



Asymmetries on Closed End Country Funds Premium and Monetary Policy Announcements: An Approach Through the Perspective of Foreign Countries

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Abstract

In this paper we examine how monetary announcements can explain US country funds premiums in international markets, taking into account monetary asymmetries relating to information news and directional actions of monetary policy. The monetary determinants which we have used to explore the closed-end fund puzzle emanate from the announcements of official rates of the countries of origin of NAVs.

Our conclusions which reflect the investor sentiment as it varies in developing and emerged markets are supported by appropriate monetary assumptions concerning the role of monetary announcements. We find out that neither the expected nor the unexpected component of the monetary rate retains a dominant role in interpreting the fund premiums. In the case of developing funds the age has a negative influence on premium, while in developed funds the main fund's benchmark index has a positive correlation with the fund premium. Moreover, the foreign exchange rate plays a significantly negative role in the CEFCs of developed countries and a positive role in those of developing markets. But the proxy for the US equity market seems to positively influence the whole range of funds. By examining the possible asymmetries we can see that premiums are negatively affected by unfavorable monetary news.

We have also considered the case in which asymmetries on the funds premiums are based on the direction of the monetary policy, as shaped by the decisions of central banks in foreign countries.

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1. Introduction

Over the last decades, empirical studies have asserted the notion of “*closed-end funds puzzle*”¹. Closed-end funds (CEFs) are, like the more traditional open-end funds (mutual funds), an investment scheme that initially raises funds from investors and subsequently invest its capital mainly into other publicly traded portfolio of securities. In contrast to mutual funds, CEFs do not issue new shares (fixed capitalization) after the initial public offering (IPO). Only occasionally, CEFs “can issue new shares for their existing shareholders (rights issue), the public (public offerings) or for some specific investors (private placements)” (Krintas, 2009). Moreover, if an investor decides to buy shares after the IPO or needs to sell his shares, he can do so in the secondary market, on the stock exchange or in the over-the-counter (OTC) markets.

CEFs are exchange-traded products and thus their market price is determined by the law of supply and demand. This price usually diverges from the Net Asset Value (NAV)² per share of the funds’ assets, despite the fact that it should reflect the fundamental value of NAV. A fund with a share price below its NAV is said to be at a discount, while the share price above the NAV is said to be at a premium (as a percent of the NAV per share).

Since several years ago an academic debate has been going on around the CEF puzzle (Pratt, 1966), but there is still no widely accepted interpretation for this phenomenon. Generally, CEFs sell at a discount relative to their underlying assets (Malkiel, 1977; Brickley and Schallheim, 1985; Lee, Shleifer and Thaler, 1990 & 1991, among others).

There are several studies in the past which were aimed to explain the closed-end funds puzzle using either the *Efficient Market Hypothesis* (EMH) practiced by the Traditional Finance or the *Investor Sentiment Hypothesis* (ISH) practiced by the Behavioral Finance (Russel, 2005). Some of the most salient explanations from Traditional Finance viewpoint are NAV miscalculation, agency problems, tax timing issues, market segmentation and dividend policy, among other issues. As Halkos and Krintas (2006) suggest, one can better understand theories on discounts and the closed-end funds puzzle by using both behavioral and fundamental factors.

Closed-end country funds (CECFs) are traded in one country (domestic market) but invest in securities of foreign (local) markets. As Lee and Hong (2002) point out, CECFs have “dual characteristics” because their price is affected by factors from both the domestic and the foreign market. Bodurtha *et al.* (1995) have investigated these dual characteristics and concluded that CECFs’ premium movements reflect a risk associated to the domestic market (in this case the U.S. market). According to their arguments, the puzzle is the result of the differential investor sentiment (U.S. vs. foreign market) and not of market segmentation.

In this paper we attempt to shed light on the effect of monetary policy decisions on the U.S. CECF premiums taking into account the asymmetries originating from different countries, depending on the changes in both direction and type of monetary news, within various monetary periods. As Kurov (2010) points out, the two main

¹ Malkiel, 1977; Weiss, Lehn and Malmquist, 1989; Lee, Shleifer and Thaler, 1991; Levis and Thomas, 1995; Dimson and Minio-Kozerski, 1999, among others).

² The net asset value (NAV) is determined as the value of the fund’s assets less its liabilities.

goals of a country's monetary policy are price stability and sustainable economic growth. A change in the monetary policy and, particularly, a change in the official rates of a foreign country's central bank can have direct and immediate effects³ on the financial markets, while any indirect and lagged effects reflect the monetary policy in relation to macroeconomic objectives. Furthermore, there are several other academic contributions⁴ where there is extensive analysis of arguments regarding the immediacy of monetary policy and its importance in interpreting stock returns.

Among previous empirical studies which have investigated the effect of monetary policy on asset prices, several cross section analysis examples underwrite various asymmetric effects of monetary policy on both equity returns, depending on both the nature of monetary news ('good' vs. 'bad' news), and the monetary directions. Apparently, there is no relevant approach to CECFs by the academic efforts made so far, which allows us to cast light on this area and contribute to this field of finance research.

Our objective is to investigate the behavior of closed-end country funds premiums under diverse monetary policies. This will ensure a meaningful contribution to the academic literature on the discount puzzle, while also displaying the process of monetary transmission mechanism in the category of closed-end country funds.

As it was previously mentioned, we attempt to identify how changes of monetary policy are reflected on the U.S. closed-end country funds premiums. More specifically, this paper has four principal objectives. Firstly, we examine the effect of monetary announcements of central banks in foreign markets (which are the countries where the fund holdings are invested), on the mispricing of CECFs.

Secondly, we examine possible asymmetries on country funds premiums caused by the effects of monetary policy news ("good" or "bad" monetary news) due to central banks' announcements. Specifically, we examine whether 'good' or 'bad' monetary news from the countries where the fund underlying assets are invested, affect the closed-end country funds premiums.

Thirdly, we study possible asymmetries on the premiums on CECFs based on the direction of monetary policy, as shaped by central banks' decisions. By classifying rate changes due to monetary policy directions into "unexpected/ expected increase", "unexpected/ expected decrease" and "unexpected/ expected no change", we analyze the asymmetric response of premiums to monetary directions which derive from the foreign markets.

Fourthly, having considered the previously documented monetary relationships, we investigate whether country fund premiums have different behavior in developing than in developed regions.

Our findings add up new arguments to the efforts made to interpret the closed-end fund puzzle through the use of monetary announcements effects on the funds pricing.

³ Bernanke and Blinder (1992) prove that the funds rate is a measure of the monetary policy and monetary policy affects the real economy.

⁴ See Bernanke and Kuttner (2005), Thorbecke (1997), Patelis (1997), Lastrapes (1998), Rigobon and Sack (2003), Farka (2009), among others.

As asset markets seem to strongly react to monetary policy decisions and especially to the surprise component of the interest rates changes (Bernanke and Kuttner, 2005), our findings on the choice of country funds provide additional insights for international investors and fund managers. As a result, the decision to use closed-end country funds as vehicles for achieving international diversification can be better supported if we consider premium fluctuations under varying monetary conditions. As Lobo (2000) argues, The Federal Reserve's monetary policy backs up portfolio selection decisions adopted by investment advisors.

In fact, there is empirical evidence that country fund premiums are significantly affected by factors such as the fund age, the fund benchmark, the exchange rate, the SP500 index (as a US stock market proxy), any unfavorable monetary news, the expected increase and the unexpected shifts of monetary rates, all originating from the examination of monetary decisions in markets where the country fund NAVs are invested.

Our study contributes to existing literature in several ways. Firstly, it looks into the closed-end country funds from the viewpoint of a perspective on monetary policy, in a way that, to the best of our knowledge, it has not been done before. Secondly, it enhances the idea that the existence of premiums cannot be explained by monetary policy surprises alone, even when those monetary policy surprises are caused by central banks' decisions. Thirdly, it uses to a greater extent than many previous studies the Bloomberg estimations surveys as a tool for extracting the unexpected monetary interest rates decisions, having a large set of country funds and foreign countries in our sample. Several studies use Bloomberg surveys to estimate the surprise component of the monetary policy, in an attempt to explain the effect of monetary policy on asset prices. To date, to the best of our knowledge, Bloomberg surveys have not been used to interpret closed-end funds premiums in relation to monetary interest rate announcements, and here is a part of our contribution to literature.

Andersson (2010) who has studied the volatility reactions of both the U.S. and the European stock and bond markets to monetary decisions has also based his estimates on the target surprise using Bloomberg survey measures. He concludes that survey estimates are proper indicators of monetary target surprises. A series of studies uses surveys to estimate the impact of macroeconomic news on asset markets⁵. Besides, recent research -focusing on the effect of monetary policy on stock returns - have measured the surprise component of the monetary policy change either using Bloomberg survey estimates (Vithessonthi and Techarongrojwong, 2012, 2013; Vithessonthi 2014; Lahura, 2012; Hussain, 2011) or estimate expectations derived from Money Market Services (Reinhart and Simin, 1997), among others. Fourthly, our academic effort extends previous literature by confirming significant asymmetries on the direction of monetary policy and the type of monetary news in expansionary and restrictive periods, making comparison between mature and developing markets.

5 See Bekaert, Hoerova and Duca (2013) (Bloomberg and Money Market Services), Jiang, Konstantinidi and Skiadopoulos (2012) (Bloomberg, stock market), Lapp and Pearce (2012) (Money Market Services, stock market), Hanousek et al. (2009) (Bloomberg, stock market), Andritzky et al. (2007) (Bloomberg, bond market), among others.

The paper is organized as follows: Section 2 presents a selected literature for the CEF puzzle and the relation between asset prices and monetary policy. Section 3 describes the data used. Section 4 covers the methodology employed in our study. Section 5 reports the empirical results and finally, section 6 reports the conclusions and recommendations that resulted from this study.

