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GREEK CLOSED-END FUND PREMIA: DIFFERENCES AND SIMILARITIES WITH US PREMIA AND THEIR IMPLICATIONS

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ABSTRACT

Greek Closed-End Fund Premia: Differences and Similarities with US Premia and Their Implications*

The prices of Greek closed-end funds behave similarly to the prices of US funds: they deviate substantially from their net asset values (NAVs); they are more volatile than their NAVs; and they are overly-sensitive to the movements of the domestic stock market index. Furthermore, their premia are: (i) positively correlated cross-sectionally; (ii) positively correlated with the future NAV returns; and (iii) negatively correlated with the future returns on the funds. Yet most Greek funds are subsidiaries of banks that have considerable influence on their pricing, whereas US funds are owned mainly by small investors. Future explanations to the closed-end fund puzzle should, therefore, transcend the narrow institutional characteristics of asset composition and ownership of US closed-end funds.

JEL Classification: G14, G15, G23

Keywords: closed-end fund, net asset value, fund premium, fund discount, mean reversion, excess volatility, common factor, predictive ability, over-sensitivity, noise trading, small investor, bank subsidiary, arbitrage, measurement error, market friction

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NON-TECHNICAL SUMMARY

Closed-end funds are companies traded in the stock market, whose assets are securities issued by other companies. Closed-end funds are special because, unlike other traded companies in the stock market, their economic value is known with relative precision. This economic value, the so-called net asset value (NAV), is the known market value of their assets minus the relatively small net cost of the service they provide to investors. Closed-end funds have attracted the attention of both economists and investors because their prices do not always equal their NAVs. Substantial price deviations are observed over time, either in the form of premia or in the form of discounts, although for US closed-end funds discounts prevail on average.

The literature on the subject is voluminous, has concentrated almost exclusively on US closed-end funds, and has not resolved the question of why closed-end fund prices deviate so much from their NAVs. The early literature attempts to explain the deviations, but with only partial success because of errors in the NAV measurement of the true economic value of a closed-end fund, which can originate from tax, accounting or other factors. A second strand in the literature emphasizes frictions in the market, which prevent the effective arbitrage between price and NAV. Again, this literature can only explain part of the puzzle. For example, part of the premium in country funds invested in countries that restrict capital movements can be explained by the lack of arbitrage. Alternatively, the difficulty of opening up a closed-end fund can explain part of the discount in domestic funds. A more recent third strand in the literature claims to have explained the pricing puzzle, but assumes that a fraction of investors who buy closed-end funds are irrational, that is, they follow fads and trade based on sentiment (Lee, Shleifer and Thaler (1991)). Moreover, these irrational investors, or noise traders, are taken to be the small investors, because it is small investors who primarily hold closed-end funds in the United States.

Contrary to the United States, where small investors own the majority of closed-end fund shares, in Greece 10 of the 15 closed-end funds are subsidiaries of domestic banks, which hold a large chunk of the closed-end fund stocks and also appoint their management teams. Hence, if the behaviour of Greek closed-end funds resembles that of US closed-end funds, researchers ought to seek explanations for the closed-end fund puzzle that are universal and transcend the US institutional framework and the narrow notion that small investors are irrational.

Greek closed-end fund prices do indeed behave similarly to US closed-end fund prices. First, like their US counterparts, they deviate substantially from their NAVs. During the period 1987–90, Greek closed-end funds were selling at substantial premia, sometimes higher than 100% of the NAV. Later on, discounts became the norm. These discounts were also large, sometimes exceeding 35% of the NAV. As in the case of their US counterparts, it is difficult to explain the large magnitude of these deviations as simple measurement errors of the NAV.

A second common characteristic between Greek and US closed-end fund prices is their excessive volatility. The prices of 14 out of the existing 15 Greek closed-end funds fluctuate much more than their net asset values.

Third, like in the United States, there seems to be a common factor in Greek closed-end fund premia, which drives their evolution over time; the cross-sectional bivariate correlations between the premia are large and positive.

Fourth, Greek closed-end fund premia are negatively and statistically significantly associated with the subsequent fund returns. A 1% increase in today's premium is followed by a decline in the fund return of more than 0.5% a year later, a magnitude similar to the one estimated in the United States. Mean-reverting sentiment is one explanation for this correlation: if fund prices move above their NAVs due to positive sentiment, the subsequent drop in sentiment would cause prices to fall and would generate the observed negative correlation. Note, however, that such mean-reverting sentiment cannot be attributed exclusively to small investors.

Fifth, like in US country funds, Greek closed-end fund premia are positively associated with subsequent NAV returns. An 1% increase in today's premium is followed by an increase in the NAV return of about 0.2% one year later. This relationship is not as strong as the corresponding relationship of the premium with subsequent fund returns but, nevertheless, it suggests that the NAV may also contain a small measurement error and does not, therefore, adequately capture the true economic value of the closed-end fund: a positive (negative) measurement error today on the NAV that later disappears, would result in a subsequent fall (increase) in NAV and would generate the observed positive association between today's premium and future NAV returns.

Sixth, the fluctuations of the overall Greek stock market seem to unduly influence the fluctuation of the closed-end fund prices. The betas of the closed-end funds are close to unity, whereas the betas of their NAVs are about one-half. Put differently, there is a positive correlation between the excess return on the funds – or approximately the change in their premium –

and the return on the overall stock market. Greek investors are overly-sensitive to fluctuations in the overall domestic stock market, not paying proper attention to the composition of the closed-end fund portfolios, a large component of which is domestic fixed-income assets. These fixed-income assets do not necessarily behave like stocks. Similar evidence of over-sensitivity to the domestic market has been presented by Hardouvelis, La Porta and Wizman (1994) for the US country funds.

Lastly, the over-sensitivity of the premium to the domestic index does not originate from an over-sensitivity to the return of the parent bank. Fund returns and net asset value returns have a special positive relationship with their parent bank return, but this relationship is the same for the two returns. Put differently, excess fund returns are not related to the parent bank return. They are related to the component of the aggregate stock market return which is orthogonal to the parent bank return.

It is difficult to explain the empirical regularities of closed-end fund prices in Greece utilizing the proposed models in the academic literature. As in the United States, the behaviour of the closed-end fund premia is a puzzle. Yet, the evidence from Greek closed-end fund prices, when compared to the evidence from US closed-end prices, suggests that the eventual explanation to the puzzle must be universal and cannot be specific to the characteristics of the asset composition and ownership of US closed-end funds.

GREEK CLOSED-END FUND PREMIA: DIFFERENCES AND SIMILARITIES WITH U.S. PREMIA AND THEIR IMPLICATIONS

I. Introduction

Closed-end funds are companies traded in the stock market, whose assets are securities issued by other companies. Closed-end funds are special because, unlike other traded companies in the stock market, their economic value is known with relative precision. This economic value, the so called net asset value (NAV), is the known market value of their assets minus the relatively small net cost of the service they provide to investors. Closed-end funds have attracted the attention of both economists and investors because their prices do not always equal their NAVs. Substantial price deviations are observed over time, either in the form of premia or in the form of discounts, although for U.S. closed-end funds, discounts prevail on average.

