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Mispricing Explanations of Closed-End Funds: A Survey Review

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Abstract

The aim of this survey is to review the most prevailing developments regarding the existence of the closed-end funds' discounts and premiums and the factors which generate them. Despite the plethora of academic research conducted in order to reach a generally accepted explanation of the closed-end fund puzzle based on both the traditional and the behavioral approaches, particular attention is still required to be payed to the pricing of closed-end funds in the academic literature to date. As the divergence between the closed-fund market prices and their fundamental values offers great challenges to a possible interpretation, this study summarizes a set of conclusions that can help researchers and practitioners study better this financial asset category.

This paper is organized as follows: Section 1 summarizes the basic reference for closed-end funds; Section 2 captures the different theories on the existence of closed-end fund puzzle; Section 3 analyzes the theories of discount according to the main traditional interpretations; Section 4 reviews the explanation of discounts taking into account the investor behavior arguments; Section 5 deals with closed-end funds in the international financial environment; and Section 6 provides the conclusions.

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1. Introduction

Closed-end funds (CEFs), along with investment trusts, open-end and exchange-traded funds (ETFs), belong to the class of collective investment undertakings. They are offered to investors during an initial public offering (IPO), but unlike open-end funds, the capitalization of CEFs is "closed", thus it does not increase by issuing new shares. After the IPO, their fixed number of shares are traded on stock exchanges or

on over-the-country (OTC) markets and the law of supply and demand determines their market price.

The investment orientations of CEFs vary depending on the investment objectives and strategies applied, while the portfolio of their assets (NAV) is usually invested in various diversified portfolios categories, which include companies' listed shares (or not), bonds or various combinations of them. Diversified management and the dispersion of their holdings in different segments (regions, countries, investment assets, etc.) serve various classes of investors depending on the expected return and the level of risk they choose to take. Besides, as with any investment option, CEFs face a number of risks, such as political, market, credit, liquidity, financial leverage risks, etc.

Although closed-end funds are considered among the leading alternative investment options, there is a plethora of research efforts to clarify the existence of the deviation between their market price and the internal value (positive or negative), a phenomenon known as the "*closed-end fund discount puzzle*".

In a global economy abound with experienced and knowledgeable institutional or private investors, where a nearly unrestricted movement of capitals is allowed and where rich, accurate and prompt financial reporting is available along with reduced transaction costs -compared to the past- and with a variety of investment strategies and tools for accomplishing investment goals, the existence of financial irregularities, such as the CEFs puzzle, seems a paradoxical phenomenon.

One of the most common characteristics of a closed-end fund is the generation of either a premium or a discount as a result of the difference between its market price and the value of its underlying assets (NAV)[1].

The Premium is measured by the following formula:

$$\text{Premium} = \frac{\text{Price} - \text{NAV}}{\text{NAV}} * 100 \qquad (1)$$

In line with the results of some early studies, the market price of a traded closed-end fund is undervalued in relation to its underlying assets (Malkiel, 1977; Brickley and Schallheim, 1985; Lee, Shleifer and Thaler, 1990 and 1991, among others).

2. Describing the Closed-End Fund Puzzle

The enigma of deviation between the current market share price and the fund's asset value has led to the following two different research approaches by the academic community, attempting to explain the decades-old closed-end funds puzzle.
The first approach is the *Efficient Market Hypothesis (EMH)* which argues that asset prices should reflect their fundamental value (Fama, 1970). To demystify the divergence of closed-end funds market prices from their fundamental values, EMH

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[1] A premium occurs when the market price of closed-end funds exceeds the intrinsic value of its net assets. A discount is a negative premium.

theory holds that it is a result of existence of various market imperfections, such as fund management fees, asset portfolio characteristics, or taxes, among others.[2]

The second theory refers to the *Investor Sentiment Hypothesis (ISH)*, which argues that the phenomenon of price differentials between the closed-end funds and their corresponding net asset values derive from the emotional differences between rational and non-rational investors, which in turn affect the valuation of the shares prices and their assets (Pratt, 1966; Simon, 1969; Zweig, 1973; Boudreaux, 1973; DeLong *et al.,* 1990; Lee, Shleifer and Thaler, 1990, 1991; among others).

Aiming at a respectable interpretation of the closed-end fund puzzle, Lee, Shleifer and Thaler (1991), have depicted four periods that describe its life cycle:

a. The cycle begins immediately after the launch of the new funds, when traded CEFs usually become overpriced in relation to their intrinsic value, but then their price depreciates relatively to the value of their assets. According to Lee, Shleifer and Thaler (1991), the level of overvaluation in the period of flotation is around 10%. The authors argue that the reasons leading to the appreciation of the market price are related to start-up and underwriting costs that reduce proceeds.

b. Within 120 days after the first trading, the average depreciation is valued at 10%, as already confirmed through observations by Weiss, Lehn and Malmquist (1989). Studying 64 closed-end funds after their public offering period (IPO), Weiss *et al.* (1989) document that, despite the average positive initial stock market returns, the cumulative index-adjusted return reveals a gradual loss of about 15% after 120 trading days. There were similar findings in the study of Hardouvelis *et al.* (1994) regarding 35 transnational closed-end funds.

c. According to Lee *et al. (*1991), in the third stage of the CEFs stock market activity, the majority of CEFs' discounts appear to be mean- reverting, while discounts show high correlation between funds. Similar conclusions are shown in subsequent studies, such as those of Bodurtha, Kim and Lee (1995) and Frankel and Schmukler (1996), among others.

d. During the fourth stage of CEFs' life cycle and in cases of their liquidation or conversion from closed to open, fund prices tend to converge to their NAV and discounts diminish. Brickley and Schallheim (1985) had reached the same conclusions as Lee *et al.* (1991) did, concerning the adjustments of discounted prices to overvalued price levels close to NAV. In this phase, investors enjoy substantial abnormal returns in the period close to the announcement of the final reorganizational change.

3. The Discount Puzzle According to Traditional Financial Interpretations

According to empirical studies that have been adopted by supporters of traditional finance theories, in order to explain frictions that appear in the CEFs sector, several factors are normally used, such as taxes, expenses and liquidity. Thus, the academic

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[2] More details in early studies by Edwards (1968) and Malkiel (1977), among others.

efforts which have used the closed-end funds for the interpretation of the differential between the funds share price and their NAV, based their arguments on a possible incorrect evaluation of the net asset value (NAV), on agency problems, on matters relating to taxation arising from transactions of funds, on dividend yields and on market segmentation issues.

