FINANCIAL RESTRAINTS IN THE SOUTH KOREAN MIRACLE*

by

Panicos O. Demetriades§
University of Leicester

and

Kul B. Luintel
Brunel University

ABSTRACT

We provide novel empirical evidence on the effects of financial restraints on South Korean financial development. The evidence is linked to a simple model of the Korean banking system that encapsulates its cartelised nature, which predicts a positive association between financial development and (i) the degree of state control over the banking system, (ii) mild repression of lending rates. The model also predicts that in the presence of lending rate controls, increases in the level of the administered deposit rate are unlikely to influence financial deepening. We test the model empirically by constructing individual and summary measures of financial restraints. Our empirical findings are consistent with our theoretical predictions but contrast sharply with the predictions of earlier literature that postulates that interest rate ceilings and other financial restraints constitute sources of 'financial repression'.

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§ Corresponding author: Professor Panicos O. Demetriades, Department of Economics, University of Leicester, University Road, Leicester, LE1 7RH, UK. Tel: +44 116 252 2835. Fax: +44 116 252 2908. E-mail: pd28@le.ac.uk.

FINANCIAL RESTRAINTS IN THE SOUTH KOREAN 'MIRACLE'

1. Introduction

Investment rates that averaged 25% of GDP and average per capita growth rates exceeding 6.0 per cent per year during 1960–95 transformed South Korea from a relatively underdeveloped state into a highly industrialised economy with living standards comparable to those in many Western countries. While explanations of this 'miracle' abound (e.g. World Bank, 1993), the important question of what were the effects of pervasive government intervention in the financial system is still unanswered. Besides its significant relevance for policy makers in other developing countries, this question is also central to the academic debate concerning the benefits and costs of financial liberalisation (McKinnon, 1973; Shaw, 1973; Fry, 1995; Fry, 1997; Stiglitz, 1994; Stiglitz, 1998; Singh, 1997; Arestis and Demetriades, 1999).

In this paper we provide novel empirical evidence on the effects of financial restraints in South Korea, which sheds new light on the mechanism of financial deepening. This evidence is linked to a simple model of the Korean banking system that encapsulates its cartelised nature. The model predicts a positive association between financial development and (i) the degree of state control over the banking system, (ii) mild repression of lending rates. It also predicts that in the presence of lending rate controls, increases in the level of the administered deposit rate are unlikely to influence financial deepening. We test the model empirically by constructing individual and summary measures of financial restraints, utilising the methods advanced by Demetriades and Luintel (1996a, 1996b, 1997). Our empirical findings are consistent with our theoretical predictions but contrast sharply with the predictions of earlier literature that postulates that interest rate ceilings and other financial restraints constitute sources of 'financial repression', containing financial development and investment.

The paper is structured as follows. Section 2 provides a brief overview of relevant literature and explains why South Korea is an interesting case study. Section 3 puts forward a theoretical framework for analysing the effects of financial restraints on South Korean financial development. Section 4 presents the econometric model and discusses estimation issues. Section 5 explains the construction of the measures of financial restraints and outlines the data sources. Section 6 presents the main empirical results[1]. Finally, section 7 summarises and concludes.

[1] A full set of results is provided in the working paper version of this paper, Demetriades and Luintel (1996c).

2. Financial Restraints and Economic Growth: The South Korean Puzzle

Many developing countries during the 1960s and 1970s, including South Korea, adopted policies that restricted the freedom of financial intermediaries to determine interest rates and allocate loanable funds. The main intention of these policies was to secure low cost finance for industries that were deemed important for economic growth. Such interventionist policies were seen to constitute sources of 'financial repression' by a voluminous literature (McKinnon, 1973; Shaw, 1973; Fry, 1995). According to this literature, interest rate ceilings, high reserve requirements and directed credit programmes inhibit the development of the banking system and, as a result, reduce both the volume and productivity of investment (McKinnon, 1973; Shaw, 1973; Galbis, 1977; Kapur, 1976; Mathieson, 1980; Fry, 1978, 1995). This literature has been influential in shaping financial reforms in many LDCs, not least because the Bretton Woods institutions embraced its conclusions. Thus, a typical component of structural reforms encouraged by the IMF and the World Bank has been the 'liberalisation' of financial markets. To this end, interest rate restrictions were lifted, state banks privatised and government intervention in the allocation of loanable funds discouraged.

The financial repression literature encountered a great deal of criticism[2]. One line of criticism emphasises the importance of structural considerations such as unofficial credit markets (Taylor, 1983). These are capable of reversing the conclusions of McKinnon/Shaw: an interest rate increase in the official market may not raise investment if the increase in bank deposits crowds out curb market loans[3] (Van Wijnbergen, 1983). Another, more recent, line of criticism draws on the experience of several unsuccessful liberalisation episodes, particularly in Latin America (e.g. Diaz-Alejandro, 1985; Villanueva and Mirakhor, 1990). Emphasising the role of imperfect information in financial markets, these critics argue that high domestic interest rates, which usually follow financial liberalisation, increase adverse selection and moral hazard problems in credit markets (Stiglitz, 1994). Thus, interest rate restrictions may inadvertently have beneficial consequences on the stability and soundness of the banking system, reducing financial fragility and preventing crises (Stigtlitz, 1998). One mechanism through which this may occur is higher bank franchise values, which encourage prudent behaviour by banks (Caprio and Summers, 1996; Hellmann, Murdock and Stiglitz, 2000).