The literature on the subject is voluminous. One strand in the literature attempts to explain the deviations as errors in the NAV measurement of the true economic value of a closed-end fund. These errors can originate from tax, accounting or other factors (see Malkiel [1977], Bourdeaux [1983], Brickley, Manaster and Schallheim [1991], and others). The conclusion from this research is that although these factors cause prices to deviate from NAVs, they cannot explain the observed magnitude of the deviations or their variation over time.

A second strand in the literature emphasizes frictions in the market, which prevent the effective arbitrage between price and NAV. Again, this literature can only explain part of the puzzle. For example, part of the premium in country funds invested in countries that restrict capital movements can be explained by the lack of arbitrage (see Bosner-Neal, Brauer, Neal, and Wheatley [1990], Hardouvelis, La Porta, and Wizman (HLW) [1994]).

Alternatively, the difficulty of opening up a closed-end fund can explain part of the discount in domestic funds (Brauer [1984]).

A recent third strand in the literature was initiated by the early work of Zweig [1973], and particularly the model and empirical work of Lee, Shleifer and Thaler (LST) [1991]. LST review the empirical anomalies related to closed-end fund prices and argue that none of the available explanations can satisfactorily explain all aspects of the closed-end fund puzzle. They propose a model similar to that of Delong, Shleifer, Summers, and Waldman [1990], in which a fraction of the investors that buy the closed-end funds are irrational, that is, they follow fads and trade based on sentiment. LST also emphasize that these irrational investors, or noise-traders, are small investors. Counter-arguments are found in Chen, Kan, and Miller [1993].

The literature on closed-end funds, although voluminous, has exclusively concentrated on U.S. closed-end funds. With the exception of Ammer [1990], who studied U.K. funds, there is no other analysis of closed-end funds outside the United States. This is a major handicap because the bulk of recent research attempts to create models and find explanations to the puzzle that are too specific to the institutional aspects of U.S. closed-end funds. For example, LST's [1991] notion that small investors are noise traders is probably motivated by the empirical observation that the owners of closed-end funds in the U.S. are small investors.

If the behaviour of closed-end funds outside the United States, which operate under different institutional frameworks, resembles the behaviour of U.S. closed-end funds, then researchers ought to seek explanations to the closed-end fund puzzle that are universal and transcend the narrow U.S. institutional framework. Indeed, this paper presents exactly one such example. Two thirds of Greek closed-end funds are subsidiaries of domestic banks, which hold a large chunk of the closed-end fund stocks and also appoint their management teams. Yet, as we see later, the prices of Greek closed-end funds behave amazingly similarly to the prices of U.S. closed-end funds.

The rest of the paper is organized as follows: Section II describes the institutional framework of Greek closed-end funds. Section III presents the first summary statistics of the fund returns, the NAV returns and their premia and describes the evolution of these premia over time. Section IV explores the cross-sectional common elements in the prices, NAVs and, particularly, the premia of the closed-end funds. Section V analyzes the time-series properties of the premia, specifically their predictive ability of future fund returns, NAV returns and excess returns. Section VI correlates movements in the premia with movements of the aggregate domestic market index to check for a possible presence of fund over-sensitivity to the domestic market (see HLW [1994] for such evidence in the case of U.S. country funds). Section VII explores the relationship between the returns of the funds and the returns of the banks that are major shareholders to see if the parent institutions exert an influence on the mispricing of the funds. Section IIX summarizes our principal findings and concludes.

II. Institutional Characteristics of Greek Closed-End Funds

At the end of 1994, fifteen closed-end mutual funds were operating in Greece, compared to 71 open-end funds and a total number of 189 companies traded in the Athens Stock Exchange (ASE). Table I presents the market value of the assets of each of the fifteen closed-end funds at the end of 1993. The total value of the assets of all fifteen funds at the end of 1993 was $446.89 million. The corresponding value of open-end funds was $3.56 billion, whereas the total capitalized value of the ASE was $14.57 billion. Thus, the average size of a closed-end fund is smaller than the average size of an open-end fund, and it is about half the average size of a company traded in the ASE. The largest closed-end fund is "Alpha EEX" with assets of $117 million and the smallest is "Mesogiaki EEX" with assets of $3.58 million. The table also shows that most closed-end funds do not have a long history. Nine of the fifteen closed-end funds have been introduced since the year 1990.

Closed-end funds in Greece are allowed to invest in a particular firm's stock or debt instruments amounts that cannot exceed 10% the book value of the firm's common equity, or 10% of the closed-end fund's own equity. Table II presents the three largest investments of each closed-end fund plus the largest shareholder of each fund. The table reveals that ten out of fifteen closed-end funds are subsidiaries of commercial or investment banks, and carry a name similar to the name of the parent institution. The parent institution holds a large percentage of the closed-end fund stocks. The parent institution usually has considerably more power, since it also appoints the management team of the closed-end fund.

Another interesting point in Table II is that the fund typically invests a high percentage of its assets in securities of the parent institution or other subsidiaries of the parent institution. For example, the "Investments Ergasias" puts the maximum allowed 10% of its assets in securities of the parent "Ergasias Bank." The close links between a closed-end fund and its parent institution opens up the question of whether or not there is a relationship between their returns. This question will be explored later in section VII.

Table III presents the asset structure of each fund in seventeen categories of investments. The table shows that domestic securities compose the largest share of a fund's portfolio, ranging from 55% for Interinvest to 90% for Dias. The domestic "bias" of the closed-end funds partly reflects the fact that capital has traditionally been restricted from moving freely abroad. Although laws were introduced as far back as 1986 allowing the movement of capital for investment in securities, restrictions still existed. The full liberalization of capital movements in Greece took place very recently, in May 1994 (see Bank of Greece [1994]).

III. Greek Closed-End Fund Premia: Summary Statistics and their Evolution over Time

Until 1994, Greek closed-end funds were required to publish their net asset value at the end of each quarter. The reported net asset value was, therefore, checked by a certified accountant. These are the data used in our analysis and were supplied to us by the individual funds themselves. The quarterly availability of the net asset value data establishes a quarterly frequency in our sample. The sample size, reported in the third column of Table I, is different for each fund. The longest available NAV series is that of Investments Ergasias, which dates back to the first quarter of 1983.

Table IV presents the means and standard deviations of (i) the return of each fund, (ii) the NAV return of each fund, and (iii) the fund premium, that is, the percentage deviation of the price from the NAV. The return of the fund is defined as $R_{t+1} = \ln(P_{t+1} + D_{t-1}) - \ln(P_t)$, where P_{t-1} is the end-of-quarter-t+1 stock price of the fund, and D_{t+1} denotes the value of dividends paid during quarter t+1, compounded daily at the prevailing risk-free (three-month T-bill) rate to reflect the end-of-quarter value. The corresponding NAV return is defined as $R'_{t+1} = \ln(NAV_{t+1} + D_{t-1}) - \ln(NAV_t)$, where NAV_{t+1} is the end-of-quarter-t+1 net asset value. Finally, the percentage deviation of price from NAV is defined as $PREM_t \doteq \ln(P_t / NAV_t)$. The table shows that the average deviations of prices from their NAVs are quite large. In some funds these deviations are positive (premia), whereas in other funds the deviations are negative (discounts). It is not easy, however, to make a precise cross-sectional comparison because the historical samples are different for the different funds.

