Sweder van Wijnbergen

Interest Rate Management in LDCs

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INTEREST RATE MANAGEMENT IN LDC's

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The McKinnon argument that higher Time Deposit rates raise output and lower inflation in the short run and increase medium-term growth by raising the savings rate are shown to depend crucially on the assumption that portfolio shifts into TD's come out of an asset providing less intermediation than the banking system. We show that if instead the shift is out of an asset providing more intermediation (e.g., loans on a curbmarket), raising TD rates is contractionary in the short run, may have negative impacts on growth and can lead to more rather than less inflation in the short run.

1. Introduction

Establishing high time deposit rates¹ has become a standard part of the policy advice given to LDC's by external experts, ranging from the visiting academic economist via the World Bank to emissaries of the IMF. The rationale behind this advice goes back to an eloquent be it occasionally vague analysis presented by R. McKinnon in his well known book on financial intermediation and economic development, McKinnon (1973), and a similar book by Shaw (1973). Their argument rests on the assumption that higher TD rates will increase the savings rate. If one goes on to assume that LDC's are in a neoclassical type situation, where investment equals whatever is leftover from total output after consumption has taken its share, the conclusion follows. McKinnon has added an additional argument, which points to the importance of financial intermediation. Higher time deposit rates will, so the story goes, lead to an influx of deposits into commercial banks. This 'raises the real size of the banking system and hence the net flow of real bank credit to finance investment', to quote Kapur (1976).² This, again, should help long-run growth. Kapur goes on to argue that the

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¹Comments by Lance Taylor and Ricardo Faini are gratefully acknowledged.
²Kapur refers in this quote to investment in working capital. Via his assumption of a fixed proportion between fixed and working capital, the statement also applies to fixed capital formation (as is confirmed by his dynamic analysis). Note by the way the stock/flow confusion embedded in his statement.
increased availability of funds for working capital purposes will also increase output and so reduce inflationary pressure given aggregate demand.

It is this body of theory that has led to the almost universal acceptance amongst those concerned with Development Economics of the beneficial effects of increases in TD rates on output and growth. Short-run consequences are usually not taken into account, nor their possible conflict with the professed long-run targets. Local economists in LDC's, who cannot afford to ignore these problems, have mostly resisted the recommended policies. As a result, a McKinnon-style stabilization policy (an increase in time deposit rates coupled with tight money growth rules) has to my knowledge never been implemented.\footnote{\textsuperscript{3}}

However, the results obtained by McKinnon/Kapur depend crucially on one hidden assumption on asset market structure, an assumption that is never stated explicitly: all these authors assume that the portfolio shift into TD's is coming out of an 'unproductive' asset like gold, cash, commodity stocks, etc.

This seems an overly drastic simplification of the financial structure of most LDC's. Official commercial paper or other primary securities markets are usually in their infancy (with some Latin American exceptions), but in most countries there are flourishing Unorganized Money Markets, UMM, where the public can lend directly to firms or farmers. The existence of such an alternative asset, providing more rather than less intermediation than the banking system, may change the conclusions drastically. It is not at all obvious that TD's are closer substitutes to cash, gold, etc., rather than to loans extended on the curbmarkets. Nevertheless, this assumption is always made in this literature, albeit invariably implicitly. Tobin has been arguing many times more than ten years ago that assumptions like this are of crucial importance in determining the effects of monetary policy.

In the first part of this paper we explicitly formulate the portfolio allocation problem faced by wealthholders in a model that provided a more realistic description of financial markets in LDC's. The public can either hold cash, TD's or curbmarket loans. The model is closed by a simple Keynesian fixed price output determination mechanism. We analyze the portfolio shifts that will occur when $r_{TD}$ changes, and the implications they have for the impact of changes in TD rates on economic activity.

In section 3 of this paper we go beyond the Tobin-style analysis and look at the impact of changes in Time Deposit rates on inflation, capital accumulation and medium-term growth, integrating the simplified analysis of the first part in a medium term growth model. The model used there stresses

\footnote{\textsuperscript{3}Not even in Korea in 1965, one of the more celebrated monetary reforms. Large capital inflows associated with an opening up of the capital market a few months before the interest rate reforms were allowed to feed into the money supply, making for an essentially accommodating monetary policy.}
not only the portfolio structure analyzed in section 2, but also the importance of the link between monetary policy and the aggregate supply curve via credit-financing of working capital. Recently, several authors have found that incorporating this institutional detail characteristic of many LDC's, has unusual consequences for the link between monetary policy and inflation [Cavallo (1977), Bruno (1979) or van Wijnbergen (1980)].

We will show that taking these institutional characters typical for LDC's into account does lead to unorthodox results. A 'traditional' analysis of inflation would simply add an expectation augmented Phillips curve to the model of section 2, and come up with the straightforward result that high \( r_{TD} \)'s will increase or slow down inflation depending on whether they have an expansionary effect on economic activity or not. As we will see below, incorporating the influence of real curb market rates on the cost of financing working capital and from there on prices, drastically changes these results. A further victim of our analysis is the optimistic McKinnon view that higher \( TD \) rates (whatever their short-run impact) will lead to higher growth. If an increase in \( TD \) rates raises the real curbmarket rate, it may slow down the growth rate, the higher savings rate out of income notwithstanding. A condition under which this is bound to happen is derived and analyzed. Section 4 offers some conclusions.

