

FINANCIAL DEREGULATION AND SEGMENTED  
CAPITAL MARKETS: THE CASE OF KOREA

By

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Discussion Paper Number 432  
February 1987

### Abstract

This paper deals with the relation between the official and unorganized (or curb) financial markets in Korea. The paper focuses on the behavior of officially controlled interest rates and freely determined market interest rates, and analyzes the effects of financial deregulation on interest rates, investment and growth in a segmented capital market.

The empirical results show that changes in the officially controlled time deposit rate have been positively related to changes in the freely determined curb market interest rate. An aggregate investment function is also estimated for Korea. It is found that an increase (decrease) in the curb rate discourages (encourages) investment; on the other hand, increases in the real volume of credit intermediated in the official segment have a positive effect on real aggregate investment.

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## I. Introduction

In 1981, Korea's Fifth Five Year Plan established as one of its goals the liberalization of the country's financial sector. In the years following the inception of the plan a number of steps towards economic liberalization were actually taken. The main characteristics of the reforms were: (a) new financial instruments were created; (b) some steps towards increasing competition among banks were taken, including the privatization of commercial banks, and the granting of permission to foreign banks to participate in a number of areas previously restricted to domestic banks; (c) banks were allowed to increase the scope of their business; (d) overall competition in the financial sector was encouraged by giving a more important role to nonbank financial institutions; (e) in theory -- but not in reality -- the government intervention in the allocation of credit was reduced; and (f) a somewhat greater degree of flexibility in terms of the interest rate which banks could charge on their loans was allowed.<sup>1</sup>

In spite of these important steps towards deregulating the financial market, by late 1986 a number of controls were still in place. Particularly important among them were the fixing of interest rates at no clearing levels, and the government interference in the process of credit allocation. The no-market clearing interest rates were reflected on the continued importance of the unofficial or curb financial market.<sup>2</sup> In fact, the segmented nature of the Korean financial market -- where this curb segment coexists with the official financial institutions -- makes the analysis of the possible effects of financial policies particularly interesting and difficult. For example, under capital market segmentation it is possible that the liberalization of the official segment will result in a reduction of the overall degree of intermediation. This would be the case, for

example, if as a result of the reform the degree of intermediation crowded out in the curb market exceeded the increase in intermediation in the official segment.

The purpose of this paper is to analyze the interaction between the official and curb capital markets in Korea. The paper focuses on the relation between official interest rates in the controlled segment, and freely determined interest rates in the curb market. More specifically, the analysis deals with the probable effects on interest rates, intermediation and investment, of policies aimed at further deregulating the Korean financial market. This analysis is particularly relevant since it is highly likely that during the next few years the Korean authorities will undertake steps towards freeing official interest rates and opening the capital account. The paper is organized in the following form: Section I is the introduction. In Section II some important aspects related to the effects of financial liberalization policies are briefly discussed. In particular, the way in which the existence of a segmented capital market alters the more traditional results is analyzed. In Section III the historical behavior of official and freely determined interest rates is analyzed. In Section IV a model of interest rates determination in a semi-open economy is developed and applied to Korea's curb market rate. It is found that this freely determined interest rate has responded to a number of variables, including changes in overall domestic liquidity, expectations of devaluation, world interest rates, and official interest rates in the controlled segment. In Section V an investment function is estimated for Korea. The results obtained show that the investment ratio has been (negatively) influenced by the curb market interest rate, and positively affected by the real availability of credit in the official segment. Finally, Section VI contains the

concluding remarks, including some policy implications of the empirical analysis presented in the paper.

## II. Financial Liberalization, Interest Rates, Segmentation, and Economic Activity

According to the more traditional financial repression view of Shaw and McKinnon, a financial reform that raises real interest rates will increase the supply of savings, increase investment and ultimately result in higher growth.<sup>3</sup> Central to this analysis is the idea that by reforming the organized financial sector funds will flow from unproductive uses, such as real estate speculation, gold, or foreign exchange holdings, into the formal financial system, with the subsequent increase in net intermediation. This view has recently been challenged by some authors that have argued that in countries such as Korea, with a large informal financial market, the liberalization of interest rates in the official segment will crowd out funds from the unofficial segment or curb market.<sup>4</sup> If, after the reform that raises official interest rates, reserve requirements in the official market exceeds the freely determined (and optimal) reserves requirement in the curb market, the total volume of intermediation (that is official plus curb segments) may decline, rather than increase as the traditional McKinnon-Shaw approach indicates. This view goes even further, to suggest that as the level of intermediation falls after the reform, investment will be lower and growth will be reduced (van Wijnbergen 1984).