2. Literature review

2.1 Closed-End Fund Puzzle

Lee, Shleifer and Thaler (1991) who identified the four "pieces to the puzzle which together characterize the life cycle of a closed-end fund", indicate the following distinct periods: (1) Closed-end funds start out at a premium of 10 percent (on average) with respect to their NAV, which is explained by start-up costs and underwriting fees. (2) Within four months from their inception, they move to an average discount of 10 percent. (3) CEFs discounts appear to fluctuate over time across the funds, and (4) at the time of open-ending (or fund's liquidation), the discounts tend to shrink.

The number of academic works used to explain the closed-end fund puzzle was neither reduced over the years nor are limited in diversity of methodological approaches and conclusions. The continuous effort to explain the divergence between CEF prices and their underlying assets can be summarized in two main research approaches: the first derives from the *Efficient Market Hypothesis* in line with which asset prices must reflect their fundamental values (Fama, 1970). The second is based in the *investor sentiment hypothesis*, which holds that the CEF puzzle derives from variation in emotional states and beliefs between rational and irrational investors, which in turn affect the prices of CEFs and their NAV holdings (Pratt, 1966; Simon, 1969; Zweig, 1973; Boudreaux, 1973; DeLong *et al.* 1990; Lee, Shleifer and Thaler, 1990, 1991; among others).

In their attempt to explain the closed-end fund paradox with the Efficient Market Hypothesis, previous studies have based their arguments on possibly incorrect NAV miscalculation, on problems having to do with agency theories, on tax issues arising from the closed-end fund share transactions and on dividend yield and market segmentation issues.

According to the results of a group of studies (Malkiel 1977 and 1995; Brickley *et al.*, 1991; Neal and Wheatley, 1998; Datar, 2001; Chan, Jain and Xia, 2008; Cherkes *et al.* 2009; among others) NAV miscalculation may be considered to be the result of tax liabilities relating to unrealized capital gains, and may also be due to low liquidity assets in the NAV portfolio.

In accordance with the market segmentation hypothesis (Bonser-Neal *et al.*, 1990; Johnson, Schneeweis and Dinning, 1993; Chang, Eun and Kolodny, 1995; Choi and Lee, 1996; Bekeart and Urias, 1996; Kim and Song 2010, among others), the existence of premiums may derive from diversification benefits which are offered by (country) funds, as many international investors select funds from countries with investment restrictions. Jones and Stroup (2010) define the premium as "equal to the

marginal cost of avoiding the binding restrictions in the local country, by instead purchasing shares of the fund in the US".

The agency cost hypothesis, as another concept offering an explanation to the CEF discounts relates the amount of administrative costs or poor management results in with the equity return. Thus, a number of studies (Boudreaux, 1973; Barclay *et al.*, 1993; Deaves and Krinsky, 1994; Malkiel, 1995; Baur *et al.*, 1996; Chay and Trzcinka, 1999; Gemmil and Thomas, 2002; Ross, 2002; Arora *et al.*, 2003; Russel, 2005; among others) have argued that in cases where management fees are considered very high and there is an advanced probability that the managerial performance is lower than the expected, the value of the closed-end fund's portfolio assets is reduced and hence its market price. Malkiel (1995) states, in this respect, that significant institutional ownership of funds by insiders, leads to large discounts on the price of the funds in relation to the value of its underlying assets.

With respect to dividend yields issues, Malkiel (1995) argued that a policy of high dividends in a CEF, decreases retained earnings and reduces tax liabilities of the fund, leading the fund to a smaller discount (or premium). Similarly, Pontiff (1996) holds that the existence of high discounts is the result of a high-dividend payout policy, concludes that there is an arbitrage opportunity between the value of the fund (long position) and the values of its assets (short position). Lee and Moore (2003) who support the dividend yield preference hypothesis point out that the increase in demand for bond funds by short-term (individual) investors who seek higher yields, demonstrate an overestimation of their price level in relation to the NAV values.

Given the relative insufficiency of rational explanations to deal with CEFs pricing anomalies, the supporters of behavioral finance considered this area a breeding ground for the development of their theory in respect to the discount puzzle. Zweig (1973) argued that non-professional investors dominate CEF share transactions and concluded that changes in expectations are reflected by changes in discount (or premiums) levels of funds.

Since the 1990s, a number of academic research projects supported the idea that the effect of the undervalued CEFs might be explained by the "*investor sentiment*" theory in harmony with the "*noisy irrational expectations model*". De Long *et al.* (1990) provided an explanation according to which, the excessive optimism of irrational noise traders justifies the over-valuation observed in CEFs (price rises), after their initial entry into the stock market.

Lee, Shleifer and Thaler (1990), argued that, following initial public offerings of CEFs, their premium is due to overoptimistic forecasts by noise traders, and that the discount changes are related to funds redemptions as well as to the small firms' returns. Contrariwise, Abraham, Elan and Marcus (1993), asserted that the investor sentiment hypothesis cannot explain the existence of discounts in closed-end bond funds which present an equally high systematic risk as that of the respective stock CEFs and concluded that bond funds are not affected by the behavior of this particular class of investors.

Bodurtha, Kim and Lee (1995) have used U.S. closed-end country funds in their study and pointed out that the divergence between their share price and their underlying

assets proves the existence of the investor sentiment, in respect to the funds' relative value in international and local markets where their assets are separately traded.

Frankel and Schmukler (1996) who have studied the behavior of the premiums on a sample of U.S. closed-end funds investing in Mexico, accept that the market price of the funds will depend more on the US investors' information and expectations, while the Net Asset Values are affected mainly by the behavior and knowledge of local Mexican investors. Thus, any discounts on CEFs are justified by the different expectations between international (US) and local (Mexican) investors.

Hardouvelis and Tsiritakis (1996) have linked noise traders' behavior with the predictive power of the Greek CEFs. Among others, they ascertain that the premiums of CEFs may also adversely predict their future returns. Similarly, they found a positive though not significant relationship between the current premiums and the future returns of a fund's net asset value. In harmony with the thoughts of the above mentioned authors, positive investor sentiments with limited knowledge (noise traders), cause CEF prices to rise in relation to their internal values and in as much as prices tend to be mean-reverting, they are expected to fall in the forthcoming future.

Richard and Wiggins (2000) advocate the existence of the "investor sentiment hypothesis" and the "managerial performance theory" on the strength that the CECFs premiums (or discounts) provide information on future NAV returns. On the other hand, the authors ascertained that CECFs prices (discounts or premiums) reflect investors' optimistic or pessimistic forecasts on future stock returns in countries where NAV underlying assets are traded (foreign market index).

Gemmill and Thomas (2002) associate the noise trader sentiment with the fluctuations of UK CEFs, rejecting the assumption that long-run discounts derive from noise-trader risk.

Halkos and Krintas (2006) have studied the Greek closed-end funds using factor analysis and showed that premiums (discounts) are related to a specific behavioral factor which is determined using variables such as the number of Equity Mutual Funds Shares Outstanding, the change in Inflows/ Outflows of the Equity Mutual Funds, the change in total assets of the Equity Mutual Funds and the monthly change of the Athens Stock Exchange (ASE) General Index.

As a matter of fact, some academic studies have used the interest rate changes for the interpretation of CEFs discounts despite doing it over a relatively short period of time. For example, Lee, Shleifer and Thaler (1991) have pointed out that CEF mispricing is not associated with unanticipated changes in the term structure of interest rates. In an equal manner, Pontiff (1996) has studied the possibility of arbitrage between the market prices of closed-end funds and their assets, and deduced that costly arbitrage cannot shrink large discounts, due to high interest rate levels. In particular, he demonstrated that the strong correlation between high interest rates and large discounts is empirically supported by the fact that an increase in absolute discounts by approximately 0.5% is due to the increase in 1-month T-bill yield by 1%.

Flynn (2005) has described the positive relationship between CEFs discounts and the interest rates (using the 1-year Treasury Yield) for the 1985-2001 period, supporting the idea that due to the reluctance of small investors to buy (compared to bond yields),

an increase in interest rates lowers the levels of CEF prices and thus increases their NAV. He demonstrated that a 1% increase in interest rates leads the average discount at an increase of 2.26%.

Flynn (2012) has verified the evidence on CEF mispricing taking into account the noise traders' behavior and the costly arbitrage in the US and the UK markets. He points out that the occurrence of high US CEF discounts is due to the existence of a larger number of irrational traders, whose behavior does not promote a convergence between the values of their underlying assets and their respective market price.

2.2 Monetary Policy and Asset Prices

Monetary policy decisions and the stock market turn out to be interdependent for two main reasons: first, the stock market is one of the main channels of monetary policy transmission (asset price channel); second, since the stock market reflects market expectations with regard to the economic environment, monetary policy authorities take into account stock market behavior in the formulation of their monetary decisions (Rigobon and Sack, 2003). As Sellon (2004) argues, whenever estimations by the assets markets and the central bank opinions coincide with respect to the monetary path, monetary authorities adjust the target interest rate according to market expectations.

The role of central banks in respect to monetary policy implementation encompasses the use of short-term interest rates and the resulting undertaken control of those rates by the banking authorities has an impact on some other measurable variables, such as the long-term interest rates, the exchange rates and the stock market returns. The monetary decisions do not just affect the rate used by the firms to discount their future cash flows but also influence their expectations concerning the upcoming inflation levels and their future financial results.

It is already clear-cut that monetary policy actions affect public's expectations regarding future policy moves (Pakko and Wheelock, 1996; Sellon, 2004; among others) by "creating news" and "reducing noise" as argued by Blinder *et al.* (2008). Thus, the pronouncements of central banks not only influence expectations by changing the asset price levels, thus generating news, but also reduce noise by eliminating any price volatility issues in the asset markets. If monetary decisions are meant to prevent unforeseen consequences to market participants, Bernoth and Hagen (2004) confirm that short-term rates can be satisfactorily predicted by the money markets. Respectively, Swanson (2006) notes that forecasters from both US financial markets and the private sector have the ability to anticipate the federal future rate a few months ahead and that they are not surprised by Federal Reserve decisions.

