial top group and its descendants *equal to or not much larger than* the rate of growth of per capita income of total population is quite likely. As line 12 in Exhibit III indicates, it would be attained with $s_u y_u$ equal to about .015. On the basis of a yield of 6 per cent this involves a savings proportion of 25 per cent; with a lower yield it means a higher savings proportion.

Two comments are pertinent here. First, the savings rate used in the first column is almost as high as that found for the top 5 per cent group in sample studies during the last two decades. But with 40 per cent of property income the group assumed here must be larger than the top 5 per cent. Furthermore, this savings rate was found for a group that includes significant proportions of recent and transitory migrants into the top group—and they are likely to save larger proportions of their income than the individuals continuously at high income levels. For a segment of the population that is assumed to be at top levels for decades, the savings-income ratio should be significantly lower than for a segment whose recent or transitory income rises result in a lagging adjustment of expenditures or in a deliberate utilization of windfall income as a reservoir against the more normal, leaner years. Hence, an s_u well below .3 is more realistic.

Second, y_u—the yield rate for the savings of the continuous initial top group and its descendants—may well be lower than, rather than equal to or higher than, the yield rate for the country's total savings. This may be due partly to the drift of such savings into more conservative investments; but it is largely due to the fact that our continuity assumption *excludes* newcomers who rise to the top because of association with new and successful industries. It is these industries that provide the source of high property income returns and have a bolstering effect on the yield rate for the total pool of country-wide savings.

THE EFFECTS OF SHIFTING

The analysis above suggests three conclusions. First, because of its lower reproduction rate, the upper income group of year 0 and its descendants will constitute only part of the upper income group of year n; and such admixture means, under the assumption of continuity of relative position, that the relative standing of the upper group in year n may be below the level ascribable to the descendants of the upper group in year 0. Second, because

the per capita service income of the descendants of the upper group of year 0 is most likely to grow at appreciably lower rates than the per capita service income of total population, there is a substantial offset to any greater growth (under the assumption of continuity) of per capita property income of the descendants of the upper group of year 0. Therefore, even under the assumption of continuity, total per capita income of these descendants may not grow at a rate higher than that for total population. Third, the rate of growth of property income of the initial top group will cease exceeding the rate of growth of *total* property income as soon as the share in savings is equal to or less than the share in wealth. The combination of these three conclusions may mean a *decline*, not a rise, in the share of the given top ordinal group.

That under conditions of a progressive economy this is a likely rather than a surprising result follows from the three empirical assumptions used in the analysis: (1) service income, even for the upper income groups, was assumed to be a substantial proportion of total income; (2) the rate of reproduction of the upper income groups was assumed to be lower than that of total population; (3) the per capita service income of the upper income groups was assumed to grow at a slower rate than the per capita service income of the economy. Two of the three assumptions rest upon integral characteristics of a *growing* economy. Such growth is accompanied by substantial inter-industry shifts, which are involved in assumption 3; by a population growth pattern in which family limitation spreads from the top to the lower social groups, and in which death rates are under sufficient control so that birth rate differentials are the most important factor—both of which are involved in assumption 2. Thus the inference that, given continuity in relative position (no shifting), the share of upper income groups is likely to decline has been derived by assumptions which are characteristics of a growing and progressive economy—in which, because of that very fact, there *must* be extensive shifting in relative position, into and out of the upper income groups. For a slowly growing underdeveloped economy the assumption of continuity might produce the opposite result: with the mixture ratio quite small and the effects of inter-industry shifts on per capita service income possibly negligible, the inference might well be that the income shares of

upper income groups, under the assumption of continuity, tend to rise.

Viewed against the background of a growing economy, the preceding analysis is artificial in that it combines conditions of continuity with empirical assumptions that deny them: it is hardly a surprise that allowing growth elsewhere but not in the upper income groups, *except* for the straight accumulation of savings, one concludes that the total income share of the initial upper income group and its descendants is not likely to rise but may decline. Yet such analysis has some value, because it distinguishes between the elements of continuity and shift. Of particular interest is the suggestion that it is the shift process that may account for *sustaining* the income share of the upper income groups and for keeping the share of service incomes in the total income of the upper groups as high as it is.

We have no data on this shift process, but some conjectural analysis may be useful.