3.1 Net Asset Value Misvaluation

Proponents of the view that the existence of the discount in closed-end funds is due to overestimation of their underlying assets, document their findings on unrealized capital gains and on "illiquid assets" present in the asset portfolio.

One of the factors that financial literature uses to justify the different perceptions in shaping the quotations is *information asymmetry* between market participants and insiders. As mentioned in several studies that explore information asymmetry between traders in financial markets (e.g. Cao, Field and Hanka, 2004; Cheng *et al*., 2006), insiders springing from firm insiders and fund managers redeem the information about the true value of closed-end fund to their advantage, against non-informed outside investors. The increase in the difference between the stock market and the bid-ask spread of CEFs can be taken as a result of market participants' effort to reduce the trading activity of the fund which is based on internal information, so that asymmetric differences are eliminated.

Therefore, in practical terms, the bid-ask spread safeguards traders from speculation techniques, which may be provoked by insider investors. Neal and Wheatley (1998) investigated this issue using a total of 17 closed-end funds and 17 control stocks assuming, on a theoretical level, that the difference between bid-price and ask-price will be lower in CEFs than the corresponding difference in control stocks, due to lack of information asymmetry in closed-funds. Specifically, the authors assume that due to the obligation of the closed-end funds to communicate their stock prices and the value of their assets through printed publications on a weekly basis, the likelihood of having significant differences between the aforementioned prices is minimized. This necessity restrains the phenomenon of adverse selection due to low likelihood of information asymmetry among internal fund shareholders, managers and investors.

As adverse selection is considered part of the necessary costs incurred by market makers for the effective management of the bid-ask spread, asymmetric information between traders seems to have an effect on the size of those deviations, indicating the differences in the perception of the true value of a CEF's share. For instance, in each case where insiders know the future positive results deriving from a proper CEF management, they can exploit the divergence between market price and net asset value (NAV), taking arbitrage opportunity in the stock markets at the expense of market makers. Using two different models on firm's bid-ask spread for the assessment of the adverse selection component, Neal and Wheatley (1998) found that the adverse selection component estimates for the closed-end fund and control variables showed no significant divergence between each other. However, the existence of adverse selection in a sample of closed-end funds contradicts the assumption that the disclosure of CEFs eliminates the adverse selection as a phenomenon. According to the authors, adverse selection is not the result of the current NAV, but that of other factors or a consequence of misspecified models.

Malkiel (1995) used a sample of 30 investment companies in 1994 and recognized that the discount puzzle is directly related to unrealized capital appreciation, considering that fund price differences compensate investors against tax liabilities, which result from the distribution of future capital gains. At the same time, he justifies a discount in those closed-end funds whose NAV include restricted shares, letter stocks[3], illiquid assets, or private placements. The existence of this non-marketable category of assets that are hard to liquidate at prices which deviate from their commercial value, result in significant discounts on CEFs values. As claimed by Malkiel (1995), the increased portfolio turnover ratio has also resulted in overpricing (or in discounts reductions) and while both dividend policy and percentage of insider ownership[4] are related to the existence of discounts, they do not seem to have any statistical significance. Finally, Malkiel (1995) deduces that past closed-end funds returns (up to five years before), the ownership of foreign stocks, the expense ratios, as well as the fund size and the absolute price level of shares, show no interpretive correlation with the presence of discounts.

The existence of overpriced (or discounted) CEFs, the fact that, on average, different types of CEFs have different price variations in relation to their assets values and the effect of declining (converging to NAV value) when CEFs transformed into open-ended, are three facts to which hitherto interpretations of the CEF discount puzzle failed to give satisfactory answers. This offered an opportunity to Datar (2001) to argue that the discount puzzle can be studied in terms of CEFs liquidity. Studying a sample of 18 equity and 90 bonds US closed-end funds between 1988 and 1991, Datar (2001) has concluded that liquidity has a significant effect on the appearance of divergences in the market price of their intrinsic value. In particular, he stressed that funds with high liquidity and volatility[5] exhibit higher price increase when compared with the corresponding low trading activity funds. His conclusions about the liquidity ratio and the existence of underpriced or overpriced values differ depending on funds category, with equity funds showing the highest price deviations from their fundamental values.

Examining the portfolio holdings of a sample of closed-end funds, Lee *et al.* (1991), identified that the funds' market price diverged from their fundamental values (NAV). However, they didn't find significant possession in restricted shares that would justify the existence of the discount puzzle.

Exploring illiquidity and its effects in international market segmentation through a sample of 41 US country funds, Chan, Jain and Xia (2008) argued that closed-end country funds' market price is affected in their domestic country, but when liquidity issues appear in the country of NAV (foreign country), only their intrinsic value is affected. Contrariwise, they noticed that in integrated markets, the share price of the

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[3] **Letter Stocks**: unregistered shares offered privately prior to market placing at a discount to institutional investors.

[4] By the term "**insiders**", we mean those employees, officers or beneficial owners of a company who own more than 10% of its shares.

[5] Measured by the weekly and dollar volume of traded shares, as well as the percentage of outstanding shares traded on the stock market during a week. The volatility of liquidity is calculated as max price minus min price divided by min price (Datar, 2001).

fund is affected by the lack of liquidity, both in the domestic country and in the country where the underlying assets are being traded.

Using control variables and criteria such as the portfolio weight of the top-10 listed shares, the number of stock included in their NAV and the Herfindahl[6] index, Chan, Kot and Lee (2008) chose 54 Chinese CEFs in the period between 2000 and 2003, and investigated the discount effect compared to the diversification level of their NAV. They made the case that less diversified (funds) portfolios attract more institutional investors, because by focusing on fewer holdings through a more active investment strategy, portfolio management becomes more feasible and profitable. Thus, the more diversified a CEF portfolio is, the greater its discount level is, as it is not a favorable investment option for institutional investors. Furthermore, the findings of Chan, Kot and Lee (2008) offer insights into the hypothesis that the size of a fund[7] exhibits a positive relation with the discount level and support the argument that a higher dividend policy reduces the level of fund discount (for instance, attractive CEFs are considered the smaller ones and those that offer higher dividends, as such characteristics increase the funds' value).

As it has been argued through the findings of a number of researchers (including Amihud and Mendelson, 1986; Chordia, Subrahmanyam and Anshuman, 2001; Pástor and Stambaugh, 2003; Acharya and Pedersen, 2005, among others), the level of liquidity seems to have a significant role (positive or negative) in pricing securities, as well as in interpreting the discount puzzle in closed-end funds. The existence of liquidity enables the reduction of expected losses in cases where investment decisions require immediate liquidation of financial assets and serves as a determinant in shaping investment portfolios.