Table IV also shows that Greek closed-end fund returns exhibit large standard deviations. In fourteen out of the fifteen funds, the standard deviation of the fund return is larger – and in most cases substantially larger -- than the standard deviation of the NAV return, and in one fund the standard deviations are approximately equal. Hence, there is

evidence of excess volatility in fund prices similar to the one reported in HLW [1994] for U.S. country funds or Pontiff [1994] for U.S. domestic funds.

The evolution of the average closed-end fund premium over time is shown in Diagram I. Diagram I plots the cross-sectional arithmetic mean of $PREM_t$ from 1983:I through 1994:IV. In the first five years, from 1983:I through 1988:I, the cross-sectional mean contains only one fund, Investments Ergasias. Later on, more funds are added as more data become available. Observe that until 1992, and excluding the 1983-85 period, Greek funds where exhibiting premia. These premia were quite high during the four-year period 1987-1991, sometimes exceeding 100 percent! After 1992, most funds have been trading at discounts. All the funds introduced since 1992 are traded at discounts and at prices sometimes as low as -35 percent their NAVs.

Diagram I also plots the logarithm of the Athens Stock Exchange Index (ASEI). A comparison of the two plots reveals a close positive correlation between changes in the index and changes in the average premium. In particular, the year 1987, a period when high premia appeared for the first time, coincides with a vast increase in the aggregate index. Subsequently, the ups and downs of the index coincide with similar ups and downs in the premium, although the index never declines to the pre-1987 levels as the premium does. The positive association between changes in the premium and changes in the index suggests an over-sensitivity of fund prices to the general stock index, which is reminiscent of a similar relation in U.S. country fund prices, estimated by HLW [1994]. This apparent over-sensitivity will be explored more fully later in Section VI.

It is hard to think of reasons why such high premia prevailed for the four-year period 1987-1990. Each fund manager we contacted independently suggested that the premia reflected a climate of excessive euphoria in the Greek stock market that began in early 1987 and lasted three or four years. On the other hand, by 1990, the end of this four-year period, the market was becoming deeper and wider with high trading volume and with more information flowing to investors about each company of the ASE. By that time, a system of

electronic transactions was introduced in the ASE, a modern clearing house was created and the number of brokerage firms had multiplied. The ASE had become one of the fastest growing stock markets in the world, attracting the interest of foreign institutional investors as well. It is possible, therefore, that as time went by, comparatively more rational investors entered the market, causing the high premia to slowly disappear.

IV. Are the Different Premia Related to Each Other?

Panels A, B and C of Table V present the bivariate correlations between (i) the fund returns, (ii) the NAV returns, and (iii) the premia for seven of the funds, whose data go as far back as 1991:I. Panels A and B show that the bivariate correlations between the fund returns or the NAV returns are positive. This is an expected result because the differences in the portfolios of these funds are not very large (Table III).

Panel C of Table V shows that the bivariate correlations between the premia are also positive and high. It appears, therefore, that at least one common factor across the funds drives the evolution of their premia over time. Recall that a similar positive cross-sectional correlation between the premia is reported by LST [1991] for U.S. domestic closed-end funds and by HLW [1994] for U.S. country funds. These authors argue that the common factor which drives these premia is noise-trader sentiment.

V. The Predictive Ability of the Premium

We now turn to the time-series properties of the closed-end fund premia, specifically their predictive ability. Neal and Wheatley [1993] have shown that, during the period 1933-1991, the premium of a U.S. domestic fund is able to predict the future returns (primarily movements of the price) of the fund. An increase in the premium by one percent today is associated with a decline in the return of the fund of 0.56%, 1.09%, 1.67%, and 2.57% one,

two, three, and four years later. HLW [1994] have provided similar evidence for the U.S. country funds for the period 1985-1993. An increase in the premium by one percent today is associated with a decline in the return of the country fund by 0.06%, 0.14%, and 0.40% one, four, and thirteen weeks later. Both sets of authors interpret the negative association as evidence of mean-reverting sentiment, which influences the fund price: An increase in the fund price today due to positive sentiment is followed by a gradual decrease in the price due to mean-reversion in sentiment, generating a negative correlation between the current premium and the future fund returns.

HLW [1994] have also shown that the premium predicts movements in the NAVs of domestic country funds as well. An one percent increase in the premium today is associated with an increase in the NAV return by 0.02%, 0.06%, and 0.13% one, four and thirteen weeks later. This is evidence that part of the premium reflects a rational assessment of the true economic value of the fund: The current NAV contains a large negative measurement error, underestimating the true value of the fund, whereas the current price of the fund does not contain the same negative measurement error, hence, a premium is generated. As time goes by, the measurement error on the NAV disappears, hence, the NAV increases reflecting more closely the true economic value of the fund. Thus a positive correlation is created between the current premium and future NAV returns.[1]

Table VI presents regressions of the multi-period return on the fund, $R_{t,t+N}$, the multi-period return on the NAV, $R'_{t,t+N}$, and the multi-period excess return, $R_{t,t+N} - R'_{t,t+N}$, on the beginning of the period premium, $PREM_t = \ln(P_t / NAV_t)$. The returns are defined over horizons of one, two, three and four quarters as follows: $R_{t,t+N} = \ln(P_{t+N} + D_{t,t+N}) - \ln(P_t)$, N = 1, 2, 3, 4, where P_{t+N} is the price of the fund at the end of period t+N and $D_{t,t+N}$ is the end-of-period value of dividends paid within the period (t, t+N), compounded daily at the risk-free three-month T-bill rate to reflect the end-of-period value. $R'_{t,t+N}$ is similarly defined as $\ln(NAV_{t+N} + D_{t,t+N}) - \ln(NAV_t)$. Given the small sample size for most funds, the

regressions stack all 15 funds together, allowing for separate fund intercepts but restricting the slope coefficients to be the same across the funds.

Table VI shows that, as in the case of U.S. domestic closed-end funds (Neal and Wheatley [1993] or Pontiff [1993]), there is a statistically significant negative association between today's premium and the future return of the fund at every horizon.[2] An increase in the premium today by one percent is associated with a decline in the fund return of 0,23%, 0.34%, 0.43%, and 0,57% one, two, three, and four quarters later. Thus, as in the case of U.S. domestic funds, at least fifty percent of the original increase in the premium of Greek domestic funds disappears one year later.