1. Two obvious sources of shifting are of limited interest here. Since our distinction of upper groups at any given time is based on income size during a year or similarly short time span, purely transient elements affect the income position. Units move up into the top income groups and drop down again when these elements have passed. However, they are replaced by others, some of which may likewise be raised to high levels by transient elements. Although nothing can be said about its effect on any trends in the income shares of upper groups, such shifting is important. First, it tends to raise the income shares of the upper groups at any given time—the shares of the same ordinal top group (say of the top 5 per cent) based on an average extending over a longer period would be lower. Second, it tends to raise the savings-income proportions—not only because it increases the shares of the top group, but also because of the possible lag of expenditures under conditions of transitory rises of income. Third, like all shifts into and out of the top group, it interrupts the accumulation, in the same hands, of high income and large savings.

Likewise, cyclical elements in the shift—associated with differing sensitivity to business cycles of various industries, occupations, types of income, etc.—do not call for extended discussion. Their effects are similar to those of the more transient shifts just noted. Although they serve to maintain the high income shares and high savings proportions at any given point of time, and reduce continuity and

hence the power of accumulation of assets in a few hands, they are of less interest here than the secular factors that *can* produce some long-term shifts in relative position of groups in the size distribution of income.

2. One such secular shift has been stressed in the preceding analysis. The lower reproduction rates of the upper income groups mean that for a given top group there must be inflow from below the top, i.e. from newcomers or descendants of the groups below the top in year 0. But this shift would not offset any possible decline in the shares of the top groups unless the rate of growth in per capita income of the groups drafted from below the top were very much higher than the rise in per capita income for total population—and there is no ground for this assumption. However, this shift does help to offset declines in the proportion of service to total incomes among the upper income groups.

The secular shift among industries and occupations is of greater interest. Economic growth is accompanied by continuous changes in industrial structure so that at successive points of time different industries are in the vanguard of growth. It is attachment to such industries that places people at the top of the economic ladder—as is indicated by the succession of captains of industry who are the conspicuous members of the top income group. Two aspects of such continuous inter-industry shifts are important for their effects on the top income group. First, the economic leaders of one industrial epoch cannot be identified with those of another: the descendants of the fur trade magnates are not the leading entrepreneurs in railroads and the descendants of the latter are not the leading entrepreneurs in the automobile industry. This continuous change in the family identity of successful entrepreneurs—large *and* medium—prevents the concentration of high income position associated with participation in the several leading industries over generations. Second, the entry of these units into the upper income groups when it occurs and in its early periods is via high service incomes; only at the later stages does property income become important.

One can only conjecture whether the entry of successful entrepreneurs (or other economic agents) connected with the continuously emerging successful and rapidly growing industries serves to overcome the otherwise possibly downward trend in the share of upper income groups, or even to convert it into a rising trend. That the effect is bolstering is obvious: the relative income excess (over the country-wide average) of these new entrants must be greater

than that of those whom they displace. But how great the effect is, it is impossible to tell.

Two corollaries follow from this analysis. First, if the sustaining effect upon upper income shares is imparted only by new entries and new entries are associated with the emergence of new industries, there is a direct *positive* connection between the process of growth and the share of upper income groups—offsetting the possibly negative connection inferred above under the assumption of continuity. Second, the slowing down of such change, of the emergence of new industries, would, of course, tend to weaken the sustaining effect on upper income shares. However, one should define the effect properly. It may well be that, even though the rate of growth and of additions of new industries slackens, the relative income advantages grow apace. For example, if the automobile industry yielded a new group at the top of the income pyramid with a per capita income x times that of the average, whereas an earlier economic leader-industry, say the railroads, yielded a top group with a per capita income only $.8x$ times that of the average (with both top groups the same proportion of total population), the automobile industry—even if it did not boost total economic growth as much as the railroads—did have a larger sustaining effect on the shares of upper income groups.

The comments on the effect of new industries apply equally to the effect of new occupations (which often develop in connection with new industries). The one modification is that there may be greater continuity in inheritance of occupation than in inheritance of the association with the leader-industry. One can envisage a succession of surgeons, engineers, or lawyers in the family line more easily than a succession of successful entrepreneurs. But even the former is not too likely if we: (1) think of the very top ranks within one and the same occupation; and (2) consider the shifts among leader occupations and professions, so that the succession ought to be traced from the successful surgeon to the successful advertising-slogan-maker or from the popular preacher to the eminent movie comedian. Top income position in the same family line by virtue of occupation is perhaps scarcely more probable than by virtue of industry association.

CONCLUDING COMMENTS

1. The preceding analysis yields no definite conclusions concerning the factors that limit either the level of or the possible rise in

the income share of upper income groups. But it suggests that in a growing economy: (a) assumption of continuity of an initial top group and its descendants may well result in a *decline* rather than a rise of income shares of top groups; and (b) the shifting process, while interrupting the accumulation of savings and assets in the same levels, tends to *bolster* the income (and even more, the savings) share of upper income groups. In other words, the analysis casts doubt upon the possibility of rising *trends*—and hence *high* levels—of income shares of upper groups, *due to* cumulative effects of high savings rates and presumptively growing concentration of assets.

