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CAPITAL CONTROLS AND PREMIUMS ON CLOSED-END FUND SHARES: THE CASE OF THE KOREA FUND**

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I. INTRODUCTION

This is a theoretical study of the behavior of premiums on the closed-end funds exclusively invested in foreign securities under market imperfections. The existence of exchange and tax controls could make such funds particularly attractive. Examining the portfolios of the closed-end funds invested in foreign securities, Malkiel (1977) suggested that these effects were likely to be small, and any premiums or discounts on fund invested in foreign securities resulted not from any market imperfections but rather from investor infatuation or disenchantment with foreign securities. In recent years, however, the premiums on the Korea Fund, on the New York Stock Exchange, and the Taiwan Fund, on the American stock Exchange, have been more than 100 percent of their net asset values. This evidence appears to be in contrary to the suggestion by Malkiel.

Given the existence of the premiums on these funds, we need a theoretical model which explains what variables are responsible for the existence of the premiums. The paper develops a simple model of determination of the premiums on closed-end funds under capital and exchange controls betwen countries. The model developed in the paper is a two-country partial equlibrium asset pricing model. The paper derives premium equations from an insight that the key to determining the premiums on the Korea Fund is to price the Korea equity relative to the U. S. equity of an equal investment cost. The paper then shows that the key determinants of the premiums are the earnings-price ratio, the interest differentials, and the expected rate of change of the exchange rate. These determinants of the premiums are assumed to be exogenously given in our model. In a general equilibrium model, these variables, as well as the premiums would be simultanenously determined in the system. However, one may regard that the interest differentials and the expected rate of change of the exchange rate reflect the degree of the existing capital and exchange controls. Since the purpose of the paper is to explain the existence of the premiums due to capital and exchange controls, a general equlibrium analysis would simply complicate the analysis without giving any further siginificant insights. The existing capital and exchange controls may be considered to be of a temporary nature.

In Janury 1981, the Korean government announced the liberalization plans

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according to which existing capital and exchange controls are scheduled to be removed in the 1990s. Given the planned course of the liberalization of the Korean capital market, it is intersting to incorporate investors' anticipation of a removal of the controls into the model. The paper derives the model with and without the investors' anticipation of a removal of existing controls in the foreseeable future. The paper shows that the premiums with anticipation effect are less than those without it.

Whereas the investors' anticipation affects the premiums on the funds, the paper finds that the implications of the investors' anticipation are also significant for the price determination of the Korean stock. Given the anticipation that the Korean interest rate will fall relative to the U. S. interst rate when the existing controls are removed in the fufure, investors may realize that the Korean stock price will be much higher in the future. In that case, the effect of this future event is likely to be built into the current price of the Korean stock. The paper derives the dynamic time paths of the Korean stock price and the premium on the Korea Fund when the investors anticipate that the existing controls will be removed in the foreseeable future. The driving force of the time paths is the number of the years for which the Korean interest rate remains higher than the U. S interest rate due to the existing controls.

The paper is organized as follows. Section 2 introduces basic terminology for our analysis and discusses some existing theoretical arguments for the existence of premiums or discounts on closed-end funds. Section 3 develops models of the closed-end funds premiums determination under capital and exchange controls. Section 4 looks at the actual premiums on the Korea Fund and compares these to the ones predicted by the models in Section 3. Section 5 evaluates the models in light of the empirical observations and draws some policy implications.

Ⅱ. TERMINOLOGY AND SOME THEORETICAL ARGUMENTS FOR CLOSED-END FUNDS PREMIUMS AND/OR DISCOUNTS IN THE LITERATURE

An investment company is a corporation which has as its earning asset a portfolio of securities. The market value of the investment firm's portfolio minus short-term liabilities is called its net asset value. Investment companies have two organizational forms : open-end and closed-end. Whether an investment company is considered open-end or closed-end depends upon the continuous issuance and/or redeemability of its shares at its net asset value.

An open-end investment company (commonly known as a mutual fund) issues as many new shares or redeems outstanding ones at its net asset value (ignoring up front loads and/or redemption charges). Therefore both the supply and demand curves of the open-end fund shares are infinitely elastic at its net asset value, which means that the market price of the open-end fund shares is set at its net asset value. However, unlike an open-end investment company, a close-end investment company neither issues new shares nor redeems outstanding ones.[1] Hence, investors

1) There are some exceptions to this rule : New shares of closed-end funds may be created for the payment of capital gains distributions, and occasionally rights to purchase additional shares are issued to shareholders. On this matter see Wiesenberger (1986).

must buy or sell the shares at market prices on an open market, like the New York Stock Exchange. The market price of the closed-end shares is largely determined by the demand for and the supply of the shares at that time. In that case, the price of the shares is not necessarily set at its net asset value. In other words, the shares of the closed-end investment company may sell at a discount or premium. The premium is defined as the difference between the market value of the investment company and the net asset value of the portfolio, divided by the net asset value. The discount is a negative premium.

