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THE RATE OF INTEREST AND THE DEMAND FOR LABOR

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THE RATE OF INTEREST AND THE DEMAND FOR LABOR

Albert Berry

Considerable discussion has been directed recently to the question of whether below equilibrium interest rates, which typify parts of the capital market in most less developed countries, are among the culprits in the low labor absorption and the high and increasing capital intensity of the modern sectors of the economies (especially manufacturing).

The simple argument that an increase in the price of capital, by changing the relative price of that factor compared to labor, should lead to an increase in the relative amount of labor used, appears intuitively plausible; but it cannot be taken for granted without careful analysis of the dynamic behaviour of firms, the differences between firms which receive credit at a subsidized level and those which do not (when a below equilibrium interest rate is used for part of the recipients) the time required for a firm and a number of other factors, some of which will be outlined below. It is clear that the relationship between labor demand and interest rate policy is not a simple one; it will become clear that results vary across a wide range of possibilities according to the assumptions made.

Consideration of the relationship between the interest rate at which a firm can borrow and its growth is particularly important given that so much of the discussion surrounding the interest rate-employment relationship has to date focused on the static framework, i.e. the question of how the representative firm would change its factor proportions in response to a change in the interest rate, holding its output constant. Some of the discussion with respect to this "constant output" elasticity of substitution has been poorly framed, with too

little account taken of both the time factor (the elasticity of substitution would obviously be expected to be higher in the long run when full adjustments can be made than in the shorter run) and the fact that empirical calculations of such elasticities of substitution--whether for the industry or for the economy--are sure to be a conglomerate product of many different elements in the situation, and will never correspond precisely to any specific conceptually defined elasticity of substitution. Without trying to defend the above statement (since it is not of major interest for the discussion of this paper) we may note that it seems probable, in the light of present evidence, that: a) the short run (say a year or less) elasticity of substitution for the typical firm is probably rather low, far below 1.0; this is almost a foregone conclusion in the static context of unchanging or slowly changing output, and especially so when the wage/rental ratio decreases, since fixed capital cannot be simply sold or rented out when, say, the wage rate falls. (b) The longer run elasticity of substitution of the individual firm is probably substantially above the short run elasticity, but not dramatically high, given the specificity of the knowledge the typical entrepreneurs has; he tends to know substantially less than full range of technological possibilities, and is usually much better at applying some than others--so it might not be implausible to guess that in many industrial sectors this elasticity would lie in the range 0.3 to 0.7 or thereabouts; (c) elasticity of substitution in an industry in the long run, where allowance is made for changing relative importance of different entrepreneurs according to their ability to adapt to different technologies, is probably fairly high in many industries, probably above 1 in many; d) the long run elasticity of substitution between labor and capital for the industrial

sector or the economy as a whole, allowing for substitution between industries is of course the highest of all those considered, substantially above 1. Since this elasticity is the really relevant one (except where the intermediate run is more relevant than the long run) in most real world cases, there seems no reason for the elasticity pessimism which has characterized much of the literature. Some of the literature to suffer from the engineers' "rigidity bias", the failure to distinguish between the short and long run, and the failure to take account of all the degrees of freedom which the economy has at its command, i.e. substitution among industries, among sizes of firms, and so on.

In any case, the static elasticity of substitution which one would expect to be reflected in a firm's isoquant¹ is clearly, based on a much too partial experiment (in which too few things are allowed to vary) to provide an adequate model for the prediction of the impact of changes in interest rates. In the discussion which follows, the emphasis is on general equilibrium changes in the relative importance of different types of firms as a function of interest rate policy, a focus designed to complement the discussion of the static elasticity of substitution.

To order the discussion which follows, it is useful to set down the results corresponding to each case discussed in tabular form. Table 1 summarizes the assumption result combinations; the assumptions are grouped according to whether they refer to some aspect of the capital market, a characteristic of the rest of the economy, or an aspect of government policy.² The distinction between static and

¹The short run elasticity in its short run isoquant and the long run elasticity in the long run isoquant.

²The issue here is credit policy: "government" should be read as "the institution which makes credit policy."

Case	ASPECTS OF THE ECONOMY				ASPECTS OF THE CAPITAL MARKET		ASPECTS OF GOVERNMENT POLICY		RESULTS			
	Factor				Borrowing	Source	Destination of	Lending Rate	Credit Policy	Factor	Output	Distribution
	Scale effects	Substitutability	Savings	Labor Market	Rate of Firms which can borrow	of Funds	Firm Lending	of Firms		Proportions		
#1 (One source and destination of funds)	Decreasing returns beyond output \bar{x}	Some	Independent of interest	Perfect	Fixed at R_0	Government only	Government only	$\leq R_0$	Policy A Demand and supply of funds equal Policy B (lower for randomly chosen set of firms) no credit to others	Same in A & B	Maximized under A; less under B	Wage rate lower in B; thus distribution worse
#1a	"	"	Positive function of \bar{x}	"	"	"	"	"	"	K/L higher in A over time	"	"
#1b	"	"	Independent of \bar{x}	"	"	"	"	R_0	"	Same in A & B	Same in A & B	Wage rate same, profits of subset firms paid, e.g. taxes imply dist worse in B than
#2 (Internal funding possible)	"	"	"	"	"	Government or internal	"	"	"	Dualism in B; favored firms have higher K/L than A firms; rest lower	Lower in B	Wage rate probably in B and distribution worse
#2a	Increasing returns over a range before they decrease	"	"	"	"	"	"	"	"	"	Loss greater in B than in previous case	"
#3 (Intermediation costs exist)	Decreasing returns beyond output \bar{x}	"	"	"	"	"	"	$\leq R_0$ (because of intermediation costs)	"	"	Loss in B	Wage rate lower if distribution pre worse
#4 (Labor Market Imperfections)	"	"	"	Dualistic (easy credit access firms must pay higher wages)	"	"	"	$\leq R_0$	"	Credit favored firms have much higher K/L	Loss in B	Wage bill probably in B
#4a	"	"	"	"	"	"	"	R_0	"	Favored firms have larger K/L	Loss in B (may or may not be less than in previous cases)	"

dynamic analysis is important. The objective of the analysis being to sort out the effects of a below equilibrium interest rate policy, we distinguish, for each set of assumptions, the results of Regime A--an economy with an equilibrium interest rate and Regime B--an economy where at least some (possibly all) firms receive subsidized (i.e., below equilibrium) borrowing rates.