Whether in a particular case the liberalization reform will work in the traditional way or in the fashion suggested by the reform critics is an empirical matter. Unfortunately it is a difficult empirical question, since many of the required data to perform the analysis -- and especially those pertaining to the informal curb market -- many times are not available.

Although in almost every case there are no data on the volume of intermediation that takes place in the informal or curb market, there are some indirect ways of analyzing whether a liberalization reform has generated some crowding out in the informal market. More specifically, if there are data on curb interest rates, it is possible to indirectly test the crowding out hypothesis. If, when interest rates paid on time deposits in the organized market are raised, some funds come out of the curb market, there should be an increase in the interest rate freely determined in that segment of the market. This is because as a result of the higher time deposits rate there is a leftward shift in the supply of funds to the curb market. The extent of the increase in the curb market rate will, of course, depend on the elasticities involved. From an empirical point of view, then, an indirect test of the crowding out hypothesis would consist of estimating whether, with other things constant, a higher interest rate in the official market results in an increase in the curb market interest rate. Sections III and IV are, in fact, devoted to an empirical analysis of this type for the case of Korea.

### III. Official and Curb Market Interest Rates in Korea

Table 1 contains data on different interest rates for 1977-1985. The real rates have been computed using the annualized rate of inflation for the corresponding quarter. As may be seen, until 1981 there were a profusion of negative real rates. However, starting with that year all interest rates included in the sample have had consistent positive real rates. Moreover, the value of real rates during the more recent period were, even in the official and controlled financial market, quite high. For example, during 1985 the real interest rate on loans in the official market averaged

Table 1

Interest Rates in Korea  
1977 - 1985  
(Quarterly Data)

Year and Quarter	Nominal			Real		
	Curb Rate	Time Deposit Rate	Loan Rate	Curb Rate	Time Deposit Rate	Loan Rate
1977:3	35.5	16.2	15.0	21.8	2.5	1.3
1977:4	34.0	14.3	15.0	30.5	10.8	11.5
1978:1	38.4	14.4	15.0	14.1	-9.9	-9.3
1978:2	38.4	18.0	15.0	26.0	5.6	2.6
1978:3	43.2	18.6	18.0	23.9	-0.7	-1.3
1978:4	46.8	18.6	18.5	35.3	7.1	7.0
1979:1	44.0	18.6	19.1	25.8	0.4	0.9
1979:2	42.0	18.6	19.0	9.0	-14.5	-14.1
1979:3	40.7	18.6	19.0	29.0	6.9	7.3
1979:4	42.7	18.6	19.0	27.5	3.4	3.8
1980:1	50.8	23.3	24.3	4.1	-23.4	-22.4
1980:2	48.8	24.0	24.7	14.3	-10.5	-9.8
1980:3	42.5	22.9	23.7	21.6	2.0	2.8
1980:4	37.7	21.4	20.8	4.5	-11.8	-12.4
1981:1	36.6	19.5	20.0	19.5	2.4	2.9
1981:2	35.2	19.5	20.0	15.7	0.0	0.5
1981:3	33.8	19.5	20.0	12.8	-1.5	-1.0
1981:4	35.4	19.0	19.0	32.7	16.3	16.3
1982:1	32.6	15.1	16.1	27.8	10.3	11.3
1982:2	33.1	12.5	13.9	26.3	5.7	7.1
1982:3	27.5	8.0	10.0	22.3	2.8	4.8
1982:4	29.0	8.0	10.0	28.4	7.4	9.4
1983:1	24.1	8.0	10.0	16.3	0.2	2.2
1983:2	27.5	8.0	10.0	26.1	6.6	8.6
1983:3	26.8	8.0	10.0	26.2	7.4	9.4
1983:4	24.7	8.0	10.0	24.7	8.0	10.0
1984:1	24.1	10.0	10.4	18.2	4.1	4.5
1984:2	25.7	10.0	10.5	23.5	7.8	8.3
1984:3	23.5	10.0	10.5	22.1	8.6	9.1
1984:4	25.4	10.0	11.1	24.2	8.8	9.9
1985:1	27.7	10.0	11.5	24.2	6.5	8.0
1985:2	27.0	10.0	11.5	24.1	7.1	8.6

Source: Bank of Korea

approximately 9% per year. The corresponding real rate on time deposits in the official banks has averaged almost 8% per annum.

