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Credit Allocation and Investment Decisions: The Case of the
Manufacturing Sector in Korea

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The widespread use of equilibrium models to analyze the effects of credit availability on the expenditure decisions of economic agents has focused attention on interest rate movements as the mechanism through which these effects are transmitted from the financial to the real sector of the economy. Meanwhile, most of the empirical literature on selective credit controls has emphasized the direct effect of credit availability as measured by credit aggregates and has ignored possible indirect effects through interest rate movements. The present study takes a middle course. It analyzes the effectiveness of selective credit controls using a methodology which takes into account both types of effect on expenditure decisions. This methodology is particularly appropriate to the case of Korea because the Korean financial system has remained on the whole highly controlled despite some efforts to liberalize the financial sector since the mid-sixties. Even in periods of relatively high interest rates, a major portion of the credit extended in the Korean economy was provided at lower, subsidized rates. Under these conditions, there is plenty of room for disagreement on whether interest rates or direct credit availability played the dominant role in the transmission of the effects of credit allocation measures to the real sector.

Korea has a long history of using selective credit controls to influence the allocation of resources in the economy. In its 1967 Annual Report (page 18), for example, the Bank of Korea stated that "... the monetary and credit policies during the year were concentrated on not only squeezing the excessive purchasing power through elastic liquidity control measures but also giving selective financial support to some high-priority sectors such as small and medium industries and foreign

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exchange earning industries." The present paper provides some empirical evidence on the effectiveness of such policies in the case of the manufacturing sector in Korea. More specifically, it investigates the overall impact of selective credit policies aimed at raising the supply of credit to small-scale industries by estimating their effect on the level of investment and on changes in inventories and working capital, both for small and for large enterprises.

Section I describes the credit policies adopted by the Korean authorities to stimulate the expansion of small enterprises. Section II discusses some conceptual issues which are important for the design of the empirical tests. Section III explains the methodology used to assess the effectiveness of credit allocation policies during the seventies. Section IV presents the empirical results, and Section V summarizes our conclusions.

I. Credit Incentives for Expansion of the Small and Medium-Sized Enterprises in Korea

The system of selective credit controls in Korea is a complex one. While the methodology used in this study can be applied to the analysis of an array of selective credit controls, this paper concentrates on credit incentives for the expansion of small and medium-sized enterprises. The main reason for this choice was one of statistical convenience: Korean financial analysis data provides separate information for small and large enterprises. An additional consideration was the fact that credit incentives to small enterprises have been in force without major changes for much longer than most other types of selective credit control measures. As early as 1961 a special bank was established to provide finance to small and medium enterprises. Since 1965, the commercial banks have been urged to provide 30 per cent of their total loans to small and medium enterprises. To assist in the implementation of this objective, a Committee for Financial Support to Small and Medium Industries was set up in 1967, special support funds were provided several times during the following years, and interest rate subsidies were introduced in connection with loans from these special funds. In 1972, a credit guarantee fund for small and medium industries was established at the Small and Medium Industries Bank.

In March 1976, the Monetary Board changed the regulations on the handling of funds by the banking institutions to strengthen financial support for small and medium enterprises, and stipulated that commercial banks should lend over 30 per cent of the annual increase in their total lending to these firms. In contrast to the measures of the pre-1976 period, these procedures, incorporated into the "Guidelines for Loans to Small and Medium Industries," were mandatory. On December 1976, these guidelines were further revised to make local banks lend more than 40 per cent of their additional lending to small and medium industries.

Finally, in October 1980 the Monetary Board raised the ratio again so as to provide "... more banking funds to these enterprises for which it is relatively more difficult to gain access to bank loans compared to their contribution to the national economy" (Bank of Korea, Annual Report: 1980, p. 29). The minimum ratio was increased from 30 to 35 per cent for nationwide banks and from 40 to 55 per cent for local banks.

Although the degree of market orientation in monetary policy varied in Korea during the period of our study (1970-81), some form of selective credit policy was in use throughout this period to provide incentives to small and medium enterprises. The precise objective of such policies was never spelled out in detail. Their introduction seems to have been founded on the belief that the amount of finance available to these enterprises was excessively small in relation to their contribution to the Korean economy. In this paper, it is assumed that the main objective of these selective credit policies was to expand the contribution of this sector to the economy by increasing its productive capacity. Consequently, our main emphasis is on the effect of credit allocation policies on the investment activity of small and medium industries, although their effect on working capital and inventories is also examined in detail.

Many of the features of the selective credit policies described above were dismantled in 1982. For instance, subsidized interest rates for priority sectors were eliminated in mid-1982. In addition the objective of financial sector reform underway in Korea is to replace resource allocation based on credit control by use of market signals. The analysis of the present paper therefore covers the period 1970-1981.

II. Conceptual Framework

Two basic approaches have been used in the applied literature to test the effectiveness of selective credit controls: one approach takes interest rates as the basic transmission mechanism through which the impact of selective credit controls is reflected in the changes in expenditure decisions; the second approach and by far the more widely used relies directly on the quantity of credit as the link between selective credit controls and expenditures. ^{1/} The first approach seems to be more appropriate to conditions in relatively free and highly developed financial markets where interest rates are allowed to adjust freely to prevailing market conditions. The second approach is more relevant in tightly regulated financial markets where interest rate ceilings and controls substantially limit equilibrating interest rate movements and where nonprice rationing plays a major role. The problem is that few developing countries fit neatly into either category. Periods when

^{1/} For a more detailed explanation of the credit availability approach, see Vaez-Zadeh and Leite (1983).

interest rates adjust freely to supply and demand conditions alternate frequently with periods when this freedom is substantially curtailed or completely eliminated. Korea is no exception to this rule. On the one hand, interest rates have often been controlled. On the other, unorganized financial markets play an important role in financial intermediation in Korea and, by their very nature, interest rates in those markets cannot be controlled. Thus, it is difficult to decide a priori which of the two alternative models best describes actual developments in Korea.