2. In the light of this summary, omissions in the analysis may well be noted. First, limited consideration was given to the inequality structure within service income distribution proper. Yet the factors that determine the range of income flowing out of active connection as an employee or entrepreneur, or any trend in that range, must also affect the income shares of upper income groups and their trends.

Second, the discussion was exclusively in terms of what happens within and to the upper income groups themselves. But their income *shares* can be moved by what happens at the low income levels. No consideration was given to any possible secular trends originating in movements endogenous to the lower income group; and it is hard to see any *long-term* factors there. But some complexes of factors can affect what might be called long swings in the upper income proportions. For example, the upper groups are largely urban. If there are protracted price level movements up or down (like the decline from the 1870's to the late 1890's), and if these movements have a greater impact on agriculture than on urban pursuits (as is usually the case), the very buoyant or depressed position of agriculture over two or three decades may be reflected in a lower or higher share of upper income groups (even in terms of constant prices—so long as there is no intra-country differential price correction). It may well be that from the 1870's to the 1890's the shares of the upper income groups in the United States increased, and possibly largely for that reason. On the other hand, during protracted war and postwar periods, reduction in unemployment and the effect of inflation on the service income differentials may raise substantially, and for long periods, the share of the lower income groups and automatically reduce that of upper income groups—the impulse coming, so to speak, from the bottom rather than from the top. Finally, there is the whole matter of government policy which can affect the shares

of upper groups—not only by a progressive income tax, but also by diverting an increasing proportion of new investment into new industries under public auspices (*vide* atomic energy), leaving less for new industries under private auspices and hence reducing the bolstering effect of new industries on upper income shares.

Our interest in the shares of upper income groups in income stemmed from concern with levels and trends in the contribution of upper income groups to country-wide savings. Abstractly, it is quite possible for a low level and constancy or down-trend in the income share of upper groups to be accompanied by a high level and rise in their savings-income ratio—so that their savings, expressed as a percentage of total income, would remain constant or rise. No consideration of the levels and trends in the savings-income ratio of the upper income groups was intended here.

APPENDIX D

Analysis of Savings of Lower Income Groups

SIMPLEST MODEL: SAVINGS FOR RETIREMENT ALONE; CONSTANT POPULATION, INCOME, AND EXPENDITURES

We assume that savings are accumulated only to cover living expenses during retirement. Designate:

n = number of years in working life
K = number of years in assumed retirement
W = number of persons (units) working
O = number of persons (units) retired.

If population, age composition, age of entry into working life, and age of retirement are all constant (we assume only *one* sex), then

$$\frac{W}{O} = \frac{n}{K} \tag{1}$$

Designate:

I = income per worker unit (including dependents)
E = expenditures per worker and per retired unit
S = savings per worker unit.

Then if I and E are constant, by assumption,

$$WI = (W + O)E \tag{2}$$

$$E = \frac{WI}{W+O} = \frac{W}{W+O}I \tag{3}$$

By definition,

$$S = I - E \tag{4}$$

$$\frac{S}{I} = \frac{I-E}{I} = \frac{I}{I} - \left(\frac{WI}{W+O} \div I\right) = 1 - \frac{W}{W+O} = \frac{O}{W+O} \tag{5}$$

Gross savings for all low income groups are, by assumption, WS. Gross dissavings for all low income groups are, by assumption,

$$O \times E = O(I - S) = OI - OS = S(W+O) - OS$$
$$= SW + OS - OS = WS$$

Net savings for all low income groups are

$$WS - WS = O$$

Note that:

1. To assume lower expenditures per retired unit than per working unit, i.e.

$$E_O < E_W \text{ or } E_O = aE_W \text{ where } a < 1$$

would mean that

$$WI = WE_W + OaE_W \tag{6}$$

$$E_W = \frac{WI}{W+Oa} \tag{7}$$

$$\frac{S}{I} = \frac{I-E_W}{I} = 1 - \left(\frac{WI}{W+Oa} \div I\right) = \frac{Oa}{W+Oa} \tag{8}$$

This would mean a lower gross savings-income ratio for worker units, a smaller volume of gross savings and dissavings, and net savings still equal to zero.