Under the assumptions of perfect capital market, the shares of clossed-end fund should sell for its net asset value. Otherwise, profitable arbitrage opportunities exist in the market. For instance, if the shares are selling at the a discount, an arbitrager can make profits by buying all of the fund's outstanding shares and liquidating the investment company for its net asset value.

Some authors have explored possible reasons for why the shares of closed-end fund sell at a discount or premium. Malkiel(1977) attributed the existence of the discount to unrealized capital gains of the fund's portfolio, which must be taxed, when realized, at the expense of a purchaser of the fund shares. Other explantions for discounts and/or premiums are the effects of (1) discrepancies between the true market value of the fund's portfolio and their quoted net asset value (i.e., accounting problems), (2) the existence of transactions costs, and (3) the productivity of fund management (e.g., see Thompson(1978)). A recent annual report on the closed-end investment companies by A. Wiesenberger services company cited a lack of aggressive advertising and sponsorship as a possible reason for the discounts. These explanations may account for the existence of the premiums and/or discounts on other types of closed-end funds. However, it appears that the existence of the premium on the Korea Fund is largely due to the existing capital and exchange controls across the countries.

Ⅲ. THE MODELS

1. When investors anticipate that existing capital controls remain unremoved in the foreseeable future

Consider the Korean and the U.S. economies in which capital movements have been largely restricted between the Korean and the U.S. investors. The U.S. investors have no direct access to the Korean stock market and other securities markets except for investment in the Korea Fund traded on the New York Stock Exchange. On the other hand, the Korean investors are not permitted to purchase stocks and other securities issued by the U.S. corporations and institutions.[2] The financial markets are segmented between these two countries, which requires a separate market

2) Since the 1988 spring, the Korean investors have been allowed to purchase the U.S. stocks and other securities on a limited basis. However, this will not affect the results of our analysis because the existence of the premium on the Korea Fund is mainly due to the restrictions on capital inflows into the Korean market.

equlibrium condition for each country. For our analytical purpose, we assume that the U. S. investors are concerned about returns in dollar terms, while the Korean investors in won terms. In that case, the U. S. inverstors take into account expected exchange rate changes when they invest in the Korea Fund.

The exchange rate of the Korean won against the U. S. dollar is neither pegged to a fixed parity by the central banks nor determined in a free market. Even though the Korean exchange rate regime has been known a managed floating rate regime based on a basket of major currencies, the Korean won was largely keyed to the U. S. dollar. Since the Korean economy accumulated a large trade surplus vis—a—vis the U. S., however, the Korean won has been appreciating against the U. S. dollar at a rapid rate in recent years. Considering this general background in the recent exchange rate movements, we assume that the investors anticipate that the current exchange rate will adjust to a long—run eqilibrium rate at which the Korean trade accounts are in balance vis—a—vis the U. S.

Assume that the Korean corporations pay out all earnings as dividends to the shareholders, and each share of stock represents an ownership claim to a single unit of physical capital. In that event the marginal product of capital is equal to earnings per share, μ. There are two types of assets available for investment purposes in the Korean capital market : equity and bond. A simple asset pricing model suggests that in equilibrium, earnings per won of the equity is equal to interest income per won investment in the bond plus a risk premium

$$(1) \qquad (\mu/q) = r+\pi$$

where q is the price per share of the equity, r is interst paid per won investment in the bond, and π is a risk premium. Assume that the total market value of the Korea Fund's portfolio of the Korean equity is nmq in won units. The value n is the number of outstanding shares of the Korea Fund. The value m is a conversion ratio of a share of the Korean equity into a share of the Korea Fund. The net asset value per share of the Korea fund is emq in dollar terms, where e is the dollar price of won.