The South Korean experience with financial repression is particularly interesting and relevant for other LDCs not least because it coincided with a period of rapid economic development. In spite of paying lip service to the benefits of financial liberalisation since the mid-1960s, until very

[2] For a recent critical overview of the literature see Arestis and Demetriades (1997).
[3] Some evidence of this type of crowding out in the case of South Korea is presented by Edwards (1988).

recently the South Korean government intervened extensively in the pricing and allocation of credit. Specifically, it ensured that priority sectors, mainly export-oriented industry such as steel, electronics, ship-building, automobile manufacturing etc., received preferential treatment as far as access to inexpensive bank credit was concerned. Besides extensive directed credit programmes, the Korean Ministry of Finance imposed controls covering the entire structure of deposit and lending rates.

The South Korean attempts at financial reforms in the mid-sixties were aimed, according to World Bank (1989), at increasing the role of the market in the financial system. Many commentators, however, dispute that the reforms reduced the role of the state in the process of financial intermediation. Harris (1988), for example, points out that the steep rise in real interest rates which took place in the sixties was not the outcome of market forces but was engineered by the monetary authorities of South Korea with a view to tapping the funds placed in the curb market. The substantial influx of funds from the curb market to the banking system, which followed the rise in interest rates, enabled the state to increase its control over domestic saving. Some relaxations of government controls took place in the late seventies whilst the late eighties and early nineties saw a more determined move towards more liberalised conditions. However, even the reforms of the late eighties are not unambiguously interpreted as 'financial liberalisation'. Amsden and Euh (1993), for example, point out that whilst government intervention has been less visible, it remained discreetly present, albeit in a different form. It was not until the mid-nineties that Korea relaxed all interest rate controls and then proceeded to liberalise capital flows[4].

The complexity of the South Korean experience has meant that it has proved difficult to establish the effects of financial restraints on the process of economic growth. Did financial restraints contribute to the miracle, or could growth have been even faster without it? Park (1994), for example, argues that financial repression did not hinder growth but is unable to offer any corroborating evidence[5]. One important channel through which financial restraints may influence economic growth is financial development. By presenting new evidence on the effects of financial restraints on financial development, the rest of this paper makes an important step towards resolving this puzzle.

[4] It is now widely argued that the liberalisation of capital flows was one of the fundamental factors behind the Asian crisis (Demetriades and Fattouh, 1999).

[5] World Bank (1993) argues along similar lines:

> "...it is very difficult to establish statistical links between growth and a specific intervention and even more difficult to establish causality". (World Bank, 1993, p.6).

3. Theoretical Framework

3.1. The McKinnon Shaw Approach

In the McKinnon/Shaw literature the basis for the relationship between financial and economic development is Gurley and Shaw's (1955) debt-intermediation hypothesis. This hypothesis states that an increase in the money stock relative to the level of real economic activity increases the extent of financial intermediation, which, in turn, raises productive investment and per-capita income[6]. In this literature, nominal interest rate controls inhibit capital accumulation because they reduce the real rate of return on bank deposits, thereby discouraging financial saving. Furthermore, higher reserve requirements also exert a negative influence on financial intermediation by increasing the wedge between lending and deposit rates. Thus, higher real interest rates encourage capital accumulation and real economic activity, largely through an increase in the extent of financial intermediation[7]. Moreover, this literature also predicts that higher real interest rates have a positive effect on the average productivity of the aggregate capital stock by dissuading investors from investing in low return projects (Fry, 1995; World Bank, 1989).

3.2. The Monopoly Bank Model

In the McKinnon/Shaw framework banking institutions, which presumably intermediate between savers and investors, are implicitly assumed to operate under perfectly competitive conditions transforming deposits into loans at zero cost (McKinnon, 1981 or Fry 1978, 1980, 1995). We have argued elsewhere (Demetriades and Luintel, 1996a, 1996b) that perfectly competitive models of banking are inappropriate for examining the effects of financial policies. At the theoretical level, treating the banking system as perfectly competitive leaves little room for analysing the behaviour of banks and their reaction to government interventions. More importantly, this assumption is not realistic: in many LDCs the banking industry is dominated by a small number of banks and collusive behaviour is not uncommon (see Fry, 1995). Another important source of imperfectly competitive behaviour in banking is the presence of imperfect

[6] In contrast, in McKinnon's (1973) formal model financial institutions do not intermediate between savers and investors because money is of the 'outside' type i.e. loans to the government. In McKinnon's model all investment is self-financed and indivisible. In this context there is complementarity between money and capital, which arises because economic agents have to accumulate money balances before they can undertake lumpy investment projects.

[7] Extensions of McKinnon/Shaw are typically based on the debt-intermediation hypothesis. In the papers by Kapur (1976) and Mathieson (1980) liberalisation works through an increase in the supply of credit which raises investment which in turn raises output and growth. In Galbis (1977) higher real interest rates shift funds from the traditional low-productivity sector to the banking system which then channels them on to

information. Asymmetric information in loan markets is in fact sufficient to generate some degree of market power for lenders who would then be able to act as if they were monopolists in relation to the pool of potential borrowers that are attached to them through long-term bank-customer relations (Stiglitz, 1994).