Filbien and Labondance (2013) have looked at the Eurozone stock markets and have concluded that the stock markets in the post-euro era have a decreasing propensity to react to ECB MRO interest rate announcements, supporting the hypothesis that it is easier for markets to forecast ECB's monetary policy decisions.

The importance of central bank's monetary policy announcements and the reactions caused to financial markets can also be displayed and examined from two different viewpoints: from the Monetary Authorities' side where the effectiveness of their

decisions in the financial markets through the monetary transmission mechanism is investigated (i.e. if changes in short-term interest rates affect long-term interest rates and if monetary decisions generate any inflationary phenomena). Similarly, from the market participants' side it is examined whether their anticipations concerning the interest rate path are in line with the decisions of central banks. Whenever the decisions of central banks deviate from the path of the market expectations, participants should strongly react to the unexpected target change. As the expected component of monetary policy is already included into asset prices, they are expected to be influenced only by the unanticipated portion of monetary decisions' changes.

There is a plethora of papers examining the relationship between asset prices and monetary policy⁶. In existing literature there are many approaches seeking to identify the impact of monetary policy announcements on stock markets⁷. Generally, academic works exploring the relationship between the stock markets and the monetary policy implementation conclude that an unanticipated monetary policy action has a significant effect on share returns, inversely proportional to the path of the shocks to short-term rates. Specifically, an unexpected official interest rate hike leads to a drop in the stock prices and vice versa.

Using an event study analysis with intraday data, Gürkaynak *et al.* (2005) have demonstrated that the effect of monetary policy on US bond and stock markets, is not a function of one but of two factors: the "target factor" (i.e. the current Federal Funds Target Rate) and the "path factor" (which represents the released FOMC statements). They found that a 4.3% decline in the S&P500 index results in a 1-basis-point surprise increase in the Fed rate (provided there are no surprises in the FOMC statement).

For the US stock market, Bernanke and Kuttner (2005) have used Federal funds futures contracts in order to estimate the Federal funds rate changes and an event-study method to provide explanations for the reaction of stock prices to monetary policy implementation. Their results indicate that an unanticipated 25-basis-point cut in the Fed funds rate target would bring about a 1% increase in the equity market.

Farka (2009) has taken into account endogeneity and omitted variable problems and made use of intraday future prices for the S&P500 index and for the Federal funds rate for the 1994-2005 period. Using an event-study method she ascertained that the anticipated component of monetary policy has no effect on share values, arguing that an unanticipated rate hike of 1-percent will cause a negative stock return of -5.6 percent, within a 20-minute window interval around the time of FOMC announcements.

6 An early attempt was carried out by Sprinkel (1964).

7 See Bomfim (2003), Bernanke and Kuttner (2005), Boyd *et al.* (2005), Andersen *et al.* (2007b), Zebedee *et al.* (2008), Wongswan (2009), Farka (2009), Chuliá *et al.* (2010), Kurov (2010), Li, İçcan and Xu (2010), Vithessonthi and Techarongrojwong (2012), Guo, Hu and Jiang (2013), among others. Moreover, some recent articles that examine the relationship between US treasuries and monetary policy are, for instance, Kuttner (2001), Gürkaynak *et al.* (2005), Hamilton (2008), Beechey and Wright (2009), Farka and DaSilva (2011) and Rosa (2012).

Chuliá *et al.* (2010) have used intraday data to improve precision of their estimates in respect of the likelihood of other economic announcements happening on the same day that FOMC decisions are pronounced. Their study has provided evidence that a positive surprise of 10-basis-points shift in the target rate (“bad” news) leads to a negative stock return of -46 basis points.

Kishor and Marfatia (2013) have used high frequency data and a sample of 35 countries to demonstrate that an unanticipated Fed's rate decrease results in positive abnormal returns on the global equity indices, with the exception of European markets.

Tang *et al.* (2013) have examined the stock market of China and found that after decisions were taken for an easing of the monetary policy stance, the daily index of Shanghai Stock Exchange has an average positive response with a 3-day delay.

Lutz (2013) examines how the investor sentiment is affected by monetary policy shocks during conventional and unconventional monetary policy regimes, i.e., when the Federal funds rate overcomes the zero lower bound (ZLB) and when the Fed rate hit its zero lower bound. With regard to the first period, Lutz (2013) concludes that an unexpected increase in the Fed funds rate leads to a large drop in investor sentiment in the short and in the medium-term. Similar results were obtained for the second period. To sum up, Lutz (2013) claims that “contractionary monetary policy shocks have an adverse effect on investor behavior during both conventional and unconventional monetary policy regimes”.

In contrast to previous results which suggest that an unanticipated rate rise (or decrease) is associated with a decline (or rise respectively) of stock returns, Vithessonthi and Techarongrojwong (2013) produce opposing results. Using the repurchase rate of the Bank of Thailand as a proxy for monetary policy decisions, they found that the abnormal returns of the SET Index rise by approx. 75 basis-points, as the result of an expected policy rate hike by 100 basis-points.

Papadamou and Siriopoulos (2014) examined whether the creation of the Monetary Policy Committee (MPC) in May 1997 has affected the interest rate risk effect on stock returns of UK banks and life insurance companies. They have examined the effect of interest rate risk using sectoral observations and data of four major British banks⁸ and four major life insurance companies⁹ listed in the London Stock Exchange (LSE). The authors have found empirical evidence that the creation of the MPC can reduce the interest rate risk that banks and life insurance companies face.

Tsai C-L (2014), used intraday stock data and Federal Funds futures rate to measure the surprise component of Fed's rate, argues that a drop by -3.1 percent in stock returns is a result of an increase by 1 percent in Fed funds rate.

To date, although a considerable amount of the published literature has dealt with the effects of monetary policy on equity returns, there is much less information about the association between CEFs' premiums and monetary announcements in foreign countries where the NAV is invested. Particularly, in the case of US closed-end country funds, because their fund shares depend on the different economic conditions

⁸ Lloyds, HSBC, Barclays and Standard Chartered.

⁹ Prudential, St James's Place, Legal & General and Aviva.

between any two countries, it is appropriate to investigate the behavior of discounts when the monetary environment changes in those foreign markets.

Despite the fact that when US investors buy country funds they mostly affect the CEFs' market prices rather than the values of their underlying assets (Chandar and Patro, 2000), the investor sentiment hypothesis argues that monetary decisions in countries where the NAV is invested cannot be overlooked, because they are involved in shaping the underlying assets and influence the levels of premiums. As the asymmetric influence of monetary policy in shaping quotations has already been studied (Farka, 2009; Chuliá; 2010; among others), it would be quite interesting to shed light on CEFs premiums (or discounts) and explain their function through the investor sentiment approach, in connection with the monetary decisions in NAV countries.

2.3 Monetary Asymmetries and Asset Prices

A part of the empirical finance literature dedicates its efforts to detect both possible asymmetries arising from the behaviour of stock returns in relation to the direction of monetary rates and the effect of "bad" or "good" news on stock markets.

Asymmetries related to the direction of monetary policy (increase or decrease of policy rates) reveal that stock price adjustments are more likely to derive from positive monetary shocks (in contraction phase) than from negative ones.

Previous studies have accepted that in periods of recessions, there are significant changes in the level of volatility of financial markets and that the effect of bad news (negative shocks) on stock prices is stronger than good news (positive shocks)¹⁰.

Jensen and Johnson (1995), have used event study analysis for the 1962-1991 period, and studied the impact of discount rate changes on US stock and bond markets. By separating the daily returns into periods with rate increases ("bad" news) and rate decreases ("good" news) they have managed to prove that rate increases (or decreases) lead the stock market to excess (or negative, respectively) returns.

Respectively, Jensen, Mercer and Johnson (1996) - in order to analyze the relation of the expected stock and bond returns with FED monetary decisions - have used the discount rate change dummy as a directional explanatory variable for the 1954-1992 period¹¹. They confirmed that stock returns are significantly higher in periods of decreasing monetary rates than within monetary environments with increasing interest rates.

Extending their research, Conover, Jensen and Johnson (1999) in a series of 16 foreign markets (US included) and following the same directional classification of discount rate changes as Jensen *et al.* (1996) propose, they additionally document that stock returns in most of the studied economies have negative and statistically significant returns in periods of rising short-term interest rates ("bad news") and positive in the opposite expansive monetary periods ("good news").

¹⁰ See references in Nelson (1991) and Glosten *et al.* (1993), among others.

¹¹ They set a value of one in any case the discount rate was an increase during the previous period, and zero when the discount rate has a previous decreased change.

Bernanke and Kuttner (2005) have used dummy variables for the observations of “positive surprises” in rate changes and for the “increases” in the fund rate; consequently, they have disregarded the statistical significance of those asymmetries in the interpretation of stock returns. At the same time, however, they have demonstrated that the change of the short-term interest rate direction has considerable impact on market returns.

Furthermore, depending on the effect they have on stock markets, monetary announcements may be regarded as “good” or “bad” (favorable or detrimental to stock returns).

Lobo (2000) has illustrated the existence of negative returns in stock prices prior to the dates of interest rate increases (bad news), but has also added that the prices are adjusted to positive levels after the announcements.

Using the target Fed rate as a proxy for the US monetary instrument, Bomfim (2003) argues that higher-than anticipated market expectations for the Fed funds rate target (“positive surprises”), have greater impact on stock volatilities compared to the impact generated by “negative surprises”.

Boyd, Hu, και Jagannathan (2005), in examining how macroeconomic news affect stock returns in the short run, have concluded that any announcement regarding unemployment rise is interpreted by market participants as “bad news” in periods of recessions and as “good news” during economic expansions.

Farka (2009) states that monetary shocks are characterized as “good news” when the interest rates are reduced less than expected, increasing more than expected or do not change when forecast is made for a possible reduction. Farka (2009), recognizing that a “bad” new is considered a less than expected target rate decline during an expansionary monetary stance or a more than expected hike during a contractionary period, she confirmed that the stock returns react negatively and more intensely (stronger) for bad news in expansive cycles than in contraction ones.