A.1 First Step Micro-Economic Assumptions--The Case of Equilibrium Firm Size

The theory of the firm, at least as used in the simple micro-economics of perfect competition, is clearly a dubious tool for real world analysis and, although most of the traditional micro assumptions are used during parts of this discussion, they are subsequently varied to test the sensitivity of the results to them. The first assumptions about the capital market will not be designed for realism but rather to facilitate exposition of some of the mechanisms at work. Suppose, first, that:

1. For the typical firm at a given level of output, some factor substitution between capital and labor is possible.

2. Firms have an equilibrium size defined by the existence, beyond a certain level of output, of decreasing returns to scale.

3. Firms have only one source of funds which can be used in production, the credit system; they pay an interest rate which is the topic of discussion. (Subsequently the obvious fact that firms also use internally generated savings--or prior savings of the entrepreneurs--is taken into account.)

4. Firms may lend at the same interest rate, determined by public policy ; it is not possible for firms to lend to each other.¹ We implicitly assume

¹This "nonsense" assumption, when the results it brings are compared with those of subsequent cases, helps to clarify the relative roles played by two interest rates: that at which firms borrow and that at which they lend.

a sort of "one big intermediary" through which all savings must flow before being invested, even by the saving entity.

5. There are no imperfections in any market besides that of capital, i.e., the labor market, the markets for other factors, and the product markets are perfect.

6. Savings are independent of the interest rate.

Consider, under these conditions the impact of the concession of a below equilibrium interest rate (on whatever amount of credit is desired) to a randomly selected group of interested firms in a one sector economy.^{1,2}

In Figure 1 capital is measured on the vertical and labor on the horizontal axis; the isoquant map reflects the production function of each firm in the industry or sector. The slope of the line $p_1 p_1'$ reflects the relative factor price when an equilibrium interest rate policy is followed; if increasing average costs set in at the output level 40, it is then true that the equilibrium factor combination for each firm in "Regime A" is represented by the point A, with the output level of 40 units.

¹The "one sector" assumption is also made for simplicity. Note that by definition it is impossible for all firms in the economy to borrow all they want at below equilibrium rates, where equilibrium is defined with some given preference with respect to inflation borne in mind.

²Since usually the selection of firms that receive subsidized credit is anything but random, this analysis is obviously only an academic first step in the overall consideration of the problem; nevertheless it is useful in drawing out some of the phenomena which must subsequently be borne in mind.

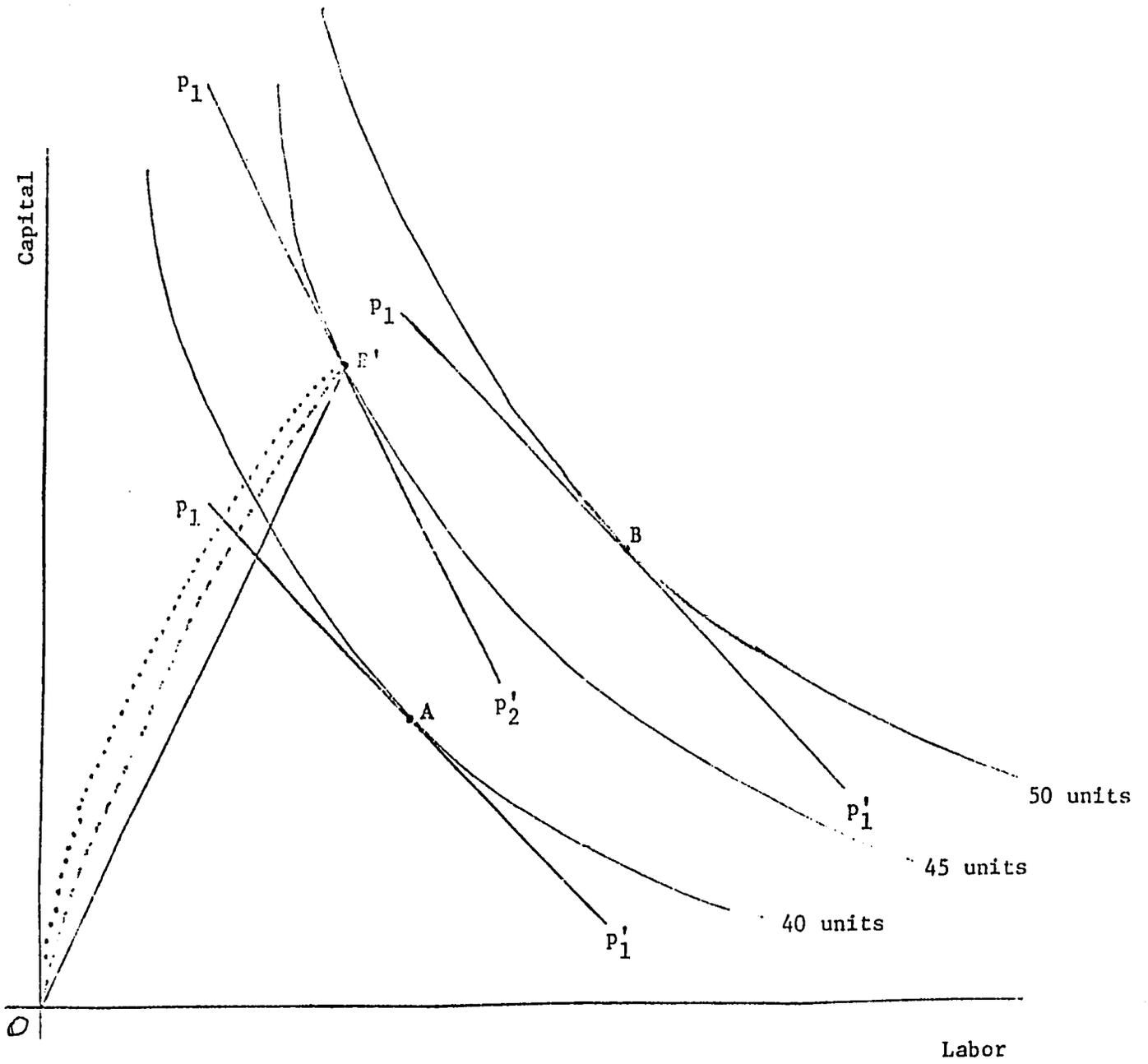


Figure 1

With a below equilibrium

interest rate and the same wage rate, the representative firm in Regime B would of course choose a different factor proportion; also, its equilibrium size would be greater. But the desire to use a factor proportion different from that of Point A (which corresponds to the economy's factor endowment) will push the wage rate down.