2. Time deposit rates, bank lending rates and economic activity: A simplified short-run model

In this section we will present a simplified model focusing mainly on asset markets and the substitution effects generated there by changes in interest rates. The real sector is modelled by a simple Keynesian, demand determined, output mechanism. In the next section inflation and LR considerations will be brought in.

The public is assumed to allocate its wealth over currency, time deposits and loans in the curb markets, taking into account the rate of returns on these three assets (minus the inflation rate \(-\hat{p}\), the real time deposit rate \( r_{TD} - \hat{p} \) and the real curb market rate \( i - \hat{p} \)), real income \( y \) and real wealth \( W \).\(^4\)

The allocation is described by a Tobin-type portfolio model where we impose unit wealth elasticities for simplicity:

\[
C^D = f^c(\hat{p}, i, r_{TD}, y) W, \quad (1a)
\]

\[
TD = f^{TD}(\hat{p}, i, r_{TD}, y) W, \quad (1b)
\]

\(^4\)In this section \( \hat{p} \) is still considered exogenous. \( \hat{p} \) will be 'endogenized' in section 3.

\(^5\)What really matters is the existence of a group of assets more 'productive' (i.e., leading to more pass-through into capital) than time deposits, and a less 'productive' group. Whether the latter consists of cash, gold or commodity stocks is really not relevant.
\[ L_{UMM} = f_{UMM}^Y(\hat{\rho}, i, r_{TD}, y)W, \]  

(1c)

where \( UMM \) refers to the curb market (Unorganized Money Market) and with the usual adding up conditions applying to these demand functions:

\[ \sum_i f_i^j = 0, \quad \sum_j f_i^j = 1. \]  

(1')

A subscript \( j \) indicates a partial derivative with respect to argument \( j \). Further, we impose the gross-substitute assumption, demand functions have positive derivatives with respect to their own rate of return, but negative with respect to the rate of return on the two alternative assets. Finally it is a well established empirical fact that currency and time deposit holdings are positively related to income; this implies via the consistency conditions (1') that the supply of curb market loans depends negatively on income:

\[ f_y^{UMM} < 0. \]  

(1'')

By assumption, banks have as their only source of funds private Time Deposits against which they are required to hold reserves at a rate \( \rho \). They allocate the remainder of their assets over free reserves and loans depending on the inflation rate and the bank lending rate \( r_L \), so their supply of loans (in real terms) becomes:

\[ L_{DMB}^S = b(\hat{\rho}, r_L)(1 - \rho)TD, \quad 0 < b < 1. \]  

(2)

Finally, firms are supposed to snap up every loan the commercial banks are willing to make, as they are offered at below market interest rates. The remainder of their credit needs is met by the curb market. They need credit to finance working capital (fixed capital is brought in the next section); the need for working capital depends positively on the real product wage and output:

\[ D_f = D_f(w, y), \quad D_{f1, 2} > 0, \]  

(3)

where \( D_f \) is the business sector's demand for working capital in real terms. If we put all this in a Tobin-type accounting framework, we get table 1, where \( MR \) is the monetary base in real terms and \( TD^5 \) the supply of Time Deposits by banks (also in real terms). Table 1 incorporates in the \( TD \)-row the assumption that Time Deposit rate ceilings throw banks off their supply curve \( TD^5 \) and make \( TD \)'s demand determined. With \( TD \) determined by demand, we are left with the market clearing equation for the monetary base \( MR \) and for the curb market. Using the various balance sheet constraints with which the public, banks and firms are faced, it is easy to show that
Table 1

<table>
<thead>
<tr>
<th>Assets</th>
<th>Public</th>
<th>Banks</th>
<th>Firms</th>
<th>Supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Currency</td>
<td>(f^c(\hat{\rho}, i, r_{TD}, y)W + \rho TD + (1 - b(\hat{\rho}, r_L))(1 - \rho)TD) [= MR]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time Deposit</td>
<td>(f^{TD}(\hat{\rho}, i, r_{TD}, y)W - TD^S) [&lt; 0]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UMMM</td>
<td>(f^{UMM}(\hat{\rho}, i, r_{TD}, y)) + b(\hat{\rho}, r_L)(1 - \rho)TD) [-D_f(w, y) = 0]</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

equilibrium in the UMM implies equality of demand (by the public and the banking system) and supply of Monetary Base, the two equilibrium conditions are not independent. In what follows we use the UMM equilibrium condition:

\[f^{UMM}(\hat{\rho}, i, r_{TD}, y)W = D_f(w, y) - LMB\]  \[4\]

substituting \(1^o\) and \(2\) in \(4\) gives \(4'\),

\[f^{UMM}(\hat{\rho}, i, r_{TD}, y)W - D_f(w, y) - b(p, r_L)(1 - \rho)f^{TD}(\hat{\rho}, i, r_{TD}, y)W.\]  \[4'\]