2. To assume an interest return on savings in the process of their accumulation would make no difference in the analysis, since the interest would be included in I and in S. It would mean that the retired units O would be getting some income on their gradually dwindling savings balances. But this is tantamount to having a *lower* rate of expenditure per unit, and alternative interest rates could be taken into account by means of an a term similar to that given under point 1.

POPULATION GROWTH

Assume that population grows and affects W immediately and that we pass from W_0 to W_n in n years. Throughout this period, until the end of the nth year, O remains unchanged, i.e. $O_n = O_0$. But W_n is obviously larger than W_0.

Assume that W grows at the rate r. Hence,

$$W_1 = W_0 - \frac{W_0}{n} + \frac{W_0}{n}(1+r)$$

$$W_2 = W_1 - \frac{W_0}{n} + \frac{W_0}{n}(1+r)^2 = W_0 - \frac{2W_0}{n} + \frac{W_0}{n}[(1+r) + (1+r)^2]$$

$$\cdot$$

$$\cdot$$

$$\cdot$$

$$W_n = W_0 - \frac{nW_0}{n} + \frac{W_0}{n}[(1+r) + (1+r)^2 + \ldots (1+r)^n]$$

$$(9) \qquad = \frac{W_0}{n}\frac{(1+r)}{r}[(1+r)^n - 1]$$

Since, with growth in population, W will always be larger than O, by the cumulated effect of the n years between entry into O and entry into W, equation 9 combined with $O_n = O_0$ will yield the excess of W over O under conditions of constant r in W (and in O).

In year n, total gross savings will be

$$(10) \qquad W_n S = W_0 S \frac{1+r}{rn}[(1+r)^n - 1]$$

Total gross dissavings will be the same as under the assumption of constant population, $W_0 S$.

Hence, *net* total savings for all low income groups will be

$$(11) \qquad N_s = W_0 S\left(\left\{\frac{1+r}{rn}[(1+r)^n - 1]\right\} - 1\right)$$

The net savings-income ratio will be

$$\frac{N_s}{W_n I} = \frac{W_0 S\left(\left\{\frac{1+r}{rn}[(1+r)^n - 1]\right\} - 1\right)}{W_0 \frac{1+r}{rn}[(1+r)^n - 1]I}$$

$$= \frac{S}{I} \cdot \frac{\left(\left\{\frac{1+r}{rn}[(1+r)^n - 1]\right\} - 1\right)}{\left\{\frac{1+r}{rn}[(1+r)^n - 1]\right\}} \tag{12}$$

If r is larger than O, i.e. if population grows, the coefficient of S/I in equation 12 is necessarily positive and a proper fraction. Thus the proportion of total net savings to total income is a fraction of the proportion of gross savings of the W group. In other words, the lower income groups as a whole generate positive net savings.

Illustrative calculations show how the coefficient of S/I in equation 12 varies with values of r and n (see Exhibit I). Obviously, the

EXHIBIT I

Variations in the Coefficient of S/I in Equation 12 with Alternative Values of r and n

	VALUES OF r, PER YEAR		
	.01	.02	−.01
		$n = 25$	
1. rn	.25	.50	−.25
2. $(1+r)$	1.01	1.02	.99
3. $(1+r)/rn$ (line 2 ÷ line 1)	4.04	2.04	−3.96
4. $(1+r)^n$	1.282	1.640	.778
5. $(1+r)^n - 1$	.282	.640	−.222
6. $[(1+r)/rn][(1+r)^n - 1]$ (line 3 × line 5)	1.13928	1.30560	.87912
7. Coefficient of S/I [(line 6 − 1) ÷ line 6]	.122	.234	−.138
		$n = 45$	
1. rn	.45	.90	
2. $(1+r)$	1.01	1.02	
3. $(1+r)/rn$ (line 2 ÷ line 1)	2.244	1.133	
4. $(1+r)^n$	1.565	2.438	
5. $(1+r)^n - 1$	.565	1.438	
6. $[(1+r)/rn][(1+r)^n - 1]$ (line 3 × line 5)	1.2679	1.6293	
7. Coefficient of S/I [(line 6 − 1) ÷ line 6]	.211	.386	

larger r and n are, the larger the coefficient is. As a matter of curiosity we also calculate the coefficient for a negative r, i.e. on the assumption of declining population. In that case, *net* savings are

negative since the declining body of workers W, saving for their own future in accordance with the ratio set by n and K, accumulate gross savings that are *smaller* than the current dissavings of the retired who originated in a larger population.

During the last century to century and a half, growth processes tended to bring about a decline in the rate of growth of population—i.e. a decline in the positive value of r—and a rise in the ratio of K, years of retirement, to n, years of work. Since these two trends have opposite effects on the net savings proportion generated by the lower income groups, their combination may have made for stability in the proportion.