Table VI also reveals a small positive association between the current premium and the future NAV returns. This association is insignificant, but becomes statistically significant and much stronger later on in Tables VII and VIII, when we include additional explanatory variables in the regressions. Observe that an increase in the premium today by one percent is associated with an increase in the NAV return by 0.11% two and three quarters later.[3] This positive association is consistent with the evidence of Chay and Trzcinka [1993] for domestic US funds and HLW [1994] for US country funds. The positive association of the current premium with the future NAV return implies that the excess return $R_{t,t+N} - R^{'}_{t,t+N}$ ought to have a stronger negative association with $PREM_t$ than $R_{t,t+N}$ has. Indeed, Table VI shows that this association is both bigger in magnitude and is estimated more precisely.[4]

As mentioned earlier, the premium´s ability to predict future NAV returns suggests that part of the premium reflects a measurement error on the NAV. A positive (negative) current error on the NAV that subsequently disappears generates a positive correlation between the current premium and future NAV returns. On the other hand, the premium´s even greater ability to predict future fund returns suggests that a larger part of the premium might reflect "measurement" error on the fund price. Such a measurement error could be due to the presence of noise traders. If the price moves higher than the NAV due to positive sentiment, and if sentiment itself is mean-reverting, then the price is expected to

subsequently decline, generating a negative correlation between today's premium and the future return. It is difficult to think of an alternative interpretation based on risk premia.

VI. Premium Over-Sensitivity to the Domestic Stock Index?

Recall that Diagram I revealed a close positive relationship between changes in the premium and changes in the logarithm of the Athens stock market index (ASEI). Changes in the premium are approximately equal to the excess return on the fund, $R_{t,t+N} - R'_{t,t+N}$. Indeed, $R_{t,t+N} - R'_{t,t+N} = [\ln(P_{t+N} + D_{t+N}) - \ln(NAV_{t+N} + D_{t+N})] - [\ln(P_t) - \ln(NAV_t)]$. The second term in brackets is the percentage premium at time t, $PREM_t$. The first term in brackets is approximately equal to the percentage premium at t+N, $PREM_{t+N}$. The approximation is more exact the smaller dividends are relative to the price or the net asset value. Hence, the excess return is approximately equal to the change in the percentage premium. Also, note that changes in the logarithm of the ASEI are equal to the return on the Greek stock market, excluding dividends: $RM_{t,t+N} = \ln(ASEI_{t+N} / ASEI_t)$. Thus, in order to analyze the positive relationship of Diagram I further, we now correlate the excess return, $R_{t,t+N} - R'_{t,t+N}$, with the return on the aggregate stock market, $RM_{t,t+N}$.

Table VII presents regressions in which the dependent variables are the same multi-period returns of Table VI, $R_{t,t+N}$, $R'_{t,t+N}$ and $R_{t,t+N} - R'_{t,t+N}$. The independent variable is the return on the aggregate stock market, $RM_{t,t+N}$, which is defined over the same horizon as the dependent variables, N = 1, 2, 3, or 4 quarters. The regressions show that the sensitivity, or beta, of the fund return with respect to the aggregate stock market return is about twice the sensitivity of the NAV return. Hence, the excess return $R_{t,t+N} - R'_{t,t+N}$ is positively related to $RM_{t,t+N}$, confirming the visual impression of this correlation from Diagram I. The positive association between $R_{t,t+N} - R'_{t,t+N}$ and $RM_{t,t+N}$ continues to hold

when we add to the regressions the independent variable of Table VI, namely, the beginning-of-the-period premium, $PREM_t$.

The positive association between the excess return on the fund and the return on the aggregate stock market suggests that fund prices are overly-sensitive to movements in the aggregate index. Investors apparently ignore the fact that a large percentage of the closed-end fund assets are invested in fixed-income securities, whose value does not necessarily move in the same direction as the overall stock market, and act as if the fund's value is related very closely to the value of the overall stock market.

VII. The Relation of the Premium to the Return of the Parent Bank

The over-sensitivity of the closed-end fund premium to the general stock market index leads us to explore further the nature of this relationship. Specifically, we would like to know whether or not the over-sensitivity is due to the special relationship Greek closed-end funds have with Greek banks, or it is due to other extraneous factors. As mentioned earlier, ten of the fifteen Greek closed-end funds are bank subsidiaries (Table II).

In order to first check if the special relationship between the parent bank and the closed-end fund subsidiary is evident in the data, one can add the parent bank return as an explanatory variable to a regression of the fund return on the general stock market return. If the bank return adds explanatory power to the regression, one may then conclude that the relationship between closed-end funds and their parent bank is econometrically important, and goes beyond the usual relationship between fund returns and the market return. Subsequently, a similar regression, in which the dependent variable is the excess fund return, can also pinpoint the source of the closed-end fund price over-sensitivity to the domestic stock market index.

Table VIII enhances the regressions of earlier Table VII by including the parent bank return as an additional explanatory variable. The new regressions are now run for eight

closed-end funds -- two out of the ten close-end funds that are subsidiaries of banks have missing observations on the parent bank return. Observe that in both the fund and NAV regressions the δ_N coefficients are positive and statistically significant for all four quarterly horizons, suggesting that there is, indeed, a special relationship between the parent bank and the fund subsidiary.

Table VIII further shows that the δ_N coefficients are similar across the fund and the net asset value return regressions -- in all the horizons except for N = 4 quarters -- and, hence, the excess return is unrelated to the parent bank return. On the contrary, the excess return is strongly related to the market return. It follows that the over-sensitivity of the premium to the domestic stock market index is due primarily to factors that are orthogonal to the parent bank returns.

IIX. Conclusions

Greek closed-end funds are of smaller size than their U.S. counterparts and have a special characteristic that differentiates them substantially from U.S. closed-end funds. Most of them are subsidiaries of banks. By contrast, in the U.S., closed-end funds are owned primarily by small investors. In Greece, the parent institution controls the closed-end fund not only through its direct stock ownership, but also through the ability to appoint the management team.

Despite the differences in ownership between Greek and U.S. closed-end funds, the behaviour of their prices shows surprising similarities. One conclusion from these similarities could be that, like in the United States, the few small Greek investors, who own a percentage of the stocks of these funds, may have an unduly large influence in the determination of Greek closed-end fund prices and, particularly, their premia above net asset values. However, given the differences in ownership in the two countries, another more reasonable conclusion would be that the behaviour of closed-end fund prices is not

necessarily related mainly to the behaviour of small investors. The similarities in the behaviour of Greek and U.S. closed-end fund prices must, therefore, be explained by an hypothesis that does not necessarily depend on the much-emphasized presence of irrational small investors (LST [1991]).

The similarities between the behaviour of Greek closed-end fund prices and U.S. closed-end fund prices that the paper uncovered are the following: First, like their U.S. counterparts, Greek closed-end fund prices deviate substantially from their NAVs. During the four-year period 1987-1990, Greek closed-end funds were selling at substantial premia, sometimes higher than 100 percent the NAV. Later on, discounts became the norm. These discounts were also large, sometimes exceeding -35 percent the NAV. Like the case of their U.S. counterparts, it is difficult to explain the large magnitude of these deviations as simple measurement errors of the NAV.

A second common characteristic between Greek and U.S. closed-end fund prices is their excessive volatility. The prices of the overwhelming majority of the Greek closed-end funds fluctuate a lot more than their net asset values. Similar evidence has been reported by HLW [1994] for U.S. country fund prices, and Pontiff [1994] for U.S. domestic fund prices.