Departure of the benchmark model from perfect competition has important implications for the way in which financial restraints affect financial development. Consider the case of a monopoly bank facing deposit rate controls. This could be thought of as either the only bank in the economy – a bank cartel – or, perhaps more realistically, as a representative bank which behaves as a monopolist in relation to the pool of its long-term borrowers, as suggested by Stiglitz (ibid.). Thus, the representative bank has perfect information about its own borrower base (and no information about the borrower base of other banks to whom it refuses to provide loans). Assume that the bank has access to a technology that allows it to influence the volume of deposits without having to change the deposit rate. This technology may include activities such as varying the number of bank branches and/or marketing and is assumed to exhibit diminishing returns. This assumption is not implausible: doubling the number of bank branches or marketing expenditure is unlikely to lead to a doubling of the volume of bank deposits. Essentially, what we are assuming here amounts to admitting the presence of some savings outside the banking system that could be attracted to the banking system not only through higher deposit rates but also through an improvement in the non-pecuniary attributes of bank deposits (such as increased convenience or lower shoe-leather costs).

Diagramatically, the deposit collection technology is summarised in Figure 1 by an upward sloping marginal cost schedule for collecting loanable funds. Figure 1 also depicts a downward sloping demand for bank loans along with the associated marginal revenue curve. The slope of the demand schedule for bank loans reflects the availability and convenience of substitutes to bank loans, such as curb market loans[8]. The mono-bank maximises profit by selecting lending rate i^m at which the volume of loans is L^m. Assume now that the authorities impose a lending rate ceiling at the level i_1. The marginal revenue curve now becomes flat up to point A where the ceiling rate meets the demand curve and drops off to meet the original marginal revenue curve at point B after which the two curves coincide. The profit maximising position is one in which L_1, the new volume of loans, is higher than without the ceiling. Thus, the imposition of the lending rate ceiling by the authorities raises the volume of bank loans (and deposits). Note,

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the modern sector which is more productive. Thus, the effects of financial deepening on the real economy work through the average efficiency of investment.

[8] The curb loan rate is assumed constant throughout this analysis.

importantly, that the lending rate ceiling does not lead to credit rationing, in contrast to the McKinnon/Shaw case. This result holds true as long as the lending rate ceiling remains above the competitive level i^c. Ceilings below i^c result in some credit rationing because it is no longer possible for the bank to satisfy the demand for credit without the marginal cost of funds exceeding the marginal revenue. Note, however, that unless the ceiling is placed below the marginal cost of funds at L^m, the volume of bank credit remains above the monopoly level. For example, a lending rate ceiling at i_2 results in a lower level of financial intermediation. Thus, mild repression of loan rates increases the volumes of loans and deposits while severe repression will actually reduce them.

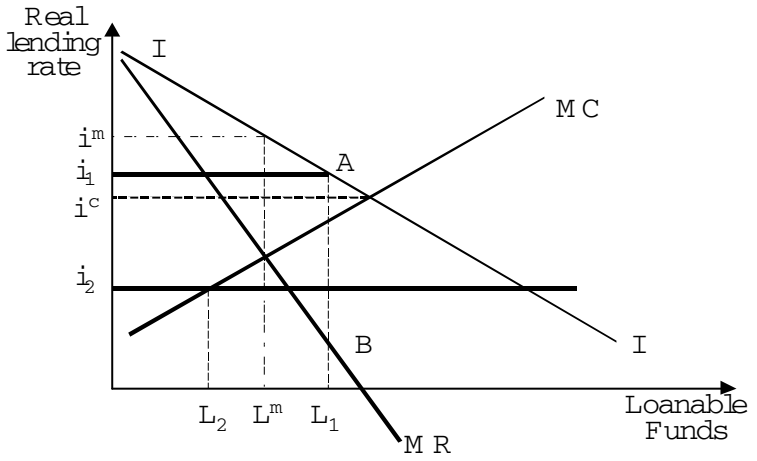

Figure 1
The Mono-Bank Model: Lending Rate Ceiling

In the above simple model, although the deposit rate is fixed, the volume of deposits varies as a result of changes in other determinants of the supply of deposits to the bank i.e. number of branches and marketing activity. Nevertheless, allowing the deposit rate to vary does not alter the qualitative nature of the effects of a lending rate ceiling on financial deepening. This can be achieved by introducing the deposit rate in the deposit collection technology. We show in the Appendix that with flexible deposit rates the mono-bank will minimise the cost of collecting any given level of deposits by choosing the optimal mix between deposit-rate and marketing activity. At the margin, the cost of collecting an additional dollar of deposits by raising the interest rate should equal the cost of raising the extra dollar through additional marketing expenditure. Once again, the mono-bank will respond to lending rate ceilings by raising the volume of both loans and deposits. The latter will now come from a combination of a rise in the deposit rate and more intensive marketing activity.

