The Investment Multiplier in an Underdeveloped Economy

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The multiplier is the marginal effect of a change of one economic variable upon another economic variable, of which the first variable is a component.¹ The concept of the multiplier was first developed by R.F. Kahn in his now famous article² "Relation of Home Investment to Unemployment" published in 1931. Kahn formulated an employment multiplier showing the marginal effect of a change in primary employment on total employment. However, it is the investment multiplier, introduced by Keynes as an integral part of his General Theory, which has gained prominence in the literature. The investment multiplier establishes a precise relationship between aggregate income and the rate of investment, given the marginal propensity to consume. The fundamental relationship is expressed by the following equation:

\[
\frac{dy}{dl} = \frac{1}{1 - \frac{dc}{dy}}
\]

where:
- \( \frac{dc}{dy} \) stands for the marginal propensity to consume
- \( \frac{dy}{dl} \) denotes the multiplier—the change in income relative to the change in investment.

The simple multiplier model indicates the total income-creating effects of an autonomous increment of investment on the basis of certain highly simplifying assumptions—the absence of time lags, no induced investment, constant marginal propensity to consume, closed economy, etc. The more sophisticated models of the multiplier, developed after Keynes, have refined the analysis by dropping some of the above assumptions. A notable improvement was the inclusion of induced investment as a variable through introduction of the concept of marginal propensity to invest. The multiplier and accelerator models could thus be combined. The combined multiplier-accelerator, sometimes termed as the spending multiplier, is given by the following equation:

\[
\frac{dy}{dl_0} = \frac{1}{1 - (c' + i')}
\]

where:
- \( c' \) is the marginal propensity to consume
- \( i' \) is the marginal propensity to invest
- \( I_0 \) is the autonomous investment

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Corresponding to the stability condition for the simple multiplier model \( \frac{de}{dy} < 1 \ldots \) (Keynes' fundamental psychological law) there is the necessary condition \( c' + i' < 1 \) for the determinateness of the spending multiplier. The latter can also be stated in the form that the marginal propensity to save should be greater than the marginal propensity to invest. The introduction of the time element into the otherwise static multiplier analysis is the only other refinement which needs to be noted for our purposes. The dynamic multiplier enables us to measure the effect produced at any given moment of time as well as the final limit which the effect tends to approach. It can be shown that the static multiplier is the final limit to which the dynamic multiplier tends.

An attempt will be made in this paper to examine the concept of the investment multiplier with special reference to the income expansion process in underdeveloped countries where autonomous investment represents deficit spending by the government for financing development outlays. The need, for conceptual reasons, of distinguishing the real income multiplier from the money income multiplier will be pointed out and the relevance of the multiplier technique for studying the dynamics of inflation in underdeveloped economies will be analyzed. The problem will be discussed in relation to the length of the income propagation period, the elasticity of output, and the gestation period of development projects.

The Keynesian Aggregative Model vs. Underdeveloped Economies

The Keynesian aggregative model, in which multiple income effects of a single injection of purchasing power play so vital a role, visualizes an underemployment equilibrium in terms of idle industrial capacity, involuntary unemployment and a generally elastic supply curve of output. A movement away from this underemployment equilibrium towards full employment is thus expected to be accompanied by relatively small increases in the general price level, the rise in money incomes being more or less matched by a rise in employment and output. This appears to be one of the main reasons why the argument of the General Theory abstracts, for the most part, from the problem of price changes. The consumption function which alone determines the multiplier in the Keynesian model is expressed in real terms and is a function largely of real income. The influence of objective and subjective factors on the marginal propensity to consume and thus on the multiplier was recognized but could be ignored for the short-term problems which were analyzed. Thus, except for some slight qualifications, the multiplier in the General Theory is a 'real income' multiplier.

