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FINANCIAL ASSETS, INFLATION HEDGES, AND CAPITAL UTILIZATION IN DEVELOPING COUNTRIES: AN EXTENSION OF MCKINNON'S COMPLEMENTARITY HYPOTHESIS*

PAUL BURKETT AND ROBERT C. VOGEL

In a highly influential book McKinnon [1973] proposed that interest rate liberalization and low inflation can promote capital accumulation and economic growth in developing countries. An important aspect of McKinnon's work is his formal argument that money (broadly defined to include both cash and bank deposits) and physical capital are more likely to be complements than substitutes under conditions of "financial repression," where interest rate controls or high inflation reduce the real yield on money balances to low or even negative levels [McKinnon, Chapter 6].

McKinnon's formal analysis assumes that household firms and other small enterprises in financially repressed developing economies are faced with significant capital indivisibilities and have no access to credit, so that they are forced to accumulate substantial amounts of noncapital assets before undertaking productive investments. Under financial repression, accumulation of inflation hedges (commodity inventories, for example) may be the least-cost method of building up these noncapital asset balances required for "lumpy" investments in physical capital. Even inflation hedges may have negative returns (e.g., due to high storage costs), thereby further reducing potential capital accumulation. In this situation an increased yield to money balances (via interest rate liberalization or lower inflation) can lower the cost of accumulating funds for physical capital purchases, so that increased money balances may be associated with a more rapid rate of capital accumulation and hence economic growth.

McKinnon's "complementarity hypothesis" thus emphasizes the use of cash and deposit balances as a "conduit" for physical capital accumulation by credit-constrained enterprises. However, as noted by Drake [1980, p. 66]:

> [t]he "conduit" argument is not the only reason for complementarity between the demand for money to hold and that for physical capital. McKinnon seems to have

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overlooked the important point that firms need liquid working capital and that the demand for money balances for this purpose grows (absolutely, but not necessarily proportionally) with the scale of a firm's operations. . . . [M]oney working capital is such an important complement to physical capital as to have deserved explicit notice.

Aside from the possible use of cash and deposit balances by credit-constrained firms to finance purchases of variable inputs, the assumption of pure "self-finance" seems at least somewhat inconsistent with other arguments by both McKinnon [1973, Chapters 7–8] and Shaw [1973], in which financial liberalization increases the supply of credit, as higher deposit holdings augment the loanable funds channeled through financial intermediaries. Indeed, much of the recent financial development literature has emphasized the positive effect of financial liberalization on both the level and the efficiency of financial intermediation in developing countries [Fry, 1988].

The present paper extends McKinnon's complementarity hypothesis to the case where a credit-constrained firm uses noncapital asset balances (cash, bank deposits, and inflation hedges) as working capital, and where the firm's credit constraint is loosened by increased deposit holdings. In the model developed in Section I, the firm produces output using variable inputs ("operating costs") and physical capital, and its operating costs are subject to a cash-in-advance constraint. Physical capital is assumed to be totally illiquid, so that operating costs must be financed by converting the noncapital assets into a medium of payment, and these conversions entail transaction costs that are deducted from the firm's profits. The firm's profit-maximizing choice between physical capital and operating costs is thus partly determined by the yields and transaction costs associated with the noncapital asset balances used to finance variable input purchases.

Section II analyzes the model under the assumption that the firm's borrowing constraint is fixed. It is shown that improvements in the yield or liquidity of bank deposits (or lower inflation) increase the marginal return to increased operating costs, where this return incorporates the marginal profit (adjusted for transaction costs) on the increased noncapital asset balances required to finance additional variable inputs. This "substitution effect" causes the firm to increase the amount of variable inputs employed per unit of physical capital, i.e., a more intensive utilization of a reduced capital stock. At the same time the increased deposit holdings of the representative firm will tend to increase the supply of credit available for other production units. The implications of this last point are addressed in Section III, which considers the effects of a loosening of the firm's credit constraint by higher deposit holdings. In this case, increases in the real yield on bank deposits or a reduction of deposit transaction cost may raise the firm's profit-maximizing capital stock, depending on whether the "scale effect" of the increased borrowing opportunity is greater or less than the "substitution effect" that occurs when the credit constraint is fixed.[1] Further, the increased scale of the firm's total factor purchases under the expanded borrowing opportunity means that current-period output is more likely to rise than is the case for a fixed credit constraint.