The real sector part will be kept as simple as possible, to highlight the portfolio aspects of the issue; a more extended analysis follows in section 3. All we do now is postulate a simple fixed price Keynesian output mechanism:

\[y = A(i - \hat{\rho}, y), \quad A_i < 0, \quad 0 < A_y < 1.\]  \[5\]

\(5\) gives the traditional downward sloping IS curve after differentiation:  \[6\]

\[\frac{d\hat{\rho}}{dy}_{IS} = (1 - A_y)/A_i < 0.\]  \[6\]

Differentiation of \(4'\) gives us the locus describing asset market equilibrium (labeled LM-curve in fig. 1),

\[\frac{d\hat{\rho}}{dy}_{LM} = -[(f^{UMM}_y + b(1 - \rho)f^{TD}_y)W - D_{fy}] / (f^{UMM}_i b(1 - \rho)f^{TD}_i W).\]  \[7\]

\[6\]Note that in this section inflation \(\hat{\rho}\) is still exogenous. \(\hat{\rho}\) will be ‘endogenized’ in section 3.
Two of the 3 terms in the numerator are negative, one is positive. But the consistency conditions (1') allow us to resolve the ambiguity:

\[ f'_y UMM + b(1 - \rho) f'_y TD = f'_y UMM + f'_y TD - (1 - b + \rho b) f'_y TD \]

\[ = -f'_y C - (1 - b + \rho b) f'_y TD < 0. \]

Therefore \((f'_y UMM + b(1 - \rho) f'_y TD) W - D_{f_y} < 0\) holds so the numerator is always negative.

A similar analysis shows that the denominator is positive:

\[ f'_i UMM + b(1 - \rho) f'_i TD = f'_i UMM + f'_i TD - (1 - b + \rho b) f'_i TD \]

\[ = -f'_i C - (1 - b + \rho b) f'_i TD > 0. \]

Taking all this together gives

\[ \frac{di}{dy} |_{LM} > 0 \quad \text{or an upward sloping LM curve.} \quad (8) \]

Let us now analyze what happens when regulated interest rates are changed. First the time deposit rate.

Clearly \(r_{TD}\) has no direct impact on the goods market, so the IS curve does not move. A change (say an increase) does however change the asset portfolio people are willing to hold, as assetholders will move out of currency and curb market loans into time deposits. The impact of this change on asset market equilibrium can be read from eq. (4):
\[
\frac{di}{dr_{TD}} \bigg|_{LM} = -(f_{r_{TD}}^{UMM} + b(1-\rho)f_{r_{TD}}^{TP})/(f_{i}^{UMM} + b(1-\rho)f_{i}^{TP})
\]
\[
= [(1-b+b\rho)f_{r_{TD}}^{UMM} - b(1-\rho)f_{r_{TD}}^{C}]/(f_{i}^{C} + (1-b+b\rho)f_{i}^{TP}) \geq 0.
\]

The direction of the shift of LM, and via that the impact of the change of the time deposit rate on economic activity, will depend on the relative sensitivity of the demand for the two alternative assets (currency and curb market loans) to changes in time deposit rates (see fig. 2):

\[
f_{r_{TD}}^{UMM}/f_{r_{TD}}^{C} \geq b(1-\rho)/(1-b(1-\rho)) \Rightarrow \frac{dy}{dr_{TD}} \bigg|_{LM} \geq 0, \quad \text{and}
\]
\[
\Rightarrow \frac{dy}{dr_{TD}} \leq 0.
\]

Fig. 2

The intuition behind the algebra is quite simple. Consider the case that people shift mainly out of curb market loans after a rise in the time deposit rates \([f_{r_{TD}}^{UMM}/f_{r_{TD}}^{C} > b(1-\rho)/(1-b(1-\rho))].\) In this case the total supply of funds to the business sector will decline as funds are shifted from the curb market which provides one for one intermediation (no reserve requirements) into the banking system which provides only partial intermediation: partial because a fraction is syphoned off into required and free reserves rather than passed on to firms. As a result, the curb market rate will increase and economic activity will decrease (Case I in fig. 1). If the banking system also provides complete intermediation \((\rho=0, b=1 \text{ or zero required and free reserves})\) and the shift comes out of the curb market only \((f_{r_{TD}}^{C} = 0),\) there will of course be no net effect of \(dr_{TD}\)
on economic activity as can be read from eq. (9),

\[ f^C_{rd} = 0, \quad \rho = 0, \quad b = 1 \Rightarrow \frac{d}{dt} \frac{y}{r_{TD}} \bigg|_{LM} = \frac{dy}{dr_{TD}} = 0. \]

In the opposite case, \( \rho = 1 \), any shift out of the curb market into time deposits will just lead to reserve accumulation by banks and will therefore be contractionary: \(^7\)

\[ \rho = 1 \Rightarrow \frac{d}{dt} r_{TD} = -\frac{f^{\text{UMM}}_{r_{TD}}}{f^C_{r_{TD}}} > 0, \quad \frac{dy}{dr_{TD}} < 0. \]

The opposite case (Case II) is the one where people mainly shift out of currency into time deposits, not out of loans extended in the curb market:

\[ f^{\text{UMM}}_{r_{TD}}/f^C_{r_{TD}} < b(1-\rho)/(1-b(1-\rho)). \]

Currency is an unproductive asset, so any shift out of it into time deposits, which are partially passed through to the business sector by the banking system, leads to greater supply of funds to the business sector, a fall in the curb market rate and an increase in economic activity.