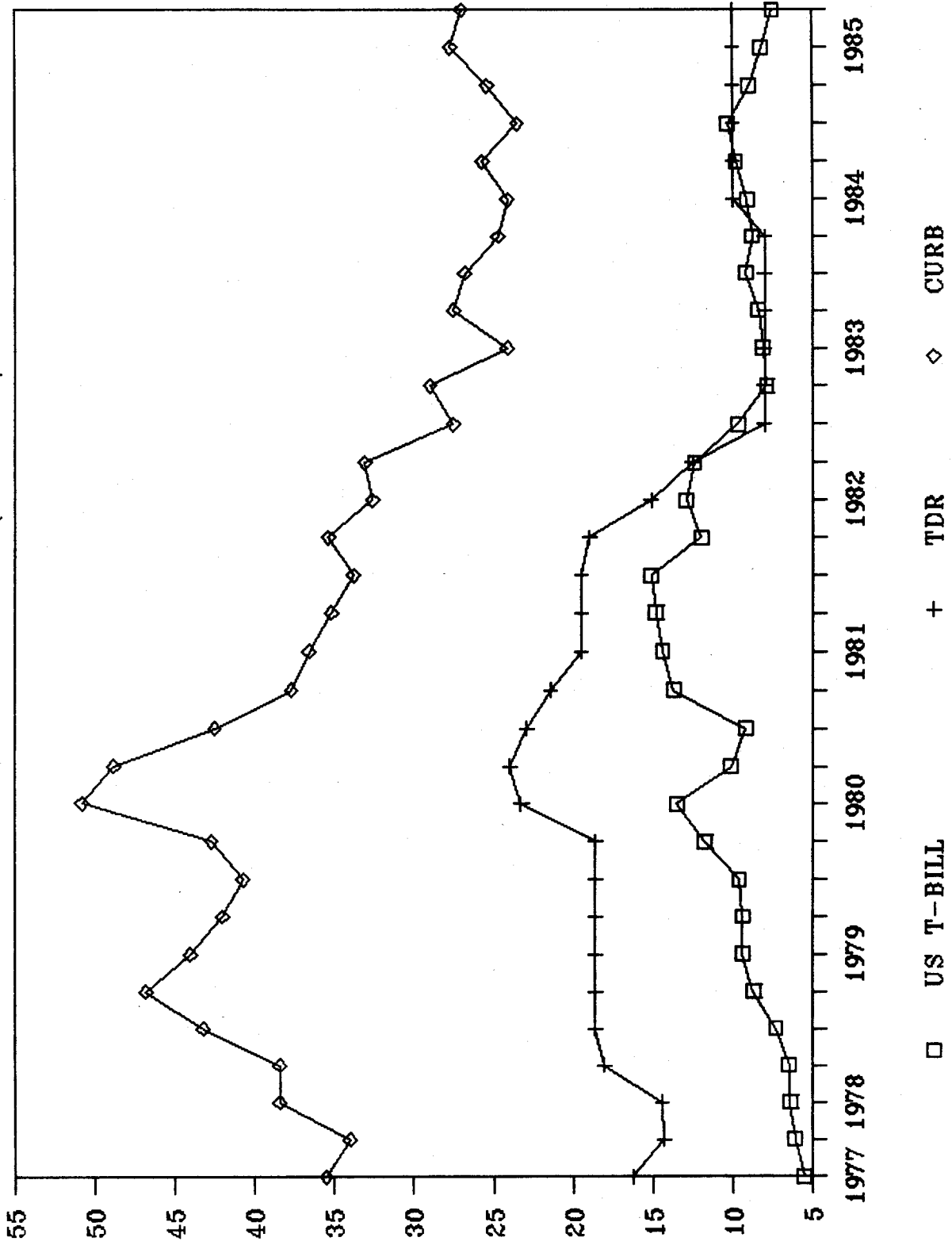
In spite of this sharp increase in real rates in the official market and of the additional flexibility introduced by the bank on lending rates -- which allows banks to charge anything between 10% and 11.5% -- in late 1985 there were still indications that a situation of excess demand for funds persisted. This excess demand was reflected in two basic ways. First, as indicated above, the curb market activities continued to be very important and the interest rate differential between the organized and unorganized segments exceeds any reasonable risk premium. Second, there was evidence suggesting that most banks lent money only at the highest rate allowed by the bank. (In principle, the purpose of this band was to discriminate among "good" and "bad" risks.)<sup>5</sup>