It is evident that the above-mentioned assumptions underlying the Keynesian model do not generally hold in an underdeveloped economy. There is no involuntary unemployment at least insofar as employment cannot be increased simply by an increase in effective demand. The unemployment in a less developed agricultural economy takes the form mainly of disguised unemployment. An automatic transfer of excess population from agricultural to non-agricultural sector following a general expansion in money incomes and demand cannot be taken for granted. In the first place, an industrial base does not exist and cannot obviously be created by inflation of incomes alone. The problem basically is that of shortage of capital. Secondly, even if there are some consumer goods industries, there is no reason to assume idle capacity in them. An increase in agricultural production in underdeveloped countries as a result of the stimulus of increased demand is also likely

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to be small. In these countries, with the small peasant farm as the unit, the costs of production consist essentially of the living expenses of the farmer and his family and of certain fixed dues to the landlord or the state. The high ratio of these supplementary costs to the fixed costs tends to keep production at all times more or less at the maximum level possible under the given conditions, leaving very little margin for expansion. The net effect of these factors, at least in the short run, is that the increase in public investment, say, in social overhead capital, and consequent multiple expansion in incomes results in a steep rise in prices with little or no increase in output.

The full implications of this rather obvious proposition for the multiplier analysis in an underdeveloped economy are not always realized. It is not enough to say that “the income multiplier is much higher in money terms and to that extent prices rise much faster than an increase in aggregate real income”. It is necessary to emphasize that the concept of multiplier, in the Keynesian sense, loses its meaning for situations where the rise in prices is large. Any substantial increase in prices is likely to be accompanied by shifts in income distribution between various groups of the economy. With these shifts in income the marginal propensity to consume in real terms which is an aggregate magnitude consisting of marginal propensities of different income groups, may change significantly. The marginal propensity to consume in money terms which determines the money income multiplier would therefore not stand in any simple relationship to the marginal propensity to consume in real terms. For instance, it cannot be asserted that the money income multiplier would be higher than the real income multiplier to the extent that an increase in money incomes is not matched by an increase in output. Contrary to what Keynes argued, it is not necessarily true that any attempt to increase investment once full employment had been reached will set up a tendency in money prices to rise without limit. As will be discussed subsequently, the price or money income multiplier may be finite even with no increase in output depending upon the marginal propensity to consume out of money income. Once the possibility of major price changes is admitted, a distinction has to be introduced between the marginal propensity to consume in real terms and the marginal propensity to consume out of money income. This distinction has generally not been drawn in the writings on the multiplier in relation to underdeveloped economies. The dynamic model presented by V.K.R.V. Rao in his well known article Deficit Financing, Capital Formation and Price Behaviour in an Underdeveloped Economy also suffers from this defect. The basic assumptions of Rao's model fail to take account of the redistributive effect of inflation. On the one hand it is assumed that the investment outlay undertaken by the government will result merely in an increase in prices which would in turn give rise only to increased profits, and on the other hand, the marginal propensity to consume out of increased money incomes is implicitly assumed to be unity. Thus even though real wages and consequently the share of wage earners in total real output progressively declines while the relative position of profit-earners improves, no changes in the real marginal propensity to consume are envisaged. This is clearly an unrealistic assumption

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5. Some leakage in the form of taxation is, however, provided.
and should at least have been explicitly stated. The argument often advanced that the marginal propensity to consume in underdeveloped countries is equal to unity and thus the multiplier in these countries may be indeterminate is also, to some extent, the result of the failure to distinguish between money and real propensities.

The above analysis brings out the basic difficulty in applying the Keynesian-type multiplier, which is uniquely determined by the marginal propensity to consume in real terms, to situations where inflationary pressures dominate. Multiplier models based explicitly on the marginal propensity to consume (and to invest) in money terms may perhaps be more meaningful in these cases. This is not the same thing as saying that consumption depends upon money income. Indeed, the propensities to consume for various income groups in the economy which lie behind the aggregate money marginal propensity to consume of the community as a whole could and should be conceived in real terms even in the money income multiplier model.