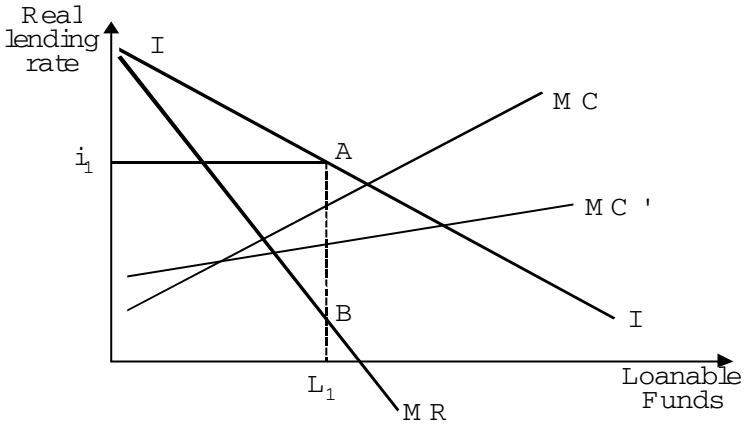

Figure 2
The Mono-Bank Model: An increase in the deposit rate

Thus, the bank will engineer both a shift in the supply of deposits as well as a movement along the curve.

The same framework allows us also to examine the sensitivity of financial deepening to changes in the level of the administered deposit rate when a lending rate ceiling is also present. Such centrally determined changes were quite frequent in South Korea. In many cases increases in deposit rates were interpreted as aiming to increase the role of the market in the financial system[9]. In the Appendix we show that an increase in the administered deposit rate leads to an increase in the intercept and a decrease in the slope of the marginal cost schedule. The marginal cost of raising an extra dollar of deposits at the original equilibrium level of loans is, therefore, likely to decline[10]. However, whether there is any increase in lending very much depends on whether the demand for loans was rationed to start with. If it was not rationed, as is the case in Figure 2, the shift in the marginal cost schedule has no effect on the volume of loans and deposits because of the discontinuity in the marginal revenue schedule (depicted by the segment AB). This situation is capable of explaining why, under conditions of regulated lending rates, financial deepening is not sensitive to changes in the deposit rate – a common empirical finding in financial deepening equations for developing countries (Arestis and Demetriades, 1997).

3.3. The South Korean Model

The mono-bank model, in spite of its simplicity, contains elements that accord well with the South Korean experience. Importantly, the presence of a bank cartel that stepped in to fix interest rates whenever the authorities relaxed their control over lending or deposit rates is well

[9] See Harris (1988) and World Bank (1989).

[10] It may help the reader to think of the analogy with fixed factors of production in the short-run; a rise in the volume of the fixed factor is likely to allow a more efficient input mix so that marginal cost declines.

documented[11]. The model is particularly relevant under the assumption of fixed deposit rates, as these remained under the formal control of the state until the late eighties and informally so until recently. As a result, the mono-bank model, under the assumptions of administered deposit rates and varying degrees of state control, can provide the basis for fruitful analysis. The latter has implications for the extent to which the bank cartel could aim for profit maximisation. Even though the cartel stepped in to fix interest rates whenever the government relaxed interest rate controls, it was rarely, if ever, totally free to aim for maximum monopoly profit. According to Park and Kim (1994), "...during the most repressive period... the commercial banks were little more than government agencies delegated the tasks of mobilizing savings and allocating them according to directives and guidelines issued by the government" (p.215).

A brief historical overview of the South Korean banking system reveals that it was brought under tight government control in the early 1960's through the nationalisation of all commercial banks. At the same time the Bank of Korea, which until then enjoyed independence from the state, was subjugated to the Ministry of Finance (Park and Kim, 1994). The control of the state over commercial banking continued unabated, extending to the creation of specialised banks and other banking institutions, until the early eighties when the government began to divest its holdings in commercial banks. Since 1982, commercial banks have, in theory, been allowed to operate as privately owned institutions and have been subject to less government control. However, even after privatisation and the relaxation of formal controls, the state has been able to exert considerable informal control over interest rates and credit allocation (Amsden and Euh, 1993; Park and Kim, 1994; Dalla and Khatkhate, 1994)[12]. Gradually, though, the commercial banks began to enjoy more freedom over both interest rates and credit allocation as a result of continued efforts towards financial liberalisation which began during the late eighties and culminated in the 1993 liberalisation programme.

The privatisation of the banking system in the early eighties, followed by the gradual relaxation of government control over interest rates, clearly increased the scope of the bank cartel to aim for maximum monopoly profit, restricting output and raising interest rate spreads. The evidence on interest rate spreads is in fact supportive of this conjecture, showing a gradual increase in these spreads during the eighties and early nineties (Park and Kim, 1994). In this context it is,

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[11] For example, following the partial deregulation of lending rates in 1979 the Korean Bankers Association met to fix interest rates (Bank of Korea Annual Report 1979, p.18). See also Park and Kim (1994).

[12] Similar views are also expressed by Park (1994) who points out that whilst interest rates are now set by the bank cartel, the monetary authorities maintain an attitude of 'benign neglect' only as long as they think that these rates are reasonable – otherwise they have the leverage to change them.

therefore, reasonable to postulate that the degree of state control over the banking system was inversely related to the ability of the banking system to operate as a profit maximising cartel. Thus, one would expect to observe a positive association between the degree of state control over the banking system and the level of financial development.

This situation is illustrated in Figure 3 where point A represents the equilibrium position of the banking system under a volume maximising objective (subject to a no loss constraint). Point B, on the other hand, represents the equilibrium position that would be chosen by a bank cartel if it were free to maximise profit. Intermediate points could be thought of as representing intermediate degrees of state control over the banking system.