Third, there seems to be a common factor in Greek closed-end fund premia, which drives their evolution over time. The cross-sectional bivariate correlations between the premia are large and positive. Similar evidence for the U.S. funds is reported by LST [1991], HLW [1994] and others.

Fourth, Greek closed-end fund premia are negatively and statistically significantly associated with the subsequent fund returns. An one percent increase in today's premium is followed by a decline in the fund return of more than 0.5% a year later. Neal and Wheatley [1993] report a drop in the return of U.S. domestic funds of 0.56%, and the drop in the return of Greek domestic funds is 0.57%! These estimated correlations suggest that if a measurement error story were to explain the behaviour of Greek closed-end fund premia, a large component of such a measurement error would have to be attached on the price of

the fund. Mean-reverting sentiment is one such measurement error story: If fund prices move above their NAVs due to positive sentiment, the subsequent drop in sentiment would cause prices to fall and would generate the observed negative correlation. Note, however, that such mean-reverting sentiment cannot be attributed exclusively to small investors.

Fifth, Greek closed-end fund premia are positively associated with subsequent net asset value returns. An one percent increase in today's premium is followed by an increase in the NAV return of about 0.20% a year later (Table VIII). This relationship is not as strong as the corresponding relationship of the premium with subsequent fund returns but, nevertheless, it suggests that the net asset value may also contain a small measurement error and does not, therefore, adequately capture the true economic value of the closed-end fund : A positive (negative) measurement error today on the NAV that later disappears, would result in a subsequent fall (increase) in NAV and would generate the observed positive association between today's premium and future NAV returns. A similar positive association is found by HLW [1994] for the case of U.S. country funds and by Chay and Trzcinka [1993] for the case of U.S. domestic funds.

Sixth, the fluctuations of the overall Greek stock market seem to unduly influence the fluctuation of the closed-end fund prices. The betas of the closed end funds are close to unity, whereas the betas of their NAVs are about one-half. Put differently, there is a positive correlation between the excess return on the funds -- or approximately the change in their premium -- and the return on the overall stock market. Greek investors are overly-sensitive to fluctuations in the overall domestic stock market, not paying proper attention to the composition of the closed-end fund portfolios, a large component of which is domestic fixed-income assets. These fixed-income assets do not necessarily behave like stocks. Similar evidence of over-sensitivity to the domestic market has been presented by HLW [1994] for the U.S. country funds. No one has examined if the domestic U.S. funds are also overly-sensitive to the behaviour of the domestic stock market.[5]

Finally, the over-sensitivity of the premium to the domestic index does not originate from an over-sensitivity to the return of the parent bank. Fund returns and net asset value returns have a special positive relationship with their parent bank return, but this relationship is the same for the two returns. Put differently, excess fund returns are not related to the parent bank return. They are related to the component of the aggregate stock market return which is orthogonal to the parent bank return.

It is difficult to explain the empirical regularities of closed-end fund prices in Greece utilizing the proposed models in the academic literature. As in the U.S., the behaviour of the closed-end fund premia is a puzzle. Yet, the evidence from Greek closed-end fund prices, when compared to the evidence from U.S. closed-end prices, suggests that the eventual explanation to the puzzle must be universal and cannot be specific to the characteristics of the asset composition and ownership of U.S. closed-end funds.

References

Ammer, John M., 1990, "Expenses, Yields, and Excess Returns: New Evidence on Closed End Fund Discounts from the U.K.," London School of Economics, Financial Markets Group Discussion Paper no.108.

Bank of Greece, 1994, "The Liberalization of Capital Movements and the Financial Markets Disturbance of May 1994", *Economic Bulletin* No 4, November, pp. 7-12.

Bosner-Neal Catherine, Greggory Brauer, Robert Neal, and Simon Wheatley, 1990,"International Investment Restrictions and Closed-End Country Fund Prices," *Journal of Finance* 45, 523-47.

Boudreaux, K.J., 1973, "Discounts and Premiums on Closed-End Funds: A Study in Valuation," *Journal of Finance* 28, 512-22.

Brauer, Greggory A., 1984, "Open-Ending Closed-End Funds," *Journal of Financial Economics* 13, 491-508.

Brickley, James A., Steven Manaster, and James Schallheim, 1991, "The Tax Timing Option and the Discounts on Closed-End Investment Companies," *Journal of Business* 64, 287-311.

Chay, J.B., and Charles A. Trzcinka, 1993, "The Pricing of Closed-End Funds: Discounts and Managerial Performance," Working Paper, School of Management, State University of New York at Buffalo.

Chen, Nai-Fu, Raymond Kan and Merton Miller, 1993, "Are the Discounts on Closed-End Funds a Sentiment Index ?" *Journal of Finance* 48, 795-800.

DeLong, J. Bradford, Andrei Shleifer, Lawrence H. Summers, and Robert Waldman, 1990, "Noise Trader Risk in Financial Markets," *Journal of Political Economy* 98, 703-38.

Hardouvelis, Gikas A., Rafael La Porta and Thierry A. Wizman, 1994, "What Moves the Discount on Country Equity Funds?" in the *Internationalization of Equity Markets*, pp 345-97, J. Frankel edt., Chicago: University of Chicago Press.

Lee, Charles M.C., Andrei Shleifer, and Richard Thaler, 1991, "Investor Sentiment and the Closed-End Fund Puzzle," *Journal of Finance* 46, 75-109.

Malkiel, Burton G., 1977, "The Valuation of Closed-End Investment Company Shares," *Journal of Finance* 32, 847-60.

Neal, Robert, 1994, "Comment on What Moves the Discount on Country Equity Funds?" in the *Internationalization of Equity Markets*, pp 345-97, J. Frankel edt., Chicago: University of Chicago Press.

Neal, Robert, and Simon Wheatley, 1993, "Closed-End Fund Discounts and the Predictability of Small Firm Returns," Working Paper, University of Washington.

Newey, Whitney K. and Kenneth D. West, 1987, "A Simple Positive Definite, Heteroscedasticity and Autocorrelation Consistent Covariance Matrix," *Econometrica*, 55, 703-708.

Pontiff, Jeffrey, 1993, "Closed-End Fund Premia and Returns: Implications for Financial Market Equilibrium," Working Paper, University of Washington.

Pontiff, Jeffrey, 1994, "Excess Volatility and Closed-End Funds," Working Paper, University of Washington.

White, H., 1980, "A Heteroscedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroscedasticity," *Econometrica*, 48, pp. 817-838.

Xia, Ziongjian, 1995, "The Information Content of Closed-End Fund Discounts Revisited," Work in Progress, Department of Economics, Rutgers University.

Zweig, Martin E., 1973, "An Investor Expectations Stock Price Predictive Model using Closed-End Fund Premiums," *Journal of Finance* 28, 67-87.

Endnotes

[1] Neal and Wheatley [1993] do not find a consistent correlation between today's premium and the future NAV returns of domestic U S. funds. Neither does Xia [1995]. Chay and Trzinka [1993] find a small positive correlation.