Let us assume that, in the early phases, population grows 2 per cent per year; n, beginning at 15 years of age, covers 45 years; and K, starting at 60, is 10 years. The gross savings-income ratio, S/I, equals

$$\frac{O}{W} + O = \frac{K}{n} + K = \frac{10}{55} = .182$$

The coefficient of S/I, under these assumptions, is .386, and the net savings proportion for the lower income groups as a whole is .182 $\times$ .386, or .070, i.e. about 7 per cent. Now let us assume that, in later phases of development, population growth slackens to 1 per cent per year; n, beginning at 20, is cut down to 25; and K, starting at 45, is extended to 25. Under these conditions S/I is .50; the coefficient of S/I is .122; and the net savings proportion is .061. In other words, with a retardation in the rate of population growth, and with a marked reduction in years of work and a marked increase in years of retirement, the required net savings proportion for the group as a whole *declines*. With somewhat different figures, it would have been possible to show stability, or a slight rise in the net savings proportions. The major point of the illustration is the slight change in the net savings proportion, with major changes in rate of population growth and distribution of adult life between work and retirement.

Incidentally, this combination of trends increases both gross savings and dissavings. Thus, in the early phase, gross savings were 18.2 per cent of total income and dissavings were 11.2 per cent (leaving 7 per cent as the net savings residual). The gross flow of savings (savings plus dissavings, regardless of sign) was, therefore, 29.4 per cent of income. In the later phase, gross savings were 50 per cent, dissavings were 43.9 per cent, and net savings were 6.1 per cent of income. The gross flow of savings was 93.9 per cent of

income, or more than triple that in the first phases. If the two trends suggested have any empirical bearing on the development of modern economies, the functions of financial institutions must have increased substantially in order to accommodate themselves to the increase in gross savings flows.

VARIATIONS IN SAVINGS PLANS AND REALIZATIONS

To the extent that we deal with security calculations, one may argue that plans are made for the accumulation of savings sufficient for the longest reasonably expected lifetime. In fact, of course, people do not live that long; and the difference between the assumed and actual lifetimes will mean *net* savings for the total of all low income groups, because *realized* dissavings will be lower than those assumed and covered by positive savings. This case is different from that mentioned at the beginning of this appendix because in the latter a lower level of expenditures upon retirement, i.e. of dissavings, was allowed for in the savings plan and *net* savings were, therefore, zero. In the present case, net savings are positive. For example, if instead of K, the number of years planned for retirement, only $K/2$ years are in fact lived through, the average number of retired units O is cut in half and net savings are generated because WS is larger than $OE/2$.

Whether this reasoning has any empirical bearing is a moot question. It is far from evident that people do overestimate length of life in making savings plans or even that they give such plans serious consideration at all. One may plausibly argue that, on the contrary, people tend to underestimate years of retirement and possible dependence. At any rate, this is not a question that can be profitably discussed in conjectural terms.

Net savings would also be realized if some provision is made for estates, i.e. if savings plans cover not only living expenses upon retirement but also some residue for survivors. The equations would have to be changed to satisfy this assumption since the yield rate on accumulations would be more important than in the present model and the net savings proportion would be determined largely by the ratio of the estate planned (or the return on it) to assumed income levels.[1]

Of somewhat greater interest in the present connection is the possibility of a systematic difference between the expenditure levels

[1] See discussion in "Proportion of Capital Formation to National Product," *American Economic Review, Proceedings*, May 1952, pp. 508-526.

per unit of the working and of the retired population, a difference associated with a growth in per unit expenditures not unlike the growth in population. Because retired units are assumed to be older than working units, the former may have established their expenditure patterns (which tend to become fixed after a certain stage in life) before the working population; and in an economy in which income and expenditures per unit are growing, expenditures per retired unit are likely to be lower than those per working unit. Incidentally, savings plans are based upon such expenditure levels because they are found satisfactory, not because of any economy pressures.

Assume, for example, that expenditure patterns become pretty well fixed by the middle of working life, and that these fixed patterns are the basis of savings and retirement plans. Assume also, for simplicity in calculation, that this level is the basis for savings throughout working life. There is, therefore, a gap of $n/2$ years between the date at which the expenditure levels that are the basis for savings plans prevail and the date when retirement begins. Assume also that per unit expenditures grow t per cent per year, reflecting a similar growth in per unit income—so that savings plans set at progressively advancing dates are based on desired expenditure levels that also grow at the rate of t per cent per year. We thus have a setup similar to that for population growth, except that the cumulation period is $n/2$ rather than n years.