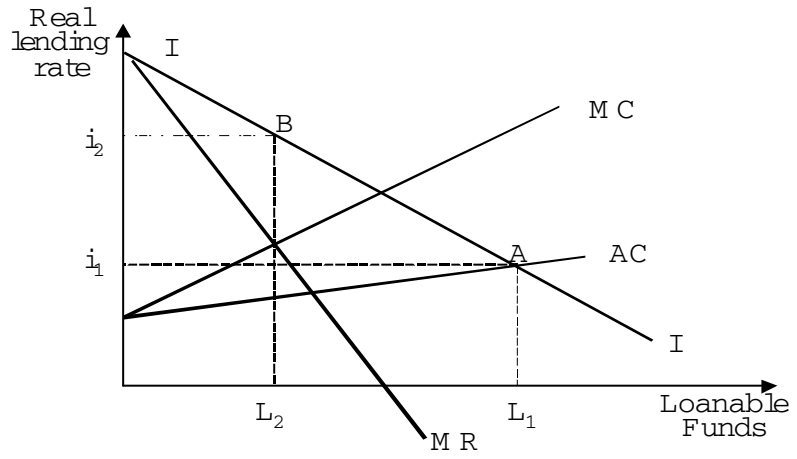

Figure 3
The Mono-Bank Model: Volume Maximising v. Profit Maximising

4. Model Specification and Econometric Issues

Our econometric model is closely linked to the model of the Korean banking sector outlined in the previous section. We first specify a financial depth equation that allows us to shed new light on the effects of financial restraints on the financial development of South Korea. We then discuss estimation issues.

Financial development

One simple prediction of our analysis is that the imposition of a lending rate ceiling at an appropriate level will have a positive effect on financial development. Our analysis also suggests that in the presence of deposit rate controls – these were in place in Korea until 1988 – banks may still be able to influence the volume of bank deposits through marketing, branching and related activities. A related prediction is that even in the presence of both lending and deposit

rate controls, the volume of bank loans (and deposits) may still vary according to the degree of state control over the banking system. Specifically, under mild repression of lending rates, the main prediction of our analysis is that financial restraints will have a positive impact on the volume of bank loans. To test this prediction, we include a summary measure of financial restraints in the financial development equation. Alongside, we also include the real deposit rate and the level of real income that are normally expected to influence the supply of bank deposits to the banking system. We expect the latter to have a positive effect on financial deepening, capturing the demand-side relationship between financial development and economic activity[13]. Under free market conditions, the former is also, normally, expected to influence financial depth positively. However, in the presence of deposit rate restrictions, variation in the (administered) real rate of interest is unlikely to be a significant determinant of financial depth for two reasons. Firstly, the restrictions on the nominal deposit rate make it impossible for banks to use it as an instrument for active liability management. Instead, as we have argued, banks are likely to use other methods to influence the volume of deposits. Second, as we have shown in section 3, in the presence of a lending rate ceiling variations in the administered deposit rate are unlikely to increase the demand for loanable funds by the banking system. Thus, the link between the (administered) deposit rate and the volume of deposits raised by the banking system is weakened by the presence of a lending rate ceiling. Formal controls on lending rates persisted until 1978 in South Korea while less formal ones continued until the mid-nineties.

Under the above assumptions the equation for financial development can be expressed as:

$$L_t = \mu + \theta_1 y_t + \theta_2 r_t + \theta_3 FR_t + e_t \qquad (1)$$

where L is an indicator of financial depth, y the logarithm of per capita real output, r is the real deposit rate of interest and FR is an indicator of financial restraints, which stands for the presence of a lending rate ceiling or a summary measure of financial restraints. Note that this model nests the McKinnon/Shaw hypothesis as a special case in which θ_2 is positive and θ_3 is zero given that in this framework financial restraints would affect financial deepening only through its influence on the real interest rate.

Given that the above specification is based on a number of assumptions, including the presence of mild repression of interest rates, it is important to check for mis-specification and structural breaks. Specifically, we check for non-linear effects that would indicate the presence of severe financial repression, by entering the square of the financial restraints index in the equation. According to our model, the level term should enter positively while the square term may enter

[13] This is a standard empirical finding. See, for example, Demetriades and Hussein (1996).

with a negative sign under severe repression of lending rates. The checks for non-linearity are followed by three sets of tests for structural breaks, which are linked to three different liberalisation episodes: i) the elimination of formal lending rate controls in 1979 ii) the liberalisation of the mid-eighties iii) the relaxation of formal deposit rate controls in 1988. According to our model, the relationship between financial deepening and the real interest rate should be strengthened when interest rates become market-determined. However, it must be borne in mind that even after the relaxation of formal controls on interest rates, the Korean authorities maintained informal controls, that were facilitated by the continued presence of state control over the banking system (Amsden and Euh, 1993).

5. Measurement and Data Sources

Financial Restraints

We construct measures of financial restraints by utilising information from annual reports of the Bank of Korea pertaining to interest rate controls and reserve requirements. We record two types of interest rate controls: a ceiling on the deposit rate (DRC) and a ceiling on the lending rate (LRC). These controls are measured by dummy variables that take the value 1 if a control is present and 0 otherwise. Data on the required reserve ratios on time deposits (RRTD) and demand deposits (RRDD) are also collected.

Although it is tempting to use all the controls in equations of financial depth in order to estimate their individual effects, the high correlation among these controls may render parameter estimates imprecise. On the other hand, using them individually may result in omitted variables since the authorities simultaneously impose all or most of these controls. Thus, we construct summary measures of financial restraints either utilising (a) the method of principal components and (b) simple arithmetic averaging after standardisation (see Demetriades and Luintel 1996a, 1996b, 1997).