Given the assumption of a perfect labor market, the wage rate must fall until these firms face the same relative factor price as do the firms of regime A. The equilibrium point for the firms would not, however, be at point A, since it would pay firms receiving credit at a subsidized rate and employing labor more cheaply than could regime A firms to grow larger. The relative inefficiency of regime B would, therefore, not be due to different factor proportions but to above optimal size of enterprise.¹ If, of course, the below equilibrium interest rate also discouraged the saving process, there would eventually be less capital in this system, implying per se lower total output and lower wage rates. In that event the system with the equilibrium interest rate would paradoxically, have firms with higher capital labor ratios in equilibrium than the "cheap capital" system. In the short run, however, the impact of the below equilibrium interest rate policy is to (a) lower total income (output) due to the inefficiently large firm size, and (b) lower the wage rate and labor share of income while subsidizing the credit receiving firms and thus worsening the income distribution. Point B,

¹It should be remembered, though, that all firms really being in the same situation is almost a contradiction of terms. It follows only from the assumption that no firm can get started on the basis of its own capital.

incidentally will involve the same relative factor price facing the firm as Point A if the production function is homogeneous. By definition, one impact the policy does not and cannot have is to change average factor proportions.

The discussion of this case is static, as there is little to be gained by treating dynamic complications of a situation only considered for heuristic purposes.

A.2 No Restriction On Use of Subsidized Credit; Savings Still Pass Through Public Intermediary

The relevance of the unrealistic assumption of control over the use of subsidized credit can now be noted. Assume the only source of credit for investment is the (single) public sector intermediary, but any funds can be lent or relent to that intermediary. Then Regime B will reproduce the Regime A result if the lending rate for firms (the interest rate received when they pass funds to the intermediary) is the equilibrium rate. Assuming no constraints on the use of funds, a firm's lending rate defines the opportunity cost of the use of funds in its own enterprise; its borrowing rate becomes irrelevant whenever it is below the lending rate. If Regime B interest rates on funds attracted by the intermediary are below equilibrium, the result discussed in the previous case is present once again; (if the interest rate were above equilibrium, firms would be too small and a different form of inefficiency would be present). The equilibrium wage rate is the same as in Regime A when the firms' lending rate is the equilibrium one and below it when that rate is below equilibrium.

A.3 Funds Not Required to Pass Through Intermediary: Internal Funding Possible

The above cases have, by the assumption that all savings had to be funnelled to a unique public intermediary which then determined their use,

ruled out the possible existence of any but the credit favored firms; this in its turn has ruled out the inter-firm dualism which is very likely to be the hall-mark of a below equilibrium interest rate policy.

Suppose (as is in fact valid) that the equilibrium wage in this system will be less far below that of Regime A (percentagewise) than the subsidized interest rate is below the equilibrium one of Regime A. Then the relevant factor price-line for a favored firm could be p_2p_2' of Figure 1, with a steeper slope than p_1p_1' , and the equilibrium point for the firm a point like B' (with output of say 45 units).¹ It is clear that if one compares the efficiency of resource utilization of a firm at A and one at B', it is higher for the former, as long as the factor price line p_1p_1' accurately reflects the relative social opportunity costs of the factors; the measure "value of output/social cost of factors" would thus indicate that the A type firm is superior to the B' type firm.^{2,3} The relevant comparison, however, is not between two such firms in equilibrium, but rather between the relative efficiency of one regime which, by making credit equally available to all firms at the equilibrium interest rate promotes growth by all firms to point A, and a second regime which by discriminating among firms promotes rapid growth to point B for some firms and slow growth or no growth on the part of others (which expand only on the basis of their self generated funds).

¹ Assuming the wage is not as low as in case A.1 and the interest rate is the same, output would be between 40 and 50 units.

² The A-firm is superior both because it applies the socially optimal factor proportions and also because it is of socially optimal size, while the B firm, in minimizing average private costs, produces an output at which average social cost is already rising. If the factor markets were manipulated so that all firms in regime B were at point B', the lower social efficiency of resource utilization would (tautologically) be reflected in a lower total output from that system, given the same capital stock; it would also imply unemployed labor since, in this simple one-sector economy, the factor endowment ratio is given by the slope of the ray OA. The implication of unemployment in the system suggests the implausibility of assuming that all firms be at point B.'

These latter firms, if they grow at all, eventually also "land" at point B since the equilibrium position of firms under the assumptions applied here is determined not by the rate at which they can borrow but the rate at which they can lend; it alone sets the size above which it does not pay them to go. For the first case considered so far, it is necessary to move out of the static framework to capture the essence of the difference between the two regimes--the fact that firms grow to the same equilibrium at different rates in Regime B. And it is important to remember that the existence of a different optimal factor combination for easy access Regime B firms than for Regime A firms depends on the existence of low access Regime B firms which generate a high labor demand per unit of capital and thus keep the wage rate above that which would imply the same wage/rental ratio as prevails in Regime A.² If no "credit access" firms survived in Regime B, the situation would revert to that considered in the previous section.

Whether all firms in the Regime A are thought of as moving immediately to Point A is a question of firm dynamics not of great relevance here; experience suggests that firms probably do not move immediately to their

Continued from previous page

In fact we are more concerned with the fact that a regime with some firms at point B cannot be as efficient as one with all firms at point A. Since the social opportunity cost of factors to a firm depends on the structure of the rest of the economy, it is not strictly appropriate to compare efficiency (i.e. contribution to national income) of firms from these two regimes on the basis of the factor prices holding in regime A.

²If unfavored firms have no potential funds but the savings generated in their own production process, they may not come into existence, i.e. the set of "unfavored firms" may not exist. This would be especially likely if there were important increasing returns to scale at small output levels, beyond which these firms could not easily get, but beyond which they would have to get to compete price-wise with the favored firms.

equilibrium position but rather expand over a period of time, during which "learning by doing" frequently occurs.¹ In Regime B it is a foregone conclusion that the discriminated firms will not move immediately to point B' since their growth is constrained by the supply of internally generated funds; the other firms will move more rapidly to that point.

It is interesting to note that the two groups of firms in regime B may or may not follow the same growth path to point B'. This depends in part on the relative ease of adjustment of the quantity of labor used in comparison with that of capital. Where capital is a constraint it requires time to build up the capital stock and it is therefore more likely the labor will adjust fairly fully to capital at each level of capital.² One extreme assumption would be that labor can be adjusted instantaneously to the existing capital stock,³ the opposite extreme assumption being that it requires as much or more time to locate the appropriate labor supply as to obtain capital.⁴ In the latter case, (and in general) the growth path cannot be explained simply in terms of the relative factor price at successive points of time and the production function; in the second case it can be traced out

¹Since the equilibrium position may change fairly frequently, it is hard to deduce whether or in what sense a firm is or is not in equilibrium at any given point of time.