Fortunately, there is a relatively simple way to test this issue empirically. A simplified multiperiod model may be used to explain this point. Assume that each firm or sector maximizes some form of an intertemporal objective function subject to a budget constraint for each time period. This budget constraint comprises, on the income side, the firm's revenues (which result from its past investments and loans and from its sale of assets) and the volume of its borrowing; on the expenditures side, it comprises investment, debt servicing and all other uses of available resources. The firm or sector then chooses the level of spending and its composition as well as its required borrowing for each year so as to maximize its objective function, subject to the budget constraints and expectations about the future. Thus, as a result of this constrained maximization exercise, the firm determines its desired level of investment as a function of exogenous variables such as initial wealth, interest rate and income. ^{1/} The demand for borrowing is also simultaneously determined in the same way.

Suppose now that some form of credit control is introduced and that, as a result, nonprice credit rationing comes into effect. This means that at the prevailing interest rate the firm or sector can no longer treat its borrowing as a free decision variable: the optimization process will be performed subject to the additional constraint of credit availability. In this case, the interest rate is unlikely to be the main mechanism through which credit availability affects economic decisions. The direct credit rationing effect will in all likelihood be more important. However, this does not mean that the interest rate variable should be left out of the investment or other expenditure equations. Interest rates affect expenditure decisions not only through their influence on the cost of finance but also through their effects on expected future receipts and payments which in turn play a role in the budget constraint of future periods. In a multiperiod maximization exercise these effects may well be significant. Moreover, the level of borrowing is now an exogenous variable and should enter the expenditure equations as such. It is thus justifiable

^{1/} For the sake of simplicity, we are assuming that present income level depends on past decisions but not on present developments (these would influence future income). To the extent that the firm (or sector) is relatively small it is safe to assume that the interest rate is exogenous to the decision-making process of the firm.

to use simultaneously both the interest rate and a financing variable in the equation that explains the economic decisions of the firm. ^{1/}

On the other hand, if interest rates are allowed to adjust fully to the new market conditions resulting from the imposition of selective credit controls, nonprice credit rationing will not take place even if credit to a given sector is reduced as a result of these controls. That is, interest rates will adjust in order to eliminate any excess demand (or supply) that may result from such controls in any sector. In a country such as Korea with a thriving unorganized financial market this might take place even if interest rates in organized markets are controlled. In this case, the interest rate is likely to be the main transmission mechanism between credit availability and investment; its coefficient in the expenditure equations should be expected to be significant, while those of the financing variables should be expected to be insignificant.

In summary, it is possible to examine the effectiveness of the selective credit policies introduced by the Korean authorities without having to decide in advance whether the direct or indirect effect of credit availability is the most relevant to that country. This can be done by estimating expenditure equations which include both interest rates and credit as explanatory variables.

III. Methodology

The introduction of a selective credit control such as the one implemented in Korea, which applies to a single source of finance, bank credit, is predicated on the assumption that firms aim to maintain a certain balance between specific types of financial resources and their uses. Thus a change in the availability of finance from a given source will affect the allocation of resources between the preferred sector and the rest of the economy. The validity of this assumption, and, hence, the effectiveness of these selective credit policies depends basically on two factors: (1) the degree of substitutability between sources of finance; and (2) the extent to which a constrained source of finance might affect more than one class of expenditures.

The methodology used in this paper is designed to permit an investigation of the possible substitutability between five different sources of credit: bank borrowing, nonbank borrowing, trade credits (payables),

^{1/} An alternative framework which would also justify a simultaneous inclusion of interest rates and financing variables would be one which postulates that interest rates influence the desired level of investment while the availability of credit affects the speed of adjustment to the desired level.

internal financing (net worth), and other types of credit (mostly bond financing and foreign borrowing), in financing investment, inventories, and working capital of small and medium-sized, and large manufacturing enterprises in Korea. ^{1/}

The first step in the analysis is the estimation of conventional investment equations with one of the credit aggregates referred to above included as an explanatory variable. Thus, in these equations, investment is explained by income, lagged capital stock, interest rate and a financing variable. Similar equations are used for small and large enterprises as well as for changes in inventories and working capital. The only unconventional element in this formulation is the simultaneous inclusion of both interest rates and a financing variable in the same equation.

Thus, the basic estimating equations are:

$$RDFA = a_0 + b_0RIR + c_0RVAD + d_0RFA(-1) + e_0RDFV \quad (1)$$

$$RDINV = a_1 + b_1RIR + c_1RVAD + d_1RINV(-1) + e_1RDFV \quad (2)$$

$$RDQA = a_2 + b_2RIR + c_2RVAD + d_2RQA(-1) + e_2RDFV \quad (3)$$

where all variables are measured in real terms and:

RDFA = change in fixed assets

RDINV = change in inventories

RDQA = change in working capital

RIR = interest rate

RVAD = value added

RFA(-1) = lagged capital stock

RINV(-1) = lagged inventories

RQA(-1) = lagged working capital

RDFV = change in a financing variable

^{1/} Working capital is defined here as the sum of cash in hand, bank deposits, receivables and securities. It does not include inventories and is not net of current liabilities.

RDFV represents one of the following five financing variables all measured in real terms:

- RDBB = bank borrowing
- RDNBB = nonbank borrowing
- RDPAY = trade financing (change in payables)
- RDOL = change in other liabilities (mostly bonds and foreign financing)
- RDNTW = change in internal financing (change in net worth)

The coefficients of income and the financing variable are expected to be positive. The coefficient of the lagged dependent variables is expected to be negative and between zero and one.

The basic hypothesis of this paper is that bank credit to small enterprises was rationed in the past and that it remained so even after the introduction of selective credit controls, although to a lesser extent than before. 1/ This hypothesis will be supported if the coefficient of bank borrowing (RDBB) is significant in the estimated equations. This would further imply that selective credit controls have influenced the spending decisions of enterprises. If the variable is not found to be significant in these equations, one of the following conclusions will have to be accepted: (1) bank credit is not used to finance the dependent variable in question; 2/ (2) bank credit is used to finance the dependent variable but it can be substituted by other sources of financing, in which case, because bank credit has been rationed, one or more additional financial sources are being used to fill the gap; (3) there is no bank credit rationing, in which case bank credit is an endogenous variable and should not appear in the reduced form equation. All three possibilities imply that selective credit policy is ineffective in influencing the pattern of expenditures. Whatever the conclusions of this part of the analysis, other tests will be carried out to determine either the underlying reasons for the inefficacy of the controls, or the reliability of results in case the controls are found to be effective.