Assumptions of A Money Income Multiplier

We now turn, therefore, to the examination of a simple multiplier-accelerator model where magnitudes are expressed in money terms. The major assumptions underlying this model may be noted at the outset. The most drastic assumption to be made is that the creation of money incomes due to deficit spending by the government and its secondary effects is not accompanied by any increase in output of goods and services. The assumption of zero elasticity of output amounts in fact to the assumption of full employment. This assumption admittedly represents an oversimplification for an underdeveloped country because at least primary employment will increase owing to autonomous government investment, which for the sake of convenience is assumed to be in labour intensive public works. The assumption of zero increase in output may seem inconsistent with the other assumption that the main purpose of the government’s deficit spending is to raise the proportion of total real investment in the country to a higher level than prevails in the initial equilibrium and to keep it at this higher level. Ignoring the effect of an increased rate of investment and increased capital stock on future output is in the Keynesian tradition. The model presented here is therefore not truly dynamic. The justification for abstracting completely from changes in output is that it enables us to focus on essential relationships in the process of income expansion. Moreover, if we take into consideration the long-term nature of projects (irrigation, transport, power) on which governments in underdeveloped countries tend to concentrate and the relatively short income propagation period in these countries, the prospective increase in output may be quite small over the time horizon with which the policy maker is concerned. An important factor which increases the practical concern with the short-run developments is the pressing balance of payments considerations which have been disregarded in this paper. Another assumption of the model is that marginal propensities to save and to invest in money terms remain constant throughout the process of expansion. The assumption of unchanged propensities also underlies the real income multiplier. The instability in money propensities may, however, be greater particularly if a struggle develops between different sectors or income groups in the economy. But this is more likely to be the case in an industrial economy with organized labour than in an underdeveloped country.

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20. Labour for projects may be assumed to be drawn from the surplus in agriculture.

The Model

A money income multiplier is given simply by substituting marginal propensities to consume and to invest in money terms in place of ‘real’ propensities in the real income multiplier. If we designate the marginal propensity to consume in money terms as \( L' \) and the marginal propensity to invest out of inflated income as \( B' \), the combined price multiplier-accelerator would be equal to

\[
\frac{1}{1 - (L' + B')}
\]

The significance of the marginal propensity to consume in money terms was touched upon only briefly in the preceding pages; some further discussion of the concept is necessary. If the desire to save of the community as a whole depended on its real income alone, the system could not have an equilibrium. The marginal propensity to save out of inflated money income would be zero irrespective of the marginal propensity to consume in real terms and the price multiplier would be infinite.\(^3\) However, as noted earlier, the income redistribution effects of inflation can cause a major divergence between the marginal propensity to save in money and in real terms by bringing about a shift in the consumption function. The attempt of any one sector of the economy to increase its relative share of the total national product lies at the root of the inflationary process. In so far as the attempt is successful, income shares of various sectors are changed and so real consumption changes too. We should expect the marginal propensity to save out of money income to be positive even if there is no increase in output, provided the rise in the general price level leads to a significant redistribution of incomes in favour of high income groups who generally have a higher propensity to save. The presence of money illusion may also be a factor tending to raise real savings. No generalization can, however, be made in this regard. On the other hand, the general expectation of a continued rise in prices may shift up the consumption function of all sectors of the economy and thus result in hyperinflation. This possibility, though not remote, has been disregarded.

Next, we have to consider the meaning to be attached to the marginal propensity to invest in money terms. The assumption was made above that the autonomous investment of the government has the immediate effect of raising the proportion of real investment to the national income to a certain desired level and that this ratio is maintained in subsequent periods. This simply means that the marginal propensity to invest out of inflated income is assumed to be equal to the ratio established between investment and national income. The strict government planning and control of total investment is probably not an unrealistic assumption for an underdeveloped country where all imports including capital-goods imports are subject to trade and exchange restrictions.

The following diagrammatic presentation\(^3\) shows the cases of stable and unstable equilibrium for the money income multiplier in our model.

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\(^3\) It would be finite for any given period.

\(^3\) The diagram has been adapted from “The Behaviour of Money National Income Under Inflationary Conditions” by A. Smithies, in the Quarterly Journal of Economics, 1942, Pp. 113-128.
Let national income be measured horizontally and saving and investment vertically. Then let OA be the initial equilibrium value of 'full employment' income. This will be determined by the intersection of BM and BN, the schedules of the real propensity to save and to invest. At point B ex-post savings equal ex-ante savings and ex-post investment equals ex-ante investment. Now suppose that at the prevailing prices the government proposes to increase investment to OE. Then for any value of Y the money value of I would be given by the line OG, the slope of which measures the ratio of investment to national income (after autonomous investment). Let BH be the propensity to save out of money national income. If the slope of BH is greater than that of OG, the inflation may eventually come to an end because then a level of money income exists at which planned money savings equal planned money investment. Income OK depicts such an equilibrium. If the slope of BH is equal to or less than that of OG, the inflation will go on indefinitely. The unstable equilibrium is marked by the line 'BH'. Under our assumptions the stability condition\textsuperscript{14} \textit{i.e.}, an upper limit to inflation, requires that the proportion of total investment to income should be less than the marginal propensity to save in terms of inflated income.