²Where "adjust" means "reach its long run equilibrium level given that stock of capital and its own price (the wage rate)."

³The result is the same in any case where the capital growth is predictable so that planning the labor force at future points can be done with sufficient lead time as to always be applying the long run optimal amount of labor to the existing capital stock.

⁴To assume that capital could be adjusted instantaneously to the stock of labor would essentially deny the existence of the problem being considered here.

fully with this information, so we consider that assumption first. Under it, the growth paths of the two firms are identical; they might, for example, correspond to the solid line OB' of Figure 1. For any given capital stock, regardless of whether it is based on credit or own funds, there is an optimal amount of labor determined by (a) the marginal productivity of labor with that stock of capital and (b) the wage rate. The only difference in the expansion process of the two firms would be the faster pace of the one with credit. In the situation where it requires some time to incorporate new workers into the force (and planning in advance cannot fully overcome the relevant obstacles) the two growth paths would not be the same; both types of firms would, at each level of output, have lower labor/capital ratios than those indicated by the solid line OB' since they would not be able, at each stock of capital, to adjust to the long run equilibrium labor force corresponding to it. The labor/capital ratio of the firm with the faster growing capital stock would be lower at each output level, since it would have less time to adjust the labor stock; the dotted line OB' might represent the growth path of that firm and the dashed line OB' the discriminated firm.

As noted above, as long as the lending rate is the same for all firms the final equilibrium point will be the same in each case,¹ and the only source of differences between the two types of firms in social efficiency,²

¹Abstracting from the possibility that some firms do not grow at all, and assuming that the lending rate/wage rate ratio does not change over time. This special case requires a sort of continuous balance between firms in equilibrium and those below it.

²Defined normally as the ratio value of output, to value of inputs evaluated at their shadow price; that definition, however, is only meaningful when the alternative use of each factor can in effect be specified (so that its marginal productivity can be specified). In the present case social efficiency is best defined tautologically as being higher for the type of firm whose presence implies higher total output than would the presence of the other type.

in employment generated per unit of capital, or in impact on the distribution of income would result from different paths to that point, and the relative speed of movement to it. The relative efficiency of the two regimes depends, if it be assumed for simplicity that all firms in regime A and easy access firms in B move immediately to their equilibrium positions, on:

- (1) Differences in the factor proportions of firms at different levels of output;¹
- (2) Economies of scale;
- (3) Relative total output of the easy access as opposed to the low access firms.

These factors interact more or less as follows: If there are no economies of scale, loss occurs only if and because the no access firms use different factor proportions than the easy access ones; and in the absence of economies of scale and with a homogeneous production function the two groups of firms would use the same factor proportions, so no inefficiency would result.² In the presence of economies of scale, loss would necessarily

¹In cases where the equilibrium position is different, its relative position would of course be an important point of comparison.

²This case may be visualized as follows. The low access firms in regime B have a given share of a fixed capital stock, equal in regime A and in regime B. The rest is allocated by the subsidizing intermediary to easy access firms. One may ask whether the wage and interest rate of regime A would also be equilibria in this system. The labor demand of the low access firms would be that implying the regime A factor proportions (unless less labor were demanded because of failure to adjust labor to its long run equilibria level given the current capital stock); the amount of each factor unused by the low access firms would imply also the regime A factor proportions for the easy access firms and the regime A factor price ratio would thus be equilibrium overall.

occur. Its extent would depend (in a fairly complicated way) on the degree of economies of scale and subsequent diseconomies, the degree of factor substitutability, and the relative amounts of capital employed by no access and easy access firms.¹ Loss would tend to be quite high with large economies of scale, medium level factor substitutability and a high share of capital in the low access firms. With the last condition, significant loss is inevitable since even if the no access firms used the same factor proportions as the high access ones, their factor productivity (for both factors) would be well below that of regime A firms. The probably high marginal productivity of labor (if the economies are related to capital indivisibility), would lead them to bid up the wage rate unless there was no factor substitutability, and this would lead to the easy access firms having a lower labor/capital ratio than Regime A firms at the same time as these no access firms have a higher ratio. This allocation of labor between the two groups of firms reduces the loss, but cannot erase it unless the factors are perfectly substitutable, in which case low access to capital does not prevent a firm from reaching optimal size and hence leads to no loss at all. With the high wage, the equilibrium \underline{r} (at which easy access firms can lend) in the rest of the system would be below that in regime A and the easy access firms would be more capital intensive than regime A firms.

Comparison of the two regimes is more complicated if easy access firms grow only gradually to equilibrium. In a system of perfect markets,

¹Regime B will involve some subset of firms at point B' and another subset moving towards it. The relative social efficiency of firms on route to point B' may or may not be higher than those at B'; the latter are inefficiently large from a social point of view, but the former may, at least at the early stages, be inefficiently small. (A firm whose growth is slow enough under these circumstances may have a growth path to the left of the ray OAA', since it has more time to adjust its use of labor to the stock of capital than would a firm of regime A with good access to credit.)

a firm's equilibrium position is an optimal one in terms of efficiency of resource utilization (minimization of average social cost). Thus in regime A, point A is not inferior to any other point.¹ And in that case, delays involved in moving to point A, may be assumed to be unavoidable and therefore not involving inefficiency relative to any other possible state of affairs. Delays in moving to point B by easy access firms may be likewise interpreted. In general, no conclusions are altered by this additional complication. In this case, as in that considered in section A.1, the impact of intervention in the credit market is to lower total output and, presumably, to worsen the distribution of income.²

In each of the above cases, if savings were positively related to r , and the intermediary does lend at lower rates than it borrows, then total capital will tend to be lower in regime B than in A; the average capital/labor ratio will, paradoxically be higher in the system with the low interest rate (applying of course to only some of the firms); an additional source of lower output in B is then present.

A.4 General Borrowing Rate--Lending Rate Differentials

A significant oversimplification in the above discussion has involved the assumption of no intermediation costs in capital markets, and therefore no margin between the interest paid to savers and that charged to borrowers

¹It may not be superior to points involving lower amounts of output if there are constant returns to scale over a range before decreasing returns begin.