The empirical evidence of Chuliá, Martens and Dijk (2010) has shown that investors’ reactions are sharper in the case of negative surprises of the Fed rate (good news for stock as the target rate decreases) than positive ones (target rate increases means bad news for stock returns). Their evidence contradict the findings of Bernanke and Kuttner (2005) who did not establish asymmetric effects relating to “bad” and “good” news, using daily stock returns data.

Filbien and Labondance (2013) claim that the Eurozone stock markets (as they are mirrored by the DJ Eurostoxx50 Index) overestimate the bad news, but in bad times investors focus on good news, learning from the ECB monetary decisions.

Tsai (2014) has used both intraday stock returns of 1500 publicly traded firms and target surprises regarding the Feds rate target for the 1999-2007 period and has confirmed the findings of Chuliá *et al.* (2010) on the fact that the negative unanticipated changes (“good” news) of Fed decisions on stock returns are more significant compared with positive shifts (bad news) in both 5-15 and 10-20 window minute intervals around FOMC announcement times.

3. Data

The data were retrieved from various sources: information about the US closed-end country funds prices and NAVs, the benchmark indices, the exchange rates, the survey monetary reports and the monetary interest rates are collected from Bloomberg Professional Services and Thomson Reuters Datastream Professional. Moreover, data concerning the monetary decisions were retrieved from the monetary statements, the monetary policy Committee minutes and the press releases of the central banks of the countries in which our funds invest their underlying assets.

We have also used information about the country funds from their company websites and their prospectuses, from CEF Connect¹² and CEFA¹³, too.

In this paper we examine 20 closed-end country funds that invest their NAVs in 14 countries (11 funds from 8 developed markets and 9 funds from 6 developing economies) whereas, the classification of the countries into developed and developing is based on the International Statistical Institute (ISI).¹⁴ In particular, we have gathered 1484 observations in total (934 observations from developed and 550 from developing countries). Table 1 presents the funds under examination:

¹² The CEF Connect's information services about the US Closed-End Fund belong to the Nuveen Investments.

¹³ The Closed-End Fund Association (CEFA) is a non-profit trade association representing the closed-end fund industry and its members are among the leading investment companies in the United States, Canada and abroad.

¹⁴ According to ISI, developing countries are those with Gross National Income (GNI) per capita per year of US\$ 11,905 and less (as specified by the World Bank, 2012): (<http://www.isi-web.org/component/content/article/5-root/root/81-developing>).

Table 1

Closed-end country funds classification and the country in which their NAVs are invested. The countries are divided in developed and developing. Column “Fund” presents the examined funds per country (in parentheses are the symbols of Bloomberg). The column “Stock Market Fund’s Benchmark Index” presents the funds’ main benchmark index.

Developed Market Funds		
Country	Fund	Stock Market Fund’s Benchmark Index
Australia	Aberdeen Australia Equity Fund (IAF US)	S&P/ASX 200 Index
Ireland	New Ireland Fund (IRL US)	Irish Overall Index (ISEQ Index)
Japan	<ul style="list-style-type: none"> • Aberdeen Japan Equity Fund (JEQ US) • Japan Smaller Capitalization (JOF US) 	<ul style="list-style-type: none"> • Tokyo Stock Price Index (TPX Index). • Standard and Poor's 500 Index (SPX Index).
Switzerland	Swiss Helvetia Fund (SWZ US)	Swiss Performance Index (SPI Index)
Germany	New Germany Fund (GF US)	Deutsche Borse Midcap Market Performance Selection Index
Chile	Aberdeen Chile Fund (CH US)	MSCI Chile Index
S. Korea	<ul style="list-style-type: none"> • Korea Equity Fund (KEF US) • Korea Fund (KF US) 	<ul style="list-style-type: none"> • Korea Stock Exchange (KOSPI Index) • MSCI Korea Index (MXKR Index)
Taiwan	<ul style="list-style-type: none"> • Taiwan Fund (TWN US) • Shelton Greater China Fund (formerly the Taiwan Greater China Fund) (TFC US)¹⁵ 	<ul style="list-style-type: none"> • Taiwan Stock Exchange Weighted Index (TWSE Index) • MSCI Taiwan Index

Developing Market Funds		
Malaysia	Malaysia Fund (MAY US) ¹⁶	FTSE Bursa Malaysia Index
Turkey	Turkish Investment Fund (TKF US)	MSCI Turkey Index
Mexico	<ul style="list-style-type: none"> • Mexico Equity & Income Fund (MXE US) • Mexico Fund (MXF US) 	Mexico IPC (BOLSA) - Price Index (MEXBOL Index)
India	<ul style="list-style-type: none"> • India Fund Inc (IFN US) • Morgan Stanley India Investment Fund (IIF US) 	S&P BSE 500 Index
Indonesia	Aberdeen Indonesia Fund (IF US)	MSCI Indonesia Index
Thailand	<ul style="list-style-type: none"> • Thai Capital Fund (TF US) • Thai Fund (TTF US) 	The Stock Exchange of Thailand-SET Index

Source: Bloomberg (author representation)

15 On October 10, 2011, Shelton Greater China Fund converted from a closed-end investment company to an open-end investment company.

16 The Malaysia Fund (MAY US Equity) has liquidated its shares, closing its share register books at the close of business on August 17, 2012 (the Effective Date). The last trading date of funds stock on the NYSE was on August 20, 2012.

In Table 2 we list the policy rates and the corresponding sample sizes, according to the available Bloomberg survey data.

Table 2
Monetary Policy Rates and Monetary Announcements

Fund Name	Country	Policy Rate	Periods of Monetary Announcements	Number of Monetary Decisions used
Aberdeen Australia Equity Fund	Australia	RBA Cash Rate	12/3/2008 - 10/2/2013	54
Aberdeen Chile Fund	Chile	Chile Monetary Policy Rate	8/9/2001- 10/18/2013	146
New Germany Fund	Germany	ECB Main Refinancing Rate (Fixed rate tenders)	10/11/2000- 10/2/2013	168
India Fund Inc	India	Reserve Bank of India- Reverse Repo Rate	4/29/2005- 10/29/2013	48
Morgan Stanley India Invest. Fund	India	Reserve Bank of India- Reverse R.R.	4/29/2005- 10/29/2013	48
Aberdeen Indonesia Fund	Indonesia	Bank Indonesia Reference Interest Rate-Middle Rate	6/12/2005- 10/08/2013	94
New Ireland Fund	Ireland	ECB Main Refinancing Rate (Fixed rate tenders)	10/11/2000- 10/2/2013	168
Aberdeen Japan Equity Fund	Japan	Uncollateralized overnight call rate	8/11/2006 - 4/4/2013 ¹⁷	85
Japan Smaller Capitalization	Japan	Uncollateralized overnight call rate	8/11/2006 - 4/4/2013	86
Malaysia Fund	Malaysia	Overnight Policy Rate- OPR	11/30/2005- 7/5/2012	49
Mexico Equity & Income Fund	Mexico	Mexico Overnight O/N Rate	10/28/2005- 10/25/2013	84
Mexico Fund	Mexico	Mexico Overnight O/N Rate	10/28/2005- 10/25/2013	84
Korea Equity Fund	S. Korea	Korea target ON Call Rate	3/7/2008- 10/10/2013	68
Korea Fund	S. Korea	Korea target ON Call Rate	3/7/2008- 10/10/2013	68
Swiss Helvetia Fund	Switzerland	Switzerland National Bank Libor Target Rate	9/16/2004 - 9/19/2013	37
Shelton Greater China Fund (formerly the "Taiwan Greater China Fund")	Taiwan	Taiwan Discount Rate	31/3/06- 9/29/2011	23
Taiwan Fund	Taiwan	Taiwan Discount Rate	3/31/2006- 9/26/2013	31
Turkish Investment Fund	Turkey	Turkey 1 Week Repo Announcm.	6/17/2010- 10/23/2013	41
Thai Capital Fund	Thailand	Bank Of Thailand Repurchase Market Rates - 1 Day Official rates	5/23/2007- 7/10/2013	50
Thai Fund	Thailand	Bank Of Thailand Repurchase Market Rates 1 Day Official rates	5/23/2007- 10/19/2013	52

Source: Bloomberg (author representation)

¹⁷ On 4/04/2013 there was the introduction of the "*Quantitative and Qualitative Monetary Easing*". With a view to pursuing quantitative monetary easing, the main operating target for money market operations is changed from the uncollateralized overnight call rate to the monetary base.

The closed-end fund premium is the difference between the natural log of the net asset value and the closing fund price:

$$\text{PREM} \equiv \ln(\text{Fund Price}) - \ln(\text{NAV})$$

It should be noted that all the closing prices used in the analysis of the country funds, of NAVs and exchange rates, and in the analysis of the benchmark indices along with the control variable “AGE” are expressed using natural log.

Finally, in order to deal with the “*non-synchronous trading effect*” problem, a one-day lag in monetary policy rates is adopted (as well as in exchange rates, in stock market benchmark indices and for the NAV values) in all Asian countries.

4. Methodology

4.1 The Models

In order to examine the effect of monetary policy changes and specifically the effect of the central banks’ interest rates changes on the closed-end country funds premiums, we utilize the following regression model proposed by Bernanke and Kuttner (2005) and recently by Vithessonthi and Techarongrojwong (2012):

$$\text{Prem}_t = \alpha + \beta \Delta i_t + \varepsilon_t \quad (1)$$

Where,

- Prem_t represents the premium¹⁸ of the closed-end country funds on day t,
- α is a constant term,
- Δi_t is the change in the central banks’ interest rate instruments on day t,
- β is the coefficient of Δi_t and
- ε_t is the error term.