For the U. S. investors, three types of assets are available for investment purposes : the U. S. bond, the U. S. equity, and the Korea Fund. Since the U. S. investors are concerned about returns in dollar terms, the earnings on the investment in the Korea Fund are also affected by an exchange gain or loss. Assuming that the risk premiums on the U. S. equity and on the Korea Fund are equal to the U. S. investors,[3] we can write the equilibrium condition in the U. S. capital market comparable to (1) as follows :

3) However, one can argue for or against a higher risk premimum on the Korea Fund relative to that on the U. S. equity. On the viewpoint that the Korea Fund is a foreign asset to the U. S. investors, and hence a riskier asset than the U. S. (home) equity, a greater risk premium is required on the Korea Fund than on the U. S. equity. On the other hand, for a portfolio diversification purpose, an inclusion of the Korea Fund in the U. S. portfolios may reduce a portfolio risk and hence a smaller risk premium is required on the Korea Fund to the U. S. investors.

(2) $[e_0 m\mu/emp] = (\mu^*/q^*) = r^*+\pi^*$

whers e_0 is a long—run (expected) equlibrum value of e. We define the variable p such that emp is the current market price per share of the Korea Fund in dollar terms, and hence $(e_0 m\mu/emp)$ is the earings—price ratio of the Korea Fund. All variables with asterisk in (2) represent the U. S. counterparts in dollars to the variables in (1).

The premium on the Korea Fund is the excess of the market price of the Korea Fund over its net asset value. Whereas the net asset value of the Korea Fund is determined by the Korean capital market equilibrium condition (1), the market price of the Korea Fund is determined by the U. S. capital market equlibrium condition (2). Therefore the key to determining the premium on the Korea Fund is to price the Korean equity relative to the U. S. equity of an equal investment cost. Reasoning along this line suggests that the premium is determined by a relative equilibrium condition of the Korean to the U. S. market. In order to derive a premium equation, we substact (2) from (1) and using the condition $(e_0 m\mu/emp) = (\mu^*/q^*)$ in (2), rearrange to obtain (3)

(3) $[(emp-emq)/emq] = (e_0/e)\{(q^*/\mu^*)[(r-r^*)+(\pi-\pi^*)] - [(1/e_0)/(1/e) - 1]\}$

where a positive value of the left—hand—side variable of (3) is a premium on the Korea Fund. The variables r, r^*, π, and π^* in (3) are considered to be in terms of the "rates", in neither dollar nor won terms. The terms—$[(1/e_0)/(1/e)-1]$ is a long—run expected rate of appreciation of the won against the dollar.

Equation (3) is one of the key equations pertaining to the determinants of the premium on the Korea Fund under capital and exchange controls. According to (3), the premium on the Korea Fund under capital and exchange controls is largely determined by the price—earnings ratio of the U. S. equity, the interst differentials and the expected exchange gains/losses. To further explore the implications of (3), we start with the benchmark case in which $r-r^*=0=\pi-\pi^*$, and $e_0-e=0$. In that case, the U. S. equity and the Korean equity of an equal investment cost are perfect substitutes to the U. S. investors, and hence the Korea Fund should sell for its net asset value as implied by (3). Now how does the premium on the Korea Fund change in response to one percentage point change in either the interest differentials or the expected rate of appreciation of the won against the dollar in the neighborhood of $r-r^*=0=\pi-\pi^*$ and $e_0-e=0$? Equation (3) suggests that while the premium changes in proportion to the one percentage point change in the expected rate of change of the exchange rate, it changes by a multiple percentage points of (q^*/μ^*) to the one percentage change in the interest rate differentials. The intuition behind this result is that the one percentage point change in the long—run expected rate of change of the exchange rate has only a valuation effect on the asset price in dollar terms. In that event, the value of the Korean equity relative to the U. S. equity increases by the one percentage point in dollar terms, which means a one percentage point higher premium on the Korea Fund. On the other hand, the one percentage point

change in the interest differentials means a one percentage point change of all future dividend earnings of the Korean equity above those of the U. S. equity, in equilibrium. In that case, the value of the Korean equity relative to the U. S. equity changes by one percentage point times the price—earnings ratio (q^*/μ^*).

2. When investors anticipate that the existing captial controls will be removed in the foreseeable future

Suppose that existing capital controls are expected to be removed in future year T. We assume that the Korean capital market will be completely integrated with the U. S. capital market in year T. Since the Korean market is small relative to the U. S. market, and hence will be dominated by the U. S. market, the Korean interest rate r (adjusted for the risk factor of the Korean bond relative to the U. S. bond) will drastically fall to the U. S. interest rate r^* in year T, given that r is currently higher than r^*.