We can now give the equations that take account of both population growth and growth in income and expenditures per unit.

$$(13)\quad W_nS_n = W_0S_0\left\{\frac{1+r}{rn}[(1+r)^n-1]\right\}\left\{\frac{2(1+t)}{tn}[(1+t)^{n/2}-1]\right\}$$

$$(14)\quad NS_n = W_0S_0\left(\left\{\frac{1+r}{rn}[(1+r)^n-1]\right\}\left\{\frac{2(1+t)}{tn}[(1+t)^{n/2}-1]\right\}-1\right)$$

$$(15)\quad \frac{NS_n}{W_nI_n} = \frac{S_0}{I_0}\,\frac{\left\{\frac{1+r}{rn}[(1+r)^n-1]\right\}\left\{\frac{2(1+t)}{tn}[(1+t)^{n/2}-1]\right\}-1}{\left\{\frac{1+r}{rn}[(1+r)^n-1]\right\}\left\{\frac{2(1+t)}{tn}[(1+t)^{n/2}-1]\right\}}$$

The addition of this lag of the expenditure levels that are the basis of savings plans behind those current when the plans are

realized increases the possibility of net savings, and similarly to the assumption of population growth—provided, of course, that income and expenditures per unit do grow. The coefficient of S/I in equation 15 is larger than that in equation 12.

Here also we can assume two trends posited in the discussion of population growth: a decrease in n and an increase in K and a decline in the rate of growth in per unit income or expenditures, t. The former trend, of course, raises the value of S/I; both trends diminish the coefficient since n and t are reduced. The two trends combined thus have opposite effects on the *net* savings proportion that may offset each other. Their effects on the gross savings flow are the same as were indicated under "Population Growth."

EXHIBIT II

Variations in the Coefficient of S/I in Equation 15 under Alternative Values of n, r, and t

	VALUE OF t	
	.01	.02
	$n = 25; r = .01$	
1. tn	.25	.50
2. $2(1+t)$	2.02	2.04
3. $2(1+t)/tn$ (line 2 ÷ line 1)	8.08	4.08
4. $(1+t)^{n/2}$	1.1324	1.281
5. $(1+t)^{n/2}-1$	.1324	.281
6. $[2(1+t)/tn][(1+t)^{n/2}-1]$ (line 3 × line 5)	1.0698	1.1465
7. $[(1+r)/rn][(1+r)^n-1]$	1.13928	1.13928
8. $\{[2(1+t)tn][(1+t)^{n/2}-1]\}\{[(1+r)/rn][(1+r)^n-1]\}$ (combined with population) (line 6 × line 7)	1.2188	1.3062
9. Coefficient of S/I [(line 8 − 1) ÷ line 8]	.180	.234
	$n = 45; r = .01$	
1. tn	.45	.90
2. $2(1+t)$	2.02	2.04
3. $2(1+t)/tn$ (line 2 ÷ line 1)	4.49	2.27
4. $(1+t)^{n/2}$	1.2509	1.5614
5. $(1+t)^{n/2}-1$	.2509	.5614
6. $[2(1+t)/tn][(1+t)^{n/2}-1]$ (line 3 × line 5)	1.1265	1.2744
7. $[(1+r)/rn][(1+r)^n-1]$	1.2679	1.2679
8. $\{[2(1+t)tn][(1+t)^{n/2}-1]\}\{[(1+r)/rn][(1+r)^n-1]\}$ (combined with population) (line 6 × line 7)	1.4283	1.6158
9. Coefficient of S/I [(line 8 − 1) ÷ line 8]	.300	.381

EFFECT OF UNIT ORGANIZATION

We have assumed so far that working and retired units are separate. Since the large, and often joint, family structure is prevalent in underdeveloped countries and the small family predominates in

the developed countries, we may ask how different assumptions concerning jointness or separateness of working and retired units would affect the analysis.

We use the simplest model here, and assume that there are *no* separate retired units—that each is joined with a working unit. The total number of units is reduced from $(W + O)$ to W since O, by assumption, is joined with W. Then, if we designate the lone working units as Y, and the joint units as Z (i.e. working plus retired), we get $Y + Z = W$.

If, for example, W is three times O, i.e. n is 45 years and K is 15 years, it follows that Z equals one-third and Y equals two-thirds of W; or Z equals one-half of Y.