Arguing that the effect of the CEFs discount puzzle is related to the level of liquidity, Cherkes, Sagi and Stanton (2009)[8] attribute the divergence between a fund market price and its intrinsic value to the tradeoff between the advantages offered when buying the CEF (rather than directly owning its underlying assets) and its managerial fees. Specifically, in line with the authors' model, an investment decision to buy a CEF from the stock market reduces the high transaction costs that incur if, alternatively, it is decided to buy and sell the illiquid assets of NAV when they are unexpectedly required to be liquidated. In practice, the absence of management fees results in a CEF premium, while any managerial fees lead to either undervaluation or overvaluation of its price compared to NAV, depending on the relation between managerial costs and benefits arising from liquidity. Moreover, as it emerges from their arguments, the authors do not seem to attribute the purchase of CEFs with premiums, during their IPO, to irrational behavior, but they rather identify the undervalued fund price as a rational reward to underwriters for the liquidity services which they provide for the newly issued shares of a closed-end fund.

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[6] The Herfindahl-Hirschman Index incorporates information in relation to the weighted distribution of shares included in a portfolio. A portfolio with low diversification indicates a higher level of the Herfindahl index, while a larger discount on the price of a closed-end fund is associated with higher values of the index.

[7] Assets of NAV times (x) the number of shares outstanding in the market.

[8] According to Cherkes, Sagi and Stanton (2009) the value of a CEF is the result of the following equation: NAV + capitalized liquidity benefits - capitalized manager's fees.

In the study around the interpretation of the discount puzzle, Davies, Fletcher and Marshall (2013) based their arguments on the role of illiquidity and analyzed UK country funds, which invest their assets in emerging and emerged markets. Initially, they proved that the lack of liquidity is one of the key factors for the discrepancy between fund market price and its NAV, both in emerging markets and during the period of the last financial crisis of 2009. They concluded that the positive relation between illiquidity issues and premium shown in emerging economies derives from the desire of investors to choose those markets for trade due to the economic dynamics they show. Contrariwise, the lack of liquidity in developed markets deters investors from choosing investment firms in those countries, resulting in discounts in their market value. In parallel, by studying the relation between the severe financial crisis of 2009 and the behavior of the funds used in the sample, they observed that in developed markets the level of premium plummets, in contrast to the stability observed in emerging markets.

With regard to the increased needs for international portfolio diversification via closed-end country funds, Chen, Morse and Nguyen (2009) examined whether the introduction of the new global stock benchmark "World Equity Benchmark Series" (WEBS)[9] has negative impact on the liquidity and trading behavior of CEFs. In line with the authors' findings, the adoption of this international index has primarily resulted in a trading volume reduction of closed funds, but this decline derives from the lower number of daily trading activity (liquidity problem) and is not a consequence of smaller trade size. Finally, investigating liquidity problems on bid-ask spreads and quote depth, the authors concluded that the introduction of the WEBS index is considered favorable for closed-end country funds transactions.

3.2   Agency Costs

The academic literature comprises in-depth studies on the different aspirations between corporate managers (agents) and shareholders (principals), which sometimes generate conflict of interests in the operation of businesses. The separation of ownership and control, which Berle and Means had already perused since 1932, is still considered crucial to the economic theory of conflict of interests between shareholders and managers and to the "*theory of the firm*" (Ross, 1973; Demsetz, 1983).

Often, business owners have to address not only an internal control weakness in safeguarding the company's assets and resources, but also the loss of control of the way the business is operated by managers (agents). Due to the fact that management goals may differ from principals' interests, the latter usually study, design and implement mechanisms aimed at reducing or eliminating any differences between their conflicting interests. The agent cost stems from the development and maintenance of the processes that would lead to the convergence of both principals' ambitions and agents' aspirations and it is the grid that holds those diverging relations together.

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[9] The "WEBS" was created on 18 March 1996. It monitors the course of a set of indexes of Morgan Stanley Capital Investment (MSCI) in various countries, such as Australia, Austria, Belgium, France, Germany, Switzerland, United Kingdom, Japan, Spain, Italy, Canada, Malaysia, Mexico, Hong Kong, the Netherlands, Singapore and Sweden.

Jensen and Meckling (1976), in their attempt to explain the importance of relations in a corporation, assumed that there is an agency cost relationship formed between the principal and the agents. Under the rationale that both the principals and the agents aim to maximize their utility, agency problems arise when an agent is called to maximize the wealth of the corporate owners, even if such actions may reduce the principal's utility.

In order to minimize agency problems and limit any divergence from their interests, shareholders offer proper operational incentives to corporate managers (agents) while also imposing relevant control procedures by incurring certain monitoring costs. In contrast, using firm resources, managers try to assure the owner that their decisions will not undermine the welfare of the principals.

Pursuant to the agency theory, the explanation of discounts and premiums on closed-end funds is a function of the level of administrative costs or poor expected management results, in terms of return of capital. Thus, according to the agency cost theory, in cases where management fees are considered to be very high and the performance of management lower than the expected, a share price discount is observed as a result of the reduction in the value of CEFs portfolios.

Barclay, Holderness and Pontiff (1993) further investigated the effect of corporate ownership in the business value by examining the relationship between closed-end funds discounts and block ownership. Using a sample of 138 closed-end funds (1979, 1984 and 1989), they have provided evidence for the existence of a significant average discount (14.2%) for funds with a large percentage of ownership, compared with the average price discount of 4% in the funds with small blockholders' ownership. The authors displayed their comments on the significant and positive relationship between the fund discounts and the large percentage of managerial stock ownership. Looking at press releases and proxy statements for all the funds in the sample, the authors conclude that major shareholders (and internal managers), in receiving private benefits for controlling the fund, avoid the open-ending solution which would result in the abrogation of those benefits. In conclusion, and in line with the findings of Barclay *et al.* (1993), the presence of significant CEFs discounts may be partly explained by the high number of large block-shareholders.

Malkiel (1995) argues, on his side, that a large insider ownership in CEFs leads to large fund price discounts relative to their NAV, because in case the fund is led to liquidation at the net asset value, the major shareholders will gain significant profits. Additionally, Malkiel (1995) expresses the view that high management fees are considered a deadweight loss to investors, and hypothesizes that discounts reflect the capitalized value of those fees.