Perhaps the most interesting information from Table 1 relates to the curb market rate. As may be seen, during 1984-85 it was very high, reaching almost 25% in real terms. During this period a number of observers, and in particular representatives of the business sector, forcefully argued that these high curb real rates were discouraging investment.

Figure 1 depicts the behavior of the official nominal interest rate paid on time deposits, the curb nominal rate, and the U.S. treasury bill rate, which is used as a proxy for world interest rates. As can be seen the spreads between the freely determined curb rate and the other two interest rates have been significant and persistent. It is particularly interesting to note that throughout the period the spread between the curb rate and the U.S. Treasury bill exceeds, by a substantial margin, any reasonable estimate of the expected rate of devaluation of the won.<sup>6</sup> Also, notice that in the recent period the officially pegged time deposit rate has moved closely with



# KOREAN AND WORLD NOMINAL INTEREST RATES (1977-1985)



the U.S. T-bill rate.

As a preliminary step in the analysis of interest rate behavior in the unofficial sector some regressions relating the curb market rate and the officially fixed time deposit rate were estimated. The regressions used both yearly data for 1968-1984 and quarterly data for 1977-1985. The yearly regression using ordinary least squares yielded the following result, where the number in parentheses are t-statistics):

$$\begin{array}{rcl} \text{curb} = & 0.169 & + \quad 0.146 \text{ TDR} & R^2 = .901 & (1) \\ & (7.605) & (11.295) & \text{D.W.} = 2.087 \end{array}$$

The quarterly regression was estimated using ordinary least squares corrected by first order serial correlation, and used data for the period 1977-1985 only.

$$\begin{array}{rcl} \text{curb} = & 0.167 & + \quad 1.180 \text{ TDR} & R^2 = .489 & (2) \\ & (4.440) & (5.174) & \text{D.W.} = 1.847 \end{array}$$

As may be seen in both cases the coefficient of the time deposits rate is positive and significant, providing some support to the hypothesis that during these periods administered increases in the time deposit rate in the official market provoked crowding out in the curb market. The fact that the coefficient is significantly higher in the quarterly data regression suggests that the extent of the crowding out has been more marked in the recent period. In the section that follows a more complete model of interest rate behavior in the free market, that incorporates the role of foreign variables as well as domestic liquidity is estimated to further analyze this issue.

#### IV. A Model of Interest Rate Determination in Korea

The regressions presented above [equations (1) and (2)] showed that there has been a significantly positive relation between officially fixed

nominal interest rates and the freely determined interest rates in the unofficial or curb market. A problem with those results, however, is that they don't incorporate other variables as possible determinants of the (freely determined) interest rate in Korea. In particular, one would like to have some idea on how the interest rate reacts (if at all) to changes in world interest rates and in the expected rate of devaluation. This is an important policy question, since it is related to the degree of economic openness of the Korean capital account. Moreover, this type of analysis will shed some light on the possible effects that a more active exchange rate management could have on the freely determined curb market interest rate. In order to tackle some of these questions a small reduced form model of interest rate determination in a semi-open economy was estimated.