All four positively correlated policy measures are standardised to mean zero and standard deviation of unity and then used to compute (a) principal components (b) a simple arithmetic average. The latter in itself constitutes a summary measure of financial restraints (FR2). The principal components analysis results in four principal components, the first of which accounts for only 67% of the variation of the four policy variables. We therefore compute a summary measure (FR1) which is the weighted average of all four principal components. The weights correspond to the proportion of variance explained, i.e. the first principal component is given a

weight of 67%. The correlations between each of the two summary measures and the underlying financial restraints are very strong, ranging from 0.6 to 0.94.

Financial Depth

We utilise two indicators of financial depth. The first one is the ratio of commercial bank deposits to nominal GDP. This is a fairly standard measure of financial depth. We also construct a second, broader, indicator of financial depth which, in addition to bank deposits also includes the deposit liabilities of other financial institutions, postal savings banks and development banks. The data required to construct these indicators were obtained from International Financial Statistics (IFS, various issues) published by the International Monetary Fund[14].

Other Data

The time series on CPI, nominal GDP, real GDP and population were also obtained from the same source[15]. The six-month deposit and general lending rates are obtained from Bank of Korea Annual Report (various issues). The real rate of interest is measured on an ex-ante basis, by subtracting the lagged rate of inflation from the current deposit rate on 6 month-deposits. The per capita series for real GDP is calculated by dividing the corresponding aggregate series by population.

6. Empirical Results

Equation 1 is estimated utilising both measures of financial development; L_1 and L_2 denote the narrow and broad measure of financial depth, respectively. In terms of explanatory variables, in addition to those in equation (1), which represent the long-run determinants of financial depth, we also include a lagged dependent variable to capture dynamics (and prevent dynamic mis-specification). As far as estimation method is concerned, because of the likely endogeneity of real GDP per capita, we use Instrumental Variables[16]. The instruments chosen for this variable are the logarithm of real exports per capita (x) and the change in the logarithm of the capital stock per capita (k).

[14] Bank deposits are defined as the sum of lines 24 and 25. The broad measure is the difference between total liquid liabilities (line 55l) and currency in circulation (line 24a).

[15] CPI: Line 64; nominal GDP: line 99b; real GDP: line 99bp; population: line 99z.

[16] We have also checked for the possible endogeneity of the real deposit rate using the Hausman test. The null of non-simultaneity could not be rejected. This is not surprising given that the real deposit rate was controlled by the authorities.

Three sets of results for each measure of financial development are reported in Table 1. Model A uses the weighted principal component index (FR1). Our model predicts that a mild lending rate ceiling increases the supply of credit. Model B tests this prediction by entering the lending rate ceiling (LRC) as the only financial restraint in the financial development equation. Finally, in model C we estimate the effects of the second summary measure of financial restraints (FR2).

Examining firstly the results using the principal components measure of financial restraints (FR1), it can be observed that the empirical performance of Model A is highly satisfactory in that all the variables enter with the expected signs and, with the exception of the real interest rate, are statistically significant. Moreover, the estimated coefficients have plausible values, the estimated model explains more than 95% of the variation in the dependent variable, passes Sargan's test of the validity of the instruments and there is no evidence of serial correlation. Importantly, the financial restraints index enters with a positive sign and is significant while the real interest rate is not significant; both these findings are consistent with our theoretical predictions.

The estimated coefficients reveal a much more powerful influence of the financial restraints index on financial depth compared to the real interest rate. Calculated at the mean of the dependent variable, the maximum effect of the financial restraints index[17] is 0.13 or 66.5%. To achieve the same result through the interest rate an increase of over 42 percentage points is required (even setting aside the issue of statistical insignificance). Solving the model for the long run reinforces the above conclusions since the long-run coefficients are about three times as large as the short-run ones. Thus, the long-run income elasticity of financial development is 1.42, suggesting that financial depth is a luxury good, while the long-run interest rate semi-elasticity amounts 0.01, which is in line with other studies. Finally, the estimated long-run coefficient of the financial restraints index is 0.53.

Examining the results for the case where the dependent variable is the broad measure of financial depth, we observe some changes in the magnitudes of the estimated coefficients but the qualitative nature of the results remains unaltered. Importantly, while the measure of financial restraints continues to have large positive and significant effects, the effect of the real interest rate remains small and insignificant. Thus, we conclude that the results utilising

[17] This is obtained by finding the difference between the maximum and minimum values of the index and multiplying it by the estimated coefficient of 0.15.