First, bank borrowing is replaced by each of the other financial variables to see which, if any, is more significantly related to the

1/ By rationing, it should be remembered, is meant the existence of excess demand for credit.

2/ This case can be verified if one can find which other financing variable is closely related to the dependent variable.

dependent variable. If any one of the other financial variables is more significant, the conclusion will be that indeed that type of credit is the key source of finance, constituting a more important constraint on the dependent variable than bank borrowing. Second, to test further the possibility of substitution between bank borrowing and other types of credit, another series of regressions are performed in which the financial variable represents the sum of bank borrowing and a combination of other financing variables. If the coefficient for any of these broader variables is more significant than the coefficient for bank credit alone, this would indicate that the shortfalls in bank borrowing are compensated by variations in the other components of the combined variable. That is, bank credit has been substituted by one or a combination of other sources of finance. Such a result would also indicate that despite this substitution there is still credit rationing, which means that there is a limit to the substitution which is possible or desirable. If neither bank credit nor any of these broader financing variables is significantly related to the dependent variable, the conclusion concerning the inefficacy of selective credit controls will be strengthened. However the precise reason for this outcome will be unclear, except that neither the combined variable nor bank credit is an important financing source for this specific dependent variable. The same procedure is repeated for each expenditure category and for large firms. The assumption will again be that credit to these firms has also been rationed, particularly after the imposition of selective credit controls.

IV. Empirical Results

The analysis of this paper is based on annual data obtained from annual surveys of the manufacturing sector conducted by Korea Development Bank on a yearly basis since 1968. These surveys provide consolidated balance sheets and profit and loss account data both for small and medium-sized enterprises and for large enterprises. Except for price indices used to deflate the available data, all variables employed come from this source. 1/ Estimations have also been made using interest rates prevailing in the unorganized markets instead of those obtained by calculating average interest costs. With minor exceptions the results were not significantly affected by this change. 2/ Because of data gaps and the use of lagged variables, the estimation period extends from 1970 to 1981.

1/ Investment and change in inventories were deflated by the implicit investment deflator; value added was deflated by the implicit manufacturing output deflator; all other variables were deflated by the wholesale price index.

2/ These results are available from the authors upon request.

The statistical properties of the estimation results are generally satisfactory. R^2 is normally high, and with the exception of the real interest rate, most variables are significant and of the expected sign.

The fact that interest rate coefficients are not significant in any of the estimated regressions indicates that in Korea interest rate movements are not the main transmission mechanism through which credit availability influences economic decisions. It also points to the plausibility of the assumption that there is credit rationing in the Korean economy.

a. Investment

Table 1 presents the results for the first set of tests regarding investment. From these regressions it is clear that in the case of both small and large enterprises bank borrowing is significantly related to investment. This gives support to our basic assumption that bank credit has been rationed in Korea during the period in question. It also shows that there is a close relationship between investment in small enterprises and internal financing (here represented by changes in net worth). This is not unexpected, as it is often argued that small enterprises tend to have limited access to outside financing and that they are thus forced to pace their growth according to their capacity to generate internal finance. This is not to say, however, that internal finance is the only source of investment finance. After all, even if all changes in net worth were used for financing investment, this would cover on average only 58 per cent of investment expenditures. In fact, one might claim that availability of internal finance is closely linked to investment not only because it finances investment but also because it signals to lenders the debt service capacity of the firm or sector in question, thereby affecting the ability of the firm to obtain outside investment finance.

The next set of tests investigates whether there might be some substitution between bank borrowing and other sources of investment finance. These results are presented in Appendix Table 1. As one would expect, given the results of our first set of regressions, adding bank borrowing to internal finance and using this sum as the new financial variable (RDX15) in the investment equation produces results which are almost as good as those obtained by using internal financing as the only financing variable. ^{1/} This indicates that bank borrowing, although contributing to the financing of investment, is not the main constraining variable. Consequently, an increase in the flow of bank credit may not change investment significantly, thus rendering the selective credit policy relatively ineffective. Moreover, the results indicate that other

^{1/} While t-probability is equally good, the adjusted R^2 is somewhat lower.

Table 1. Korea: Investment in the Manufacturing Sector 1/

	Constant	R1R	RVAD	RFA(-1)	RDBB	RDNBB	RDPAY	RDOL	RDNTW	\bar{R}^2
Small and medium enterprises	0.74 (0.38)	-0.01 (0.04)	0.43 (0.93)	-0.51 (0.98)	1.01 (0.98)					0.86
	-0.16 (0.08)	0.12 (0.54)	0.64 (0.99)	-0.62 (0.99)		2.09 (0.94)				0.82
	-0.50 (0.22)	0.16 (0.61)	0.68 (0.98)	-0.67 (0.99)			0.90 (0.82)			0.76
	-3.43 (0.86)	0.44 (0.94)	0.12 (0.21)	-0.06 (0.13)				1.01 (0.90)		0.79
Large enterprises	0.67 (0.68)	-0.07 (0.67)	0.49 (1.00)	-0.40 (1.00)					1.10 (1.00)	0.97
	2.24 (0.49)	0.03 (0.07)	1.26 (1.00)	-0.72 (1.00)	0.91 (0.98)					0.80
	7.24 (0.87)	-0.34 (0.52)	1.08 (0.97)	-0.53 (0.97)		-0.03 (0.02)				0.54
	6.94 (0.88)	-0.28 (0.47)	1.20 (0.99)	-0.64 (0.98)			0.50 (0.60)			0.59
	4.28 (0.96)	-0.14 (0.54)	1.03 (1.00)	-0.66 (1.00)				1.02 (1.00)		0.93
	4.86 (0.71)	-0.24 (0.41)	0.82 (0.95)	-0.40 (0.91)					0.63 (0.73)	0.62

1/ Data in parentheses represent t-probabilities.

sources also contribute to the financing of investment in small enterprises. To verify this possibility, all combinations of the five financing sources which included bank credit were tried. The only combination that produced results which were as good as the regression with internal financing alone was one which included the sum of internal financing, bank borrowing, and other liabilities (mostly bonds and foreign financing). ^{1/} Even then the t-probability of the coefficients of most variables is much smaller in the latter equation than when internal finance alone was included. This indicates that the basic source of investment financing for small and medium enterprises in Korea is indeed internal finance, but that other sources such as bank borrowing and other liabilities also play a role. The conclusion is thus that the selective credit policies implemented by the Korean authorities are likely to have had some direct, but perhaps insignificant, positive effect on the investment activity of small enterprises. However, the key to an expansion of investment expenditures in this sector remains the generation of internal resources.