Most empirical studies on interest rates behavior have made extreme assumptions regarding the degree of openness of the economy. It has been generally assumed that the country in question is either completely closed to the rest of the world or that it is fully open and that there are no capital controls. These extreme assumptions are, of course, inadequate for middle income countries such as Korea, where the degree of openness corresponds to some intermediate situation. The capital account is partially open and there are some controls to capital movements.<sup>7</sup> Presumably in a semi-open economy -- with some legal restrictions to capital movements -- interest rates will be affected in the short- to medium run by both closed economy factors, like the situation of excess demand or supply for total liquidity in the economy, and open economy conditions such as world interest rates and the expected rate of devaluation. Edwards (1985) has argued that interest rate behavior in a small semi-open economy can be captured by the following simple equation:<sup>8</sup>

$$\Delta i_t = \theta[(iW_t + D_t + P_t) - i_{t-1}] - \lambda[\log m_{t-1} - \log m_t^d] \quad (3)$$

where  $i$  is the domestic nominal interest rate;  $iW$  is the world interest rate for instruments of the same characteristic as the domestic ones (with the exception of currency of denomination);  $D$  is the expected rate of devaluation;  $P$  is a risk premium factor;  $m$  is a measure of real liquidity in the economy (i.e., broadly defined money or domestic credit, for example); and  $m^d$  is the real quantity of this liquidity aggregate desired by the public (i.e., the real demand for domestic credit or money). This equation, as discussed above, combines open and closed economy factors as possible determinants of the domestic interest rate, and lets the data reveal what is the actual degree of economic (as opposed to legal) openness of the economy. (The economic degree of openness is in fact captured by the coefficient  $\theta$ .)

The first term in equation (3) captures the open economy factors affecting domestic interest rates. It states that there will be some forces in the economy that will cause interest rates to move slowly through time in the direction suggested by the uncovered interest parity. The speed and extent at which that movement will take place will depend on the parameter  $\theta$ . The second term of this equation refers to the closed economy factors affecting the interest rate, in the short run, in this small open economy. It states that, with other things given, an excess supply for real liquidity will exercise a downward pressure on the domestic interest rate. The most important property of equation (3) is that the extreme situations of fully open or completely closed economies are particular cases. If the economy under study is completely open, we would expect that  $\theta = 1$  and  $\lambda = 0$ . In that case equation (3) becomes an interest arbitrage condition. If, on the other hand, the economy is completely closed to foreign influences, it would

be expected that  $\theta = 0$  and  $\lambda \geq 0$ . Intermediate cases of semi-open (semi-closed) economy will have positive  $\theta$  and  $\lambda$ . Notice that according to equation (3), in the long run of the semi-open case there will be monetary equilibrium [ $\log m = \log m^d$ ], and the domestic nominal interest rate will depend on open economy factors only. However, because of the existence of a risk premium term  $P_t$ , even in the long run the domestic rate can (and usually will) differ from that world rate plus expected devaluation.

In order to empirically estimate (3) it is first necessary to specify the demand for real liquidity function  $m^d$ . Following the traditional convention it is assumed that this function has a semi-logarithmic form:

$$\log m_t^d = b_0 + b_1 \log y_t - b_2 i_t \quad (4)$$

where  $y$  is real income. Combining this demand for  $m$  equation with the interest rate equation (3) presented above, the following reduced form for interest rate determination in semi-open economies, can be obtained (where  $\epsilon_t$  is an error term with the usual properties):

$$i_t = \beta_0 + \beta_1 (iW_t + D_t + P_t) + \beta_2 i_{t-1} + \beta_3 \log m_{t-1} + \beta_4 \log y_t + \epsilon_t \quad (5)$$

The  $\beta$  coefficients in (5) are related to the structural parameters in the following way:

$$\beta_1 = \frac{\theta}{(1+\lambda b_2)}; \quad \beta_2 = \frac{(1-\theta)}{(1+\lambda b_2)}; \quad \beta_3 = \frac{-\lambda}{(1+\lambda b_2)}; \quad \beta_4 = \frac{\lambda b_1}{(1+\lambda b_2)}$$