Table 1
Financial Development Models
Sample period: 1956–1994 (39 observations)
Instrumental Variable estimation (Instruments for y_t: x_t, Dk_t)

	Model A		Model B		Model C	
Regressors	Dependent Variable L_1	Dependent Variable L_2	Dependent Variable L_1	Dependent Variable L_2	Dependent Variable L_1	Dependent Variable L_2
Intercept	–5.9914*	–6.8567**	–7.8567*	–7.5192**	–5.2720*	–6.4634**
	(2.5325)	(2.4204)	(3.2460)	(2.981)	(2.234)	(2.333)
$L_{i,t-1}$	0.7177**	0.7166**	0.7116**	0.6585**	0.7308**	0.6861**
	(0.0967)	(0.106)	(0.1119)	(0.1239)	(0.092)	(0.101)
Y_t	0.3995*	0.4617**	0.5130*	0.4951**	0.3496*	0.4345**
	(0.171)	(0.176)	(0.2144)	(0.1969)	(0.150)	(0.157)
r_t	0.0032	0.0023	0.0024	0.0021	0.0030	0.0021
	(0.002)	(0.002)	(0.0027)	(0.0023)	(0.002)	(0.002)
$FR1_t$	0.1508*	0.1358*	—	—	—	—
	(0.064)	(0.060)				
LRC	—	—	0.4955*	0.2953	—	—
			(0.2161)	(0.1523)		
$FR2_t$	—	—	—	—	0.0439*	0.0426*
					(0.0186)	(0.017)
Adjusted R^2	0.9573	0.9599	0.9451	0.9575	0.9575	0.9607
AR(1)	1.5720	2.7135	—	—	1.5846	2.5008
Sargan's test	0.6585	2.1973	—	—	0.5513	1.6792
Stability tests						
1989–94:						
Wald: χ^2(6)	0.8530	0.6783	1.9117	1.0561	1.3779	0.6841
Chow: F(6,28)	0.2564	0.2203	0.3758	0.0333	0.3023	0.1807
1986–94:						
Wald: χ^2(5)	1.8478	0.7323	2.5947	0.5964	2.1221	0.5844
Chow: F(5,29)	0.3695	0.1464	0.5189	0.1193	0.4244	0.1169
1980–94:						
Wald: χ^2(5)	7.9502	5.9895	8.8738	6.5339	8.2234	6.3604
Chow: F(5,29)	1.5900	1.1979	1.7747	1.3068	1.6447	1.2721

Notes:

1. Variable definitions: L_1 and L_2 are narrow and broad measures of financial depth respectively. $FR1_t$ is weighted principal component index of financial restraints; $FR2_t$: equally weighted index of financial restraints; LRC: interest rate ceiling; x: the logarithm of real exports per capita.
2. Diagnostics: AR(1) is a Lagrange Multiplier test for first-order serial correlation distributed as chi-square (1). Sargan's test is a test of the validity of the instruments distributed as chi-square (1). The first stability test is a Wald test for a structural break. The second stability test is Chow's test for the stability of regression coefficients.
3. Figures in parentheses are standard errors. One and two asterisks denote significance at 5% and 1% levels respectively.
4. AR(1) and Sargan's tests are not applicable to Model B, the estimates of which are obtained after correcting for first-order moving average errors. The Durbin-Watson test of the reported estimates suggests no serial correlation.

the principal components measure of financial restraints are consistent with our theoretical predictions and are not sensitive to the measurement of financial depth[18].

To check robustness, we put Model A through a series of structural stability tests. Specifically, we examine the stability of the model following i) the relaxation of formal deposit rate controls in the post-1988 period ii) the liberalisation of the mid-eighties iii) the relaxation of formal lending rate controls in the post 1979 period. In view of the IV estimator followed, we calculate the Wald statistic versions of the Chow tests. Under the null of structural stability the Wald test for the first period is $\chi^2(6)$ distributed; for the second period it is $\chi^2(8)$ and for the third period it is $\chi^2(15)$ distributed. The empirical P-values resumed by the Wald tests under the null are 0.992, 0.822 and 0.995 respectively for the post-1988, mid-eighties and post-1979 periods for the narrow measure of financial depth; they are respectively 0.996, 0.972 and 0.998 for the broad measure of financial depth. Thus, Wald tests cannot reject the null of no structural break for both models. We conclude, therefore, that there is no evidence of structural instability in the financial deepening equation.

Model B provides a simple test of the mono-bank model. The estimates suggest that the lending rate ceiling has a positive and significant coefficient whereas the real deposit-rate is insignificant. Both these findings are consistent with the predictions of the mono-bank model presented in Section 3. These findings are insensitive to which of the two measures of financial depth that is employed. Furthermore, the estimated equation passes the same structural stability tests as Model A. Model C repeats the estimation utilising the second summary measure of financial restraints. While there are naturally some small changes in the estimated coefficients compared to those obtained for Model A, the qualitative nature of the results is unaltered. The summary measure of financial restraints enters with a positive and significant coefficient while the real deposit rate remains statistically insignificant. Model C passes the same diagnostic and structural stability tests as Model A. Finally, we also checked for non-linear effects of the financial restraints index and the real interest rate (separately and jointly) in all three models to examine the possibility of differences in the effects of 'mild' and 'severe' financial repression[19]. We have found these non-linear terms to be highly insignificant. To conclude, these additional tests of robustness lend further support to the view that in South Korea the suppression of lending rates was mild, boosting financial development by reducing the ability of the bank cartel to act as a profit maximising monopolist.

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[18] In an earlier version of this paper we also used the first principal component of financial restraints, without any qualitative changes in the results.

7. Concluding Comments

The traditional approach of analysing financial restraints implicitly treats the banking system as a perfectly competitive industry that passively transforms deposits into loans at zero cost. As a result, empirical tests of the financial liberalisation hypothesis have tended to focus on the marginal effects of financial policies through changes in real interest rates and have ignored their potentially large effects through banks' non-competitive responses to relaxations of financial restraints. In this paper we presented evidence from South Korea which robustly shows that the direct effects of financial restraints on financial development were not only positive but also quite large while the effects of changes in the real interest rate were insignificant[20]. Thus, the basic conclusion of an entire literature may well be reversed if these direct policy effects are taken into account.