[2] Heteroskedasticity-consistent t-statistics are reported, as in White [1980]. In the horizons of N = 2, 3, and 4 quarters, these statistics ignore the serial correlation created by the overlapping of the time intervals. There is no easy way to correct for this serial correlation in the stacked regressions. Traditional techniques, such as Newey and West's [1987], introduce a large error to the corrected standard errors because they assume --for the purposes of the correction-- that the last observation of one fund is one time interval behind the first observation of the next fund in the stacking. Since each fund's time series is small and there are fourteen such links in the stacked form, this error can be large, rendering the standard correction inappropriate.

[3] In Tables VII and VIII, an one percent increase in the premium today is associated with a future increase in the NAV return of approximately 0.20%.

[4] We have also repeated the regressions of Table VI redefining the independent variable as $PREMD_t = \ln(P_t + D_t) - \ln(NAV_t + D_t)$. The new variable avoids a measurement error problem mentioned by Neal [1994]. Neal observed that the definition of the percent premium used in regressions similar to those of Table VI can be influenced by large dividend payouts, especially at times when the premia are very high. Assume, for example, that the price a closed-end fund is $30, whereas its NAV is $20, implying a $10 or 50% premium above NAV. Next, assume that the fund is paying a dividend of $5 and, hence, its NAV declines to $15. If markets are efficient, the price ought also to decline by $5 to the level of $25. Now, however, the same $10 premium equals 66.67% the new NAV! Thus, large dividend payouts can create large measurement errors in the independent variables of the regressions, biasing the estimated coefficients towards zero. The regression results are, however, very similar to the results of Table VI: An one percent increase in the adjusted premium, $PREMD_t$, is associated with a 0.23%, 0.34%, 0.43% and 0.58% one, two, three and four quarters later.

[5] LST [1991] emphasize the relationship of the fund premium with the return of small company stocks.

Table I
Greek Closed End Funds

Greek Closed End Funds	Total Assets, end-1993 ($ million)	Date of first listing	Date of the first observation in the sample
Alpha AEEX	117.00	11.19.84	03.31.90
Anaptixeos Investments	10.96	08.12.82	03.31.90
Dias AEEX	5.16	07.27.92	09.30.92
EDEX	13.47	08.18.80	03.31.90
Elliniki AEEX	82.95	01.19.73	12.31.88
Emporiki AEEX	6.69	08.17.93	09.30.93
Eolliki AEEX	7.17	08.09.93	31.12.93
Ergasias Investments	61.91	11.11.77	03.31.83
Ethniki AEEX	44.80	06.19.81	06.30.88
Exelixi AEEX	4.17	05.06.92	12.31.92
Interinvest	3.72	01.15.92	12.31.92
Ioniki AEEX	11.93	08.02.93	09.30.93
Messogiaki AEEX	3.58	08.18.93	03.31.94
Pireos Investments	11.68	05.18.91	03.31.91
Proodos	61.70	07.30.90	09.30.90

Source: Bank of Greece.

Table II
The Largest Investments and the Largest Shareholder of each Closed-End Fund at the end of 1993

The second column shows the three largest investments of each fund (percent of the fund's assets). The third column shows the major shareholder, typically a bank, with the percentage of stocks it owns. Five of the fifteen closed-end funds do not have a major shareholder that owns more than 10% of the shares. The source of the data are the funds themselves.

	Largest Investments	Largest Shareholder
Alpha AEEX	Pisteos Bank (8.8%) Titan (2.7%) Alpha Leasing (2.5%)	Alpha Pisteos Bank (30%)
Anaptixeos Investments	Ergasias Bank (4%) Alpha Leasing (4%) Intrakom (4%)	Kritis Bank (74.1%)
Dias AEEX	Pisteos Bank (7%) Alpha Leasing (6%) Ergasias Bank (5%)	Ownership diffusion
Edex	Titan (6%) Ethniki Bank (5%) Pisteos Bank (4%)	ETEVA (57%)
Elliniki AEEX	Pisteos Bank (3%) Emporiki Bank (3%) Ioniki Bank (2%)	ETVA (50%)
Emporiki AEEX	Emporiki Bank (9%) Ioniki Bank (6%) Attikis Bank (6%)	Emporiki Bank (85%)
Eoliki AEEX	Klonatex (7.2%) Rilken (4.9%) Delta (4.9%)	Ownership diffusion
Ergasias Investments	Ergasias Bank (10%) Elais (6%) Radio Athina (4%)	Ergasias Bank (34%)
Ethniki AEEX	Ethniki Bank (7%) Astir Bank (6%) Titan (4%)	Ethniki Bank (83%)
Exelixi AEEX	Pisteos Bank (7%) Delta (6%) Emporiki Bank (5%)	Ownership diffusion
Idiotiki Investments	Pireos Bank (8%) Delta (7%) Ergasias Bank (4%)	Pireos Bank (10%)
Interinvest	Emporiki Bank (4%) Pisteos Bank (4%) Ergasias Bank (4%)	Ownership diffusion
Ioniki Investments	AGET Iraklis (8%) Ioniki Bank (5.8%) AEGEK (4.6%)	Ioniki Bank (75%)
Mesogiaki Investments	Rokka (16%) Metka (10%) Ag.Georgiou Mills (8%)	Ownership diffusion
Proodos Investments	Ergasias Bank (10%) Pisteos Bank (10%) Tria Epsilon (6%)	Ergasias Bank (10%)

Table III
Asset structure of Greek closed-end funds in seventen categories of investments at the end of 1993