Equation (5) refers to the determination of the market, freely determined nominal interest rate. In that regard, within the Korean framework,  $i$  has to be interpreted as the curb market interest rate. A problem with this equation, however, is that it does not incorporate in any way the fact that in Korea there is a segmented capital market where the official (controlled) and the unofficial markets coexist. In order to

capture this segmentation, and more specifically the possible effect of changes in the administratively determined term deposit rate, an additional term ( $\beta_5 \text{TDR}_t$ ) can be added to equation (5), where TDR stands for time deposits rate. Modified equation (5) -- which adds the official time deposits rate -- will then allow us to know how financial liberalization policies, as well as exogenous shocks, will affect the freely determined interest rate in Korea. The reduced form equation to be estimated is the following (where  $\mu$  is an error term with usual properties):

$$i_t = \beta_0 + \beta_1(iW_t + D_t + P_t) + \beta_2 i_{t-1} + \beta_3 \log m_{t-1} + \beta_4 \log y_t + \beta_5 \text{TDR}_t + \mu_t \quad (6)$$

where it is expected that  $\beta_1 > 0$ ,  $\beta_2 > 0$ ,  $\beta_3 < 0$ ,  $\beta_4 > 0$ . If the crowding out hypothesis is true, and increase in the officially determined rate reduces intermediation in the free segment, and we will find that  $\beta_5 > 0$ .

In the estimation of equation (6) some decisions have to be made in terms of the data actually used.  $i$  is the curb market rate as collected by the Bank of Korea.  $iW$  is the U.S. treasury bills rate. In some regressions, however, the LIBOR rate was used instead, with no effects on the results. The definition of  $D_t$ , the expected rate of devaluation, is particularly difficult. In this paper, and in order to simplify the discussion, the expected rate of devaluation was replaced with the actual rate of devaluation. This simplifying assumption, which is consistent with the perfect foresight variant of the rational expectations view, is not unreasonable for Korea in the recent period since, starting in early 1980 the won has been following a fairly slow moving rate of crawl.<sup>9</sup> With respect to the risk premium term it was assumed that it was equal to a constant plus a random term with the usual characteristics.  $y$  is real GDP

as computed by the Bank of Korea. Two alternative variables were used as proxies of real liquidity. The first was domestic credit (denoted by DC) and the second total debits of the banking sector (denoted by Db). The time series for both of these variables were obtained from the International Financial Statistics. In other regressions not reported here M2 was used. The results obtained supported those reported here.<sup>10</sup>

Table 2 contains the results obtained from the estimation of equation (6) for interest rate determination using ordinary least squares on quarterly data over 1978 through mid-1985. The results are quite satisfactory. First, all the coefficients have the expected signs. Second, with the exception of  $y$  in both regressions, all of them are significant at conventional levels. It is interesting to note that the estimated values (point estimates) of some of the coefficients are quite low, suggesting that on average the curb market interest rate may have reacted with some sluggishness to different types of shocks. Broadly speaking, the results in Table 2 indicate that the freely determined interest rate in Korea react both to closed and open economy factors. More specifically, freely determined (curb) interest rates respond to (a) changes in the expected rate of devaluation and in the world interest rate; (b) changes in the conditions of real liquidity in the economy; (c) and changes in the officially controlled time deposit rate. The estimates of the coefficient  $\beta$ 's in Table 2 suggest that with other things given, an increase in the officially administered time deposit rate of 1 percentage point will be reflected in an increase in the freely determined curb market rate of approximately .4 to .3 percentage points (300s to 400 basis points). Notice that the coefficients of TDR in equations (6.1) and (6.2) are significantly smaller than the estimate obtained in equation (2), indicating that ignoring other variables

TABLE 2  
Interest Rate Determination In Korea  
1978-1985 Quarterly Data  
(Ordinary Least Squares)

	<u>Eq. (6.1)</u>	<u>Eq. (6.2)</u>
Constant	0.474 (1.769)	0.441 (1.560)
$(iW_t + D_t)$	0.081 (1.977)	0.076 (1.710)
$i_{t-1}$	0.474 (3.013)	0.543 (3.423)
$\log DC_{t-1}$	-0.084 (-2.662)	-
$\log Db_{t-1}$	-	-0.049 (-2.112)
$\log y_t$	0.076 (0.276)	0.024 (0.858)
TDR	0.371 (1.974)	0.290 (1.800)
$R^2$	0.884	0.873
D.W.	1.83	1.50

Notes: The numbers in parentheses are t-statistics.



(as in (2)) can result in significant bias and misleading results.