Chay and Trzcinka (1999) have claimed that CEF premiums reflect the expected future return on investment, which is assumed to be achieved by the increased capability of fund managers ("*managerial performance hypothesis*"). They document that investors are willing to pay a premium by buying shares of CEFs that are expected to have higher future returns compared with their operating costs. Consequently, those funds which are estimated to provide future outperformance show lower price discounts in relation to their fundamental assets (and vice versa). Chay and Trzcinka (1999) put forward the idea that price discount in CEFs occurs due

to either high agency costs or inadequate management results in respect of their performance.

Ross (2002) confirms that the level of discounts is due to managerial fees of closed-end funds, while the relationship between management capacity and expected future investment performance of closed-end funds is also investigated by Ferguson and Leistikow (2004) and by Berk and Stanton (2007).

The study of Arora, Ju, and Ou-Yang (2003) offered new insight into the enigma of CEFs discount in relation to the existence of agency costs and information dissemination. Their hypotheses are based on the assumption that the remuneration of fund managers is directly linked to NAV and as they prefer not to return income to investors (which would cause the asset value to drop), they seek to undertake additional investment projects. The existence of internal constraints (i.e. increased trading costs) aims at reducing these opposing desires between fund managers and investors, as a repeal of such policy restrictions would boost the managers' confidence higher in taking high investment risks. The greater the value of assets under management, the greater the over-exposure of fund managers to investment risks, resulting in having a greater divergence between the closed-end fund market price and its assets value (higher discounts).

In order to investigate the factors affecting the price of closed-end funds, Kim and Lee (2007) isolated three fundamental economic forces: management fee, the principal-agent problem and the effect of the diversification. The findings of their research project are similar to previous arguments, illustrating that closed-end fund discounts are positively correlated with management fees (Kumar and Noronha, 1992; Gemmill and Thomas 2002; Russel, 2005) and agency cost (Coles *et al.*, 2000; Deli, 2002; and Barclay *et al.,* 1993). Finally, they also support the results of Bonser-Neal *et al.* (1990) who provide evidence that the discount reduction of CEFs is a result of the repeal of international investment restrictions.

Based on the activist arbitrage phenomenon, Bradley *et al.* (2010) concluded that the attempts of activists arbitrageurs to open-end CEFs reduce or eliminate the divergence of fund market price from its internal value. Through the study of a sample of CEFs belonging to the period 1988-2003, they observed that activist investors' activities have a dominant role in reducing the discount level by 10% on average, while they recognize the critical role of the bidirectional relationship between fund discount and the open-ending action: a large deviation between the market price of the funds and their intrinsic value increases the likelihood of an "activist attack", but discounts may also be reduced simply because an open-ending attack by activists can be anticipated in the future. Resultantly, based on the fact that large CEFs discounts may offer significant profits if CEFs are converted to "open-ended" or liquidated -since the stock prices will converge to their intrinsic value, which are higher- Bradley *et al.* (2010) confirmed that an increase by 1% on the discount rate implies an 0.66% increase of the likelihood for an activist arbitrage attack, at any given time. Furthermore, the anticipation that large devaluations in the prices of closed-end funds can attract the attention of arbitrageurs, indirectly leads to reduction in discount

levels, in order to avoid a potential activist attack in the future.[10] Extending the work of Barclay, Holderness and Pontiff (1993), Ross (2002), Berk and Stanton (2007), Cherkes, Sagi, and Stanton (2009), Bradley *et al.* (2010) link the existence of the funds discount with the agency cost, on the one hand arguing that activist arbitrageurs use corporate governance in the selection of the fund target and, on the other hand, noting that discount is eliminated upon "corrective" actions taken by fund management (such as repurchasing shares, changing investment advisors or increasing dividends), as a defensive measure against open-ending attempts of activist speculators.

Based on previous studies which primarily focused on asymmetric information theories, and particularly on the *signaling* and *agent cost hypotheses*, Wang and Nanda (2011) attempted to explain whether the *managed distribution policy* (MDP) leads to a reduction (or elimination) of CEFs discounts. The *signaling theory* provides a useful account of how MDP policy marks a signal of a dynamic managerial ability of the fund, which is also reflected by a higher dividend distribution. This momentum is converted into trust by investors for future positive fund returns, leading the fund market price to higher levels and correspondingly reducing the discount level. To put it another way, the authors conclude that the managed dividend policy -better explained in the light of the "*agency cost hypothesis*"- interprets the CEFs discount puzzle more consistently.

As the evidence presented thus far supports the idea that the managed distribution policy (MDP) may have a significant role in reducing CEFs discounts, Doseong, Kim and Song (2013) made an important contribution with their model, adding the option of a share repurchase program (SRP) along with the MDP and studied the differences between them. Through their findings they made notable contributions to the research of Wang and Nanda (2011), demonstrating that the adoption of a managed distribution policy reduces the CEFs discounts when an implementation of a dividend policy is announced, while the adoption of the share buyback program does not affect the discounts.

3.3   Tax Liabilities

One of the most commonly reported causes that preserve the closed-end discount puzzle is the overestimation of the value of their underlying assets arising from tax liabilities in unrealized capital gains and in respective taxable obligations due to existing illiquid assets. It is argued that with the acquisition of shares in a closed-end fund, an investor acquires an integrated capital gains tax liability for capital gains which have not yet made a profit as some assets of the fund portfolio have not yet been realized. Whenever a fund decides to record and distribute those unrealized capital gains to its shareholders, they will be, in turn, liable to capital gain taxes. The decision to purchase shares in closed-end funds may have been proportional to the alleged tax, which may translate into low fund eligibility in case of high taxation.

Although future tax liabilities reveal the existence of significant fund discounts compared to their intrinsic values, in cases of large accumulated capital gains, Malkiel

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[10] As reported by Bradley *et al.* (2010), the discount levels do not seem to decrease significantly after 1992, when activist attacks in closed-end funds were more common, compared to the investigation period from 1988 to 1992.

(1977) has an opposing opinion. He considers that, despite the high proportion (25%) of unrealized gains on CEFs, the existence of corresponding low average discount rates of appr. 5% does not signify an association between discounts and tax liabilities of a fund owner.

According to Constantinides (1983), an investor who realizes transactions that include tax liabilities holds a "cash account". This account can be used to calculate its net tax liability, which is proportional to the average tax rate. At a certain point in time the investor is required to liquidate the cash account in order to cover his tax liabilities. Since taxation of capital gains of an investment in shares can be put back to a later date (tax-timing option), the investor has the opportunity to choose the time at which he will liquidate his investment, reaping loss or gain (Chay, Choi and Pontiff, 2006). Advocating the approach of Constantinides (1983), it could be argued that the existence of the discount is a result of CEFs investors' inability to choose the most convenient time to realize their capital gains.