The next question is, what was the effect of the same selective credit policy on the investment of the large enterprises? Whether or not a selective credit policy is effective in achieving its purpose regarding small firms, it can still exert an influence on large firms' investment activity to the extent that compliance with the selective credit regulations by banks will lead to a reduction in the volume of credit otherwise available for larger firms.

In the case of large enterprises, credit rationing is again apparent. Not only are changes in bank borrowing highly significant, but changes in bond and foreign financing (RDOL) are even more significant (Table 1). This also indicates that the key variable in investment financing for large enterprises is changes in bond and foreign financing. The analysis of broader credit aggregates which combine the five basic sources of finance indicate that, taken together, changes in other financing (bond and foreign financing) and bank borrowing explain investment in large enterprises in Korea better than either one separately (Appendix Table 2). Finally, an even broader financing variable, which includes payables, further improves the explanatory power of the equation. Since the equation with payables alone did not produce statistically significant results, it can be deduced that payables are not an important source of financing for investment of large firms but that they can fill in the shortfalls in other credit sources if needed. One can thus conclude that the key sources of finance for investment by the large enterprises in Korea are bank credit, bond and foreign financing, and that, at least to some extent, these sources are substitutable. This in turn would indicate that the limitation on the amount of bank borrowing

^{1/} This new financing variable is called RDX145 in the Appendix Tables.

available as a result of the introduction of a selective credit policy to favor small enterprises is not likely to have caused a significant decline in the investment activity of large enterprises.

The above analysis shows that, from the point of view of their impact on investment alone, selective credit controls might have been slightly beneficial for small enterprises without having been unduly burdensome to large enterprises. However, insofar as large firms had to substitute bonds and foreign financing for bank borrowing as a source of investment finance, this may have reduced financing available for other activities (change in inventories or working capital), thus adversely affecting these activities. The desirability of this outcome needs to be taken into account in determining the usefulness of selective credit policies. This issue will be taken up in the next two subsections.

The results for large enterprises may be regarded as providing an alternative justification for the introduction of selective credit controls in Korea in that the rationing bank credit to large enterprises may have the effect of providing an added incentive for them to borrow abroad to finance a given level of investment. This would result in a higher overall availability of investment finance for the country as a whole while at the same time leading to an improvement in Korea's overall balance of payments position. Of course, the selective policies under discussion here do not necessarily lead to the emergence of excess demand for credit by large firms unless the total supply of credit is also controlled. Otherwise, the banks can raise the overall supply while at the same time complying with the selective credit guidelines under discussion.

b. Changes in inventories

In the case of small enterprises, changes in inventories were found to be closely related to changes in bank and nonbank borrowing (Table 2). Of the two, nonbank borrowing seems to provide slightly better results but the difference is minor. Finally, no other financing variable seems to be significantly related to changes in inventories. No combination of financing variables produces more significant results than nonbank borrowing alone. However, the combination of nonbank and bank borrowing (new financing variable RDX12) is significant enough and close enough to the quality of results of nonbank borrowing alone to indicate that both financing variables are likely to be used in the financing of changes in inventories (Appendix Table 3). Similar results are obtained with a combination of bank, nonbank and trade financing (new financing variable RDX123). Thus, to the extent that inventories were constrained by lack of finance prior to the introduction of selective credit controls, the increased availability of bank credit following the imposition of these controls no doubt permitted an increase in the inventories of small firms. This, however, should not be interpreted as being either

Table 2. Korea: Changes in Inventories in the Manufacturing Sector 1/

	Constant	RIR	RVAD	RINV(-1)	RDBB	RDNBB	RDPAY	RDOL	RDNTW	\bar{R}^2
Small and medium enterprises	0.52 (0.53)	-0.06 (0.53)	0.04 (0.26)	-0.09 (0.43)	0.76 (1.00)					0.91
	-0.26 (0.38)	0.05 (0.59)	0.17 (0.93)	-0.18 (0.83)		1.86 (1.00)				0.93
	-0.60 (0.63)	0.08 (0.73)	0.23 (0.95)	-0.34 (0.95)			-0.60 (0.63)			0.89
	-1.20 (0.70)	0.15 (0.78)	0.39 (0.80)	-0.39 (0.63)				0.02 (0.05)		0.66
	-0.13 (0.10)	-0.00 (0.03)	0.21 (0.77)	-0.12 (0.35)					0.47 (0.90)	0.78
Large enterprises	-0.82 (0.28)	0.01 (0.03)	0.05 (0.28)	0.08 (0.34)	0.52 (0.97)					0.63
	0.63 (0.16)	-0.05 (0.12)	0.26 (0.78)	-0.02 (0.08)		-0.46 (0.53)				0.31
	0.92 (0.29)	-0.06 (0.18)	0.16 (0.67)	-0.05 (0.22)			0.49 (0.91)			0.52
	0.69 (0.20)	-0.08 (0.21)	0.03 (0.11)	0.07 (0.26)				0.38 (0.85)		0.45
	1.23 (0.30)	-0.05 (0.12)	0.26 (0.73)	-0.10 (0.28)					-0.15 (0.32)	0.27

1/ Data in parentheses are t-probabilities.

a beneficial or a detrimental outcome from the point of view of this sector or the economy; such a judgment should be based on some form of social welfare criterion. This is beyond the scope of this paper which can only indicate the direction of the change.