The upshot of all this is that to predict the implication of changes in time deposit rates, one has to have some insight in the financial structure of the economy. Specifically, one wants to know which asset is the closest substitute to time deposits, and whether that asset provides more intermediation than the banking system; also of relevance of course is whether the banking system will be allowed to play its intermediary role or not. The latter case could obtain when for example the banking system is constrained by direct limits on total lending (equivalent to \( \rho = 1 \) on the margin in our model). Then an increase in time deposit rates is always contractionary. \(^8\)

Before we incorporate our analysis of this section in the full blown model of section 3, and look at LR effects, we will look at the effects of a lending rate increase. Under the financial structure found in most LDC’s, bank lending rates will not have much impact on demand for credit. Official bank credit is extended at below market rates, which makes non-price rationing of bank credit unavoidable. All a change in the lending rate does in such a case, given the volume of credit extended, is change the ‘scarcity premium’ on the rationed loans received by those privileged firms who managed to have access to bank credit. This is however not the end of the story, the qualification ‘given the volume of credit extended’ is a non-trivial restriction.

\(^7\)See the following footnote for a qualification.

\(^8\)Unless people shift only out of currency \( (f^{\text{UMM}}_{r_{TD}} = 0) \) in which case \( dr_{TD} > 0 \) is neutral when combined with no intermediation by banks:

\[ f^{\text{UMM}}_{r_{TD}} = 0, \quad \rho = 1, \quad b = 0 \Rightarrow \frac{d}{dt} \frac{y}{r_{TD}} \bigg|_{LM} = \frac{dy}{dr_{TD}} = 0. \]
The reason is that if the banking system is not operating under a system of direct credit limits, an increase in the lending rate will induce banks to hold less free reserves and extend more loans thus increasing the volume of credit outstanding. This clearly has an expansionary effect, may be a surprising result. Formally, we can see from (4') that the LM curve shifts to the right while the IS curve stays where it is (see fig. 3):

$$\frac{di}{dr_L} \bigg|_{\gamma=0} = \frac{(1-\rho)f(\partial_\gamma f(r_L))}{\partial r_L} < 0$$

(11)

and therefore that

$$\frac{dy}{dr_L} > 0.$$  

(12)

3. Interest rate reform, inflation and growth

3.1. In this section we will extend the model in several directions to analyze the effects of an interest rate reform on inflation and medium-run growth. Aggregate supply responses and inflation are introduced in the model in section 3.2. 3.3 puts everything in a medium-run growth context by incorporating capital accumulation, monetary dynamics (via the government deficit and the BoP) and relative price movements over time.

3.2. Short-term effects on inflation

The key characteristics of the aggregate supply and inflation story presented below is the incorporation of the link between the financial sector and the supply side of the economy via the credit financing of working capital. Cavallo (1977) was the first one to point to both the empirical
relevance of this transmission channel and the unorthodox results it leads to. Via this channel higher real interest rates will reduce output; if this effect on aggregate supply is stronger than the deflationary impact on aggregate demand, restrictive monetary policy and accompanying high real rates may actually push inflation up in the short run, rather than slow it down. In our model credit is needed to finance labour costs, so that total labour costs will depend on the real wage \( w \), output \( y \) and the cost of credit, \( i - \hat{\beta} \): If we use a Cobb–Douglas production function with share parameter \( \alpha \)

\[
LC = w^a K^{a-1} (1 + i - \hat{\beta}), \quad \alpha = 1/(1 - \alpha) > 1
\]

\( LC \) = labour costs in real terms.

Firms determine output such that profits \( pY - LCp \) will be maximized, which leads to the aggregate supply function⁹

\[
1 = a^a Y^{-1} K^{-a} w (1 + i - \hat{\beta})
\]

\[
= a^a w (1 + i - \hat{\beta}), \quad Y = Y/K
\]

(13)

or output will decline if either the real wage or the real rate go up. Transformation in 'per unit of capital' variables is done in anticipation of the extension into a growth model presented in section 3.3. The real wage \( w \) is fixed exogenously reflecting the assumption of a Lewis-type surplus labour economy.

Aggregate demand for domestic goods, \( A_d \), consists of foreign demand (exports \( E \)), domestic consumption of domestic goods \( C_d \), investment \( I \) and government expenditure (which, for simplicity, is assumed to fall on domestic goods only). World demand for 'our' goods depends on the terms of trade \( q = p/(ep^*) \); fixed capital formation \( I \) depends on the real rate \( i - \hat{\beta} \) and the profit rate, which in turn depends on \( Y \) and \( K \) given the real wage. We will assume \( I \) to be homogenous of degree one in \( Y \) and \( K \) for later convenience.