Since a large number of articles¹⁹ have proven that the regression expressed in Eq. (1) cannot explain the difference between the expected and unexpected policy changes, we implement Eq. (2) as follows:

$$\text{Prem}_t = \alpha + \beta^e \Delta i_t^e + \beta^u \Delta i_t^u + \varepsilon_t \quad (2)$$

¹⁸ With the term “premium” we indicate both the negative and positive premiums. The negative premium is the discount.

¹⁹ See among others, Kuttner, 2001; Rigobon and Sack, 2003; Ehrmann and Fratzscher, 2004; Guo, 2004; Bernanke and Kuttner, 2005; Gürkaynak *et al.*, 2005; Andersen *et al.* 2007b; Ehrmann and Fratzscher, 2009; Chuliá *et al.*, 2010; Hausman and Wongswan, 2011.

Where,

- Δi_t^e is the expected component of interest rate change at time t (defined as the expected interest rate, i_t^e , minus the previous interest rate at time $t - 1$) and β^e is its coefficient;
- Δi_t^u is the unexpected component of the interest rate change (defined as the actual interest rate change minus the expected interest rate change) and β^u is its coefficient.

We examine the impact of monetary policy decisions of foreign countries' central banks (where the underlying assets of the CECFs are invested) on the closed-end country funds premiums using fund-level data. Hence, Eq. (2) is transformed into the following regression formula:

$$Prem_{f,t} = \alpha + \beta^e \Delta i_{f,t}^e + \beta^u \Delta i_{f,t}^u + \varepsilon_{f,t} \quad (3)$$

Where, $Prem_{f,t}$ is the premium of the closed-end country fund f at time t .

In our study, the unexpected component of the interest rate change of the central banks has been extracted from the survey data regarding the interest rate expectations using the Bloomberg database. This is consistent with the approach adopted by Reinhart and Simin (1997), Hussain (2011), Vithessonthi and Techarongrojwong (2012), Lahura (2012) and Vithessonthi (2014), among others. Notably, the surprised component of the monetary policy is equal to the difference between the actual change of the monetary variable under consideration (i.e. the monetary rate) and the median analyst opinions supporting the market expectations).

Moreover, by adding up few new control variables to the above formula, Eq. (4) is deduced:

$$Prem_{f,t} = \alpha + \beta^e \Delta i_{f,t}^e + \beta^u \Delta i_{f,t}^u + \beta_1 AGE_{f,t} + \beta_2 FUNDBENCH_{f,t} + \beta_3 FXCHG_{f,t} + \beta_4 SP_t + \varepsilon_{f,t} \quad (4)$$

Where,

- $AGE_{f,t}$ is the natural log of the age of the fund f given by the number of months since the fund inception date, and β_1 is its coefficient;
- $FUNDBENCH_{f,t}$ is the natural log return of the main benchmark index of the fund's f country, and β_2 is its coefficient;
- $FXCHG_{f,t}$ represents the foreign exchange appreciation between US dollar and the foreign market currencies, measured as units of foreign currency per US dollar, and β_3 is its coefficient;
- SP_t denotes the natural log return of the S&P500 Index, which, as a broadly-used market-cap weighted index denotes the US stock market where the country funds stocks are traded, and β_4 is its relative coefficient.

Another goal of this paper is to examine whether the effects of central banks' monetary policy news on country funds premiums are asymmetric. The news

could be either “good” or “bad”. Thus, we examine whether the “good” or “bad” monetary news from foreign countries affect the premiums of the CECFs. In order to do that, we add up two new terms in Eq. (4) as shown below:

$$\begin{aligned}
 Prem_{f,t} = & \alpha + \beta^e \Delta i_{f,t}^e + \beta^u \Delta i_{f,t}^u + \beta_1 AGE_{f,t} \\
 & + \beta_2 FUNDBENCH_{f,t} + \beta_3 FXCHG_{f,t} + \beta_4 SP_t \\
 & + \theta^G GN_{f,t} + \theta^B BN_{f,t} + \varepsilon_{f,t}
 \end{aligned} \tag{5}$$

Where,

- GN is the dummy variable for the “good” news, equal to one if the announcement is considered to provide favorable information to investors and zero otherwise, and θ^G is its coefficient
- BN is the dummy variable for the “bad” news, equal to one if the announcement is considered to provide unfavorable information to the investors and zero otherwise, and θ^B is its coefficient.

We classify news as favorable (“good”) or unfavorable (“bad”) for the investors based on the works of Farka (2009), Chuliá *et al.* (2010) and Vithessonthi and Techarongrojwong (2012). In the first instance, we need to exam whether the country’s monetary policy is tightening or expansionary, that is if there is an increase or a decrease in the central bank’s monetary interest rates. During periods of restrictive monetary policy, we consider as “good” news an increase in the policy rate that is smaller than the one that had been expected. Similarly, we consider as “good” news the case when policy rate does not change, despite the investors’ estimation that there would be an increase. During a period of tightening monetary policy, an announcement that raises the policy rate to a level higher than that of the market’s expectation is classified as “bad” news. Likewise, during periods of expansionary monetary policy, an announcement that decreases the policy rate to a level higher than the market’s expectation is classified as “good” news. The “bad” news in the expansionary monetary policy period occur when there is a smaller-than-expected cut in the policy rate and when the policy rate remains stable even though the investors thought that it would fall. Finally, it should be mentioned that, as Vithessonthi and Techarongrojwong (2012) state, we consider as “no news” an instance where the policy rate does not change remaining consistent with the market’s expectation. Table 3 summarizes the taxonomy of news as “good” or “bad”:

Table 3**Summary of the classification of the good and bad news of the central bank's monetary policy rate announcements**

Good News	Monetary Policy Stance	Bad News	Monetary Policy Stance
Smaller-than-expected increase in the policy rate	restrictive	Larger-than-expected increase in the policy rate	restrictive
No change in the rate when the increase in the rate is expected	restrictive	Smaller-than-expected fall in the policy rate	expansive
Larger-than-expected fall in the policy rate	expansive	No change in the rate when the cut in the rate expected	expansive

Subsequently, in harmony with Vithessonthi and Techarongrojwong (2012), we add up five dummy variables for the direction of the monetary policy to Eq. (5) aiming at examining if the direction of the policy actions affects the CECFs premiums as follows:

$$\begin{aligned}
Prem_{f,t} = & \alpha + \beta^e \Delta i_{f,t}^e + \beta^u \Delta i_{f,t}^u + \beta_1 AGE_{f,t} \\
& + \beta_2 FUNDBENCH_{f,t} + \beta_3 FXCHG_{f,t} \\
& + \beta_4 SP_t + \gamma_1 EIN_{f,t} + \gamma_2 EDE_{f,t} + \gamma_3 UIN_{f,t} \\
& + \gamma_4 UDE_{f,t} + \gamma_5 UNO_{f,t} + \varepsilon_{f,t}
\end{aligned} \tag{6}$$

Where,

- *EIN* is the dummy variable for the expected increase direction and it is equal to one if the funds rate increases as it had been expected by the investors and zero otherwise, and γ_1 is its coefficient;
- *EDE* is the dummy variable for the expected decrease direction and it is equal to one if the policy rate decreases as it had been expected by the investors and zero otherwise, and γ_2 is its coefficient;
- *UIN* is the dummy variable for the unexpected increase direction and it is equal to one (1) if there is an increase in the policy rate higher or smaller than the one expected by the market increase, and equal to zero otherwise, and γ_3 is its coefficient;
- *UDE* is the dummy variable for the unexpected decrease direction and it is equal to one if there is a cut in the policy rate higher or smaller than the one expected by the market fall, and equal to zero otherwise, and γ_4 is its coefficient;
- *UNO* is the dummy variable for the unexpected “no change” direction and it is equal to one if the policy rate does not change even though a decrease/increase had been anticipated from the markets and zero otherwise, and γ_5 is its coefficient.

Therefore, as Vithessonthi and Techarongrojwong (2012) point out, the constant term α is the benchmark direction where the policy rate remains stable as it had been expected by the market. We wish to highlight that we implement the regression model expressed by Eq. (6) for each country (domestic and foreign) separately.

We have run the above multiple regressions for the overall sample (both the developing and developed countries), as well as separately.

Moreover, as our observations have been derived from different countries and collected at different points in time (events), a panel analysis is used. It is important to mention that the Ordinary Least Square (OLS) method was used in order to estimate the empirical results of the models. The advantages of the least squares method are: a) it makes easy to find the best-fit regression line (using the above formulas), and b) it ensures that we get only one best-fit line.

According to the Gauss-Markov theorem (Brooks, 2008), we should test for heteroskedasticity, multicollinearity and autocorrelation problems in regressions. The test of collinearity between the independent variables was performed using the variance inflation factor (VIF) collinearity diagnostics. Autocorrelation was detected by using the Breusch-Godfrey Serial Correlation LM test. The results from the Variance Inflation Factor (VIF) method argue strongly for the suggestion that there are no collinearity problems between the variables. Therefore, there is no probability of having any high direct linear relationship between the control variables (high correlation). Finally, heteroskedasticity was detected by using White's Test for Heteroskedasticity (Brooks, 2008). The problems with residuals in heteroskedasticity were corrected by using White's methodology for coefficient covariance matrix (White's Heteroskedasticity Consistent standard errors and covariance). Autocorrelation problems were eliminated by adding a first – order autoregressive model (AR1) to the initial regression model (Dougherty, 2012; Halkos, 2011).

4.2 Summary Statistics

Table 4 summarizes the main sample characteristics of our closed-end country funds sample. The average fund premium, changes of central banks' monetary rates (expected and unexpected) and control variables for all 20 US CECFs (investing in emerged and developing markets) are particularly illustrated.

Table 4

Summary Statistics: This table reports the average CECFs premiums and control variables for all 20 closed-end country funds (11 invested in developed and 9 in developing countries). In parentheses are the standard deviation values.