For the large enterprises the only financing variable which appears highly significant in the first set of equations is bank borrowing (Table 2). The only other source of finance which seems to be somewhat related to changes in inventory accumulation is changes in trade credit. There is thus preliminary evidence that controls on bank borrowing will affect changes in inventories by large enterprises in Korea. However, another financing variable, RDX13, representing combined changes in bank borrowing and trade financing, explains changes in inventories much better than any of them separately (Appendix Table 4). This seems to indicate that both variables are important sources of inventory financing. Since bank financing to large enterprises was restricted by the introduction of selective credit controls, the large enterprises are likely to have circumvented this constraint by obtaining more trade financing and using this source to finance inventories. It is also worth noting that, of all the regressions estimated, the best results were obtained when total financing (sum of all sources of financing, RDX12345) was used as the explanatory financial variable. This shows that the substitutability between different sources of inventory financing is not limited to bank borrowing and trade credit only, but extends to other financial variables also.

In summary, the existence of credit allocation measures to favor small and medium-sized enterprises in Korea is likely to have facilitated a build-up of inventories in small enterprises at the cost of a relatively minor direct negative effect on large enterprises. To the extent that the buildup of small enterprises' inventories is undesirable socially, this effect will have eroded the usefulness of the credit controls. Similarly, if the buildup of inventories is considered desirable, this effect would strengthen the case for the maintenance of these controls.

c. Changes in working capital

For small enterprises, changes in working capital seem to be associated with the availability of trade credits (payables), bank borrowing and to a lesser extent also nonbank borrowing. These three financing variables appear significant in the regressions reported in Table 3. Of the three, trade credit is clearly the most closely related to changes in working capital. Thus, there is at least prima facie evidence that trade credit is substitutable for bank credit. Also any effort to increase the working capital of small enterprises seems to depend primarily on their ability to obtain more trade credit rather than on their access to bank borrowing. Consequently, an increased availability of bank borrowing is not likely to have a major effect on changes in working capital. Similar tests as those for investment and

Table 3. Korea: Changes in Working Capital in the Manufacturing Sector 1/

	Constant	RIR	RVAD	RQA(-1)	RDBB	RDNBB	RDPAY	RDOL	RNTW	\bar{R}^2
Small and medium enterprises	0.85 (0.59)	-0.10 (0.65)	0.10 (0.44)	-0.09 (0.73)	0.73 (0.98)					0.89
	-0.28 (0.24)	0.03 (0.25)	0.29 (0.93)	-0.22 (0.81)		1.47 (0.96)				0.86
	-0.40 (0.58)	0.04 (0.56)	0.22 (0.97)	-0.23 (0.97)			1.06 (1.00)			0.95
	-1.27 (0.70)	0.13 (0.72)	0.49 (0.81)	-0.37 (0.65)				0.01 (0.01)		0.74
	0.81 (0.42)	-0.12 (0.53)	0.13 (0.43)	0.04 (0.11)					0.63 (0.90)	0.83
Large enterprises	-1.18 (0.34)	0.19 (0.52)	0.18 (0.65)	0.00 (0.00)	0.11 (0.41)					0.52
	-0.03 (0.01)	0.13 (0.40)	0.10 (0.38)	0.04 (0.16)		0.42 (0.61)				0.55
	-0.44 (0.18)	0.13 (0.45)	0.13 (0.60)	0.02 (0.09)			0.39 (0.93)			0.70
	-0.81 (0.33)	0.12 (0.44)	0.01 (0.06)	0.11 (0.47)				0.35 (0.94)		0.71
	-1.06 (0.34)	0.16 (0.46)	0.07 (0.24)	0.13 (0.40)					0.27 (0.65)	0.56

1/ Data in parentheses are t-probabilities.

inventories were carried out to determine more closely the possibilities of substituting other sources of financing for bank borrowing. Although none of the broader financing variables used explained changes in working capital better than trade credits (payables) alone, several did explain these better than bank borrowing alone (Appendix Table 5). This means that whatever the contribution of bank borrowing to the financing of changes in working capital, this credit source is not as indispensable a source of finance as trade credit seems to be.

The results of the regressions explaining changes in the working capital of large enterprises are our weakest results. The adjusted R^2 s are generally lower than for other cases, and the sign of lagged stock of working capital is wrong in most equations (Table 3). Despite these shortcomings, it seems quite clear from the results that the introduction of controls to redirect bank credit to the small enterprises will not have any direct effect on changes in the working capital of the large enterprises. This is so because changes in bank borrowing are not significantly related to changes in the working capital of the large enterprises. Of the five sources of financing, those most significantly related to changes in working capital are other financing (mostly bond and foreign financing) and trade financing. Finally, changes in working capital of large enterprises seem to have the closest relationship with total financing (RDX12345), indicating that all sources of financing contribute somewhat to meet the requirements of working capital (Appendix Table 6). It can thus be concluded that different sources of finance are substitutable here and that restrictions on any single source of finance are unlikely to affect significantly the working capital of large enterprises. It might be worth noting that the predominance of total financing as explanatory variable for changes in working capital is the type of result that one would expect if working capital acts as a temporary buffer between expenditure decisions and the availability of financial resources.

IV. Conclusion

Since 1965 the Korean authorities have required that a minimum percentage of total loans be provided to small and medium enterprises. This paper has examined the effects of such policy on economic decisions in the Korean manufacturing sector.

An important conclusion from our results is that limitations on credit availability tend to affect economic decisions directly instead of through interest rate movements. This is clear from the fact that interest rate coefficients are not significant in any of the equations.

The next question examined here was whether bank credit had an influence on the investment of small enterprises. Since interest rates did not show a significant relationship to investment, it was argued that this could only take place if bank credit is both rationed

and used to finance investment. Our empirical results indicate that although the main source of investment financing for small enterprises is internal resources (or net worth), bank credit is also significantly related to investment (and is indeed rationed). Thus, one can conclude that the introduction of selective credit controls to the extent that it increased the flow of bank credit to the small enterprises is likely to have had a positive effect on the investment of that sector. However, the lack of such policy is not critical to investment because internal sources can, at least in principle, substitute for bank credit to provide the necessary financing for the desired investment.