	Eoliki (%)	Alpha (%)	Dias (%)	Ethniki (%)	Elliniki (%)	Eboriki (%)	Exelixi (%)	Anaptix (%)	Ergasias (%)	E.D.E.X. (%)	Idiotiki (%)	Interin. (%)	Ioniki (%)	Mesogia (%)	Proodos (%)	Total ($ mill.)	Total (%)
Domestic Securities	57.75	70.59	90.00	67.37	55.84	81.29	79.81	80.96	71.99	81.29	73.64	55.06	60.58	81.05	65.34	302.14	67.61
Stocks listed in the ASE	54.22	42.55	61.98	52.25	38.46	62.17	61.15	55.98	68.47	50.42	58.52	34.81	41.98	72.53	44.99	217.70	48.72
Stocks not listed	0.00	0.26	0.00	0.22	0.92	0.00	1.15	0.04	3.53	3.58	1.75	0.54	0.00-	0.00	6.17	7.92	1.77
T-Bills	0.00	14.86	15.71	5.50	1.14	19.12	0.00	0.37	0.00	8.76	0.00	18.21	0.00	3.69	1.93	26.10	5.84
T- Bonds in GRD	3.36	8.92	0.00	1.34	3.71	0.00	1.92	11.39	0.00	7.39	7.22	0.00	11.67	0.00	8.99	24.46	3.47
T- Bonds in FE	0.00	1.71	12.05	0.00	1.11	0.00	14.23	1.79	0.00	0.00	6.15	1.51	6.93	4.82	3.24	8.11	1.81
Bank Bonds	0.00	0.00	0.31	0.00	9.40	0.00	0.00	7.98	0.00	2.83	0.00	0.00	0.00	0.00	0.00	9.07	2.03
Corporate Bonds	0.17	2.29	0.00	1.03	0.59	0.00	0.00	1.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.76	0.84
Mutual Fund Shares	0.00	0.00	0.00	0.00	0.51	0.00	1.35	2.34	0.00	8.31	0.00	0.00	0.00	0.00	0.00	4.18	0.94
Other	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.84	0.19
Foreign Securities	35.59	2.24	0.00	0.00	22.27	0.00	9.81	7.36	26.08	16.95	22.85	32.76	0.00	0.00	29.51	93.32	20.88
Stocks	0.11	7.98	0.00	0.00	15.47	0.00	0.00	3.15	18.49	8.61	8.25	16.38	0.00	0.00	0.00	39.17	8.76
Bonds	23.17	9.81	0.00	0.00	6.81	0.00	0.00	1.54	7.58	8.34	14.60	13.58	0.00	0.00	29.12	45.97	10.29
Mutual Fund Shares	12.31	4.63	0.00	0.00	0.00	0.00	9.81	2.67	0.00	0.00	0.00	2.80	0.00	0.00	0.00	7.95	1.78
Other	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.39	0.24	0.05
Reserves	6.66	6.70	9.95	0.00	21.88	18.71	10.38	11.68	1.93	1.76	3.51	12.18	39.42	18.95	5.15	51.42	11.51
Cash & Deposits in GRD	0.00	0.11	4.43	0.00	6.24	2.22	0.09	0.44	0.59	0.06	3.29	12.18	1.41	6.05	0.07	8.10	1.81
Cash & Deposits in FE	0.00	0.09	0.00	0.00	5.87	16.49	0.00	2.09	0.00	0.24	0.21	0.00	0.00	0.00	0.20	9.89	2.22
Repos	5.54	6.74	5.52	0.00	9.77	0.00	10.29	9.15	1.34	1.46	0.00	0.00	38.01	12.67	4.88	33.34	7.46
Other	1.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.02
Total (percent)	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00		100.00
Total ($ million)	7.17	117	5.16	44.80	82.95	6.69	4.17	10.96	61.91	13.47	11.68	3.70	11.93	3.58	61.70	446.89	

ASE = Athens Stock Exchange, GRD = Greek Drachmas, FE = Foreign Exchange.
Source: Bank of Greece.

Table IV

Summary Statistics for Greek Closed-End Fund Returns and Premia

The sample is quarterly. The return on the fund is defined as: $R_{t+1}=\ln(P_{t+1}+D_{t+1})-\ln(P_t)$, where P_{t+1} is the end-of-quarter t+1 stock price of the fund and D_{t+1} denotes dividents paid during quarter t+1 and valued at the end-of quarter t+1. The return on the net asset value is defined as: $R_{t+1}=\ln(NAV_{t+1}+D_{t+1})-\ln(NAV_t)$, where NAV denotes the end-of-quarter net asset value. The fund premium is defined as: $PREM_t=\ln(P_t/NAV_t)$.

	Sample		Fund Return (%)		NAV Return (%)		Fund Premium (%)	
			Mean	Std	Mean	Std	Mean	Std
Alpha	90:I	95:I	1.55	21.77	1.38	9.47	1.38	25.87
Anaptixeos	90:I	93:IV	-2.32	28.50	0.72	17.64	33.92	23.79
Dias	92:III	95:I	5.56	15.55	4.95	14.39	-18.99	11.22
Edex	90:I	95:I	2.42	29.24	2.69	22.37	21.70	27.05
Elliniki	88:IV	95:I	3.22	20.30	6.25	12.44	32.52	23.91
Emporiki	93:III	95:I	2.16	22.46	2.04	22.67	1.10	0.59
Eoliki	93:IV	95:I	1.02	18.81	7.97	15.64	2.31	31.26
Ergasias	83:I	95:I	2.67	27.61	2.85	21.03	12.55	39.94
Ethniki	88:II	95:I	1.82	23.86	4.49	16.86	32.28	20.26
Exelixi	92:IV	95:I	4.49	13.99	1.81	9.98	-17.88	11.07
Idiotiki	91:I	95:I	7.49	12.34	1.82	8.79	-25.81	14.80
Interinvest	92:IV	95:I	4.88	11.01	1.77	4.96	-18.95	9.73
Ioniki	93:III	95:I	-7.35	21.03	-0.43	15.34	28.66	17.64
Mesogiaki	94:I	95:I	-0.04	13.07	-2.87	10.49	-15.05	6.55
Proodos	90:III	95:I	1.51	26.47	2.63	8.39	-23.98	20.29

Table V

Bivariate Correlations for Fund Returns, NAV Returns and Premia

The definitions of R_{t+1}, $R^{'}_{t+1}$ and $PREM_t$ are contained in Table IV. In each bivariate correlation, the sample period starts in 1991: I and ends in 1994:IV.

Panel A: Fund Returns R_{t+1}

	Alpha	Edex	Elliniki	Ergasias	Ethniki	Idiotiki	Proodos
Alpha	1.0000						
Edex	0.5299	1.0000					
Elliniki	0.7123	0.6208	1.0000				
Ergasias	0.8499	0.6959	0.6117	1.0000			
Ethniki	0.7577	0.8098	0.7035	0.8311	1.0000		
Idiotiki	0.8028	0.6403	0.7940	0.8428	0.8474	1.0000	
Proodos	0.5088	0.6516	0.6443	0.4426	0.6139	0.5272	1.0000

Panel B: NAV Returns, $R^{'}_{t+1}$

	Alpha	Edex	Elliniki	Ergasias	Ethniki	Idiotiki	Proodos
Alpha	1.0000						
Edex	0.3330	1.0000					
Elliniki	0.3555	0.0814	1.0000				
Ergasias	-0.1298	-0.0743	0.4514	1.0000			
Ethniki	0.2093	-0.0795	0.5831	0.6722	1.0000		
Idiotiki	0.6610	0.1802	0.5129	-0.0061	0.5625	1.0000	
Proodos	0.3891	0.1198	0.6943	0.1639	0.5226	0.5159	1.0000

Panel C: Fund Premia, $PREM_t$

	Alpha	Edex	Elliniki	Ergasias	Ethniki	Idiotiki	Proodos
Alpha	1.0000						
Edex	0.7561	1.0000					
Elliniki	0.8135	0.8419	1.0000				
Ergasias	0.5181	0.3527	0.2890	1.0000			
Ethniki	0.7362	0.7695	0.8703	0.5720	1.0000		
Idiotiki	0.9008	0.7116	0.7038	0.6653	0.7577	1.0000	
Proodos	0.6695	0.5270	0.4547	0.5962	0.4591	0.6433	1.0000

Table VI

The Predictive Ability of the Premium

$$RET_{t,t+N} = \sum_{j=1}^{15} \alpha_{N,j} DUM_{j,t} + \beta_N PREM_t + \varepsilon_{t+N}$$