Finally, the share of consumption that falls on domestic goods depends on the terms of trade \( q \), while total consumption depends on the real rate (incorporating the McKinnon hypothesis of a positive savings response to a higher real rate),¹⁰ real income corrected for capital losses on nominal assets \( \hat{\beta}MR \), \( y_d = y - \hat{\beta}MR \), and wealth \( K + MR \) (capital plus the real value of the

⁹Capital letters are used here because the corresponding lower case letters will be used to denote quantities 'per unit of capital' in 3.3. So income per unit of capital becomes \( y = YK^{-1} \).

¹⁰The question of which real rate (curbmarket or the one on TD's) influences savings propensities cannot be resolved within this model, because the uncertainty that causes the different assets to be imperfect substitutes is not explicitly incorporated here. Choosing the real time deposit rate rather than the real curbmarket rate leaves the results unaffected however.
monetary base \(MR\). All this leads to an aggregate demand for domestic goods \(A_d\):

\[
A_d = C_d(q, i - \hat{\beta}_y Y - \hat{\beta}MR, K + MR) + I(i - \hat{\beta}_i Y, K) + E(q) + G.
\]

Finally, we assume the price level to be sticky, relative prices change only gradually. The inflation rate however can change instantaneously in response to anticipated foreign inflation \(\pi^*\) or excess demand for domestic goods:

\[
\dot{p} = \pi^* + \lambda(A_d - y).
\] (14)

(14) also incorporates the assumption of fixed exchange rates. A micro-economic rationale for equations like (14) is given in Barro (1974) and Sheshinsky and Weiss (1977). Gradual price adjustment implies the possibility of disequilibrium in the goods market. We ignore the implications this has for the behaviour of the agents in this economy and make the simplifying assumption that unsatisfied demand for domestic goods spills over into the market for foreign goods leaving total expenditure unchanged, and vice versa for the case of excess supply of domestic goods.

The financial sector part of the model is left unchanged, with one exception: firms now need to finance not only working capital \(D_f\) but also physical capital \(K\). So asset market equilibrium is described by an equation that is basically similar to (4'):

\[
f_{\text{UMM}}(\hat{p}, i, r_{TD}, Y, MR + K = K + D_f(w, Y, K)
-(1 - \rho) f_{TD}(\hat{p}, i, r_{TD}, Y, MR + K)
\]

or moving towards 'per unit of capital' variables\(^{11}\)

\[
f_{\text{UMM}}(\hat{p}, i, r_{TD}, y, mr + 1) = 1 + D_f(w, y, 1)
-(1 - \rho) f_{TD}(\hat{p}, i, r_{TD}, y, mr + 1).
\] (15')

We can now analyse the impact of an interest rate reform using eqs. (13), (14) and (15). Eqs. (13) and (14) can be combined to get what we labelled the IS curve in fig. 4. This locus describes the interaction between the curbmarket rate \(i\), output (per unit of capital now) \(y\) and inflation \(\dot{p}\) via the

\(^{11}(15)\) and (15') also incorporate the simplifying assumption that banks hold no free reserves: \(b = b(\hat{p}, i)\) but \(b = 1\) instead, cf. eq. (4').
goods markets:¹²

\[
\frac{d\hat{p}}{dy}\bigg|_{IS} = -\lambda \frac{(1 - C_{d,y} - I_y + (C_{d3} + I_1)(1 + i - \hat{p})(a - 1)y^{-1}}{1 + \lambda m \cdot C_{dy}}.
\]

(16)

The denominator is of course always positive. The numerator however cannot be signed unambiguously. If, in the short run, supply effects of tight credit policies via the working capital/curbmarket link (Cavallo-effect) dominate the deflationary impact on aggregate demand of such policies, the numerator is positive and our ‘IS-curve’ slopes downward. This is the case when tight credit policies lead to higher inflation and less output initially, rather than lower inflation and less output as traditionally assumed. The first case commands strong empirical evidence in the only two cases where this Cavallo-effect was investigated at all [Cavallo (1977) for Argentina and van Wijnbergen (1982) for South Korea]. In what follows we will assume that this ‘Cavallo-effect’ indeed dominates, so that \( \frac{d\hat{p}}{dy}\bigg|_{IS} < 0 \). By inspecting (13) and (14) it can readily be seen that changes in \( r_{TD} \) do not affect the goods market directly, so that IS curve does not shift when \( r_{TD} \) changes.