For a full assessment of the effectiveness of such measures two other questions had also to be answered: (1) what was the effect of such policies on the large enterprises; (2) what was the effect of such policies on other uses of resources such as changes in inventories and working capital. Our tests showed that the direct effect on large enterprises from the redistribution of bank credit in favor of small enterprises as a result of the selective credit policies was relatively small. This is so because the large enterprises were able to substitute bond and foreign financing for bank credit. The results also highlighted the fact that the present selective credit controls provide an added incentive for the large enterprises which have access to international capital markets to borrow abroad. During a period of balance of payments pressures which require substantial use of foreign financing, this might have been a key reason for keeping this policy in place. 1/

Our results also indicate that the introduction of selective credit controls, by increasing the availability of bank credit to small enterprises, has facilitated inventory accumulation. Moreover, this has occurred at relatively little cost to large enterprises in terms of an adverse impact on their inventory accumulation. The desirability of this outcome is, however, debatable. Finally, it was shown that an increased availability of bank credit is unlikely to affect significantly changes in the working capital of either small and medium or large enterprises.

In summary, the objective of this paper was to shed light on the effectiveness of selective credit controls in expanding investment in the small enterprises in Korea. The overall conclusion is that the selective credit controls adopted by Korea to provide incentives to small enterprises did indeed help to expand the investment activity of these firms, albeit only slightly, with only minor repercussions on other sectors and expenditure categories. One might question however whether this is the most efficient way to affect resource allocation. Therefore, it might be advisable for countries contemplating the use

1/ This should not be taken as justifying such a policy as questions regarding a country's foreign debt management need also to be addressed.

of selective credit controls to examine the possibility of using alternative measures such as the tax-cum-subsidy mechanisms proposed by Johnson (1974) instead of selective credit controls. It needs to be emphasized that this paper does not attempt an evaluation of the possible negative effects on economic efficiency which might result from the introduction of selective credit controls. Such an evaluation may be necessary before a decision to implement selective credit controls is adopted.

List of Financing Variables

RDBB = real changes in bank borrowing
RDNBB = real changes in nonbank borrowing
RDPAY = real changes in payables
RDOL = real changes in other liabilities
RDNTW = real changes in net worth
RDX12 = RDBB + RDNBB
RDX13 = RDBB + RDPAY
RDX14 = RDBB + RDOL
RDX15 = RDBB + RDNTW
RDX123 = RDBB + RDNBB + RDPAY
RDX124 = RDBB + RDNBB + RDOL
RDX125 = RDBB + RDNBB + RDNTW
RDX134 = RDBB + RDPAY + RDOL
RDX135 = RDBB + RDPAY + RDNTW
RDX145 = RDBB + RDOL + RDNTW
RDX1234 = RDBB + RDNBB + RDPAY + RDOL
RDX1235 = RDBB + RDNBB + RDPAY + RDNTW
RDX1245 = RDBB + RDNBB + RDOL + RDNTW
RDX1345 = RDBB + RDPAY + RDOL + RDNTW
RDX12345 = RDBB + RDNBB + RDPAY + RDOL + RDNTW

Appendix Table 1. Korea: Real Investment (RDFA), Supplementary Results for Small Enterprises 1/

Constant	RIR	RVAD	RFA(-1)	RDFV <u>2/</u>	\overline{R}^2	
0.50 (0.26)	0.03 (0.14)	0.49 (0.96)	-0.54 (0.98)	RDX12	0.70 (0.97)	0.85
0.19 (0.09)	0.07 (0.31)	0.54 (0.96)	-0.59 (0.98)	RDX13	0.52 (0.94)	0.80
-1.60 (0.86)	0.21 (0.93)	-0.13 (0.41)	0.01 (0.03)	RDX14	0.86 (1.00)	0.93
0.93 (0.67)	-0.08 (0.53)	0.41 (0.99)	-0.42 (0.99)	RDX15	0.60 (1.00)	0.94
0.14 (0.07)	0.08 (0.35)	0.55 (0.97)	-0.59 (0.98)	RDX123	0.43 (0.95)	0.82
-1.19 (0.71)	0.18 (0.86)	0.04 (0.13)	-0.13 (0.50)	RDX124	0.66 (1.00)	0.91
0.81 (0.57)	-0.05 (0.35)	0.43 (0.99)	-0.45 (0.99)	RDX125	0.50 (1.00)	0.93
-1.08 (0.61)	0.18 (0.81)	0.13 (0.39)	-0.24 (0.73)	RDX134	0.54 (0.99)	0.88
0.60 (0.39)	-0.02 (0.10)	0.46 (0.98)	-0.49 (0.99)	RDX135	0.42 (0.99)	0.91
-0.57 (0.61)	0.07 (0.68)	0.08 (0.46)	-0.12 (0.71)	RDX145	0.53 (1.00)	0.97
-0.89 (0.51)	0.16 (0.76)	0.22 (0.61)	-0.30 (0.84)	RDX1234	0.44 (0.99)	0.88
0.53 (0.34)	-0.00 (0.01)	0.47 (0.98)	-0.50 (0.99)	RDX1235	0.37 (0.99)	0.90
-0.45 (0.45)	0.07 (0.61)	0.14 (0.67)	-0.18 (0.84)	RDX1245	0.45 (1.00)	0.96
-0.45 (0.38)	0.08 (0.57)	0.18 (0.71)	-0.24 (0.88)	RDX1345	0.40 (1.00)	0.94
-0.38 (0.30)	0.08 (0.55)	0.23 (0.79)	-0.29 (0.91)	RDX12345	0.35 (1.00)	0.93

1/ Data in parentheses are t-probabilities.

2/ Real change in financing variable.