For each unit under Z there is dissaving. Expenditures are 75 per cent of income for the working part and 75 per cent for the retired. Total expenditures are 150 per cent of income, and dissavings are, therefore, 50 per cent of income. For each unit under Y, savings are still 25 per cent of income. Thus gross savings, YS, are $.67WS$, gross dissavings, $2ZS$, are $.67WS$, and net savings are zero.

The reduction in the number of units by the joining of retired with working units has no effect on net savings. It could have an effect only if our assumptions concerning expenditure levels at retirement and constancy of income and numbers had been modified. However, the gross flow of savings—the total of gross savings and dissavings—is affected. In the model with separate retired units, gross savings are WS and gross dissavings are WS; and their sum, signs disregarded, is therefore $2WS$. When retired units are joined with working units, reducing the total number of units, the sum of gross savings and dissavings becomes $1.33WS$. Reduction of a third in the number of units means a reduction of a third in the gross flow of savings. The implication for the differences between underdeveloped and developed economies in the role of financial institutions handling savings flows is obvious.

The important conclusion is that, in and of themselves, the number and composition of the units can have no effect on the *net* savings proportion. Such an effect would have to be exercised through some other channel—most likely the choice, made consciously or unconsciously, between investing in more children or the younger generation and the accumulation of savings in forms that can be employed to finance capital formation (as usually defined).

COMMENT

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Anyone who discusses a Kuznets paper inevitably faces a dilemma: he is presented with a wealth of material, he wants to raise a number of questions, but, alas, he is given so little time. I shall therefore take the virtues of the paper for granted and comment on a few doubtful points, concentrating not on the statistical data—this would require a paper in itself—but on questions of interpretation and concept.

The author begins with the observation that capital formation, usually defined to include expenditures on construction and on producer durables, does not include outlays on education, training, research, public health, etc., which are not less important for growth than is investment in physical capital. This is perfectly true, but must all these expenditures be squeezed into a single category? If outlays on education and training, for instance, were merged with those on physical capital, it would be necessary to allow for the depreciation or replacement of human beings as well as of physical capital. Is it not better to record such expenditures separately and then work with, and think in terms of, multiple rather than simple regression? Surely no one imagines that capital formation, even broadly defined, can be the sole explanation and cause of growth.

Kuznets would like to divide all outlays into those that raise productivity and those that do not; he suspects that the former may constitute as much as 50 per cent in developed countries, and only a few per cent in underdeveloped ones (page 22). Perhaps it would be proper to add one more category—productivity-sustaining outlays, such as necessary food and shelter, a minimum of education, and so on. In underdeveloped countries most outlays are of this nature; while a developed one devotes a good part of its resources to luxuries which neither sustain nor raise its productive capacity. A study in terms of these three categories would facilitate our understanding of the relationship between allocation of resources and growth; in particular, it would show not only the small fraction of resources devoted to an expansion of productive capacity in an underdeveloped country, but also the difficulty of raising this fraction without affecting those outlays without which the present capacity cannot be sustained.

This division of total outlays into two or three categories is, however, a task for the future, and both author and readers must be reconciled to dealing with capital formation more or less as tradi-

tionally defined, though here I do not share Kuznets' reluctance to treat residential housing equally with other forms of physical capital. In any case, capital formation as one of the determinants of growth should be expressed in real terms; it is regrettable that the author has not found it possible to take this important step. So long as we deal with gross capital formation, price deflation is less urgent because prices of capital goods usually move more or less in the same direction as do the others. But the use of net capital formation, either as an absolute magnitude or as a fraction of total output, requires estimates of depreciation of capital, and unless these estimates have been corrected for price changes the result can be quite unreliable. Net capital formation is, after all, a relatively small residual. Is it possible that the failure to deflate can account for the unexpectedly small ratio of depreciation to gross investment in the United Kingdom (Table I-3, B) as compared with this country? The ratio of depreciation to gross investment is an inverse function of the rate of growth of investment and longevity of capital; hence, with a higher American rate of growth one would expect this ratio to be lower than in Britain, unless the longevity of British capital were very much greater than ours. The deflation of output and investment series for a number of countries over a long span of time, however, is easy to suggest but difficult to construct. Let us keep the nature of the estimates in mind and be grateful to the author for what he has already done, rather than carp on that which he has not yet done.