**Analysis of Inflation**

We may now examine briefly the model presented above with reference to the problems involved in analyzing the speed, magnitude and limit of inflationary pressures in underdeveloped countries. It may be helpful first to visualize the quantitative implications of certain hypothetical values of marginal propensities to save and to invest. Following our assumptions let us say that the objective of the government investment is to raise the ratio of total investment to the national income from 5% to 10%. The marginal propensity to invest in money terms would thus be 0.1. The marginal propensity to consume out of inflated money income must be below 0.9, if there is to be a stable equilibrium. With a marginal propensity to consume of 0.8 the money income multiplier would be 10 and it can be shown that the general price level would tend to rise by 50% in the final analysis. The practical problem of increasing investment and at the same time keeping inflationary pressures within reasonable bounds thus revolves around the marginal propensity to consume out of inflated money income. It is the behaviour of this magnitude which should be analyzed with special reference to the conditions of underdeveloped economies. As has been emphasized sufficiently already, the crucial factor in this regard is the income redistribution brought about through changes in the general price level. This analysis for an industrially developed economy is generally carried out in terms of shifts in income shares of wage earners and profit earners. The limitations of such an approach for a typically underdeveloped country are self-evident. In economies which are largely agricultural, the ratio of both profits and wages to national income is low. Furthermore the subsistence sector constitutes a

\textsuperscript{14} For a general statement of the stability condition see page 21 and 22.
large part of the agricultural economy in an underdeveloped country. This sector largely comprises food crops consumed by the farmers themselves. To a lesser extent, livestock and dairy products generate incomes which give rise to no monetary transactions. Similarly, a large part of payments for services are made in kind in the rural areas. These include wage payments to agricultural workers and village artisans. The existence of this large non-monetary sector which accounts for 30-40% of total national income in many underdeveloped countries, is of basic importance. The income and consumption in the subsistence sector is more or less outside the range of monetary forces originating in the rest of the economy. Insofar as the real income of the large segment of the population is not influenced by the mechanics of inflation, the entire burden of adjustment falls on the other sectors and the chances of attaining a stable equilibrium are thereby reduced.

Two factors which may further complicate the situation deserve mention. Firstly, the agricultural rents accruing to the absentee landlords, forming a substantial portion of the total national income, are likely to remain unaffected as the payments are made in kind. This would not be a serious matter if it was possible to generalize about the consumption behaviour of landlords as a class. It has been observed that even though landlords in underdeveloped countries enjoy very high incomes, their marginal propensity to save as compared with the small group of industrialists and businessmen, is low. The second difficulty is more serious. It has been assumed that workers employed on new government projects are drawn from agriculture where their marginal product is zero. Their employment represents essentially a transfer of labour resources from the non-monetary sector to the monetary sector of the economy. The subsistence sector is therefore no longer required to provide food for the surplus workers. The real income per head of population in the subsistence sector actually goes up. The likelihood that any part of this increment of income would be saved is probably small. The transfer of population from the subsistence sector does not therefore result in any significant increase in marketable surplus of food. Under our assumption of unchanged total production, the monetary sector is required therefore to cut its consumption not only to provide for increased real investment but also for increased consumption of newly employed workers. The stronger the pressure of the above factors, the weaker would be the tendency of the marginal propensity to save out of money income to be positive and to exceed the marginal propensity to invest. It is interesting to note that a compulsory levy on agriculturists in the form of a grain tax may be in some circumstances the only way for the government to bring about a reduction in real consumption of the community as a whole.