Appendix Table 2. Korea: Real Investments (RDFA),
Supplementary Results for Large Enterprises 1/

Constant	RIR	RVAD	RFA(-1)	RDFV <u>2/</u>	\bar{R}^2
2.85 (0.63)	0.01 (0.04)	1.06 (1.00)	-0.68 (1.00)	RDX12 0.98 (0.99)	0.82
1.63 (0.48)	0.13 (0.37)	1.49 (1.00)	-0.93 (1.00)	RDX13 0.91 (1.00)	0.88
2.19 (0.77)	0.02 (0.10)	1.17 (1.00)	-0.73 (1.00)	RDX14 0.60 (1.00)	0.94
2.73 (0.52)	-0.06 (0.13)	0.98 (1.00)	-0.53 (0.99)	RDX15 0.49 (0.94)	0.74
2.86 (0.71)	0.06 (0.18)	1.28 (1.00)	-0.86 (1.00)	RDX123 0.85 (0.99)	0.86
2.96 (0.85)	-0.02 (0.06)	1.04 (1.00)	-0.69 (1.00)	RDX124 0.58 (1.00)	0.92
3.11 0.59	-0.08 (0.16)	0.87 (0.99)	-0.50 (0.99)	RDX125 0.50 (0.95)	0.74
2.31 (0.84)	0.05 (0.24)	1.30 (1.00)	-0.84 (1.00)	RDX134 0.54 (1.00)	0.95
2.17 (0.48)	0.01 (0.02)	1.11 (1.00)	-0.65 (1.00)	RDX135 0.51 (0.98)	0.80
2.14 (0.60)	-0.02 (0.60)	0.98 (1.00)	-0.58 (1.00)	RDX145 0.42 (1.00)	0.87
3.13 (0.88)	0.00 (0.02)	1.17 (1.00)	-0.79 (1.00)	RDX1234 0.51 (0.88)	0.93
2.80 (0.59)	-0.02 (0.05)	1.00 (1.00)	-0.62 (1.00)	RDX1235 0.50 (0.98)	0.79
2.66 (0.67)	-0.04 (0.13)	0.89 (1.00)	-0.56 (1.00)	RDX1245 0.41 (1.00)	0.86
2.12 (0.62)	0.01 (0.04)	1.08 (1.00)	-0.68 (1.00)	RDX1345 0.40 (1.00)	0.89
2.70 (0.71)	-0.02 (0.06)	1.00 (1.00)	-0.65 (1.00)	RDX12345 0.38 (1.00)	0.89

1/ Data in parentheses are t-probabilities.

2/ Real change in financing variable.

Appendix Table 3. Korea: Change in Real Inventories (RDINV),
Supplementary Results for Small Enterprises 1/

Constant	RIR	RVAD	RINV(-1)	RDFV <u>2/</u>	\bar{R}^2
0.35 (0.43)	-0.03 (0.38)	0.06 (0.47)	-0.10 (0.54)	RDX12 (1.00)	0.92
0.05 (0.06)	0.00 (0.00)	0.12 (0.71)	-0.20 (0.80)	RDX13 (1.00)	0.91
-0.49 (0.40)	0.06 (0.45)	-0.06 (0.19)	0.14 (0.32)	RDX14 (0.93)	0.79
0.36 (0.32)	-0.06 (0.42)	0.09 (0.48)	-0.05 (0.19)	RDX15 (0.98)	0.86
0.02 (0.03)	0.01 (0.07)	0.12 (0.75)	-0.19 (0.81)	RDX123 (1.00)	0.92
-0.34 (0.32)	0.04 (0.39)	-0.09 (0.33)	0.16 (0.44)	RDX124 (0.97)	0.84
0.37 (0.36)	-0.05 (0.46)	0.08 (0.48)	-0.08 (0.20)	RDX125 (0.99)	0.88
-0.41 (0.40)	0.05 (0.46)	-0.04 (0.17)	0.07 (0.21)	RDX134 (0.98)	0.85
0.20 (0.21)	-0.03 (0.30)	0.11 (0.61)	-0.11 (0.46)	RDX135 (0.99)	0.92
-0.17 (0.14)	0.01 (0.07)	-0.00 (0.02)	0.10 (0.27)	RDX145 (0.95)	0.81
-0.34 (0.36)	0.05 (0.44)	-0.03 (0.17)	0.06 (0.20)	RDX1234 (0.99)	0.87
0.19 (0.21)	-0.03 (0.29)	0.10 (0.63)	-0.10 (0.48)	RDX1235 (0.99)	0.90
-0.07 (0.07)	-0.00 (0.00)	-0.02 (0.10)	0.12 (0.34)	RDX1245 (0.97)	0.84
-0.15 (0.14)	0.01 (0.08)	0.00 (0.01)	0.06 (0.19)	RDX1345 (0.98)	0.85
-0.10 (0.11)	0.01 (0.06)	0.00 (0.01)	0.06 (0.20)	RDX1234 (0.99)	0.86

1/ Data in parentheses are t-probabilities.

2/ Real change in financing variable.

Appendix Table 4. Korea: Real Inventories (RDINV),
Supplementary Results for Large Enterprises 1/

Constant	RIR	RVAD	RINV(-1)	RDFV <u>2/</u>	\bar{R}^2
-0.52 (0.17)	0.03 (0.08)	0.01 (0.05)	0.05 (0.20)	RDX12 0.51 (0.94)	0.56
-0.51 (0.25)	-0.02 (0.10)	0.03 (0.24)	0.05 (0.34)	RDX13 0.44 (1.00)	0.82
-0.16 (0.06)	-0.04 (0.14)	-0.01 (0.04)	0.11 (0.43)	RDX14 0.28 (0.96)	0.60
-0.48 (0.13)	0.01 (0.02)	0.06 (0.23)	0.09 (0.28)	RDX15 0.24 (0.76)	0.39
-0.25 (0.11)	-0.01 (0.03)	-0.00 (0.02)	0.03 (0.16)	RDX123 0.43 (0.99)	0.75
0.06 (0.02)	-0.03 (0.10)	-0.01 (0.04)	0.08 (0.31)	RDX124 0.25 (0.92)	0.54
-0.11 (0.03)	0.01 (0.01)	0.08 (0.26)	0.05 (0.16)	RDX125 0.19 (0.64)	0.35
-0.34 (0.01)	0.06 (0.21)	-0.01 (0.08)	0.09 (0.43)	RDX134 0.25 (0.99)	0.71
-0.91 (0.30)	0.01 (0.02)	-0.02 (0.11)	0.13 (0.51)	RDX135 0.32 (0.97)	0.62
-0.32 (0.09)	-0.02 (0.06)	-0.00 (0.01)	0.12 (0.41)	RDX145 0.19 (0.87)	0.47
0.14 (0.05)	-0.05 (0.16)	-0.02 (0.10)	0.07 (0.31)	RDX1234 0.24 (0.97)	0.65
-0.58 (0.18)	0.01 (0.03)	-0.02 (0.10)	0.10 (0.37)	RDX1235 0.29 (0.93)	0.54
-0.07 (0.02)	-0.02 (0.05)	0.01 (0.04)	0.09 (0.30)	RDX1245 0.17 (0.80)	0.42
-0.39 (0.13)	-0.03 (0.11)	-0.04 (0.19)	0.13 (0.51)	RDX1345 0.21 (0.96)	0.60
-0.17 (0.06)	-0.03 (0.08)	-0.03 (0.14)	0.11 (0.40)	RDX12345 0.38 (1.00)	0.88

1/ Data in parentheses are t-probabilities.