If r is expected to fall to r^* in year T, the price per share of the Korean equity is also expected to change in year T. This is because the fall in r causes the Korean equity significantly more attractive to the Korean bond in year T, if other things are equal. When the Korean investors choose between the equity and the bond for an investment purpose in current year t, they will take into account this substantial change in q in year T. In that event, the following equilibrium condition may hold in current year t if the Korean equity market is efficient, i. e., the market properly anticipates this future event.

$$(4) \qquad (\mu/q(t)) + (1/T\text{-}t)[(q(T)-q(t))/q(t)] = r+\pi$$

where the left-hand-side (4) is the sum of the dividend earmings and the capital gain or loss per year per won investment in the Korean equity.[4]

To evaluate (4) and compare it to (1), we need to determine the price of the Korean equity in year T, $q(T)$. Since r will fall to r^* in year T, we may have the following equilibrium condition in the Korean capital market in yeat T.

$$(5) \qquad [\mu/q(T)] = r^*+\pi$$

where μ is assumed to remain unchanged in the subsequent years of T.[5] By examining (4) and (5), it is easy to see that $q(T)$ is greater than $q(t)$ if r is greater than r^*. It is also interesting to see how a removal of the capital controls in year T affects the share price of the Korean equity in current year t if the market properly

4) The market equilibrium condition represented by (4) is an approximation. To be more precise, we may write the equlibrium conditions as, for all $0 \leqq j \leqq T-t-1$,

(4′) $(\mu/q(t+j)) + [(q(t+j+1)-q(t+j))/q(t+j)] = r+\pi$

with the terminal condition (5) for $j=T-t$. However, the use of (4′) instead of (4) does not affect the results of the paper. To show this, we derive by successive substitutions on (4′) and using (5),

(8′) $q(t) = (\mu/r+\pi) + (1/r+\pi)(1/r+\pi+1)^{T-t}[(r+\pi)q(T)-\mu]$

It is easy to show from (8′) that $dq(t)/dt > 0$, and $d^2q(t)/dt^2 > 0$, which implies a dynamic time path of $q(t)$ similar to the one in Figure 1. We use (4) instead of (4′) in the text because (4) is simpler than (4′).

anticipates this future event. Now define the value of q which satisfies (1) as q_1 and the value of $q(t)$ satisfying (4) as q_2. By examining (1) and (4), we find that q_2 is greater than q_1 if $q(T)$ is larger than $q(t)$ in (4). In sum, we have the following relations.

(6) $q(T) > q_2 > q_1$ if $r > r^*$

While anticipation of a removal of the capital controls in year T affects the Korean capital market equlibrium condition in the current year t, it does not affect the U. S, capital market equilibrium condition (2). This is because the effect of the future event has been fully priced into $p(t)$. In fact, (5) and (2) suggest that $p(t) = q(T)$ when $\pi - \pi^* = 0 = e_0 - e$. It is easier to see this when we compare (2) to (4). In (4), $q(t)$ cannot be equal to $q(T)$ in view of (5) even when the Korean market properly anticipates the future event. The key reason is that the existing capital controls restrict r to remain greater than r^* in the preceding years of T.

In order to derive an equation for the premium on the Korea Fund when the investors anticipate that the existing capital controls will be removed in year T, we substract (2) from (4) and rearrange to obtain (7)

(7) $$[(emp(t) - emq(t)/emq(t)] = (e_0/e)\{(q^*/\mu^*)[(r - r^*) + (\pi - \pi^*) - (1/(T-t))((q(T) - q(t))/q(t))] - [(1/e_0/(1/e) - 1]\}$$

It is illuminating to compare (7) to (3). It immediately follows that the premium on the Korea Fund is less in (7) than that on the Korea Fund in (3), other things being equal. This result appears intuitively very appealing. In general, premiums on assets (or goods for the same reason) exist when assets are undervalued in regulated markets compared to what they will command in unregulated markets. In (3) or (7), the premium on the Korea Fund exists because the Korean equity is undervalued to the U. S. investors compared to what the equity would command in a unregulated market. However, the premium in (7) is less than that in (3), because anticipation of a removal of the capital controls has the same impact on the share price of the Korean equity as the Korean markets are being less regulated. This partially drives up $q(t)$ (regulated price) toward $q(T)$ (unregulated price) so that the net asset value of the Korea Fund rises and hence the premium falls.

Equations (4) and (7) can be used to derive the dynamic time paths of $q(t)$ and $v(t)$ as we approach T, where $v(t)$ is defined by the left-hand-side variable of (7).