Adopting the conclusions of Constantinides (1983, 1984), Brickley, Manaster and Schallheim (1991) sought to examine the investors' behavior in connection with tax obligations arising from owning closed-end funds. They assumed that if an investor possesses fund shares subject to taxation due to unrealized capital gains, he has a tax-timing option to execute: to liquidate the fund either with a loss or with a gain, by choosing the right time at which the tax burden will be minimized. The authors consider that when an investor acquires shares of a closed-end fund (instead of directly purchasing the shares which comprise the NAV), he may shift any deriving tax liabilities for the underlying assets to the fund manager, yet the tax liability of the future liquidation of the fund shares is passed on to the fund investor. However, despite the fact that the manager of the closed fund does not have the legal right to transfer the tax liabilities attributed to the NAV asset management to fund investors, the tax-timing option for the taxable investors will be less than the corresponding value for tax purposes if the investors had directly invested to NAV assets. This is, according to Brickley *et al.* (1991), a reasonable explanation for how fund prices are traded below the sum of the true values of the NAV assets.

Although the CEFs puzzle has gained fresh prominence, Lee, Shleifer and Thaler (1991) reject the involvement of agency costs, tax liabilities and illiquid assets of NAV, adopting the *investor sentiment hypothesis* in order to interpret the reason behind the discount's existence.

Kim (1994) offers significant insights into arbitrage activities between the CEF market price and its underlying assets, arguing that such a practice eliminates the level of discount. At the same time he argues that the discount puzzle can be justified by the loss of tax-timing opportunities available to the investor against the alternative option of either an indirect investment to a CEF or the direct holding of the underlying securities included in the fund portfolio of assets. According to the author, the CEFs discount level is positively correlated with the tax-timing option value. He considers that the direct holder of the individual shares included in a closed-end fund portfolio has comparative tax advantages which he may exert, taking a tax-timing trading opportunity. However, investors who indirectly acquire shares of a CEF are deprived of the tax-timing option value for the implementation of a profitable tax strategy. Therefore, Kim (1994) makes a major contribution by demonstrating that the

existence of CEFs discounts is the result of the loss of tax-timing options by investors in closed-end funds.

As to tax considerations, Malkiel (1995) argues that a possible explanation for the persistence of closed-end fund discounts might be the large unrealized capital gains which have negative consequences since they are subject to taxation when fund investors decide to sell them in the future.

3.4   Market Segmentation

Among the academic explanations for the undervalued market price on the shares of closed-end funds, several assumptions around the forms of market segmentation emerge. Aiming at a portfolio diversification, international investors choose, among other things, to perform investment placements in markets outside their domestic economies, some of which retain several legal restrictions on investment funds movement.

According to the market segmentation theory, financial assets involving the same risk level and which belong to different countries have the same expected returns (expressed in the same currency), provided that there are no trade restrictions and, of course, that markets are integrated (Stulz,1981). In spite of the fact that increasing global financial transactions try to limit trade barriers between countries, some economies are not totally integrated. The existence of incomplete markets will also be supported by the apparent deviations between the market value of the traded shares and the corresponding value of their underlying assets, in the category of closed-end country funds.

In order to study the US integration level with other countries[11] Bonser-Neal *et al.* (1990) confirmed the extent at which announcements about changes in global investment restrictions affect the level of change in discounts (or premiums) of CEFs which invest in unique foreign countries (country funds). Their work attempts to show that the fund country market price and the value of NAV change as a function of international investment barriers amendments[12]. They assume that a CEF premium that invests its assets in a country with tight investment restrictions is practically the additional amount that an investor is required to pay to overcome these investment barriers. Their research also showed that the premium in four out of the five closed-end funds of their study decreased upon the abolition of restrictions on international financial markets in which the invested NAV was announced or anticipated.

Johnson, Schneeweis and Dinning (1993) revealed that the existence of premiums (or discounts) on the closed-end country fund prices is the result of the investment restrictions imposed on countries where the underlying assets are invested. Thus, the existence of premiums is justified in cases where CECFs shares are traded in economies with no investment restrictions, while, at the same time, the underlying assets are traded in (or are dependent on) non-integrated markets.

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[11] Brazil, Australia, France, Germany, Switzerland, India, Japan, Italy, Korea, Malaysia, Mexico, Spain and Taiwan.
[12] Taking into account the classification by the International Monetary Fund (IMF), authors have isolated for study purposes only those investment restrictions imposed on "portfolio investment" and in "direct investment" (Bonser-Neal *et al*. 1990, p. 533).

In a similar survey investigating segmented markets, Choi and Lee (1996) analyzed the pricing sensitivity for the period between 1978 and 1990 in 21 closed-end country funds that invested their underlying assets in developed and developing countries. According to their hypothesis, the existence of price discount in a closed fund suggests that the foreign market is segmented and that the premium is the result of the investment restrictions in these economies. They also argued that, since international country funds are a pool of assets from foreign markets but traded on American stock exchanges, the returns should be sensitive in these two different markets depending on the degree of market segmentation between those economies. Considering neither the interest rate risk nor the investor sentiment, Choi and Lee (1996) assumed that the fund stock price and the net asset value traded in a foreign market should face a similar investment risk if the economies are internationally integrated. Contrarily, if the markets are segmented, the stock and the NAV prices are different when compared with each other[13].

Examining whether the cross-sectional variations in the closed-end funds premiums are the result of the existence of direct or indirect barriers to investment, Kim and Song (2010) used a sample of 55 US closed-end country funds investing between 1995 and 2004, hence a period following financial liberalization. Based on estimates from the Political Risk Services' International Country Risk Guide (ICRG) for measuring indirect investment barriers, as well as macroeconomic, political and financial factors and factors involving the same investment companies as those in the sample, they concluded that the investment of assets in countries with high economic, political, financial and foreign exchange risk, generate higher increases in their share prices. While taking into account the liquidity level of stock market transactions in emerging countries, the authors have agreed with the findings of Chan, Jain and Xia (2008), showing that the closed-end funds which invest in countries with stronger indirect investment restrictions, exhibit higher premiums in market prices in relation to their assets value.