I. Development of the Model

Consider a firm that knows all variables in the following analysis with complete certainty, and that produces its output using a stock of physical capital (K) and a flow of variable inputs. The prices of physical capital and of the variable inputs are given and fixed relative to the price of output, and variable inputs are aggregated into a single flow of expenditure on operating costs. These operating costs occur in a continuous, constant flow adding up to a total real expenditure (q) over a certain period that will be referred to as the production period. Both K and q (and all other choice variables) are chosen at the beginning of the production period.

Assuming that the price of the firm's output is constant in real terms, the firm's real sales revenue (Y) can be expressed as a function of K and q:

$$Y = Y(K,q), \tag{1}$$

such that

$$(Y_K, Y_q) > 0; \qquad (Y_{KK}, Y_{qq}) < 0; \qquad Y_{Kq} = Y_{qK} = 0. \tag{2}$$

The assumption of positive and diminishing returns to physical capital and operating costs incorporates the fact that small-scale enterprises in developing countries are typically constrained

1. Stockman [1981] has shown that if a cash-in-advance constraint is imposed on physical capital purchases in a neoclassical growth model, then the steady-state capital stock is inversely related to the rate of inflation. The present paper diverges from Stockman's by considering a cash-in-advance constraint on the *flow* of operating costs and associated liquidity-management problems of the inventory-theoretic type.

by limited managerial capacities or—for agricultural enterprises—by a fixed land input. Meanwhile, the imposition of zero cross-productivity effects provides a sufficient condition for interior solutions for the profit-maximizing values of K and q.[2] A crucial assumption of the model is that sales revenues—and the noncapital asset yields specified below—are obtained only at the end of the production period, so that the firm faces a cash-in-advance constraint on the funding of operating costs.

The firm has an initial endowment of real wealth (W) which may be augmented by borrowings obtained at the start of the production period at a given real interest rate (i). In developing the firm's profit-maximization problem, it is initially assumed that the firm faces a fixed *and* binding constraint (B) on its borrowings. At the start of the production period, the firm costlessly allocates its wealth ($W + B$) among K and three noncapital assets: cash (C), inflation hedges (H), and noncheckable bank deposits (D), with real yields denoted by r_c, r_h, and r_d, respectively. In order to fund its operating costs, the firm must convert noncapital assets into a medium of payment during the production period. For simplicity, it is assumed that withdrawals from C, H, and D occur in a continuous, constant flow, and that the transaction costs incurred in such withdrawals are proportional to the total amount withdrawn during the production period. The constant marginal transaction costs of withdrawals from C, H, and D are denoted by t_c, t_h, and t_d, respectively.[3]

Consider the firm's liquidity management problem in the case where $r_c < r_h < r_d$. (The initial ranking of noncapital asset yields is not crucial to the results given below.) In this case, a necessary condition for a nonzero solution for all three noncapital assets is that the ordering of marginal transaction costs be $t_c < t_h < t_d$. Further, as long as $i \geq r_d$, a necessary condition for positive borrowing is that all three noncapital assets be completely withdrawn during the production period.[4] Moreover, the first asset withdrawn will be C, in order to avoid unnecessary forgone income

2. The necessary and sufficient condition for interior solutions is that diminishing returns effects dominate cross-productivity effects, i.e., $Y_{KK}Y_{qq} > Y_{Kq}Y_{qK}$. The more restrictive condition in (2) simplifies the comparative statics considerably without affecting the results given below.

3. Specification of the marginal cost of withdrawals from C as t_c (rather than zero) allows for cases where demand deposits (rather than cash balances) are used to cover operating costs.

4. If deposit holdings are not completely withdrawn, it must be true that the marginal returns to increases in K and q are equated with r_d under profit maximization, which rules out borrowing as long as $i \geq r_d$.

from the excess of r_h and r_d over r_c. Since expenditures on operating costs occur at a constant rate, the fraction of the production period during which cash is withdrawn is C/q, and average cash holdings during this subperiod are $C/2$. The total yield collected on cash holdings is thus $(r_c/2)(C^2/q)$.

Since $r_d > r_h$, the next asset used to fund operating costs will be hedges. The yield r_h is collected on the full value of H during the subperiod C/q, and on average H holdings during the following subperiod H/q. Thus, the total yield collected from hedges is $r_h[H(C/q) + (½)(H^2/q)]$. By a similar analysis, the yield r_d is collected on average deposit holdings of $[D((C + H)/q) + (½)(D^2/q)]$. Given that $D/q = 1 - ((C + H)/q)$, average deposit holdings can also be expressed as $[D - (½)(D^2/q)]$.