2/ Real change in financing variable.

Appendix Table 5. Korea: Change in Real Working Capital (RDQA),
Supplementary Results for Small Enterprises 1/

Constant	RIR	RVAD	RQA(-1)	RDFV <u>2/</u>	\bar{R}^2
0.53 (0.42)	-0.06 (0.48)	0.15 (0.65)	-0.12 (0.55)	RDX12 0.50 (0.98)	0.89
0.44 (0.46)	-0.06 (0.54)	0.13 (0.69)	-0.13 (0.70)	RDX13 0.46 (1.00)	0.93
0.65 (0.39)	-0.06 (0.35)	-0.16 (0.37)	0.23 (0.50)	RDX14 0.49 (0.93)	0.84
1.21 (0.68)	-0.16 (0.75)	0.05 (0.20)	0.05 (0.17)	RDX15 0.40 (0.97)	0.88
0.32 (0.32)	-0.04 (0.39)	0.15 (0.76)	-0.15 (0.72)	RDX123 0.36 (0.99)	0.92
0.60 (0.40)	-0.05 (0.36)	-0.11 (0.30)	0.17 (0.46)	RDX124 0.41 (0.96)	0.86
1.02 (0.63)	-0.13 (0.71)	0.08 (0.33)	0.01 (0.04)	RDX125 0.33 (0.98)	0.88
0.78 (0.64)	-0.07 (0.60)	-0.20 (0.65)	0.22 (0.72)	RDX134 0.44 (0.99)	0.92
0.98 (0.72)	-0.13 (0.79)	0.06 (0.29)	0.01 (0.03)	RDX135 0.32 (0.99)	0.91
1.59 (0.75)	-0.18 (0.78)	-0.26 (0.61)	0.37 (0.75)	RDX145 0.40 (0.97)	0.88
0.61 (0.53)	-0.06 (0.49)	-0.11 (0.42)	0.14 (0.53)	RDX1234 0.35 (0.99)	0.91
0.83 (0.64)	-0.11 (0.73)	0.08 (0.43)	-0.02 (0.12)	RDX1235 0.27 (0.99)	0.91
1.34 (0.72)	-0.15 (0.75)	-0.18 (0.51)	0.29 (0.69)	RDX1245 0.33 (0.98)	0.88
1.42 (0.85)	-0.16 (0.88)	-0.23 (0.73)	0.30 (0.83)	RDX1345 0.33 (1.00)	0.92
1.19 (0.79)	-0.13 (0.82)	-0.15 (0.57)	0.23 (0.73)	RDX12345 0.28 (0.99)	0.92

1/ Data in parentheses are t-probabilities.

2/ Real change in financing variable.

Appendix Table 6. Korea: Changes in Real Working Capital (RDQA)
Supplementary Results for Large Enterprises 1/

Constant	RIR	RVAD	RQA(-1)	RDFV <u>2/</u>	$\overline{R^2}$
-1.48 (0.45)	0.21 (0.59)	0.13 (0.51)	0.01 (0.03)	RDX12 0.22 (0.69)	0.57
-1.59 (0.52)	0.20 (0.86)	0.14 (0.62)	-0.00 (0.01)	RDX13 0.20 (0.86)	0.64
-1.39 (0.45)	0.19 (0.55)	0.11 (0.47)	0.04 (0.15)	RDX14 0.14 (0.79)	0.61
-1.45 (0.42)	0.20 (0.54)	0.12 (0.48)	0.05 (0.19)	RDX15 0.12 (0.60)	0.55
-1.54 (0.56)	0.20 (0.66)	0.08 (0.41)	0.01 (0.07)	RDX123 0.26 (0.95)	0.72
-1.34 (0.46)	0.18 (0.57)	0.06 (0.29)	0.05 (0.23)	RDX124 0.16 (0.87)	0.65
-1.56 (0.48)	0.20 (0.58)	0.07 (0.27)	0.08 (0.31)	RDX125 0.17 (0.76)	0.59
-1.41 (0.51)	0.18 (0.58)	0.08 (0.41)	0.04 (0.19)	RDX134 0.15 (0.92)	0.69
-1.94 (0.63)	0.20 (0.64)	0.06 (0.64)	0.08 (0.36)	RDX135 0.20 (0.92)	0.69
-1.58 (0.51)	0.18 (0.56)	0.06 (0.25)	0.09 (0.36)	RDX145 0.13 (0.84)	0.63
-1.29 (0.51)	0.17 (0.60)	0.04 (0.21)	0.06 (0.29)	RDX1234 0.17 (0.96)	0.74
-1.89 (0.68)	0.20 (0.69)	-0.02 (0.08)	0.12 (0.54)	RDX1235 0.24 (0.97)	0.76
-1.53 (0.53)	0.18 (0.58)	0.01 (0.05)	0.11 (0.46)	RDX1245 0.15 (0.90)	0.67
-1.67 (0.60)	0.18 (0.61)	0.02 (0.10)	0.11 (0.47)	RDX1345 0.15 (0.95)	0.73
-1.57 (0.62)	0.17 (0.63)	-0.03 (0.15)	0.13 (0.59)	RDX12345 0.16 (0.98)	0.77

1/ Data in parentheses are t-probabilities.

2/ Real change in financing variable.

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