The work of Chang, Eun, and Kolodny (1995) is another example of study on whether closed-end country funds can offer an adequate explanation for the diversification of investment risk in an international environment. By using a sample of 15 CECFs ranging from 1985 to 1990, the authors concluded that:

a. Although the returns of most CECFs are correlated with the countries in which the values of their assets are invested, they exhibit equally significant correlation with the US market in which their shares are traded. In particular, the factors that determine the volatility and correlation (betas) of the closed funds returns showed higher correlation with the Standard & Poor Index than with the broad market indices in the home-countries of their underlying assets.

b. Closed-end country funds offer substantial opportunities for international portfolio diversification, especially in the developing markets of Mexico, Taiwan and Brazil.

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[13] They indicate for example that in the case of segmented markets, a risk increase in a country in which a CECF trades (e.g. USA), will negatively affect the price of the fund in this market, but not the underlying assets of its NAV in the foreign market they trade (Choi and Lee, 1996, p.48).

    c. Evidence shows, using Jensen's alpha, that almost all sample funds (with the exception of the Mexico fund) have not outperformed the MSCI World Index.

    d. Bivariate co-integration analysis revealed that the markets of N. America and Europe appear integrated in relation to the returns and the NAV of the closed-end funds included in the sample. Conversely, the research findings of Chang *et al.* (1995) do not defend the hypothesis of the integrated markets between America, Asian emerging countries and Brazil, indicating the existence of investment restrictions in those specific regions.

Studying the volatility of a sample of 40 international mutual closed-end country funds investing in 26 developed and emerging countries along with the impact of the Asian crisis of 1997 in their returns, Tsai, Swanson and Sarkar (2007) have reported the following:

    a. The Asian crisis has had a greater impact on Asian funds compared to any other region. Additionally, fund share prices were more affected by their underlying values, stating that US investor's confidence in Asian markets was shaken more acutely than that of domestic Asian investors.

    b. Funds stock prices and their intrinsic values are co-integrated, revealing the existence of a long-term relationship between them. In emerging markets, the long-term relationship has more to do with the fund share prices, while in developed markets the co-integration includes the underlying assets, as well.

    c. In the short-term and in the majority of markets, the returns of the underlying assets precede those of the fund share price, a fact attributed to the slower reaction of US investors to the local unexpected financial news, compared with that of domestic Asian investors.

Although several studies have documented sufficient explanations in order to address the dynamic relationships between CEFs market prices and NAV with respect to the existence of segmented markets, the problem of subjectivity in determining the investment barriers -which, sometimes, were not even clearly identified- received considerable criticism. Jones and Stroup (2010), in their attempt to illustrate the effect of market segmentation on discounts of CECFs, adopted the Fraser Institute's Economic Freedom Index (EFI)[14], which studies the economic freedom (and therefore the range of investment barriers) in various countries on a wider basis. Using panel data analysis on a sample of 26 CECFs ranging between 2000 and 2006, the authors confirmed the hypothesis that the divergence between CEFs market price and their intrinsic value converges to zero, depending on the economic freedom magnification.

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[14] On a scale from 1-10, the EFI index measures the size of the public sector, the legal system, access to sound money, the level of control on capital market and regulations in financial markets. The greater the level of the index, the lower the degree of market segmentation (Jones and Stroup, 2010, p.1640).

3.5   Dividend Yield Hypothesis

The strategic corporate decisions around dividends distribution in closed-end funds and their relation to the effect of the discount on their prices have become a subject of considerable academic interest by several researchers. If there is evidence supporting the assumption that the unrealized capital gains of a closed-end fund generate tax liabilities to the holder and consequently justify the existence of its undervalued price, then, in an inverse sense, the distribution of profits should lead the fund market value to appreciation.

In another study, Malkiel (1995) examines the hypothesis that a distribution of high dividends reduces unrealized capital gains of a closed fund and decreases future tax liabilities of the fund, leading the price relative to its fundamental value, to a premium. But, as high payouts have shown low statistical significance on fund pricing, the results obtained by his study do not confirm this view.

On the other hand, Pontiff (1996), supports the view that large discounts which the CEFs develop, are, among other reasons, the result of a high-dividend policy, and he demonstrated that mispricing of CEFs is explained by the opportunity for arbitrage between the value of the fund (long position) and the value of its assets (short position).

The assumption that the presence of CEF discount or premiums is the result of fund investors' request for high dividend yields (mainly investors from lower income tax brackets who seek high yields and income), has found many supporters.

Lee and Moore (2003), adopting the *dividend yield preference hypothesis*, argue that holders of closed-end bond funds are primarily individual investors who seek a high current yield. The preference in this category of closed funds emerges from both the small market price volatility and the consistency in the payment of dividends (monthly), compared with the other categories that pay dividends annually (i.e. equity). According to the authors, this preference and the trading activity which follows the equities of funds would drive prices up, leading to an overvaluation of the share prices relative to NAV.

4. Behavioral Explanation of the Discount

The weakness of the most famous economic theories concerning the discount puzzle gave rise to new approaches emanating from the field of *Behavioral Finance*. While traditional economists had based their theories on the concept of rational investment decisions, Kahneman and Tversky (1979) substantiated the view that since the traditional *Expected Utility Theory (EUT)* cannot explain sufficiently the process of economic decisions taking, under conditions of uncertainty, they introduced the "*prospect theory*". In line with the main concept of this theory "people underweight outcomes that are merely probable compared with other outcomes which are obtained with certainty" (Kahneman and Tversky, 1979). In other words, due to an irrational tendency, people are more hesitant to gamble when making profits than when incurring losses; people (i.e. investors) prefer to sell quickly when profits are made, but are indecisive about selling when they run losses (Tvede, 1999).

According to the behavioral economics approach, the understanding of some financial issues would be more feasible under the hypothesis of irrational investors. The *investor sentiment hypothesis* explains that the behavior of equity prices can essentially be attributed to the emotional swings of the irrational investor, rather than to a perusal of the changes in fundamental elements of the economy or of the equity instruments.

Zweig (1973) is considered among the pioneering scholars who depicted the theory of investor sentiments in relation to closed-end funds. He buttressed his views with elements from the *random walk theory* -as developed by Cootner (1964)- under which shares prices follow a stochastic trend through reflecting barriers, that is around some mean values. According to Zweig's (1973) conclusions, private non-professional investors are considered to be an opposing "*sentiment index*" for future return performance of a closed-end fund. Specifically, arguing that non-professional investors have a prominent presence in CEFs trading activity, Zweig states that any change in their expectations can also affect discounts or premiums associated with the fund prices of this asset category.