The sample contains quarterly observations on 15 Greek closed-end funds (see Table IV). The regressions stack the returns and the premia for the 15 funds to form vectors of T elements. Each dummy variable DUMj is equal to one for observations corresponding to fund j and zero for all other observations. Hence, for each investment horizon N, N=1,2,3,4 quarters, the regressions include different intercepts $\alpha_{N,j}$, j=1,...15, for each fund, but a common slope coefficient β_N. The independent variable is the fund premium at the beginning of the investment horizon, defined as $\ln(P_t/NAV_t)$ where P_t and NAV_t denote price per share and net asset value per share at the-end-of-quarter t. The return on the fund j is defined as $R_{j,t+N} = \ln(P_{j,t+N}+D_{j,t+N})-\ln(P_{j,t})$, where $D_{j,t+N}$ is the dividend paid during the N-quarter interval from the end-of-quarter t to the end-of-quarter t+N, valued at the-end-of-quarter t+N. The corresponding return on the net asset value is $R'_{j,t+N}= \ln (NAV_{j,t+N} + D_{j,t+N}) -\ln(NAV_t)$. The excess return equals $R_{j,t+N}-R'_{j,t+N}$. Inside the parentheses are t-statistics corrected for conditional heteroscedasticity (White [1980]). R^2adj is the adjusted coefficient of determination.

			Fund Return		NAV Return		Excess Return	
N	T	d.f.	β	R^2adj.	β	R^2adj.	β	R^2adj
1 qtr	238	222	-0.227* (-3.12)	0.024	0.048 (0.78)	0.012	-0.275* (-5.87)	0.119
2 qtrs	223	207	-0.338* (-3.76)	0.075	0.110 (1.59)	0.072	-0.449* (-8.52)	0.281
3 qtrs	208	192	-0.426* (-4.60)	0.115	0.110 (1.46)	0.135	-0.535* (-11.05)	0.387
4 qtrs	193	177	-0.568* (-5.54)	0.156	0.023 (0.28)	0.186	-0.591* (-11.23)	0.445

*Statistically significant at the 5% level

Table VII

Premium Over-sensitivity to the Domestic Stock Market?

$$RET_{t,t+N} = \sum_{j=1}^{15} \alpha_{N,j}\, DUM_{j,t} + \beta_N\, PREM_t + \gamma_N\, RM_{t,t+N} + \varepsilon_{t+N}$$

The sample contains quarterly observations on 15 Greek closed-end funds (see Table IV) .The regressions stack the dependent and independent variables across the 15 funds to form vectors of T elements. RET, DUM and PREM are defined in Table VI. $RM_{t,t+N} = \ln(ASEI_{t+N}/ASEI_t)$ is the return without dividends of the Athens Stock Exchange Index. Inside the parentheses are t-statistics corrected for conditional heteroscedasticity (White[1980]). R^2 adj is the adjusted coefficient of determination.

			Fund Return			NAV Return			Excess Return		
N	T	d.f	β	γ	R^2 adj.	β	γ	R^2 adj.	β	γ	R^2 adj.
1 qrt	238	221	0.142*	0.906*	0.483	0.091	0.447*	0.206	-0.232*	0.457*	0.328
			(-2.53)	(9.67)		(1.70)	(6.07)		(-5.10)	(5.82)	
		222		0.936*	0.460		0.428*	0.192		0.506*	0.212
				(10.70)			(5.61)			(6.33)	
2 qrts	223	206	-0.216*	0.941*	0.594	0.178*	0.518*	0.347	-0.394*	0.423*	0.468
			(-3.10)	(11.87)		(2.91)	(8.03)		(-8.45)	(7.23)	
		207		0.978*	0.559		0.488*	0.307		0.491*	0.252
				(13.94)			(6.70)			(8.05)	
3 qrts	208	191	-0.304*	0.985*	0.633	0.182*	0.586*	0.467	-0.486*	0.399*	0.559
			(-4.50)	(12.38)		(2.84)	(11.02)		(-11.39)	(6.69)	
		192		1.027*	0.581		0.561*	0.434		0.466*	0.278
				(12.95)			(10.10)			(7.26)	
4 qrts	193	176	-0.365*	0.969*	0.710	0.149*	0.602*	0.617	-0.514*	0.368*	0.631
			(-4.89)	(15.22)		(2.21)	(15.37)		(-11.00)	(6.86)	
		177		1.023*	0.656		0.580*	0.600		0.443*	0.374
				(15.14)			(14.67)			(7.17)	

*Statistically significant at the 5% level

Table VIII

Premium Over-sensitivity to the Parent Bank Return?

$$RET_{t,t+N} = \sum_{j=1}^{8} \alpha_{N,j} DUM_{j,t} + \beta_N PREM_t + \gamma_N RM_{t,t+N} + \delta_N RB_{t,t+N} + \varepsilon_{t+N}$$

The sample contains quarterly observations on eight Greek closed-end funds {Alpha, Edex, Emporiki, Ergasias, Ethniki, Idiotiki, Ioniki, Proodos}, which are subsidiaries of commercial banks (see TableII). The regressions stack the independent and the dependent variables across the eight funds to form vectors of T elements. RET, DUM and PREM are defined in Table VI, and RM is defined in Table VII. The return of the bank j is defined as $RB_{j,t+N}=\ln(BP_{j,t+N} + D_{j,t+N}) - \ln(BP_{j,t})$, where $BP_{j,t}$ is the parent bank stock price at the end of quarter t and $D_{j,t+N}$ is the divident paid during the time interval (t,t+N) valued at the end of period t+N. Inside the parentheses are t-statistics corrected for conditional heteroscedasticity [White (1980)]. R^2 adj is the adjusted coefficient of determination.

			Fund Return				NAV Return				Excess Return			
N	T	d.f.	β	γ	δ	R^2adj	β	γ	δ	R^2adj	β	γ	δ	R^2adj
1 qtr	155	144	-0.114	0.762*	0.168*	0.566	0.110	0.285	0.142	0.215	-0.223*	0.474*	0.024	0.351
			(-1.91)	(5.18)	(2.50)		(1.83)	(1.94)	(1.89)		(-4.12)	(3.87)	(0.50)	
2qtrs	147	136	-0.201*	0.752*	0.239*	0.663	0.202*	0.352*	0.181*	0.368	-0.403*	0.400*	0.058	0.496
			(2.79)	(7.04)	(3.21)		(2.92)	(2.92)	(2.42)		(-7.61)	(3.91)	(0.93)	
3qtrs	139	128	-0.347*	0.744*	0.278*	0.701	0.169*	0.393*	0.211*	0.488	-0.516*	0.351*	0.068	0.568
			(-4.97)	(5.77)	(3.40)		(2.35)	(4.16)	(3.04)		(-10.05)	(3.51)	(1.28)	
4qtrs	131	120	-0.333*	0.727*	0.268*	0.781	0.195*	0.559*	0.090	0.634	-0.529*	0.168	0.178*	0.675
			(-4.85)	(6.94)	(4.65)		(2.67)	(7.14)	(1.84)		(-11.64)	(1.94)	(4.05)	

*Statistically significant at the 5% level

Diagram 1

The Cross-Sectional Arithmetic Mean of Greek closed-end fund Premia and the Logarithm of the Athens Stock Exchange Index