Variables	Total Sample	Developed	Developing
Premium	-0.09607 (0.080)	-0.099483 (0.082)	-0.090280 (0.077)
<i>Controls</i>			
Δi^e	-0.008652 (0.182)	-0.002398 (0.185)	-0.019273 (0.176)
Δi^u	-0.006105 (0.114)	-0.006060 (0.109)	-0.006182 (0.122)
AGE	5.437 (0.231)	5.399 (0.238)	5.503 (0.203)
FUNDBENCH	-0.000021 (0.014)	0.000537 (0.014)	-0.000969 (0.015)
FXCHG	0.000253 (0.007)	0.000214 (0.008)	0.000167 (0.006)

SP	-0.00004 (0.013)	0.00003 (0.014)	-0.000167 (0.012)
No of Obs.	1484	934	550

Table 4 illustrates the classification results regarding the average premium for the total funds sample. As Table 4 shows, the mean premium is negative; the average CECF sells at discount, which, as already mentioned, is common in closed-end funds. More specifically, the average premium for the overall sample approaches a level of -10%.

Our findings for the average premium are consistent with previous studies which have shown that CEFs frequently sell at a discount to their NAV. Chan *et al.* (2008) have used 47 US single country funds between 1987 and 2001 and they also found relatively small average discount of about 6.6%. Davies *et al.* (2013) report an average discount of about 14% for a sample of 55 UK country funds, almost the same for both the emerging and developed funds, between 1992 and 2009. Nishiotis (2004) has calculated that the mean premium for a sample of US CEFs which have invested in emerging markets in the 1989-2001 period is -0.12%, while that for the funds of emerged countries is estimated at -9.70%.

The relative small averages of premiums between developed and developing countries funds that are detected could be explained by the difference in mean stock market returns as reflected by the main fund benchmarks. So, as illustrated in Table 4, the average stock returns of emerging markets are higher than the returns of developed economies, forcing discounts to relatively lower levels²⁰.

The average change of central banks' interest rate (both the expected and the unexpected), is negative for funds of all categories. In connection with the expected monetary changes, the greatest difference is observed in developing economies (approx. -1.92%), which proves that, in those countries, market expectations (as expressed by the Bloomberg surveys) are smaller than the average interest rates of the previous t-1 period. Christensen and Kwan (2014), after studying the market participants' views on monetary policy expectations, have reckoned that public's forecasts designate interest rates smaller than those of the FOMC participants, suggesting that they feel more confident with their estimations about monetary policy.

The fund age, as a control variable, is calculated as the number of months since their inception date. Based on previous studies combining possible monetary asymmetries, we expect a negative relationship between the fund age and the premium levels. In other words, the older the fund, the higher the discount level. For example, Weiss, Lehn and Malmquist (1989) report that the fund age has negative correlation with the level of premium.

Taking into account that during periods of positive investors' sentiment the discounts of the newly launched closed-end funds are lower than those of the older ones, Gemmill and Thomas (2000) have concluded that the fund age has a positive relation with the discount level. They have found that a 1% increase in fund age results in a

²⁰ It should also be noted that differences in summary statistics may be due, among others, to the classification method of countries, in both emerged and emerging markets.

0.04% increase in the fund discount. According to this, mature funds seem to be less attractive for investors, and thus their discount is higher over the years.

Contrariwise, Russel (2005) has reached a different conclusion arguing that as the fund age and size increase, the discount should normally be reduced, due to the fact that older funds have higher value and managerial experience than new ones. Furthermore, taking into account the conclusions of Gemmill and Thomas (2002) who argue that the expense ratio is reduced as fund age increases, we may also conclude that the existence of premiums in relation to the age of CEF is due to this inverse relationship.

In order to capture the systematic element of the returns of the CEFs underlying assets, we have also included the control variable "FUNDBENCH". This variable which is composed of the main funds benchmark indices, allows us to study whether these indices contain efficient informational content in order to investigate the behavior of premiums, on the basis of monetary announcements in the countries of NAVs.

We have deemed it important to connect the CEF puzzle investigation with the returns of the CEF benchmark index, whereas one of the main objectives of fund managers is to outperform a selected benchmark index. According to Table 4, our benchmark indices reveal a positive average return on the emerged CECFs over time, in contrast to the corresponding negative average returns in developing funds. In explaining the difference, one might conclude that investors may have assessed that fund managers of developing funds have underperformed their benchmark indices.

In order to provide a more comprehensive study of the role of exchange rates in explaining the CECFs puzzle, we decided to include in our analysis the control variable "FXCHG" (foreign exchange) which is measured in terms of local (foreign) currency per unit of US dollars. Because of the dual characteristic of CECFs- they are traded in US stock exchanges but invest their assets in foreign countries- their exchange rates fluctuations within diverse economies, affect the fund's daily pricing in relation to the value of their assets.

As Arshanapalli *et al.* (1996) note, during any anticipated appreciation of the foreign currency relative to the dollar, US investors may benefit from its domestic currency depreciation by purchasing CECFs. The increased demand for CECFs raises their market value and, as a result, the level of their premiums. At the same time, authors have stressed that exchange rate fluctuations have a double impact on CECFs prices: First, through the competitive effect, where depreciation (or appreciation) of the domestic currency increases (or decreases, respectively) the competitiveness of their underlying assets by lowering (or raising, respectively) their market values, strengthening (or weakening, respectively) the fund value. Second, there is the translation effect, when for instance the value of CECF is decreasing due to domestic currency depreciation in dollar values. According to the authors, the asset value of CECFs will be strengthened in case of foreign currency depreciation, only when the results of the competitive impact are greater than those of the foreign currency translation effect. Swanson and Tsai (2005) supplement that a currency devaluation in NAV countries (local country) which facilitates export businesses, can create

problems to import businesses, counterbalancing the benefits of the competitive effect with the disadvantage of the translation effect.

Frankel and Schmukler (1996) have studied US country funds that traded their NAVs in Mexico, and have concluded that the exchange rate may only partially explain the discount changes, explaining that the devaluation of pesos has led NAVs to lower prices, thus increasing the premiums. On the other hand, Chandar and Patro (2000) have used 18 emerging and 7 developed country funds and managed to show that during financial crises, their prices traded with large premiums in relation to the values of their underlying assets. They specifically revealed that during crises, the average premiums are greater than the premiums after crises and that this phenomenon is observed both in developed and in developing CECFs. Supporting their findings under non-rational explanations, the authors have argued that US investors underreact to “bad” currency news, in other words they react with insufficient emphasis (magnitude) compared to the respective investors in the countries of NAV. US investors, being regularly briefed and better informed, they particularly influence the market prices of CECFs and they tend to contribute largely to the emergence of premiums when the fundamental values of funds in the countries of NAV are significantly devaluated due to currency crises.

Table 4 shows that local currencies of emerged countries are more depreciated against the US dollar, if compared with currencies in emerging economies. This difference of currency depreciation between developed and developing countries is also reflected in the difference of discounts between them. The higher the currency depreciation in developing countries, the higher the level of discounts in CECFs prices. One possible interpretation for this phenomenon lies in the investor sentiment hypothesis, according to which, US investors, by negatively interpreting the currency depreciations in developed countries, modify their behavior in their local (US) stock markets leading CECFs prices to higher discounts, compared to emerging funds.

Finally, in line with a sound number of research studies which have argued that CEFs prices have a significant relationship with US stock returns (Hardouvelis *et al*; 1994 among others), we have included in our study the Standard & Poor's 500 variable (SP) as a proxy for measuring the US stock market. According to Table 4, the S&P index shows positive mean returns in emerged economies compared with the negative ones in developing markets, for the periods under consideration in our analysis.

5. Empirical Results

As a first step in addressing the research questions we have computed our panel regressions using data from the foreign markets where the underlying assets of our sample funds are traded. The results are displayed as explained hereafter: the second column of each table reports the results of the panel regression including all 20 closed-end country funds. Subsequently, we have separated our sample into 9 CECFs investing in developing markets and 11 CECFs investing in developed markets and we calculated the same regressions. The results are given in columns “Developing Markets” and “Developed Markets” respectively and have been corrected for any autocorrelation, heteroskedasticity and collinearity problems.

Table 5 illustrates the results from the regression of the funds’ premium against the expected and unexpected components of monetary rate changes in foreign countries.

Table 5

Panel regressions of fund premium against the expected and unexpected component of monetary rates change in foreign markets. This table reports the results of the estimates following Eq. (3). Total sample consists of 20 closed-end country funds, 9 of which invest their NAV in developing markets and 11 invest their NAV in developed markets. The values of t-statistics that reported in parentheses (*), denote significance at the 5% level (2-sided).

Variables	Total Sample	Developing Markets	Developed Markets
Δi^e	-0.0099 (-1.407)	-0.0090 (-0.575)	-0.0027 (-0.315)
Δi^u	0.0049 (0.631)	-0.0017 (-0.127)	-0.0041 (-0.2800)
Constant	-0.0948* (-12.487)	-0.0897* (-8.589)	-0.0957* (-9.348)
AR(1)	0.8598 (65.005)	0.8209 (33.933)	0.8741 (35.925)
R ²	0.738	0.674	0.765
Adj. R ²	0.739	0.672	0.765
No. of Obs.	1484	550	934

In spite of the fact that a number of studies have specified the monetary policy effect - and especially the monetary surprises changes - on asset prices, Table 5 still shows that in the simple model (Eq. 3), the monetary announcements have no significant explanatory power in the fund premiums. It was found that the unexpected change in monetary interest rates has no impact on the premiums for each fund category. This result is also consistent with previous findings related to the fact that unanticipated monetary policy actions cannot interpret the behavior of asset prices in its entirety. Bernanke and Kuttner (2005) who have examined the impact of the Federal funds rate changes on stock returns have also found that the anticipated change in Fed's rate is not significant.

Apparently, few other research studies have argued that market participants have the potential to anticipate monetary changes, taking into account the clearer policies and procedures of central banks (e.g. greater transparency, accountability, and credibility) as described by Pool *et al.* (2002). Fawley and Neely (2012), when referring to the Fed decisions, they emphasize that changes in the funds target rate become poor proxies for the unexpected components of monetary policy shocks.