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5) There are no clear-cut reasons to expect that will increase or decrease in the subsequent years of T. If a financial transfer (i. e., the U. S. investors' purchases of the Korean bond and equity) is accompanied by a real transfer (i. e., the Korean Imports of the U. S. physical capital), the marginal product of capital of the Korean firms may decline. Even so, however, it does not necessarily imply that the earnings per share of the Korean equity decline. If the Korean firms employ additional physical capital whose marginal product is no less than the cost of borrowing, the profits of the firms do not decline, and hence the earnings per share of the equity do not fall in the subsequent years of T. However, if the Korean firms issue new shares to finance physical capital spending, the earnings per share of the equity may decline as the marginal product of capital of the firms does so.

We first solve (4) for $q(t)$ for $t<T$ with the terminal condition $q(t)=q(T)$ at $t=T$, where $q(T)$ is given by (5). The solution for $q(t)$ is

(8) $q(t) = [\mu(T-t)+q(T)]/[(r+\pi)(T-t)+1]$, for $t<T$

Taking the derivative of (8) with respect to t, we find

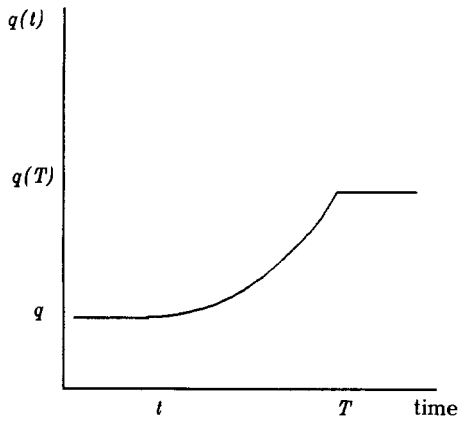
(9) $dq(t)/dt = [(r+\pi)q(T)-\mu]/[(r+\pi)(T-t)+1]^2 > 0$

since $r>r^*$, and hence $[(r+\pi)q(T)-\mu]>0$ in view fo (5). Equation (9) indicates that $q(t)$ rises steadily toward $q(T)$ as we approach T. The driving force of the dynamic time path of $p(t)$ is the variable $T-t$, which is the number of years for which r remains higher than r^*. The intuition is that as the number of remaining years declines steadily, the Korean equity approaches its full valuation. Since it can be easily shown that $d^2q/dt^2>0$, $q(t)$ rises at an increasing rate toward $q(T)$ as t goes toward T. Figure 1 shows the dynamic time path of $q(t)$.

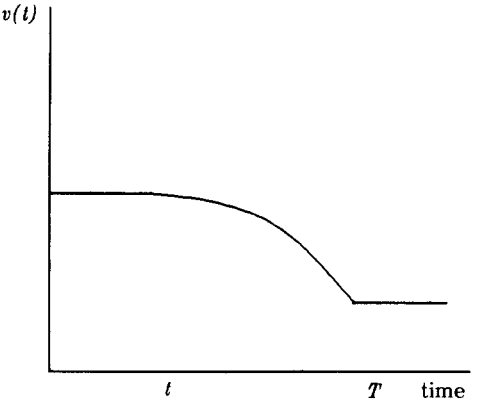
In order to derive the corresponding dynamic time path of the premium on the Korea Fund, we substitute (8) into (7) and find that.

(10) $dv/dt = -\mu[(r+\pi)q(T)-\mu]/[\mu(T-t)+c)]^2 < 0$

where v is the premium on the Korea Fund, Equation (10) suggests that the premium on the Korea Fund steadily declines as t goes toward T. This is because a steady rise in $q(t)$ raises its net asset value, and hence reduces the premium, other things being equal. Since we can easily show that $d^2v/dt^2<0$, the premium declines at an increasing rate as t goes toward T. Figure 2 shows the dynamic time path of $v(t)$.



[Figure 1] The Time Path of $q(t)$



[Figure 2] The Time Path of $v(t)$

Ⅳ. SOME EMPIRICAL OBSERVATIONS

The Korea Fund was first introduced on the New York Stock Exchange in September 1984. This section examines how well the premium equation (3) performs empirically by comparing the actual premiums to the ones predicted by (3). Since the U. S. financial market conditions have drastically changed after the 1987 October crash, we estimate the premium for periods prior to and after the crash. Our estimation is based on one observation point in September 1987 and in April 1988. The reason for these observation points is that the Korea Fund might not be fully marketed to the U. S. investors in the earlier years of 1984—1986. Since e_0 is not observable, we assume the values guessed in news media during the time for e_0. Table 1 shows the actual and assumed values of the variables in (3). Plugging the values in Table 1 into (3), and assuming $\pi-\pi^*=0$, we calculate the estimated premiums on the Korea Fund. The estimated premiums are 151 percent in September 1987 and 106 percent in April 1988. The actual premiums reported in the Wall Street Journal were 141 percent in September 1987 and 94 percent in April 1988. Based on these observations, the premium equation (3) appears to perform well empirically.