Finally, a word of caution is in order. Even though our results robustly show that in South Korea government intervention in the financial system had positive effects on financial deepening during the estimation period, this need not hold true in other countries or in other periods. The success of interventionist policies, such as those followed by the South Korean authorities, clearly hinges upon institutional factors, such as the strength of the civil service and other government institutions. Furthermore, as has been clearly shown in the theoretical analysis, repressing interest rates to levels below those that would have been obtained under competitive conditions is likely to backfire, impacting negatively on financial deepening. Our cautionary attitude is, in fact, supported by our previous work on India which demonstrates that severe financial repression had significant negative effects on both financial deepening and economic growth (Demetriades and Luintel, 1997). If any generalisation is at all possible from these contrasting findings, it must be that market failure does not guarantee government success.

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[19] These results are not reported here but are available from the authors on request.

[20] The robustness of our results extends to estimation methods. The precursor of the present paper (Demetriades and Luintel, 1996c) finds qualitatively similar results using cointegration techniques.

Appendix

Consider a bank that wishes to minimise the cost, C, of raising deposits D which consists of interest costs and other expenditure. The latter could include staff costs, the costs of running a branch network, marketing expenditure etc; for simplicity we refer to the activities that give rise to all these other costs as 'marketing'. The volume of deposits that can be raised is assumed to be increasing in the rate of interest, r, and marketing expenditure. Formally,

$$D = D(r,h)$$

where h represents marketing expenditure per pound of deposits. We assume that $D_r > 0$, $D_h > 0$, $D_{rr} < 0$ and $D_{hh} < 0$.

Thus, the bank minimises

$$C(D) = rD + hD$$

subject to $D = \bar{D}$. This is a standard optimization problem the first order conditions of which results in $D_r / D_h = 1$, which suggests that at the margin the benefit of an additional cent of marketing expenditure per dollar of deposits must equal the benefit of an additional cent of interest per dollar of deposits. To proceed further we now assume that the deposits function is Cobb-Douglas. Specifically we assume that

$$D = Ar^{a}h^{b}$$

where α and β are parameters between 0 and 1. In reality we expect that the function would be more sensitive to changes in r than to changes in h so that α is greater than β.

The first-order conditions for cost minimization now imply that:

$$\frac{r}{h} = \frac{a}{b}$$

which lead to the following optimal levels of r and h given D:

$$r = A^{-\frac{1}{a+b}}\left[\frac{a}{b}\right]^{\frac{b}{a+b}} D^{\frac{1}{a+b}}$$

The optimal cost function is, therefore, given by:

$$C^{*}(D) = \tilde{A}D^{1+\frac{1}{a+b}}$$

$$\text{where } \tilde{A} = \frac{a+b}{a}A^{-\frac{1}{a+b}}\left[\frac{a}{b}\right]^{\frac{b}{a+b}}.$$

The marginal cost of raising deposits is, therefore, given by:

$$C'(D) = \tilde{A}\{1+\frac{1}{a+b}\}D^{\frac{1}{a+b}}$$

which is positive and increasing in D. If $\alpha+\beta$ is equal to unity then the marginal cost function is linear, suggesting the presence of constant returns to the two inputs, while if it is less (greater) than unity it is convex (concave) corresponding to the case of decreasing (increasing) returns.

Consider now the case where the authorities fix the deposit rate at some level $r = \bar{r}$. Then the problem of the bank is trivial: it chooses the level of h that achieves the required level of deposits. Formally, h is given by:

$$h = A^{-\frac{1}{b}} \bar{r}^{-\frac{a}{b}} D^{\frac{1}{b}}$$

and the constrained cost function, $C(D, \bar{r})$, is given by:

$$C(D, \bar{r}) = \bar{r}D + A^{-\frac{1}{b}} \bar{r}^{-\frac{a}{b}} D^{1+\frac{1}{b}}$$

which results in the following marginal cost function:

$$C'(D, \bar{r}) = \bar{r} + [1 + \frac{1}{b}]A^{-\frac{1}{b}} \bar{r}^{-\frac{a}{b}} D^{\frac{1}{b}}.$$

This is clearly increasing and, given that β is less than unity, convex in D. To show the effect of an increase in the administered deposit rate we now differentiate this function with respect to $\bar{r}$ which yields:

$$\frac{dC'(D, \bar{r})}{d\bar{r}} = 1 - \frac{a}{b}[1 + \frac{1}{b}]A^{-\frac{1}{b}} \bar{r}^{-(1+\frac{a}{b})} D^{\frac{1}{b}}$$

For small values of D this expression is clearly positive. However, for sufficiently large D it turns negative. As a result, an increase in the administered deposit rate will tilt the marginal cost function, increasing its intercept but reducing its slope. Intuitively, the increased deposit rate has two opposing effects: it makes the interest cost of funds higher but it also reduces the non-interest cost by allowing a better mix of interest rate and marketing activities. At large values of D, the marginal cost of funds will decline because marketing is subject to diminishing returns and the relaxation of the interest rate constraint allows the bank to reduce marketing expenditure.

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