From the empirical results in Table 2 it is possible to calculate the coefficients  $\theta$  and  $\lambda$  in equation (5). These coefficients provide information on how fast a particular disequilibrium is transmitted into domestic interest rates. For example from regression (6.1) it is obtained that  $\theta = .15$  and  $\lambda = .16$ . In terms of the influence of open economy factors, this means that an increase in the expected rate of devaluation, or of world rates of interest, of 10 percentage points will be translated into a higher curb market nominal rate of little less than one percentage point during the same quarter. However, after 6 quarters the curb rate would have increased by approximately 4 percentage points. In that regard, these results show that Korea is in fact a semi-open economy, where open economy factors have a greater influence on interest rates behavior than legal regulations would suggest.

#### V. Curb Financial Market, Official Segment, and Investment in Korea

In the preceding section it was empirically established that increases in the official rate have historically resulted in higher curb market rates. These results provide support for the hypothesis that higher official rates crowd out funds from the unorganized market. What still has to be investigated is what is the effect of this higher official interest rate on total investment, and growth. This can be analyzed by estimating an equation that incorporates the potential roles of both the curb and official capital markets on funds availability and investment. There are, of course, data problems. First, as already noted, there are no data on the volume of intermediation in the curb market. Second, there are no data on the virtual interest rates that clear the rationed official market. For this reason a

compromised investment function has to be estimated. In the present study the following equation was considered.

$$\begin{aligned} \text{INVR}_t = & \gamma_0 + \gamma_1 \text{INVR}_{t-1} + \gamma_2 \text{CURBR}_{t-1} \\ & + \gamma_3 \text{DLOAN}_{t-1} + \gamma_4 (y_{t-1} - y_{t-2}) + \phi_t \end{aligned} \quad (7)$$

where INVR is real aggregate investment, CURBR is the curb market real interest rate, DLOAN is the real flow of new loans in the formal sector in the economy and  $(y_{t-1} - y_{t-2})$  is an accelerator term, with  $y$  being real output. Under the hypothesis that both the official and curb markets affect investment, it is expected that the coefficient of CURBR would be significantly negative, indicating that a higher free interest rate discourages investment, while that of DLOANS would be significantly positive.

A problem with the estimation of equation (7) is that most of the righthand side variables are measured with error. In particular, there are no data for the real curb rate; moreover, constructing it would require having information on expected inflation. Along the perfect foresight versions of the rational expectations view, expected inflation was replaced by actual inflation. In order to take into account possible problems stemming from the error in measuring this variable, instrumental variables estimators were used. DLOAN was constructed using data on total real loans, with the raw data being taken from the IMF International Financial Statistics. Since in preliminary fits the residuals from (7) exhibited negative serial correlation, the estimation was performed using Fair's method for correcting instrumental variables estimates for first order autocorrelation. The estimation of (7) using annual data for 1969-83 yielded the following result; where the numbers in parentheses are t-statistics.<sup>11</sup>

$$\begin{aligned}
 \text{INVR}_t = & 22.927 + 0.752 \text{ INVR}(-1) + 0.490 [y(-1)-y(-2)] \\
 & (2.920) \quad (17.552) \quad (3.361) \\
 & - 0.848 \text{ CURBR}(-1) + 1.907 \text{ DLOAN} \quad \text{Rho} = -.68 \quad (8) \\
 & (-3.705) \quad (5.398)
 \end{aligned}$$

These results, then, provide statistical support to the hypothesis that real investment behavior has been influenced by developments in both the official and curb segments of the capital market. These estimates are in line with some previous findings. For example, van Wijnbergen (1984) used a similar specification to estimate a private sector investment function and also found that both loans and the curb real rate were important. Other studies, however, have been less successful in identifying the importance of both elements in the determination of investment. Cheong (1983), for example also estimated (for nonhousing private investment) a similar equation. His real liquidity terms was significantly positive as expected. On the other hand, his real curb market rate was negative as predicted by the theory, but not significant. Kwack (1985) did not incorporate the interest rate in his investment function. Although it is fair to say that the investment function for Korea is somewhat sensitive to changes in specification and methods of estimation, there is enough evidence to argue that higher curb real interest rates have discouraged investment in the past, whereas higher availability of funds in the official segment has encouraged investment.