Assuming for simplicity that K does not depreciate during the production period, the firm's total profits (π) can then be written as

$$\text{(3)} \quad \pi = Y(K,q) - (1+i)B + K + \left(\frac{r_c}{2}\right)\left(\frac{C^2}{q}\right) + r_h\left[H\left(\frac{C}{q}\right) + \left(\frac{1}{2}\right)\left(\frac{H^2}{q}\right)\right] + r_d\left[D - \left(\frac{1}{2}\right)\left(\frac{D^2}{q}\right)\right] - t_cC - t_hH - t_dD,$$

indicating that the firm derives profits from sales revenues (net of operating costs and loan repayments) *plus* the end-of-period capital stock and net profit from liquidity management. The firm's profits are thus equal to end-of-period wealth, which is maximized subject to the constraints,

$$\text{(4)} \quad W + B \geq K + C + H + D$$

$$\text{(5)} \quad q = C + H + D$$

$$\text{(6)} \quad 0 \leq (K, C, H, D, q).$$

The Lagrangian for this problem is

$$\text{(7)} \quad Z = \pi + L_1(W + B - K - C - H - D) + L_2(q - C - H - D),$$

where π is defined by equation three. With interior solutions, differentiation with respect to the multipliers and the endogenous variables yields the constraints and

$$\text{(8)} \quad Y_K + 1 - L_1 = 0$$

$$\text{(9)} \quad Y_q + (½q^2)[r_dD^2 - r_cC^2 - 2r_hH(C - (H/2))] + L_2 = 0$$

$$\text{(10)} \quad r_c(C/q) + r_h(H/q) - t_c - L_1 - L_2 = 0$$

(11) $$r_h(C/q) + r_h(H/q) - t_h - L_1 - L_2 = 0$$

(12) $$r_d(1 - (D/q)) - t_d - L_1 - L_2 = 0.$$

The firm's profit-maximization conditions can be divided into two parts, the first of which involves the choice of C, H, and D given the level of operating costs (q). Specifically, equating (10) with (11), and (11) with (12), and substituting in the constraint (5), gives

(13) $$C/q = (t_h - t_c)/(r_h - r_c)$$

(14) $$D/q = 1 - [(t_d - t_h)/(r_d - r_h)]$$

(15) $$H/q = 1 - (C/q) - (D/q),$$

indicating that the portion of operating costs financed by withdrawals from each of the noncapital assets is determined by the asset's yield and liquidity relative to the "adjacent" asset(s), where "adjacent" is defined in terms of the ranking $r_c < r_h < r_d$. For example, a lowering of deposit transaction cost (t_d) or an increased deposit rate (r_d) increases the fraction of operating costs financed by deposit withdrawals and decreases the fraction financed by hedges. The second part of the firm's profit-maximization problem entails the choice between K and q. Here, substitution between (8), (9), and (12), and using the results obtained in (13)–(15) gives

(16) $$Y_K + 1 = Y_q - t_d + \frac{r_d}{2} + \left(\frac{1}{2}\right)\left[(t_d - t_c)\left(\frac{C}{q}\right) + (t_d - t_h)\left(\frac{H}{q}\right)\right],$$

so that the firm maximizes profits by equating the marginal yield to physical capital with the marginal yield to operating costs, where the latter is adjusted for the marginal profit from liquidity management resulting from an increase of q.

II. Profit-Maximizing Responses Under a Fixed Borrowing Constraint

Comparative static analysis is facilitated if the first-order conditions are reduced to four equations in (K,q,C,D)—two of which are provided by (13) and (14) above. Substitution of the constraint (5) into (4) yields the additional equation $W + B - K - q = 0$. Finally, the (H/q) term in (16) can be eliminated by substituting (5) into this equation. Total differentiation of these four equations yields the following system in (dK,dq,dC,dD):