²The somewhat incomplete specification of the model applied in this section leaves the distribution implications somewhat unclear. As among producers, distribution is of course worsened; those receiving the credit subsidy are better off than in a no intervention market and those with no access worse off. The wage rate may rise and the rate of return to capital (applied in the easy access firms) fall; distribution could be improved via this mechanism.

in the perfect capital market of regime A. A realistic treatment of this question would involve great detail and complexity; it is probably true that firms which are able to borrow at relatively lower interest rates are able to lend at relatively high ones but size is of course not the only determinant of either rate. It is also unrealistic to assume that any firm has unlimited access to credit; there is almost always a quantitative limit of some sort. In general, even an easy access firm is likely to have a higher rate of return to capital used in the firm than it achieve investing in any financial instrument.¹

One useful set of assumptions to take account of intermediation costs is to assume that the interest rates borrowers can achieve purchasing financial instruments are always equal to or less than the rate of interest, even the subsidized one, which is charged on credit.² In this situation there is a tendency, observed in case A.1, for the easy access firms to grow too far. Clearly, the lower rate of interest received on financial instruments, the greater the inefficiency which may result from a discriminatory interest rate policy. And the surprisingly favorable result cited above (case A.2) where, in the absence of any no access firms, the regime A result is duplicated in regime B (since the relevant interest rate

¹This is not necessarily true with respect to credit it extends to firms which sell to it or buy from it. There, intermediation costs are particularly low, and the granting of the credit bears directly on the firm's own profit.

²Such an assumption is likely to be invalid in highly inflationary economies where the interest rate on bank credit may be negative or very low.

for the easy access firms is the one at which they can lend) is no longer possible; with minimum borrowing/lending rate differentials likely to be say 4-6 percent or even higher in the less developed countries, that conclusion is of theoretical interest only.

The above discussion should have made clear the impossibility of analyzing interest rate policy in a general equilibrium framework by assuming that the relative factor prices in two regimes differ by the same proportion-- or even in the same way--as the interest rates on credit characterizing those regimes. Relative factor prices may vary in the opposite direction from that suggested by the interest rate differential.

The above analysis also indicates that, if the growth process to equilibrium were a fairly rapid one, the only prerequisite to efficiency in a situation where some firms had low cost access to credit and others did not would be that, as lenders, they face the same interest rate. In such a situation all firms would come to equilibrium at point A, and generate the same demand for labor as do firms in regime A; there would be no difference in output between the two regimes unless total capital stock were smaller in regime B due to the disincentive to savings.¹ In other words if in regime B there were no restrictions on credit transactions (other than the lending by the institutions whose interest rates are the object of this discussion) so that in each regime the lending rates of all firms were the same, then easy access firms (not having to use all of the credit they receive in their own enterprises) would become intermediaries,

¹That result would over time gradually be reflected in a different sloped factor price-line and greater labor intensity than in regime A, for firms in equilibrium.

lending to no-access firms and achieving an economic rent. No inefficiencies in resource utilization would characterize this situation and all firms would wind up at point A; the distribution of income would, of course, be different in that the easy access firms would have more than before; where savers are subsidized or forced to save, then whoever paid the taxes used to support the subsidy or was forced to make funds available to those firms in some other way would have less;¹ if no such subsidization occurred, then the losers would include all savers and potential borrowers now unable to borrow because of the credit restriction. The wage rate would be the same as in regime A. The effective interest rate, in the sense of the one which measures opportunity cost of capital to the firms is also the same as in regime A. For the long run results to be identical, (assuming savings to be positively responsive to the interest rate) it would be necessary for savers to receive more than easy access firms pay for credit i.e. for some other entity to provide the needed differential in the form of a subsidy.

In fact lending rates do differ, and often in the opposite direction from borrowing rates. Hence we assume here either that no access firms cannot borrow at all or that they cannot borrow from the easy access firms²

¹"Taxes" is here used in a broad sense to include any requirement which lowers someone's income, e.g. forced investments in low payment assets.

²The extent of capital market imperfections is such that assumptions which might at first glance appear extreme may in fact be reasonable approximations to reality.

B. Firms without Equilibrium Size

In the remaining sections of this paper, new assumptions are introduced or previous ones modified; in particular: 1) firms have no maximum size, but simply keep growing; this may or may not be consistent with a more or less competitive market structure; for it to be consistent there must be some obstacle to growth, e.g. capital or labor market imperfections, the need to "learn" the production function corresponding to higher output, etc.; 2) there are labor market imperfections and non-random relationships between ability to hire labor cheaply and access to cheap credit.

Consider first a market situation involving competing firms with no equilibrium size (all other assumptions remaining as in the previous section). The firms may be expected to be scattered along an expansion path, the growth of each depending on the availability of credit and of internally generated savings and the extent of other restrictions on instantaneous growth-restrictions which, as noted above, must exist for the set of assumptions to be internally consistent.¹ In regime A, given equal access to credit, the size dispersion would depend on previous history, relative seriousness of growth obstacles in the various firms, etc. At a given point in time, and assuming total capital stock to be the same in the two regimes, the average capital/labor ratio would--as observed in an earlier context--have to be the same; if all firms were located at one or

¹Otherwise given a horizontal supply of capital facing them, these firms would grow rapidly to a point where they would become monopolists or oligopolists.

another points on a unique expansion path of a linear homogeneous production function, then if adjustment of labor to capital were instantaneous, the wage rate would be the same in the two regimes. But instantaneous adjustment of labor and the assumption of a perfectly elastic supply of credit at the equilibrium interest rates and a linear homogeneous production function are inconsistent with continued pure competition. With the assumption of some barriers to growth (which are not purely non-economic, e.g. legal) the wage rate would be related to the nature of those obstacles. In regime B one subset of firms, with no access to credit would presumably have a higher L/K ratio than regime A firms since they would be growing slower and adjust L more completely to K at each K; the other subset, with the same opportunity cost of capital as regime A firms (assuming the public intermediary's borrowing rate equals the regime A rate) and a higher wage rate would presumably have lower L/K ratios. Output would be lower in regime B, though the wage rate would be higher. A greater dispersion of firms along the expansion path would be anticipated in regime B, since the easy access firms would tend to grow faster than would the typical firm in regime A, and the no-access firms slower. This feature, per se would not, however, be the direct cause of the relative inefficiency in regime B. If economies of scale exist, depending on their nature, Regime B, with some firms far out along the expansion path and others not far out could be efficient compared to regime

A with more bunching around some intermediate point.¹ In general, though, the presence of different access to one or more factors for different firms in B would tend to lower the relative efficiency of that regime due to its fostering of different factor proportions across firms, so the factor just cited might have to be strong to lead to regime B's being more efficient than regime A.