Our story is as complete as it can be pushed, given the data availability. We have argued that higher official rates, raised through a financial liberalization for example, will crowd out funds from the unorganized market. This will be reflected in higher curb market rates. The higher official rates will also generate a higher level of official

intermediation. These two effects will unleash opposite forces on investment; the higher curb rates will discourage it, while the increase in official intermediation will boost it. However, it is not possible, without building a full fledged macromodel, to know with much precision which of these two effects will be more important. Nevertheless, given the current stage of development of the Korean economy, there are some presumptions that the positive effect will dominate, and that as a result of financial liberalization investment will increase. There are two basic reasons for this. First, as pointed out above, the importance of the unorganized market has been markedly reduced during the recent period. Second, at the present time the required levels of reserves in deposit money banks is quite low (5%); in fact, it is likely to be very near to the desired ratio of precautionary reserves in the unorganized market. If that is the case, the net disintermediation effect produced because funds move from one segment to the other is probably very small.

#### VI. Concluding Remarks

This paper has dealt with the possible effects of financial liberalization in Korea. The discussion has centered on the implications of financial reform that would raise (or set free) interest rates in the official financial sector. The analysis has emphasized the fact that in Korea there is capital market segmentation where an official segment, with controlled interest rates and administered credit allocation, coexists with an unofficial or curb sector where interest rates are freely determined. It was pointed out that under this type of institutional arrangement a financial reform is likely to crowd out funds that were previously intermediated by the curb market. Whether as a result of the reform total

intermediation will increase or decrease will depend on a number of variables, including reserve requirements in the official segment, optimal precautionary reserves in the curb market, and various elasticities.

An empirical model of interest rate determination in a small economy with capital controls was estimated. It was found that nominal curb market interest rates in Korea have basically responded to three forces: (a) the evolution of real liquidity in the economy; (b) open economy factors, such as world interest rates and expected devaluation; and (c) officially fixed interest rates in the organized segment. With respect to this last factor it was found that, with other things given, higher (lower) official rates have resulted in higher (lower) curb market rates. This positive effect provides support for the crowding out hypothesis.

An aggregate investment function was estimated in order to have an idea on how financial reform would affect capital accumulation and growth. Both the change in the total level of real domestic credit in the official market, and the curb real interest rate were included as independent variables. The results obtained show that both of these variables have influenced the behavior of aggregate real investment in Korea. Higher curb rates discourage investment, while faster growth of real credit in the official segment encourages investment. In principle, then, a financial reform that results in an increase in real official credit and in a higher curb rate, will have uncertain effects over investment. Nevertheless, it is argued in Section VI, that given the current degree of development of Korea's financial sector, it is more likely that the positive effects of a financial reform will dominate, with aggregate real investment increasing as a result of the reform. However, in order to have more precise results further analysis, and additional data not available currently will be required.

Footnotes

<sup>1</sup>On the recent evolution of Korea's financial sector see Park (1976, 1985), World Bank (1986), Cho (1985).

<sup>2</sup>There are some indications, however, that during the last few years the size of the unofficial or curb market has declined. For example, a survey performed by the Citizen National Bank indicates that between 1980 and 1984 households have steadily decreased the fraction of their savings channeled through the curb market from 70.2% of total savings to 39.2% (see World Bank 1986).

<sup>3</sup>According to this approach the initial conditions are characterized by artificially low nominal rates, which usually result in negative real interest rates. See Shaw (1973) and McKinnon (1973).

<sup>4</sup>See, for example, Buffie (1984), van Wijnbergen (1984a,b).

<sup>5</sup>See World Bank (1986).

<sup>6</sup>See Edwards (1986a).

<sup>7</sup>On Korea's legal capital controls see, for example, the International Monetary Fund's, Annual Report on Exchange Controls (1985).

<sup>8</sup>See Edwards and Khan (1985) for a related model and estimates for Colombia and Singapore. Edwards (1986b) estimated a somewhat similar model for Chile.

<sup>9</sup>For a discussion of the recent Korean exchange rate policy see World Bank (1986) and Edwards (1986a).

<sup>10</sup>These results are available from the author on request.

<sup>11</sup>Equation (7) had to be estimated using annual data, since there is no long quarterly time series on investment. The following instruments were used: exports, inflation, exchange rates and lagged values of all the variables in the estimation of (7).

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