If one uses (13) to substitute out the curbmarket rate in (15), one gets a locus describing financial markets equilibrium (labeled the LM curve in fig. 4):

\[
\frac{d\hat{p}}{dy}\bigg|_{LM} = \frac{f^C + \rho f^{TP} + D_{f,y} + (f^C + \rho f^T_D)(1 + i - \hat{p})(a - 1)y^{-1}}{f^C + \rho f^{TP} + f^C + \alpha f^T_D}.
\]

(17)

The LM curve slopes upward: Assume output \( y \) goes up. Higher output \( y \) leads to more demand for loans \( (D_{f,y} > 0) \) but on the other hand it also

¹²Use (13) to substitute out \( i \) in (14) and (16) comes out.
increases the demand for money and so decreases the supply of loans on the curbmarket. To get back towards equilibrium, the curbmarket rate \( i \) has to go up, luring lenders back into the curbmarket and discouraging demand. However, by assumption \( y \) went up which is only possible in the short run if the real rate falls \( [\text{eq. (13)}] \). Accordingly, \( \bar{\rho} \) will have to go up even more than the curbmarket rate leading to a positive slope of the LM curve.

A change in the time deposit rate leads to a shift in this LM curve in the same way the LM-curve in section 2 was affected (fig. 2 and surrounding text). If an increase in Time Deposit rates mainly leads to a shift out of the curbmarket rather than out of cash, the interest rate on the curbmarket will shoot up because the net supply of funds to firms is reduced (banks soak up part of the influx as required reserves). This in turn will lead to a reduction in output given the inflation rate: the LM curve shifts to the left. In this case an increase in Time Deposit rates is not only contractionary, it will also fuel inflation in the short run. What is going on here is the following: if TD's are closer substitutes to curbmarket loans than to cash, higher TD rates will lead to an increase in the real rate, as we also argued in section 2. This in turn will reduce supply (because of the higher real cost of credit), and, under our assumption of the predominance of the Cavallo-effect, will do so more than it reduces aggregate demand. Accordingly, inflation will accelerate in the short run (see point A in fig. 4).

If however higher TD rates result mainly in a shift out of cash (into TD's) rather than out of curbmarket loans, the net supply of funds to firms will go up because banks will pass at least part of the deposits they receive on to firms, while currency is an ‘unproductive’ asset. This will lead to a lower curbmarket rate and accordingly to higher output: the LM curve shifts to the right in this case (fig. 4). In the new equilibrium (B, fig. 4) the real rate will have gone down, output will have gone up and inflation will in fact slow down (see point B in fig. 4) because of the reduction of inflationary pressure brought about by the increase in aggregate supply. As we noted in the introduction, this case, where the shift into Time Deposits comes out of an ‘unproductive’ asset, is really the one underlying the McKinnon/Shaw/Kapur analysis.

A final point to note is that in the contractionary case the real rate \( i - \bar{\rho} \) will go up and output (and profits, given the real wage) down in the short run. Clearly, the growth rate \( I = \overline{I}/K = I(i - \bar{\rho}, y, 1) \) will fall in that case, which brings us to the subject of the next section, the effects on financial deepening and growth in the medium run.

3.3. Long-run effects on financial deepening and growth

Although the short-run problems discussed in the previous sections are of crucial importance for any policy maker considering the implementation of
an interest rate reform, the real issue is the medium- to long-run effect on financial deepening, savings and growth. It is to that question that we will turn our attention now. In what follows we will discuss these questions using the model set up in section 3.2 and the associated dynamic equations. The time span considered is called the 'medium run' because we do not require net capital accumulation per capita to stop in the steady state; instead, we look at the 'medium run' in which capital will be accumulated at a constant (endogenous) growth rate and in which all other real quantities grow at the same rate ('balanced growth'). Similar techniques have been used before by Sargent (1973), Pyle and Turnovsky (1976) and Taylor (1980).

The crucial variables are the terms of trade $q$, the growth rate $I = \overline{I}/K$, and our indicator of financial deepening, $mr$, the real value of the monetary base $MR$ divided by the physical capital stock $K$: $mr = MR/K$.

The terms of trade $q$ will change gradually over time if foreign and domestic inflation rates differ (note our assumption of fixed exchange rates):

$$\frac{\dot{q}}{q} = \hat{\rho} - \pi^*.$$  

In the absence of private capital inflows changes in the monetary base $MR$ originate in the government deficit $G$ and the current account, minus inflationary erosion $\hat{\rho}MR$:

$$MR = G + Y - C_T - \overline{I} - \hat{\rho}MR.$$  

gov. current account inflationary deficit surplus erosion  
($=$ income minus expenditure)

Also, $mr = MR/K - mr(K/K)$ so that the financial deepening indicator $mr(= MR/K)$ evolves over time according to (19):

$$mr = \frac{G}{K} + \frac{Y}{K} - \frac{C_T}{K} - \frac{\overline{I}}{K} - \hat{\rho}MR - mr\frac{\overline{I}}{K} = y - \hat{\rho}mr - c_T - (1 + mr)I$$

$$= y_D - c_T - (1 + mr)I,$$  

(19)

where $y_D$ denotes disposable income ($y_D = y - \hat{\rho}mr$) and lower case letters indicate variables per unit of capital ($y = Y/K$ etc.). Our system is rounded out by the growth rate equation $\eta = \dot{K}/K$:

$$\eta = \overline{I}(i - \hat{\rho}, Y, K)/K = I(i - \hat{\rho}, y, 1).$$  

(20)