In an industry where a possible eventual outcome of the growth process is that some firms attain monopoly power,² this result would be more likely under regime B, since one subset of firms would be stimulated to grow faster than any group in regime A, and would thus be more likely to reach monopoly status. After one firm (or a few if an oligopoly equilibrium occurs) has attained this status, its further growth would presumably be less than that which a set of competitive firms (currently producing the same total output) would undertake.³ This result would depend, however, on whether the monopolist's newly generated funds can be productively (i.e. at a high rate of return) transferred to other uses. If it cannot, the monopolist will be encouraged to produce more (and sell at a lower price)

¹Note that for this to be true, either imperfect foresight by firms as to the extent of economies of scale and/or capital market imperfections-- apart from that of the differential access to the credit institutions--have to be present. Otherwise under equal access firms would grow fast enough to equate the advantages of faster growth with the cost, and the advantages would be reflected in a high equilibrium interest rate; with such high gains from expansion it would pay the capitalists of some "potential firms" who would otherwise have started their own firm, to lend instead to others and permit them to grow faster.

²This result is possible with increasing returns to scale or mildly decreasing returns, being most likely in the increasing returns case or the case where returns decrease either mildly or only after high output levels.

³Since marginal revenue product is below marginal value of product for the monopolist or oligopolists.

than he otherwise would have, and possibly also to save less. The effect of market structure depends much on factors not easily introduced into models as simple as those dealt with here. Typical monopoly behavior in the real world involves searching for other products in which funds can be invested; overall loss due to monopoly depends in that case on the efficiency with which such diversifications can be carried out.

C. Labor Market Imperfections: Equilibrium Size of Firms Exists

The assumption of perfect labor markets appears particularly unrealistic given the allegation (with much empirical support) that the set of firms which has easy access to capital has to pay higher wages than do other firms. It is frequently hypothesized that the social opportunity cost of labor is closer to that which the "low access to capital" firms pay, hence below that paid by the other firms. This combination of differentials would suggest higher capital intensity (K/L) for the firms with the low priced capital and high priced labor¹ and resulting lower social efficiency, lower demand for labor, and lower labor income in a regime with the two market imperfections than in one where both markets were perfect. That social efficiency is lower is clear for a wide range of conditions (by the general theorem that it is inefficient for a group of firms with the same production function to use different factor proportions) but that labor income is lower (or more precisely that the labor share is lower) is not in general so obvious.

¹The assumption corresponding to imperfection in the labor market can be introduced in various ways; e.g. the easy capital access regime B firms pay a tax of fixed amount on each unit of labor hired, assuring that regardless of its absolute cost, the differential between the easy access and no access firms in regime B, will be that fixed amount. Alternative specifications could be made.

As we saw in the previous analysis, what appears as a quite plausible intuition at the micro level may at the same time be misleading due to failure to allow appropriately for general equilibrium interactions. If two firms facing different relative factor prices had to operate at the same (fixed) output level, their factor proportions would indeed be different. But what is relevant is (a) the determination of the impact of the imperfections on a firm's factor proportions when output is not a fixed variable, and (b) the general equilibrium impact of the imperfections.

Consider a model, parallel to the one first considered above, where due to decreasing returns to scale beyond a certain output level firms have an equilibrium size, and where there is pure competition. With only the capital market imperfection and assuming a) the same total capital stock in each of the two regimes, and b) all firms at equilibrium, it was seen that in the situation where firms could not relend the funds received at a subsidized rate, the only difference between regimes was that some firms were larger than optimum in regime B, and thus were too small, with associated inefficiency;² when all firms in both regimes could lend at the equilibrium rate of regime A, there was no difference at all between regimes, in terms of output structure. One conclusion was that, since the two regimes have, by definition, the same labor capital ratio, there would be no general reason to expect a higher wage/rental ratio in regime B (despite the lower borrowing rate) even if no relending was allowed.

²Given economies of scale up to a certain output level, there would also be a difference in factor proportions with the small firms more labor-intensive.

Results are altered substantially when there are imperfections in the labor market. Assuming once again that point A of Figure 2 corresponds to the equilibrium position of (all) firms in regime A (with neither market imperfection),¹ it is true in this case that the equilibrium position of the easy access firms in regime B will reflect a higher capital/labor ratio than that of the regime A firms.² Meanwhile the no-access firms will be more labor intensive than the A regime firms. The equilibrium position of low credit access firms in regime B might therefore be portrayed as point C in Figure 2 on the other side of point A from point B". With the lower lending rate to easy access firms in regime B, the relative sizes of the two groups of firms in regime B are indeterminate.³ Note that if all firms must pay the tax on the use of labor it is true, as in the previous case, that there will be no difference between the two regimes, assuming the same lending rates on funds, and that the elasticity of labor supply is zero.³ The difference arises, in other words, from the assumption that low or no access firms do exist in regime B, paying lower wages and having higher labor/capital ratios than the high access firms and, in general, higher ratios than for all the firms in regime A.⁵

¹And assuming decreasing returns to scale setting in at the output level corresponding to point A.

²Even if there are no economies of scale over any range of output levels, and the firms in question have the same lending rates as other firms.

⁵If the elasticity of supply of labor is positive, this result does not hold, for in that case the low wage rate in regime B will lead to substitution of leisure to work. While implying a lower national income (a non Pareto optimal situation) this does imply less labor to capital redistribution due to the capital market imperfection.

⁴Assuming still the same total capital stock in the two regimes.

³Since the size of each type of firm depends on the wage rate, which in turn depends on the relative importance of easy access and no access firms.

If not all firms have reached their equilibrium points, it is probable that the easy access firms in regime B will be closer to their equilibrium point than will be the no-access firms, e.g. they may be clustered close to point B'' along the ray OB'', while the no access firms are close to the origin. Whether this fact affects the conclusion that the no access firms are more labor intensive depends on the expansion paths, which may or may not be linear and which depend in part on the existence and nature of obstacles to the expansion of labor inputs during the growth process.¹

The relative situations in the two regimes may be summarized as follows. If all firms in regime B had reached equilibrium, so that they were found respectively at points B'' and C, the inefficiency with respect to regime A would simply lie in the fact that it is inefficient for firms producing the same product and having the same production function to use different factor proportions. If the different credit access implied that the low access firms were still small, an additional source of inefficiency might exist--their being still in the increasing returns to scale stage of the production function. Of course, the rate of growth of these low access firms--depending, among other things, on their ability to generate internal funds and on the arrival of new small firms based

¹If (an unlikely chance) the expansion path of the low access firms near the origin implied greater capital intensity than that of the easy access firms at or near equilibrium, and the labor intensity increasing effect of slow capital growth (i.e. the longer time available in which to incorporate the long run optimal level of labor) does not offset this, such a result could occur. The low access firms' expansion path would have to be convex down.