Since the 1990s, a number of studies (including those of Lee, Shleifer and Thaler, 1990 and 1991) built on the views of De Long, Shleifer, Summers and Waldmann (1990) have depicted the view that the closed-end funds discount can be explained by the investor sentiment in line with the 'noisy' rational expectation model.

Investors, depending on their behavior towards the level of financial risk, are divided into two separate categories: rational traders and non-experienced investors, who do not cogitate or always act relying on logic (irrational traders). While the dominant element in the decisions of rational investors stems from unbiased expectations, non-informed investors systematically repeat the same wrong decisions and fluctuations in their sentiment generate new risk levels. So, the classification of investors in the two above mentioned categories is associated with assumptions referring both to the time horizon and the degree of risk aversion, elements taken into account by rational investors for their investment decisions.

The emotional fluctuations, misperceptions and the increased risks arising from irrational investor decisions provide the reasons for the deviation of the CEF stock price from its fundamental value, preventing the investors from making rational arbitrage between the fund stock price and its underlining assets. The probability that the rational investors incur losses from perceptions or actions of the non-rational ones leads to the mispricing of CEFs, as a "compensation" for the growing risk incurred by investing in them. Furthermore, in harmony with the model of De Long *et al.* (1990), the excessive optimism of non-rational investors justifies the discounts observed in closed funds through the increase of their prices, after their IPO.

Lee, Shleifer and Thaler (1990), while attempting a critical review of earlier theories[15] regarding the CEF "puzzle", have stressed the important role that non-informed investors' perceptions play in the generation of this price anomaly. In particular, they held that the number of institutional funds is smaller than that of noise traders in the

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[15] They specifically refer to the agency costs, the existence of unrealized gains or to the existence of restricted shares, among other issues.

CEFs market, as in this manner double-charging of management fees can be avoided. They also held that the overvaluation of funds after their initial public offering (IPO) is due to the over-optimistic anticipations of those individual investors. Lee, Shleifer and Thaler (1990) consider that the over-optimism of the non-rational retail investors gives an opportunity to new closed-end funds to enter the market and be traded at overpriced levels in relation to the value of their assets.

As rational investors have to deal with both the risk of the underperformed NAVs and the likelihood of an increase in pessimism on the part of irrational traders in the future, they seek an extra "compensation" if they are to buy a closed-end fund, i.e. to buy it at a discount. Justifying the investors' decision to buy a CEF at over-valued market price, the authors relate it to, the over optimism of the noise traders, especially in periods where introduction of new funds in the market (IPO) is taking place.

Acknowledging the destabilizing role of non-rational investors in relation to the premium (discount) puzzle in the prices of closed funds, Lee, Shleifer and Thaler (1991) expanded their theories. Among other things, they endorsed the view that the undervalued stock prices of a fund are not a result of pessimistic expectations of the non-rational investors, but a result deriving from the difference of risk between two options: either to purchase shares of the fund itself, or to directly invest in shares comprising its NAV. As it is riskier to hold the share of a CEF than its NAV portfolio, it is highlighted by the authors that, the puzzle of the CEFs discount, when observed, is due to a higher expected return of the share after its purchase compared with the corresponding mean performance of a portfolio which simulates the NAV.

While a growing body of literature recognizes the importance of the investor sentiment in the field of CEFs, Abraham, Elan and Marcus (1993) came to different conclusions through their empirical research on a sample of closed-end bond funds. Firstly, their results showing that the discount of closed-end bond funds has equally high systematic risk[16] as that of equity funds, contrast with the sentiment hypothesis of the non-rational investor expectations, because bonds are not influenced by the (pessimistic or optimistic) behavior of noise traders. Secondly, they demonstrated that, despite the roughly comparable level of systematic risk, bond funds have small overpriced average values regarding their NAVs, in contrast with the high discounts observed in the respective closed-end equity funds.

Combining the *investor sentiment hypothesis* with managerial performance, Richard and Wiggins (2000) researched 38 closed-end country funds in the period between 1988 and 1997. First, they confirmed the existence of the *managerial performance hypothesis*, because of the significant interpreting information for future returns on assets arising from fund premiums. Specifically, the authors argue that the existence of premium in closed-end funds prices is welcomed by those investors who foresee that the skills of the managers ensure both the appropriate stock selection and an appropriate market timing for investment. On the other hand, the authors hold that CEFs premiums (or discounts) reflect the optimistic (or pessimistic) perceptions of investors about the future stock market performance in which the underlying assets are invested, thus they are considered to be a valuation measure of a foreign stock market.

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[16] Abraham *et al.* (1993) have measured the systematic risk by calculating the beta of premium/discount relative to the NYSE Index returns.

Since the closed-end funds are classified according to their performance in relation with their market price within particular periods of time, the use of specific benchmark indices assists their performance evaluation.

One of the major tasks of the CEFs fund managers -considering the investment strategies they apply- is to outperform above the returns corresponding to a selected benchmark index. It is from the results of the investment management and the divergence (or convergences) of a fund's returns in relation to the benchmark index (under or over-performance) that the management fees are explained.

In the past, several attempts were made to record fund pricing, through the structure, incentives and relationship between shareholders and fund managers, concerning the fees of the later (agency problems). Through the study of 81 externally managed CEFs within the period 1978-1991, Coles *et al*. (2000) concluded that, among the factors which explain their premiums, is the association between managers' compensation scheme and return of a benchmark index. Specifically, their analysis concluded that only a part of the CEFs have connected the advisors' compensation with the benchmark index performance, explaining that it is only since recently that this particular relationship has been undergoing examination. The authors substantiated their analysis taking into account the moral hazard issues generated in the relationship between agents and principals, confirming, in parallel, the need for a mechanism which could align compensations schemes with performance evaluation. Therefore, a relationship between fund managers and shareholders aiming at maximizing the latter's wealth could only be built on the basis of an agreement for management fees payment dependent on the level of NAV or by adopting a benchmark index. The research of Coles *et al*. (2000) revealed that around 55% of fund managers have agreed on a fixed compensation rate as a function of NAV.