The dynamic system is block triangular in $q$ and $mr$ versus $n$: the evolution
of \( q \) and \( mr \) can be determined from (19) and (20), independent from \( \eta \). Before we can analyse (19) and (20) however, we have to express the ‘short-run variables’ \( y \), \( i \), and \( \hat{p} \) as functions of the state variables \( q \) and \( mr \) and the policy variable \( r_{TD} \).\(^{13}\)

\[
y = y(q, mr, r_{TD}),
\]

\[
\hat{p} = \hat{p}(q, mr, r_{TD}),
\]

\[
i = i(q, mr, r_{TD}).
\]

The ambiguity of \( y_{r_{TD}}, i_{r_{TD}} \) and \( \hat{p}_{r_{TD}} \) has been discussed extensively in the previous sections. The sign of \( \hat{p}_{mr} \) is uncertain too: the credit/supply-side link via working capital (Cavallo-effect) would tend to slow inflation down immediately after a one shot increase in the Monetary Base (given the capital stock), but wealth effects on spending may reverse this effect. In our diagrammatical exposition we will assume that the first effect dominates so that \( \hat{p}_{mr} < 0 \); it can however be shown that this does not affect any of the results. The signs of the other partial derivatives are fairly self-evident. (21) can be used to link the growth rate to the state variables [substitute (21) in (20)]:

\[
\eta = \eta(q, mr, r_{TD})
\]

(20')

A loss in competitiveness reduces profitability and therefore investment and medium-run growth \((\partial \eta / \partial q > 0)\) while the impact effect of higher \( TD \) rates on growth and investment is positive or negative depending on what happens to the real rate \( i - \hat{p} \).

Consider first eq. (18):

\[
\hat{q} = \hat{p}(q, mr, r_{TD}) - \pi^*.
\]

The locus of \( q \sim mr \) combinations compatible with constant relative prices \((q = 0, RP \text{ in fig. 5})\) is downward sloping, given the signs of the partial derivatives we just discussed.

\[
\frac{dq}{dmr} = -\left(\frac{\partial \hat{p}}{\partial mr}\right)/\left(\frac{\partial \hat{p}}{\partial q}\right) < 0.
\]

An upward shift in \( q \) shifts world demand away from our goods which will

\(^{13}\)An appendix containing the exact analytical expressions is available on request.
slow down inflation in the short run \((\delta \bar{p} / \delta q < 0)\); this can be offset by a decrease in the monetary base (per unit of capital), as this causes inflation to flare up again in the short run due to the higher real cost of credit (Cavallo-effect). Accordingly, the RP curve has a negative slope.

In the case where higher TD rates are contractionary, the RP curve would shift upwards in response to a higher TD rate: the higher TD rate would raise the real curbmarket rate which in turn would push up inflation via Cavallo-effects. This could be offset by an upward shift in \(q\) (a decrease in competitiveness) because that would shift world demand away and so reduce inflationary pressure.

The AA locus gives those combinations of \(q\) and \(mr\) that are compatible with constant monetary base-physical capital ratio \(mr\). Crucial both for the slope of the curve and for the direction in which it shifts after an increase in \(r_{TD}\) is the question of the impact effect of a real rate increase on financial deepening \(mr\). An increase in the real rate \(r\) will slow down investment. The issue is whether it will also slow down financial asset accumulation (which, given the government deficit, can only change via changes in the current account) and if so whether it will do so more than it slows down capital accumulation. On the one hand it will increase financial asset accumulation because a higher real rate leads to a higher savings rate. On the other hand a higher real rate leads to a lower real income via Cavallo-effects and may so decrease savings the higher savings rate not withstanding. If the latter effect is strong enough, \(mr\) could actually decline. Consider first the latter case, with the income effect dominating.

An increase in \(mr\) will lower the real rate and so increase capital accumulation. It will further decrease private saving both via wealth effects and indirect effects via the real interest rate so on balance financial deepening \(mr\) will slow down. This can, in the case under consideration, be offset by a decrease in the terms of trade (increase in competitiveness, \(dq < 0\)): this will lead to more aggregate supply and a lower real rate and therefore to more financial deepening \((mr \uparrow)\) under the assumption of dominating income effects and so bring us back on the AA-locus. The conclusion is that in this case the AA locus slopes downward (fig. 5).\(^4\)

Now what happens to the AA locus when Time Deposit rates are increased? An increase in Time Deposit rates in the case where their impact effect is contractionary \((\delta y / \delta r_{TD} < 0)\) would push inflation up initially via 'Cavallo-effects', the real rate will go up and financial deepening \(mr\) will decline. To offset this either a downward shift in \(q\) or one in \(mr\) is necessary (see previous paragraph), so the AA curve shifts to the left (fig. 5).