(17) $$dK + dq = dW + dB$$

$$(18)\quad \left(\frac{1}{q}\right)(r_h - r_c)\left[\left(\frac{C}{q}\right)dq - dC\right] = dt_c - dt_h + \left(\frac{C}{q}\right)(dr_h - dr_c)$$

$$(19)\quad \left(\frac{1}{q}\right)(r_d - r_h)\left[dD - \left(\frac{D}{q}\right)dq\right] = dt_h - dt_d + \left(1 - \left(\frac{D}{q}\right)\right)(dr_d - dr_h)$$

$$(20)\quad Y_{KK}dK - Y_{qq}dq + (r_h - r_c)\left(\frac{C}{q^2}\right)\left(\left(\frac{C}{q}\right)dq - dC\right) + (r_d - r_h)\left(\frac{D}{q^2}\right)\left(\left(\frac{D}{q}\right)dq - dD\right) = -\,dt_h + \left(\frac{dr_h}{2}\right) + \left(\frac{1}{2q^2}\right)[C^2(dr_h - dr_c) + D^2(dr_d - dr_h)],$$

where the Jacobian is

$$(21)\quad |J| = (1/q^2)(r_h - r_c)(r_d - r_h)(Y_{KK} + Y_{qq}) < 0.$$

Application of Cramer's rule to (17)–(20) gives the responses of K, q, and D to increases in r_d and t_d, respectively,

$$(22)\quad \frac{\partial K}{\partial r_d} = \frac{-\partial q}{\partial r_d} = \frac{(D/q)(1 - (1/2)(D/q))}{Y_{KK} + Y_{qq}} < 0$$

$$(23)\quad \frac{\partial D}{\partial r_d} = \left[q\,\frac{1 - (D/q)}{r_d - r_h}\right] - \left[\left(\frac{D^2}{q^2}\right)\frac{1 - (1/2)(D/q)}{Y_{KK} + Y_{qq}}\right] > 0$$

$$(24)\quad \frac{\partial K}{\partial t_d} = \frac{-\partial q}{\partial t_d} = -\,\frac{D/q}{Y_{KK} + Y_{qq}} > 0$$

$$(25)\quad \frac{\partial D}{\partial t_d} = \left[\frac{D^2/q^2}{Y_{KK} + Y_{qq}}\right] - \left[\frac{q}{r_d - r_h}\right] < 0.$$

An increase in r_d raises the marginal return to operating costs by allowing the firm to collect a higher interest income on deposit balances earmarked for eventual withdrawal, and a similar effect occurs via a lowering of t_d which decreases the transaction costs incurred in the financing of operating costs. Each of these "substitution effects" increases the profit-maximizing value of q while decreasing K, which would appear empirically as a decrease in the capital/output ratio. Simultaneously, improvements in the yield or liquidity of deposits increase the share of operating costs financed by D, thus raising the firm's average deposit holdings over the production period.[5] Similar results hold for an increase in the real yield on cash balances (i.e., a reduced rate of inflation), as shown by

$$\frac{\partial K}{\partial r_c} = \frac{-\partial q}{\partial r_c} = \frac{C^2/2q^2}{Y_{KK} + Y_{qq}} < 0 \tag{26}$$

$$\frac{\partial D}{\partial r_c} = -\left(\frac{C^2}{2q^2}\right)\frac{D/q}{Y_{KK} + Y_{qq}} > 0. \tag{27}$$

With r_d held constant, an increase in r_c causes the firm to shift part of its expenditures from K to q, due to the lower cost of holding money balances used to finance operating costs. Given that $r_c < r_h < r_d$, the increased spending on operating costs raises the firm's deposit holdings even with r_d constant, since deposits do not compete directly with cash as a source of liquidity. Under the alternative ranking $r_c < r_d < r_h$, the sign of $\partial D/\partial r_c$ is indeterminate since the "scale effect" of a higher q may be offset by the substitution of C for D. However, in financially repressed developing economies, a decreased inflation rate is likely to raise not only the yield on cash balances (r_c), but also the real interest rate on bank deposits (r_d), due to controls placed on nominal interest rates by the government [Burkett, 1986]. The responses to a higher r_c would then be reinforced by the effects shown in (22) and (23) above. In addition, if lower inflation raises r_d, the yield on bank deposits is more likely to dominate the yield on hedges, in which case $\partial D/\partial r_c > 0$ holds unambiguously (see (27)).