It is possible that as capital grows labor use tends at each capital stock to be above the long run equilibrium level corresponding to that capital stock, in which case the result just referred to would be more probable.

on outside funds (e.g. previous savings) - would be among the determinants of the size of the big firms. If the path of the total capital stock in the system were independent of firm size distribution then, at each point of time, the fewer small firms there are (because they fail to make the grade, the risks appear too high, or whatever) the more savings are transferred through the system to the high access firms. The larger the share of capital used by these firms, the lower will be the equilibrium wage rate. A low wage rate, of course, tends to stimulate low access firms; this suggests the existence of a stable equilibrium in terms of the share of savings used by low access entrepreneurs and in terms of the difference in capital/labor ratios resulting from the different relative factor prices.

What would be the impact of ending the capital market imperfection under such conditions--specifically in a situation where large firms already exist, and have reached their equilibrium size in relation to the interest rates they pay and where the small firms which have not yet had time to generate enough of their own funds to grow far, are still small.¹ One might thus compare points B'' and C in Figure 2. The changed interest rate would lead a firm beginning at C to expand in size and decrease its labor intensity moving, for example, to a point like C''. The increased wage rate, (associated with the growth of the small labor-intensive firms) could lead to a decrease in size for a firm originally at B'' and an increase in its labor/capital ratio; it might, for example, shift to a point like B'''. The two firms would still use different factor proportions

¹ Probably a more realistic explanation of the size of smaller firms is that they are operating on a different production function.

due to the different wage, but they would be closer together than before. Eventually the previously no credit access firms will grow larger than the others, since they now pay the same price for one factor and a lower price for the other. An inefficiency remains in the system due to the labor market imperfection, the labor intensive firm will now be above optimal size (the size of regime A firms) and the capital intensive firm below it. But total output has probably risen,¹ though of course it is not as high as it would be in the absence of the labor market imperfection

When equilibrium firm sizes do not exist, the net effect of each imperfection, given the other one, is harder to specify. Although the labor market imperfection is likely to lead to a greater difference in factor proportions between the two sets of firms, at the same time it may decrease the dispersion of firms by size, which may, depending on the situation lower inefficiency. It may also change the relative importance of the two sets of firms.

D. Different Production Functions

It is frequently assumed that another characteristic of easy credit access firms, along with their having to pay higher wages than other firms, is their operating on different production functions. It is usually argued that the large firms have "superior" technology, although the major

¹A possible exception, it would seem, would be the case in which the loss from the labor intensive firms growing too large in the absence of the capital market imperfection would be greater than of the capital intensive firms growing too large in the other case, this difference more than offsetting the fact that factor proportions are more similar for the two groups of firms than in the former case. It may well be questioned whether the salary differential would remain in the face of small differences in firm size, i.e. it seems plausible to assume that when the capital market imperfections are reduced or eliminated, the same may happen in the labor market. In such an instance the overall gain from reduction of the capital market imperfection would of course be greater than that implicit in the analysis to date.

feature of the difference in the production functions is probably better described by the relative limitation of the large firms' activities to the capital intensive range of factor proportions and the limitation of the small firms' activities to the labor intensive range. Figure 3 illustrates this sort of situation. Presumably each firms' longer run production function differs from its short run production function, with the short run function reflecting greater relative efficiency in those activities which the firm has employed in the past or has considered using, and the long run function involving greater flexibility i.e. greater relative efficiency in those technologies in which the firm has not had experience. Figure 3 illustrates this sort of situation. When an economy begins in a situation with one subset of firms at a point like E and another subset at a point like F, the meaning of the interest rate differential, either in leading to that situation or in determining the subsequent source of change, may be different from the cases discussed above. Consider the extreme assumption of perfect factor complementarity in both sets of firms; then unless one technology completely dominates the other, there is an optimal distribution of activity between the two, in whose absence there will be unemployment either of capital or of labor; unemployment of labor would reflect too little activity in the small firm-labor intensive sector, and distribution to the large firms of credit which could have gone to the small firm sector would both lower output and lower employment.

Where factor complementarity is not quite complete, the results differ in degree but not in kind from that just cited. Presumably if access to