This assertion is supported by the content of Tables 6 and 7 which show that the majority of the expected and unexpected monetary decisions of the central banks had already been anticipated by the market, according to the estimates of Bloomberg surveys that were used in our analysis.

Table 6

This table specifies the percentages of positive, negative or zero surprises, as reflected by the median of Bloomberg surveys' analyst responds, regarding the monetary interest rates of the central banks, in countries where the NAVs is traded. The expected component of any change in the monetary interest change (Δ^e) is the expected rate minus the previous interest rate.

	Expected Official Interest Rates (Δ^e) (Bloomberg Surveys Estimations)		
	Overall	Developing	Developed
	%	%	%
Negative ($\Delta^e < r_{t-1}$)	11,5%	16,0%	8,9%
Positive ($\Delta^e > r_{t-1}$)	12,7%	13,3%	12,4%
Null ($\Delta^e = r_{t-1}$)	75,8%	70,7%	78,7%
TOTAL	100%	100%	100%

Source: Bloomberg (author's estimations)

Table 7

This table determines the percentages of positive, negative or zero surprises, as reflected by the median of Bloomberg surveys' analyst responds regarding the monetary interest rates of the central banks, in countries where the NAV is traded. The surprise element of any change in the monetary interest change (Δ^u) is the difference between the actual from the expected rate.

	Unexpected Official Interest Rates (Δ^u) (Bloomberg Surveys Estimations)		
	Overall	Developing	Developed
	%	%	%
Negative ($\Delta^u > \text{actual}$)	7,5%	9,6%	6,2%
Positive ($\Delta^u < \text{actual}$)	6,5%	7,8%	5,8%
Null ($\Delta^u = \text{actual}$)	86,0%	82,6%	88,0%
TOTAL	100%	100%	100%

Source: Bloomberg (author's estimations)

Besides the fact that the unexpected change of monetary rates has no impact on fund premiums, Vithessonthi and Techarongrojwong (2012) have also found that the coefficients of the unexpected change in the repurchase rate were statistically insignificant when they examined how the changes in the repurchase rate of Thailand affect the stock returns. Indeed, Durham (2001), after having collected data for 16 countries for the period from December 1956 to December 2000, he performed analyses in five different ways and concluded that "monetary policy transmission mechanisms through the stock market have become less pronounced". Put differently, the effect of monetary policy changes on stock returns has weakened.

Gürkaynak, Sack and Swanson (2005) have revealed that FOMC²¹ announcements affect more the movements of the five-year and ten-year Treasury yields than what the stock market behavior does. They have also complemented that the impact of the monetary information can possibly be due to the various business conditions existing at the time of the information release by the Central Bank (FED). Moreover, in harmony with what Gürkaynak, Sack and Swanson (2005) say, Kurov (2012) has noted that the FOMC decisions and their impact on stock returns cannot be studied separately from the phases of business cycles.

When we added four extra control variables, the sign and the significance of both the expected and the unexpected components of the monetary interest rate change were not statistically modified. Therefore, as with the previous model, the results in Table 8 indicate that, both the anticipated and the surprised monetary changes do not seem to explain the premiums levels.

Table 8

Panel regressions of fund premium against the expected and the unexpected component of interest rate change and four control variables (*AGE*, *FUNDBENCH*, *FXCHG* and *SP*), in foreign markets. This table reports the results of the estimates following Eq. (4). Total sample consists of 20 closed-end country funds, 9 of which invest their NAV in developing markets and 11 invest their NAV in developed markets. The values of t-statistics are reported in parentheses. The symbols (*) and (**) denote significance at the 10% (2-sided) and 5% (2-sided) level, respectively.

Variables	Total Sample	Developing Markets	Developed Markets
Δi^e	-0.0087 (-0.974)	0.0009 (0.043)	0.0027 (0.333)
Δi^u	0.0033 (0.345)	0.0021 (0.140)	0.0035 (0.308)
AGE	0.0671 (1.285)	-0.1129 ** (-2.043)	0.2122 ** (3.114)
FUNDBENCH	-0.0936 (-1.326)	0.1202 (1.092)	-0.2454 ** (-3.147)
FXCHG	0.3009 ** (2.133)	0.5418 * (1.755)	-0.3756 ** (-2.472)
SP	0.3842 ** (4.973)	0.3142 ** (2.206)	0.3663 ** (4.197)
Constant	-0.4597 (-1.604)	0.5332* (1.731)	-1.244** (-3.357)
AR(1)	0.8588 (40.249)	0.8001 (18.273)	0.8647 (38.748)
R ²	0.748	0.692	0.798
Adj. R ²	0.747	0.689	0.797
No of Obs.	1484	550	934

Furthermore we have discovered that the fund age has mixed effects in explaining the CECFs premium. The findings of our study suggest that age has a statistically negative impact on the funds' premium (-0.113) for developing countries with a 5% significance level. Thus, the result indicates that as fund age increases by one year, the premium falls by 0.11%. The negative relationship between the fund's age and its

21 The Federal Open Market Committee (FOMC) is a 12-member committee of the Federal Reserve System that takes every key decision concerning the credit and interest rates.

premium is consistent with the findings of Chan, Jain and Xia (2008), Bradley *et al.* (2010) and Davies *et al.* (2013), among others.²² On the other hand, the fund age plays a key role in explaining the average premium in developed funds, but with a positive sign (the higher the CECFs age, the larger the premiums). This finding confirms Russel's (2005) conclusion, who argues that as the fund ages, the discounts decrease.

Moreover, we have found that the main benchmark indices of the funds have a significant negative effect on the existence of their premium, particularly on developed funds. In specific, if the benchmark index of the fund increases by 1%, the premium of developed funds will drop by 0.25%. This result demonstrates the investor sentiment differential between US and foreign investors and could conceivably be interpreted as follows: despite an increase in the underlying values in the non-US countries, US investors did not react, in turn, by purchasing the shares of CECFs and thus raising their market price. This under-reaction of the US investors can be further justified by the fact that the average returns of developed funds are lower than the respective developing ones (Table 4), thereby discouraging intense investments in this fund category.

Additionally, Table 8 reveals a significant positive relation between fund premiums and the foreign exchange rate (FXCHG) in developing countries and a corresponding significant negative relationship with developed markets. For emerging funds, an increase of the exchange rate (appreciating the foreign currency) results to the increase of the NAV values and to corresponding increase of the fund price on the home market (US). It seems that US investors overreact to the good stock market news in developing economies (due to positive average returns of benchmark indices of this fund category), buying with greater intensity the CECFs in local markets. So the existence of premiums is the result of the higher raise of the CECFs market price compared with the values of their underlying assets. This result is also consistent with the findings of Frankel and Schmukler (1996) and Davies *et al.* (2013). The adverse applies to the existence of discounts in developed CECFs.

The returns on the US market (as they are reflected by the leading indicator S&P500 Index) indicate a positive relationship with the fund premiums for all fund categories. Thus, a one-percent increase in the S&P500 Index leads US investors to buy country funds maybe for international diversification benefits they offer. This fact pushes US country funds up, leading premiums to an increase (or discounts to a drop) by 0.38 percent, on average. From the viewpoint investor sentiment and the relating differences, when US investors are more optimistic for their local stock market in relation to the foreign ones, they increase the demand for CECFs by raising their share price higher than their intrinsic value, and thus widening the premiums.

One of the main goals of this paper is to examine asymmetries in the impact of the monetary policy news (deriving from central banks' announcements) on country funds' premiums.

The results presented in Table 9 help us identify whether the "good" or "bad" monetary news coming from central banks in foreign countries affect the CECFs' premiums. The variable "GN" for the "good" news is equal to one if the

²² It has been noted by many researches (among others, Brickley and Schallheim, 1985;

announcement is considered to provide favorable information to the investors and zero otherwise and the variable “BN” for the “bad” news take on the numerical value of one, if the announcement is considered to provide unfavorable information to the investors and zero otherwise.

Table 9

Panel regressions of fund premium including “Good” and “Bad” news dummies and four control variables (*AGE*, *FUNDBENCH*, *FXCHG* and *SP*), in foreign countries. This table reports the results of the estimates following Eq. (5). We examine whether the effects of the monetary policy news coming from the central banks’ announcements on the premia of the country funds are asymmetric. Total sample consists of 20 closed-end country funds, 9 of which invest their NAV in developing markets and 11 invest their NAV in developed markets. The values of t-statistics are reported in parentheses. The symbols (*) and (**) denote significance at 10% (2-sided) and 5% (2-sided) level, respectively.

Variables	Total Sample	Developing Markets	Developed Markets
Δi^e	-0.0066 (-0.727)	0.0014 (0.070)	0.0046 (0.530)
Δi^u	0.0078 (0.670)	0.0046 (0.278)	0.0071 (0.472)
AGE	0.0651 (1.275)	-0.1129 ** (-2.033)	0.2051 ** (3.152)
FUNDBENCH	-0.0735 (-1.030)	0.1150 (1.025)	-0.2185 ** (-2.856)
FXCHG	0.2871 ** (2.033)	0.5369 * (1.742)	-0.3218 ** (-2.070)
SP	0.3950 ** (5.176)	0.3280 ** (2.278)	0.3790 ** (4.448)
GN	-0.0038 (-0.597)	0.0093 (0.762)	-0.0079 (-1.054)
BN	-0.0098 ** (-2.805)	0.0001 (0.0235)	-0.0142 ** (-3.107)
Constant	-0.4470 (-1.593)	0.5329* (1.722)	-1.2043** (-3.402)
AR(1)	0.8573 (39.815)	0.8008 (12.299)	0.8632 (38.256)
R ²	0.750	0.692	0.802
Adj. R ²	0.749	0.688	0.800
No of Obs.	1484	550	934

Furthermore, in Table 9 we confirm the same results for the variables Δi^e , Δi^u , *AGE*, *FXCHG* and *SP* with those of the previous analysis. Our empirical results are confirmed from previous studies on the important effect of “bad” news in stock returns in relation to the “good” news (“good” news has no effect on fund premiums for each country category) (Farka, 2009; Chuliá, 2010, among others). Therefore, “bad” news seems to have a more negative impact on the dependent variable for the overall fund sample and for those investing in developed countries, implying that any announcement of “bad” news would decrease the premiums of the country funds. This outcome could potentially explain the overreaction of the US investors to bad monetary news in developed countries, resulting in a selling pressure and a subsequent drop in fund prices. This reduction seems to be greater than the relative reduction in the underlying values in foreign non-US countries, due to the

corresponding reaction of local investors. One possible reason for the different reaction of local investors to new monetary information in developed countries might be the wide range of local macroeconomic variables that differentiate their expectations from those of the US investors, as regards the economic stability and the future path of local interest rates.