Putting all this together, the long-run effects become clear: the initial decrease in financial deepening because of the higher curbmarket rate persists

\(^4\)Stability requires that the RP-curve cuts the AA curve from below (see fig. 5).
over time and our indicator of ‘financial depth’ mr declines in the new steady state (point B in fig. 5). Also the initial outburst in inflation caused by the higher real rate will lead to a permanent loss in competitiveness ($q_B > q_A$) (fig. 5). The effects on the steady-state growth rate $n$ and on output per unit of capital are unambiguously negative as medium-run profits fall and the real rate rises [cf. eq. (20'), and eq. (21)].

Although it is an empirical question whether the negative Cavallo-effects of a higher real rate on output really dominate the positive effects of a higher savings rate in the short run, it is worthwhile to point out that there clearly is a distinct possibility that higher time deposit rates will lead to less rather than more financial depth (a lower mr) and lower growth in the medium run.

Consider finally the case where these negative Cavallo-effects do not dominate so that an increase in the real rate $i - \dot{p}$ indeed speeds up financial deepening mr initially.

An increase in mr will still slow down financial deepening, but this should now be offset by an increase in the terms of trade (decline of competitiveness), because a decline would lower the real rate which would slow financial deepening down further when Cavallo-effects do not dominate. Accordingly, the AA curve now slopes upward (see fig. 6).

For the same reason the shift after an increase in time deposit rates reverses sign: the higher real rate that results initially now improves financial deepening so the the AA curve shifts to the right (a higher mr would slow financial deepening down, bringing us back to the AA curve). The long-run effects are now more in line with the McKinnon/Shaw analysis (see B in fig. 6). With the savings rate effects dominating the increase in financial deepening sticks and mr goes up in the long run. The initial outburst of inflation and accompanying decline in competitiveness will be reversed later
on under the combined impact of lower world demand and higher domestic savings; whether the initial position will be restored is not obvious however: $q_B \leq q_A$ (see fig. 6). Accordingly, the net effect on growth can be either positive or negative: the financial deepening will stimulate growth, but this may be reversed if competitiveness is not restored sufficiently. So even when the positive effect on the savings rate dominates negative influences on financial deepening, negative consequences for output (per unit of capital) and medium-term growth cannot be excluded.

4. Conclusions

In this paper we examined the likely impact of changes in bank lending and deposit rates on economic activity, inflation and growth. The results are to be contrasted with the Shaw/McKinnon/Kapur view of the world (at least the LDC part of it); their point of view is, with some exaggeration, that high time deposit rates, preferably positive in real terms, are a good thing to establish in LDC's, a necessary precondition (and sufficient, one is tempted to believe occasionally) for high growth. If short-term effects of higher rates are considered at all, they are believed to be favourable, increasing output and reducing inflation.

Our results seriously qualify these claims. Explicit consideration of the portfolio shifts to be expected shows that whether an increase in time deposits is expansionary or contractionary depends on whether Time Deposits are close substitutes to 'unproductive' assets providing no pass through into capital, like cash, gold or commodity stocks, or to 'productive' assets like loans extended in the curbmarket. The importance of asset market structure for the effect of monetary policy was stressed a long time ago of course by James Tobin (1975).

We then incorporated the Tobin-type analysis in a macro-model incorporating the link between credit and the supply side of the economy via
the financing of working capital, a transmission channel shown to be of importance in LDC's, that causes often unexpected responses to monetary policy. The outcome of this analysis is that when time deposits rate increases are contractionary, they will also accelerate inflation; if they are contractionary, they are so because they lead to tight credit conditions as people shift out of the curbmarket rather than cash. The resulting high real costs of credit lead to an acceleration of inflation in the short run, indicating that in this case increases in time deposit rates will have a stagflationary impact, in sharp contrast to the results obtained by for example Kapur (1976). The crucial difference is the implicit assumption made by Kapur, and for that matter by McKinnon (1973), that time deposits only substitute with cash or other ‘unproductive’ assets. In that case it is shown that favourable short-run effects on output and inflation indeed do obtain.

We then went on to analyse the effects on capital accumulation and medium-run growth. In the contractionary case, the initial outburst of inflation after an increase in time deposit rates will lead to a loss of competitiveness, which, in itself, lowers the profit rate and therefore investment and the medium-run growth rate. Financial asset accumulation may slowdown if the fall in income more than offsets the increase in the savings rate; if this happens, the resulting ‘financial shallowing’, to borrow Shaw’s phrase, will make slower growth inevitable, as it comes on top of the negative effect of the loss of competitiveness. If however, the savings rate increase dominates, financial deepening will result. The net effect on growth becomes ambiguous in that case: the loss of competitiveness and the ‘financial deepening’ effect work at cross purposes. The important point to note is that we showed there is a distinct possibility that the beneficial effects of a higher savings rate after an increase in time deposits rate, will be thwarted by the contractionary impact of the portfolio reallocation the higher TD rates also cause.

We also looked at the effects of changes in bank lending rates. With bank loans rationed because lending rates are invariably below market clearing levels, there are no negative effects on demand for bank loans to be expected after an increase in lending rates (although some firms may run into cash flow problems). On the other hand banks will be induced to hold less free reserves and borrow more abroad to be able to make more loans when lending rates go up; therefore, the net effect is expansionary, maybe a somewhat surprising result.

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