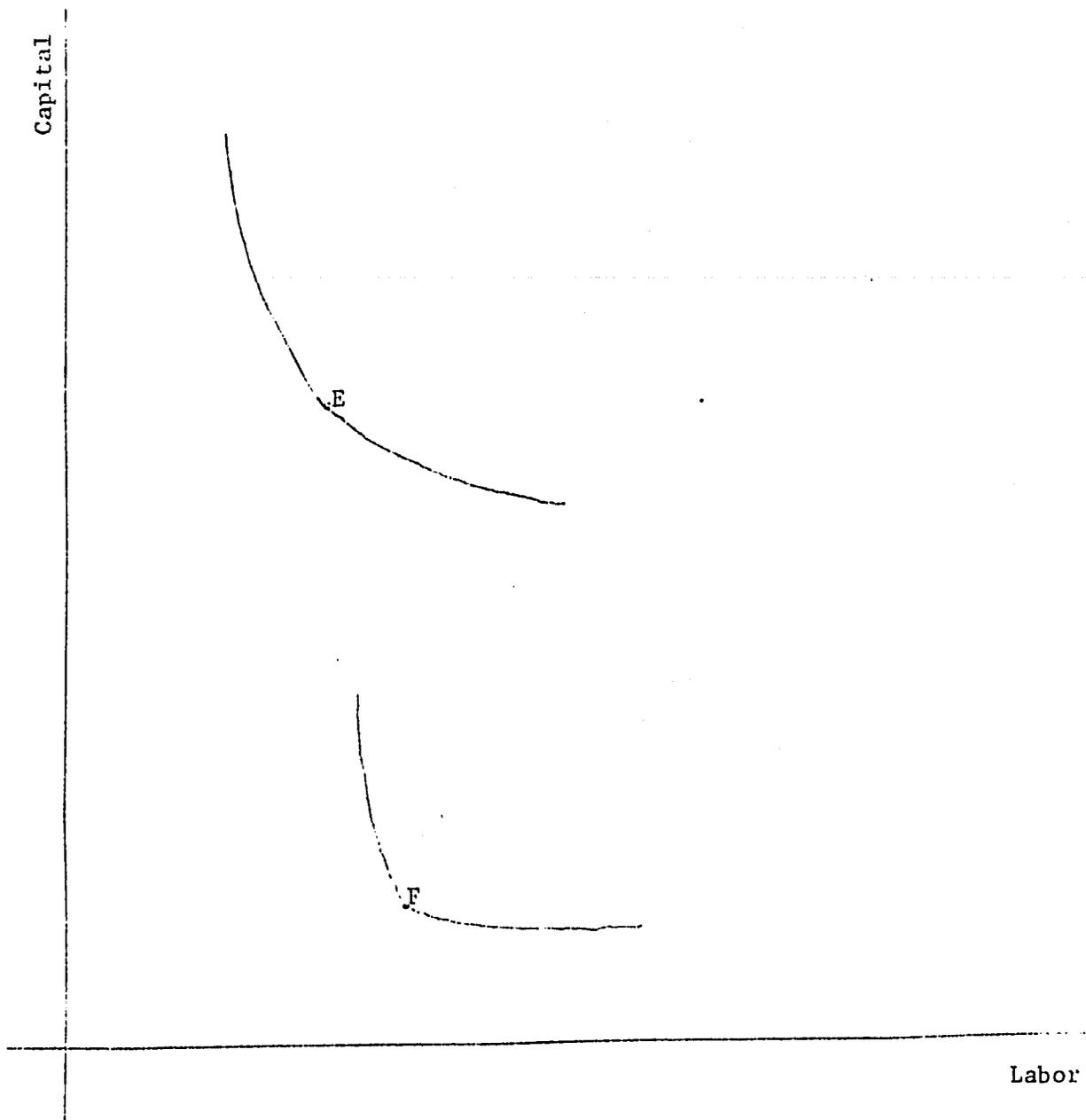


Figure 3

credit has been equal over the long run, no firms would be as labor intensive or as capital intensive as those actually observed in a case like Figure 3, but long run differences in production functions could maintain some difference ~~themselves with the result~~ that the homogeneous firm cases discussed above would never be approximated. It seems unlikely, however, that very different functions would be maintained if the time period elapsed were long enough.

E. Credit, Demand For Capital, and Demand for Labor

In the above discussion it has been implicitly assumed throughout that credit is used to increase the input of capital in a two-factor production process; it might most simply have been assumed to increase the stock of fixed capital. In any case it has been implicitly assumed that credit permitted an expansion of the capital stock and that whatever associated increase in labor best suited the firm's needs would then be effected. In fact, credit used for working capital might well increase the input of labor and could even lead to an increase in the labor/capital ratio. When this is the case, much of the above discussion could be somewhat misleading.¹ It may not be true, for example, that increased cost of credit would lower the labor/capital ratio if such credit is used primarily to finance current input costs, including labor.

To deal with this question it may be useful to disaggregate factors, and in particular to distinguish different types of capital inputs. From most

¹It would not technically be wrong, however. The fact that the use of labor requires a certain amount of working capital does not make the labor-capital distinction any less relevant.

points of view, the key distinguishing factor is the duration of life (or the period of investment) for a given capital input. All possible input combinations can be described by the total amount of capital and the total amount of labor being applied at a given point of time, and in a world of perfect markets and perfect factor mobility (including ability to rent different types of capital inputs in each period independently of what combination was used in the last period) this is all that is relevant. In fact, however, when some capital goods cannot efficiently be "rented" on a short period basis, the problem becomes more complex. A number of different activities may correspond to a given labor/capital ratio when the two factors are aggregates of a number of distinguishable inputs, and different activities with the same factor proportions may not be indifferent to the firm. For present purposes it is useful to distinguish fixed capital, working capital, and labor. It should be noted that distinguishable inputs in the underlying production function may involve a given amount of capital and a given amount of labor; for example if labor must be paid when it is applied, the application of labor definitely requires a given amount of working capital.¹ If this amount were

¹It is not true by definition that labor requires working capital, since theoretically it could be applied only at the very end of the production process, in which case its application would not have to be financed by capital. Alternatively, although this is a somewhat different situation, labor may offer credit to the firm by accepting payment at a time somewhat after its services are rendered. This, technically distinguishing it from other types of credit (since it can only be used in connection with the purchase of labor services) is relevant to analyze what sort of institutions permit the firm to receive this sort of credit in such a way that the application of more labor does not imply a need for more capital from other sources. Any choice as to when labor be applied in the production process constitutes a form of labor/capital substitutability; thus if more labor applied later in the process would substitute for less labor applied earlier, this is really a substitution of labor for the capital which would have formed the wages fund to employ the labor early in the process

fixed it would then make more sense, in describing the production function, to define this labor-capital combination as one factor rather than, for example, to lump all the capital used in different "underlying" input combinations together as a factor.

If all funds were as appropriately and as easily used for one type of input as for another, if firms did not have problems of lack of foresight, and if no factor prices changed over time, the fact that labor and capital are aggregates of a number of more specific inputs would not be relevant in the analysis. But none of these conditions is in fact met, so disaggregation does become relevant. A number of avenues of further analysis are suggested.

One aspect worthy of consideration is the fact that in some credit systems a distinction is made between credit for working capital and credit for fixed capital, so that the use a firm makes of a loan is partially subject to control by the credit-giving institution. An optimal credit policy, therefore, would involve not only the question of which firms receive credit, but also what it is used for. Of course it may be difficult or impossible to police the ultimate "use" of the credit, but in some cases control can be at least partial.

A second type of analysis is suggested by the fact that different inputs have different degrees of indivisibility; as a result the marginal use which different types of firms are likely to have for more capital may vary a great deal with firm size, and stage of development of the firm. If economies of scale are important, in the form of capital indivisibility, it might be assumed that at first capital and credit would be applied to expanding the capital stock and subsequently more to financing

the purchase of inputs including labor. This may simply be to say that the production function is not homogeneous.

F. Summary and Conclusions

The most plausible representation of the real world would, it would seem involves easy access firms which have different production functions and larger size than no access or low access firms, receive higher interest rates as lenders, (but probably on balance not high enough to do business) and pay higher wages. Although it is not clear whether the elasticity of savings with respect to the interest rate is positive or negative for people lending to the financial intermediaries, ~~or potential~~ investors in small firms, it seems plausible at least in the latter case that a subsidized interest rate will lead to a decrease in total savings. Analysis suggests that a lower interest rate policy probably also increases the relative share of output coming from large capital intensive firms, decreases total output, decreases labor income and the labor share; it is thus negative from almost every respect. Raising the interest rate and making credit accessible to all firms would, correspondingly, be a highly desirable policy from all points of view.