An important issue for economic development is whether an increased deposit rate, lower inflation, or a reduction of deposit transaction costs will have a positive or negative effect on output. In the present model the assumed constancy of the firm's output price in real terms means that changes in the firm's real (gross) output are strictly proportional to changes in the sum of real sales revenues (Y) and the end-of-period capital stock (K). Moreover, total factor purchases ($K + q$) remain constant as long as B is fixed, as reflected in the equal and opposite profit-maximizing responses of K and q to changes in r_d, r_c, and t_d (see (22), (24), and (26)). This implies that an increase in r_d or r_c, or a decrease of t_d, will raise current-period output only if $Y_K + 1 < Y_q$ in the neighborhood of $W + B$ in which K is lowered and q rises. Using (16), this condition

5. The sign of $\partial H/\partial r_d$ is indeterminate, since the substitution of D for H may be offset by a scale effect arising from increased operating costs. However, note that the *share* of operating costs funded by hedges (H/q) is unambiguously lowered by an increase in r_d (see (14) and (15)).

reduces to

$$(28)\qquad \left(\frac{r_d}{2}\right) - t_d + \left(\frac{1}{2}\right)\left[(t_d - t_c)\left(\frac{C}{q}\right) + (t_d - t_h)\left(\frac{H}{q}\right)\right] < 0,$$

indicating that output will rise if the marginal profit from liquidity management resulting from an increase of q is negative. This initial condition is consistent with a financially repressive environment in which interest controls and inflation make r_d extremely low or even negative, and where a high t_d further raises the cost of liquidity. In this situation improvements in the yield or liquidity of deposits will increase output by allowing the firm to forgo relatively less productive additions to K in favor of increased operating costs (i.e., a more intensive utilization of a smaller capital stock).

Note also that although increases of r_d or r_c (or a reduction of t_d) reduce the current-period capital stock under a fixed borrowing constraint, the firm's total profits (π) are unambiguously increased. Hence, improvements in the yield or liquidity of bank deposits (or lower inflation) will enable the firm to carry over a larger stock of wealth into the next production period, which will have a positive effect on subsequent factor purchases (including K) even if current-period output does not increase.

III. Incorporation of an Endogenous Borrowing Constraint

In the foregoing analysis the firm's total factor purchases ($K + q$) are constrained by the initial wealth endowment (W) and the fixed borrowing opportunity (B), so that increases in K or q necessarily involve a substitution of one input for the other. However, both McKinnon [1973] and Shaw [1973] emphasize the increased supply of credit likely to result from interest rate liberalization or lower inflation, as higher deposit holdings increase the loanable funds mobilized by financial intermediaries. The above analysis highlights an additional factor that may increase deposit holdings and credit supply: namely, a lowering of financial transaction costs which—as for deposit rate increases or inflation reductions—induces firms to hold a greater portion of working capital in the form of bank deposits.

The likelihood of such credit-supply effects suggests that an increased yield *or* greater liquidity of bank deposits (or lower inflation) may relax the firm's borrowing constraint, which could increase the *scale* of the firm's total factor purchases, including physical capital. This effect is consistent, for example, with a macroeconomic environment in which the firm depicted here is representative of a larger group of enterprises, and where, at a particular moment in time, different firms are at different points in their production periods. In this case the average deposit holdings of firms operating at various subperiods of production would limit the aggregate deposit balances (hence the equilibrium lending capacities) of financial intermediaries. The assumption that deposit holdings place a limit on borrowing can also be motivated in terms of the role of deposits as loan security and as a source of information for lenders on the repayment capacities of potential borrowers [McKinnon, 1973, p. 65; Vogel and Burkett, 1986]. However, the firm's borrowing constraint is also likely to be determined by other factors such as the increased deposit holdings of nonfirm households and the credit-rationing policies of intermediaries.

Since the determination of the constraint (B) goes beyond the representative-firm model developed here, the present analysis proceeds by first presenting the effects of a change in B on the choice variables K, q, and D, and then considering how these effects alter the results obtained under a fixed borrowing constraint. The important point here is that it is reasonable to assume that improvements in the yield or liquidity of deposits will increase the deposit-holdings of both firms and nonfirm households (thus increasing the supply of credit), which in turn may loosen the representative firm's borrowing constraint. Hence, the results given below apply under any of the possible credit-supply linkages mentioned above.