Our next problem deals with the variables in terms of which international and intertemporal comparisons should be made. Should we take, for instance, the gross propensity to save (the ratio of gross investment to gross national product) or the net propensity to save (the ratio of net investment to net national product)? Kuznets presents both without committing himself definitely, though he seems to lean toward the net propensity to save. He introduces two other variables—the average longevity of capital and the capital coefficient—and illustrates their interactions by means of numerical examples. This presupposes, and quite correctly, that these five variables—the gross and the net propensity to save, the rate of growth, the capital coefficient, and the longevity of capital—are somehow related to one another, but I was not able to find anywhere in the paper an explicit statement of the nature of this interrelationship. And, fortunately or unfortunately, there are quite a few possibilities. One can take, for instance, the net or the gross

propensity to save as well as the longevity of capital and the capital coefficient as given, and derive from them the rate of growth; or one can take the rate of growth as given, and perhaps also the capital coefficient and the longevity of capital, and derive the gross or net propensity to save. It is also possible to make some one variable (such as the capital coefficient) a function of another (the longevity of capital) or vice versa. Finally, they can all be thrown into a simultaneous system in which every variable is dependent on all the others. But unless the relationship assumed is explicitly indicated, it is difficult to understand the significance of Kuznets' numerical illustrations and to decide which variables should be used to make international or intertemporal comparisons.

Consider, for instance, the choice between the net and the gross propensity to save. If the productive capacity of capital declines more or less in accordance with the usual depreciation methods, it is the net capital coefficient (that is, the ratio between capital net of depreciation and net output, or between their respective increments) rather than the gross coefficient that is relevant. If, in addition, net savings are a function of net national product, the net propensity to save should be used. The magnitude of the gross propensity is then of little significance, though it may retain a certain statistical interest. On the other hand, if the productive capacity of capital remains relatively unimpaired until its retirement (which takes place because of technological obsolescence rather than physical deterioration), the gross capital coefficient (that is, the ratio between the stock of capital gross of depreciation and the gross national product, or between their respective increments) is relevant. If it also happens that no depreciation charges are set aside as a part of gross savings, and the latter are simply determined as some fraction of gross national product (by a planning authority, for instance), the net propensity to save has no significance as a variable and comparisons should be made in terms of gross. Finally, if the gross capital coefficient is retained as the significant variable, but gross savings consist of depreciation charges set aside, and net savings are determined independently (which, roughly speaking, is true of a capitalist economy), both the net and the gross propensity to save are significant: the net because it is an independent component of the total, and the gross because it is directly connected (via the capital coefficient) with the rate of growth. The gross propensity would of course have to be adjusted to allow for the cost of replacement.

At times one gets the impression that Kuznets is thinking in terms of a simultaneous relationship among these variables. Thus he presents a very interesting hypothesis (pages 48-50) which makes the net propensity to save a function of the rates of growth of population and income. But one cannot simply say, as he does on page 27, that the net savings are the limiting factor in growth, because a higher rate of growth might affect the propensity to save. In any case, why should a reduction in the latter over time be explained by a fall in the net capital coefficient (page 32)? Instead, wouldn't this fall increase the rate of growth? Or does the author treat the rate of growth as given (by whom?) and assume that the other variables get somehow adjusted to it?

The absence of an explicit model creates a certain lack of clarity in the author's discussion of international capital movements as well. If savings are the limiting factor in capital formation, as Kuznets states (good-bye, Keynesian economics!), capital imports can be added to domestic savings irrespective of the *direct* use to which the borrowed funds are put. Thus the old Russian government might very well have used the proceeds of its foreign loans for secret police, the state church, and pogroms, as the author suggests (page 34), but, unless these expenditures were made possible only by foreign loans (which is rather doubtful), capital imports did increase the total volume of savings available for Russian domestic investment.

The mere fact that, as Kuznets shows, international capital movements have been relatively small (and here a comparison with domestic gross or net savings should be more meaningful than with total net or gross national product) need not imply that they have been unimportant, particularly for the receiving country. Foreign capital has brought with it new techniques and new management, and has been frequently invested in highly strategic industries. This, for instance, was the case in prerevolutionary Russia.

Finally, a word about the types of financing of capital formation. This is a very important subject, and I found Kuznets' introduction to it most stimulating. Since depreciation charges are at best very approximate estimates of capital deterioration, gross capital expenditures of a firm or of an industry appear to me more significant than net; hence, a study in terms of gross expenditures will give a truer picture of the relative importance of their component parts, namely external funds, depreciation charges, and retained net earnings. Of the three, depreciation charges in this country have been, at least

in recent times, by far the most important component: over the period 1929-1952 (with the exception of war years) they exceeded individual savings by a ratio of almost 3 to 1, and not all individual savings were invested in business. Together with retained net earnings, depreciation charges allow a well-established, reasonably successful, and not too rapidly growing firm to achieve practically complete independence from external financing. This, of course, is not true of new and/or rapidly growing firms; the sources of their financing are a subject certainly worth an investigation.