[Table 1] Values of the Variables of (3)

	e_0	e	(q^*/μ^*)	r	r^*
September 1987	.001429	.001240	20	.135	.0767
April 1988	.001538	.001348	15	.124[1]	.0702

Definition : r=yield on one-year monetary stabilization bond;
r^*=yield on one-year Treasury note.

Note : 1) quoted as of February 25, 1988.

In Januray 1981, the Korean governmont announced the liberalization plans according to which the existing capital and exchange controls are scheduled to be removed in the 1990s. Given this policy announcement, it is interesting to see whether the effect of this future event is priced into the current value of the Korean equtiy and hence the premium on the Korea Fund. For this purpose, we want to compare the actual premiums on the Korea Fund to those predicted by (7). Since (7) contains the term $(1/T-t)[(q(T)-q(t))/q(t)]$, we find from (4) and (5) that $(1/(T-t))[(q(T)-q(T))/q(t)]=[(r-r^*)+(\pi-\pi^*)]/[(T-t)(r^*+\pi)+1]$. For an illustrative purpose, we assume that the existing controls will be removed in the second half of the 1990s so that $T-t=10$. Using the values in Table 1 and assuming $\pi=\pi^*=0$, we find that the estimated premiums given by (7) are 73 percent in September 1987 and 50 percent in April 1988. These estimated premiums given by (7) are way below those actual premiums in both September 1987 and April 1988. This seems to suggest that the effect of the future event has not yet been priced into the current value of the Korean equity. In fact,

the reason why the actual premiums on the Korea Fund have dropped from 141 percent in September 1987 to 94 percent in April 1988 is mainly due to the decline in the price-earnings ratio (q^*/μ^*) in the U. S. equity market, not due to an increase in the price of the Korean equity resulting from the effect of the anticipated future event.

V. CONCLUDING REMARKS AND SOME POLICY IMPLICATIONS

In the literature, it is shown that the existence of controls can cause disparities between interest rates on assets denominated in the same currency but issued in different countries. For instance, during the period of January 1970 and December 1974, Germany placed a series of controls on capital inflows. During that time, the differential between the interest rate on Euromark deposits in Zurich and the interest rate on interbank mark-denominated loans in Frankfurt fluctuated from near zero in 1970 to an annual rate of more than 10 percent in April 1973. Dooley and Isard (1980) estimated that the controls accounted for an interest differential of about 6 percent per annum at its peak between February-October 1973.

The main contribution of this paper is to show that a similar argument can be made for disparities between returns on equities issued in different countries. Our premium equations are derived based on the notion that the premium on the Korea Fund reflects the true value of the Korean equity relative to the U. S. equity of an equal investment cost. This suggests that the existence of the premium on the Korea Fund is an indication that the return on the Korea Fund is higher than that on the U. S. equity. Our estimation shows that the existing controls accounted for most of the actual premiums on the Korea Fund in September 1987 and April 1988. Our results are, in fact, against the earlier suggestion by Malkiel (1977) that the effects of the controls on the premiums on the closed-end funds invested in foreign securities are likely to be small.

The paper has also considered the case when the investors anticipate a removal of the controls in the foreseeable future. If the equity market is efficient in the sense that the market properly accounts for the effect of this future event, it has the same impact on the equity price as the controls are being gradually removed. Its implications are that the price of the Korean equity would gradually rise to the level at which the Korean equity is just as attractive as the U. S. equity, and hence the premium on the Korea Fund also gradually declines down to zero. In that case, a sudden increase in the price of the Korean equity may be avoided in the year when the controls are removed. In order to induce this kind of a gradual transition, however, a policy announcement is needed well in advance. In fact, the Korean government announced the financial markets liberalization plans in January 1981. A remaining question is whether this liberalization proceeds as planned so that the investors believe the plans during the transitional period.

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APPENDIX

The Market Price and the Net Asset Value of the Korea Fund
(September 1984–December 1987)

in U. S. dollar