The effects of an increased borrowing opportunity (B) are given by

$$\frac{\partial K}{\partial B} = \frac{Y_{qq}}{Y_{KK} + Y_{qq}} > 0 \tag{29}$$

$$\frac{\partial q}{\partial B} = \frac{Y_{KK}}{Y_{KK} + Y_{qq}} > 0 \tag{30}$$

$$\frac{\partial D}{\partial B} = Y_{KK} \frac{D/q}{Y_{KK} + Y_{qq}} > 0, \tag{31}$$

which shows that if the borrowing constraint is relaxed by increased aggregate deposit holdings, a reduction of t_d or an increased r_d may raise the profit-maximizing capital stock, depending on whether the positive effect in (29) is greater or less than the negative impacts shown by (22) and (24), respectively. The responses of K and q to increased borrowing depend on the relative magnitude of the diminishing returns effects for physical capital and operating costs. A loosening of the constraint (B) also raises the firm's deposit holdings earmarked for purchases of variable inputs.

In short, if one allows for the relaxation of the firm's borrowing constraint, increases in the yield or liquidity of deposits or a lower inflation rate will increase the profit-maximizing capital stock *or* the intensity of capital utilization. The conditions under which the capital stock will rise—for *given* responses of B—can be specified. In particular, an increase in r_d will raise the capital stock as long as $(\partial K/\partial B)(\partial B/\partial r_d) > -\partial K/\partial r_d$, and the corresponding condition for a reduction of t_d is $-(\partial K/\partial B)(\partial B/\partial t_d) > \partial K/\partial t_d$. For a lowering of inflation that increases both r_d and r_c, the condition is $(\partial K/\partial B)(\partial B/\partial p) > -\partial K/\partial p$, where $\partial p = \partial r_c + \partial r_d$. Using the results in (22), (24), (26), and (29), these conditions can be written as

$$\frac{\partial B}{\partial r_d} > -\left(\frac{D}{q}\right)\frac{1-(D/2q)}{Y_{qq}} \tag{32}$$

$$\frac{-\partial B}{\partial t_d} > -\frac{D/q}{Y_{qq}} \tag{33}$$

$$\frac{\partial B}{\partial p} > \frac{-[(C^2/2q^2)+(D/q)(1-(D/2q))]}{Y_{qq}} \tag{34}$$

so that larger responses of B to improvements in the yield or liquidity of deposits, or to reduced inflation, make it more likely that the capital stock will rise. These conditions are intuitive in that for *given* responses of B, the capital stock is more likely to increase, the larger are the diminishing returns effects associated with increased operating costs. Smaller initial values of D/q and C/q also raise the chances that (32)–(34) will hold. This suggests that the capital stock is more likely to rise if the representative firm was previously discouraged from holding cash or deposits by rapid inflation, repression of deposit interest rates to low or even negative levels, or high deposit transaction costs.

Even if the profit-maximizing capital stock does not increase, the loosening of the borrowing constraint still raises the firm's total factor purchases ($K + q$). Hence, while (32)–(34) determine the specific responses of factor employment, higher financial yields or reduced deposit transaction costs may raise the profit-maximizing level of output even if these conditions do not hold. Specifically, an increase in r_d will raise the profit-maximizing level of output as long as

$$(35)\quad \left[Y_q\left(\frac{\partial q}{\partial r_d}\right) + (Y_K + 1)\left(\frac{\partial K}{\partial r_d}\right)\right] + \left(\frac{\partial B}{\partial r_d}\right)\left[Y_q\left(\frac{\partial q}{\partial B}\right) + (Y_K + 1)\left(\frac{\partial K}{\partial B}\right)\right] > 0.$$

The first bracketed term in (35) is positive if (28) holds, and the remainder of (35) is unambigously positive. In other words, a negative marginal profit from liquidity management due to an increase of q is a sufficient, but not necessary, initial condition for output to rise if r_d increases. The loosening of the borrowing constraint thus makes it more likely that an increased deposit rate will have a positive impact on current-period output. The same result holds for a reduction of t_d or a decrease in inflation which raises both r_d and r_c.[6]

In summary, the above model shows that the potential benefits of interest rate liberalization, lower inflation, or reduced deposit transaction costs are not limited to the case of pure self-finance and indivisibilities in physical capital as in McKinnon's [1973, Chapter 6] basic "complementarity hypothesis." With or without a fixed credit-constraint, increased deposit holdings may be associated with a more productive utilization of the capital stock, and the additional credit-supply effects emphasized by McKinnon [1973] and Shaw [1973] emerge as a factor that will increase the scale of firms' total factor purchases (possibly including capital investments).

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6. In these latter cases the conditions for output to rise are identical except that $-\partial t_d$ and ∂p, respectively, replace the ∂r_d terms in (35).