We have then studied the asymmetry in the premiums of the CECFs based on the direction of the monetary policy, as shaped by the central banks' decisions in the foreign countries. For this purpose, we have included five new dummy variables in our regressions. The estimations of Eq. (6) are illustrated in Table 10:

Table 10

Panel regressions of fund premium including five monetary policy direction dummy variables (EID, EDD, UID, UDD and UND) in foreign countries. This table reports the results of the estimates following Eq. (6). We examine possible asymmetries on the premia of the closed-end country funds based on the direction of the monetary policy, as shaped by the decisions of central banks. Total sample consists of 20 closed-end country funds, 9 of which invest their NAV in developing markets and 11 invest their NAV in developed markets. The symbols (*) and (**) denote significance at 10% (2-sided) and 5% (2-sided) level, respectively.

Variables	Total Sample	Developing Markets	Developed Markets
Δi^c	-0.0092 (-0.899)	0.0010 (0.336)	-0.0089 (-0.927)
Δi^u	-0.0029 (-0.2785)	0.0030 (0.153)	-0.0058 (-0.5056)
AGE	0.0646 (1.278)	-0.1123 ** (-2.064)	0.2051 ** (3.264)
FUNDBENCH	-0.0764 (-1.096)	0.1287 (1.164)	-0.2156 ** (-2.864)
FXCHG	0.3251 ** (2.345)	0.4736 (1.517)	-0.3662 ** (-2.393)
SP	0.3984 ** (5.227)	0.3373 ** (2.289)	0.3709 ** (4.403)
EIN	0.0035 (0.731)	-0.0062 (-0.580)	0.0099 ** (2.145)
EDE	0.0102 * (1.672)	0.0033 (0.261)	0.0078 (1.349)
UIN	-0.0127 * (-1.719)	-0.0019 (-0.232)	-0.0248 ** (-2.086)
UDE	-0.0252 ** (-3.195)	-0.0051 (-0.445)	-0.0305 ** (-3.039)
UNO	0.0033 (0.759)	0.0139 (1.440)	-0.0027 (-0.635)
Constant	-0.447 (-1.609)	0.5301* (1.747)	-1.2068** (-3.529)
AR(1)	0.8570 (41.008)	0.7978 (17.927)	0.868 (39.203)
R ²	0.752	0.695	0.804
Adj R ²	0.750	0.688	0.802
No of Obs.	1484	550	934

In Table 10, when we estimate Eq. (6), the coefficients of Δi^c , Δi^u , AGE, FUNDBENCH, FXCHG (for developed funds) and SP, it is proven that the results are consistent with our previous findings. The unexpected decrease of monetary rates (UDE) (i.e. the decrease of the monetary rate levels that are smaller or greater than the expected ones), seems to have a negative effect on the premium of country funds for

developed countries (which is also consistent with the findings of Vithessonthi and Techarongrojwong, 2012, in the Thailand market). This result can be interpreted in terms of the investor sentiment hypothesis, whereby the variation in sentiments between the US and foreign investors is justified. In the case of the unexpected decrease of monetary rates (UDE), the individual US investors seem to underreact to the price raise of the underlying assets in two ways: either by selling the CEFs in US stock markets (market price <NAV) –as they seem unable to assess the monetary developments in emerging countries–, or by buying CEFs of developed economies but at a weaker demand than that of the underlying assets by foreign investors in local markets.

In addition, in connection with the monetary policy direction dummies, the provided results indicate that the coefficient of the unexpected increase (UIN) dummy is negative and statistically significant at the 5% level for emerged economies. In other words, any increase in monetary rates that is higher or smaller than the expected one, affects the fund premium negatively. US investors' overreactions in monetary surprises in respect of interest rates hikes in foreign markets may possibly play a pivotal role in explaining this finding, in relation to the behavior of foreign investors in their countries. Specifically, the existence of the discounted CEFs as a result of a restrictive monetary policy in foreign markets can be associated with the tighter monetary policy that US investors anticipate for those markets in the future. Thus, US investors sell out CEFs in the local markets with high-intensity and therefore lead their market values to a lower level than that of their intrinsic value. The statistical significance of the unexpected increase in the directional variable is also confirmed by Vithessonthi and Techarongrojwong (2012), revealing a positive correlation with the stock returns in Thailand.

6. Results

The information provided by central banks through monetary policy announcements influence financial markets, which in turn confirm and/or correct their estimates regarding the interest rate path in short-term. Despite often-repeated claims that the monetary views of central banks can be anticipated in advance, financial markets are still affected and market participants put effort into responding to any unexpected monetary changes, protecting their investment assets. As shown by our own contribution, despite the continuous effort of financial markets to anticipate future monetary decisions, there is still a number of monetary asymmetries that affect the interpretation of stock values.

The aim of this paper is to examine the impact of monetary policy announcements deriving from non-US central banks on the premiums of US CEFs funds. In our analysis 20 country funds traded on US exchanges and invest their NAVs in 14 foreign countries (8 developed for 11 CEFs and 6 developing for 9 CEFs). Our study further investigates the “closed-end fund puzzle”, by taking into account the monetary announcements of foreign central banks in international markets, which are absorbed both from the stock and the NAV values of CEFs and form the size of the premium or that of the discount.

As central banks decide to alter their short-term benchmark interest rate in order to influence the economy, we use a series of bank announcements on rates as proxies for the monetary policy changes, as well as the Bloomberg survey data on interest rate

expectations, for measuring the unexpected component of monetary rate changes. Specifically, by adopting monetary benchmark rates from countries in which the CECFs fundamental assets are invested, we investigate the relationship of monetary announcements and the “closed end fund puzzle” internationally (in countries of NAVs).

In our panel data analysis where we have used regression based on an event-study method (explained by Bernanke and Kuttner, 2005), we have discovered that the closed-end funds premiums cannot be explained by a model that would simply break down monetary policy into expected and surprised policy; hence additional explanatory monetary or other factors are required. It can be argued that the high transparency, accountability and credibility of central banks help market participants to anticipate more easily the future path of short-term interest rates.

Subsequently, we have added four additional control variables; the fund age, the fund’s main benchmark index, the foreign exchange appreciation between the US dollar and the foreign market’s currency and the SP500 index (as a proxy for the US stock market). When we estimate our models, the coefficient of the variable *AGE* appears negative for the developing CECFs, suggesting that for as long as a fund is maturing, its premiums decrease, and this is in harmony with Chan, Jain and Xia, (2008); Bradley *et al.*, 2010; Davies *et al.* (2013), among others.

Furthermore, the main fund benchmark indices were found to be negatively related to the premiums of developed funds, maybe due to different sentiments between US and foreign investors in evaluating fund performance. US investors seem to under-react to an increase of the underlying values, possibly having taken into account the lower average returns in developed funds during prior periods.

Another noteworthy finding that could be used to explain the CECFs premiums is the contribution of the exchange rate changes. Specifically, the coefficients of exchange rates have a positive sign for the developing funds which are attributed to over-reactions of US investors, as a result of currency appreciation in foreign markets. The opposite is true for developed markets.

The study has also revealed that the S&P 500 Index, (as a proxy of the US market) has shown a positive relationship with fund premiums in both developing and developed market funds, demonstrating the optimism difference among US and foreign investors.

One asymmetry examined in our research is the effect of monetary policy news (“Good” or “Bad”) deriving from the central banks’ announcements on country funds premiums. In order to do that, we have inserted two dummy variables (*GN*) and (*BN*) respectively, based on the works of Farka (2009), Chuliá *et al.* (2010) and Vithessonthi and Techarongrojwong (2012). For developed markets we have confirmed the results of previous studies (Farka, 2009; Chuliá *et al.*, 2010, among others), concluding that “bad” news has a negative effect on a premium.

The second possible asymmetry examined in this paper is if the direction of the monetary policy, as shaped by the decisions of central banks in foreign countries, influences the CECFs premium. For developed country funds, we establish statistically significant, negative relationships between the premium and the unexpected decrease (UDE) and the unexpected increase (UIN) variables, which is

consistent with previous studies that state that surprises of monetary policy are likely to affect stock markets (i.e. Vithessonthi and Techarongrojwong in Thailand stock market, 2012).

These results may, in turn, be explained by the differential sentiments between the US and foreign investors, in cases of monetary surprises (positive or negative). The underreactions of home investors to the unexpected decrease of monetary rate announcements in foreign markets lead them either to implement more subdued purchases in CECFs in US stock markets or to proceed with intensive sales, expanding their discount levels. On the other hand, the unexpected increase of monetary rates leads to discounts, maybe due to the overreactions of the US investors, who, anticipating higher interest rates for the future, they sell with greater intension the CECFs in the US stock market, compared with the trading activity of foreign investors in developed markets regarding the assets of NAV.

As the behavior of stock markets during the turmoil periods increasingly attracts the attention of financial market participants, it will be an challenging future study to investigate other possible asymmetries regarding the CECF puzzle, such as those that may occur in different business cycles or even those occurring at different periods of an economic crisis, at domestic and international level.

Finally, although our results are useful to investors using closed-end country funds in their diversified portfolio of assets, CEF mispricing will remain a puzzle for further academic research in the near future.

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