The above analysis suggests that the mechanism of redistribution of income in an underdeveloped economy following a general increase in the price level is quite complex. It differs in essential respects from a similar process in industrially advanced countries. Apparently, the stability requirement for a money income multiplier may be difficult to satisfy if the subsistence sector forms a large part of the economy. The fundamental problem in bringing inflation to a halt may be to make the subsistence sector take a cut in real consumption.

The income expansion process was discussed above without reference to the effect of the time lags. From a practical point of view, however, it is necessary to examine the multiplier with reference to a specific period of time. The use of the

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1. Colin Clark estimates that farm-consumed income in India as a whole comprised 46% of the total on the basis of 1935 data. More recently, the proportion of the non-monetary sector has been estimated as one-third in Economic Survey and Statistics for 1956. (Budget of Government of Pakistan, 1957-58, p. 42.)
concept of the income propagation period by Machlup18 was an important step towards dynamic multiplier analysis. The income propagation period is defined as "the length of time which it takes for money in active circulation to complete a circuit flow from income recipient to income recipient; or more exactly, it is the ratio of the active part of all cash balances (average total cash balances minus total of minimum balances) to the total of money net incomes." Taking Angell's estimate of income velocity of money for the U.S. and making allowance for idle balances, Machlup estimated an income velocity of active money of 4 per year. This meant an income propagation period of 3 months for the U.S. Later roughly similar result was obtained by Professor Angell himself who estimated this period to lie between 3.15 to 3.33 months.17 It has been suggested that the length of income propagation period in an underdeveloped economy may be quite short, probably 2 months18. While data presented in support of the argument relate only to one underdeveloped country and the period used for estimating income velocity is very short, the proposition appears to be sound for the following reasons. Firstly, the hoards of money (both currency hoards and demand deposits held as idle balances) probably account for a larger percentage of total money supply in underdeveloped countries than in more advanced economies. The high liquidity preference for speculative balances has probably much to do with institutional factors. Tax-evaded money for instance may be kept in the form of idle balances due to fear of disclosure. More fundamental is the high consumption bias of the underdeveloped economies and the nature of consumption which is concentrated on basic needs of food, clothing, shelter, etc. Further, the relatively simple economic organization in an underdeveloped economy with a smaller number of intermediaries between the producer and the consumer may also tend to shorten the duration of the income propagation period.

The shorter income propagation period would accentuate the effect of inflationary pressures. According to calculations made by Machlup,19 with a multiplier of 10, 90% of the full multiple effect would be reached in 21.85 income periods. Taking an income propagation period of two months, the bulk of the effects of a primary increase in money incomes would be felt within 3-1/2 years. Insofar as the average gestation period of projects financed with the help of created money may be much longer, inflationary financing may become an uncontrollable problem in an underdeveloped country. The need for extremely careful planning is obviously indicated.

The relative stability of the income velocity of active money, and thus of the income propagation period, during the course of expansion process has been tacitly assumed above. This assumption may have to be modified in special cases. Cyclical fluctuations in income velocity are to be expected. Furthermore, certain long-term factors would be at work lengthening the income propagation period as the structure of the economy slowly changes.


Conclusion

The analysis contained in this paper points to the need for distinguishing between money income and real income multipliers. The Keynesian-type real income multiplier has little relevance for an underdeveloped country where, owing to extremely low elasticity of output, any increase in autonomous investment is likely to result mainly in a rise in prices. The inflationary process in an underdeveloped economy may, however, be studied with the help of the concept of the money income multiplier. The marginal propensity to consume out of inflated income, which is a major determinant of the price multiplier, depends upon the redistributive effects of inflation and the shifts in the consumption function which may be crucial in an income expansion phase. The drastic assumptions necessary for setting up a simple income multiplier model, however, tend to limit its applicability to short-run processes. Nevertheless, even this simple model throws light on some basic problems. Discussion of the model with particular reference to conditions which normally prevail in an underdeveloped economy suggests that the stability requirements are not likely to be met if the subsistence sector forms a large part of the economy and if direct measures for reducing consumption in this sector cannot be enforced. The shortness of the income propagation period may further add to the strength of the inflationary pressures in an underdeveloped country. The gestation period of development projects financed through created money therefore assumes great significance.