In certain studies researchers have used various benchmark indices aiming at studying risk-adjusted returns and performance persistence of CEFs by examining both stock returns and their respective NAV returns. Bers and Madura (2000) claim that within an efficient market there is no actual place for performance persistence, explaining that should this persistence appear in the CEFs' market prices, investors would then only purchase CEFs with a record full of positive past returns. Contrariwise, in case NAV holdings showed positive return persistence, investors would benefit themselves by copying the most lucrative NAV underlying portfolios. Through a sample of 384 domestic (bond, equity and municipal bond) CEFs belonging to the period 1976-1996, they argued that whatever the funds' performance persistence was, it should be attributed to the inventor sentiment. Any positive investor sentiment arising from the most recent positive returns of a CEF are spread like "snowball" among investors resulting in raising its market value due to the increased demand (and vice versa).
By using the S&P500 and S&P/BARRA Growth and Value benchmark indices for the calculation of the risk-adjusted returns, Bers and Madura (2000) concluded that the existence of greater underlying assets returns -compared with their market price returns- is the natural result of positive investor sentiments, arising from the CEFs' net asset value outperformance when compared to their benchmark indices returns. Accordingly, the market price returns of the CEFs seemed to have not outperformed the returns of their benchmark indices. To summarize, they argued that any observed performance persistence in the NAV returns is due to the "closed characteristic" of

funds, which allows fund mangers to focus on positive intertemporal performance returns more efficiently. Respectively, they attributed the persistence of CEFs market prices to the "*snowball hypothesis*" as mentioned above.

In a later study, Madura and Bers (2002) used CEFs investing in countries other than the USA and demonstrated, among others, that the positive performance persistence is evident only in their market price returns and not in their NAV returns.

Despite the use of a benchmark index for the alignment of managerial practices with the shareholders' investment objectives and their agreement of planning compensation schemes for managers, Admati and Pfleiderer (1997) have different views. They consider that the association of the benchmark index to the fund managers' activities has disadvantages as it undermines optimal risk sharing and does not offer productivity incentives to fund managers, due to restrictions arising from the composition of the benchmark portfolio index.

Hardouvelis and Tsiritakis (1996) have linked the behavior of noise traders with the predictive ability of the Greek CEFs. They found, among other things, that closed-end funds premiums may reversely predict future returns. Similarly, a positive but not so significant relationship was found between the current premiums and future funds' NAV returns. According to the authors, the positive sentiments of the investors with limited knowledge and information (noise traders) raise the prices of CEFs higher than their internal value (NAV) and to the extent that prices tend to return to their mean (known as mean-reverting) a decline is expected in the future. Furthermore, despite the fact that the largest part of assets (NAV) of the Greek CEFs include fixed or debt instruments, their excess returns are displayed significantly positively correlated with the General Index of the Greek Stock Exchange, which proves the overly-sensitive behavior of investors in the domestic market.

On the other hand, Frankel and Schmukler (2000) offered a different approach, other than the rational behavior one, in respect of the interpretation of discounts on CEFs. They have claimed that the cause of the divergences between the funds prices and their NAV is the   information asymmetry existing between the country holders from the US stock exchange and those who invest directly in their NAV (domestic investors). The information asymmetry between those two classes of investors, with the domestic ones being considered more informed on country funds NAVs, allows US investors to buy the funds at a discount, because of the higher risk they face. The authors mention that former variations of NAV levels could more easily anticipate the current market values of CEFs than anticipate the NAV from the stock prices and their premiums.

In respect of the financial crisis in East Asia and Mexico, Levy-Yeyati and Ubide (2000) have recorded the decrease in discounts in the course of the crisis, adding in parallel that the changes in both CEFs stock prices and their NAV follow the amendments in the local Stock Exchange indices, which are in turn, affected mainly by exchange rates. This observation substantiates the view that foreign investors (in the countries of NAV) react earlier than international investors do, due to their advantage of preceding information which originates in the local stock Exchange.
Halkos and Krintas (2006), after studying Greek CEFs and using factor analysis, confirmed the existence of two factors associated with the variability in fund

premiums. The first factor has to do with certain fundamental variables, such as the NAV return, the Athens Stock Exchange (ASE) return, and the parameter of time, while the second factor, which captures behavioral variables consists of the month-to-month change in CEFs number of outstanding shares, the month-to-month change in inflows/outflows of equity CEFs, the change in the total assets of equity CEFs, as well as the monthly change of the ASE Index. The authors concluded that the fundamental factor has a positive influence -and to a greater extent than the corresponding behavioral factor- in the existence of CEFs premiums. On the other hand, the authors saw that the decrease in CEFs discounts (or premiums) is associated with the level of market sentiment (i.e. a raise in the investor sentiment leads to lower prices of premiums or discounts).

In the light of the *investor sentiment hypothesis*, Anoruo *et al.* (2007) have investigated the time-varying and cross-border behavior of four American closed-end country funds in Chile, Mexico, Brazil and Argentina, in the period between 1991 and 2001. In particular, they studied the deviations between their market prices and their intrinsic value during the financial crises in Mexico and Asia, as well as the information transmission process among them. Their study portrays strategic and long-term structural relationships between funds prices and their NAV and holds that discounts follow a mean-reverting process, which is mainly attributed to funds' share prices. The results of the study document the existence of cross-border volatility spillover, which can be observed at various times having an impact on the fund prices and their NAV.

With a view to explaining the divergence between the intrinsic value of closed-end country funds and their respective share price, Ramchander *et al.* (2008) measured how US and German investors react to a number of macroeconomic announcements[17] (surprises), by examining the behavior of both the price and the corresponding NAV of three international closed-end country funds investing in Germany. In particular, the authors focused on the investigation of the magnitude and the direction of selected financial information gathered from both US and Germany and their effects on CECFs market values and discount level in the period between 1990 and 1999. Based on empirical findings in other financial anomalies, such as the decision of investors to choose almost exclusively companies established and operating in their country (home-country bias), Ramchander *et al.* (2008) asserted the existence of systematic differences in the interpretation of macroeconomic announcements between domestic (German) and the respective foreign (US) investors. In their thorough analysis they demonstrated that macroeconomic news emanating from these countries has systematic different effects on the funds stock prices and their intrinsic values, taking into account the composition of the fund portfolio. Thus, the internal value of funds is more strongly influenced by news stemming from and referring to the German economy, as opposed to their traded price which is more susceptible to US macroeconomic announcements. Moreover, the findings of the study suggest that among macroeconomic news, those surprises that improve the German economy or worsen the US market (such as changes in industrial production and in the Producer Price Index) result in raising both the intrinsic value and the market price of the fund to the same extent.

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[17] Industrial Production Index (IPI), Producer Price Index (PPI), Retail Sales, Trade Balance and Unemployment Rate.

Using data of ten US closed-end country funds which invest in five Asian markets[18], Cohen and Remolona (2008) studied their stock price deviations from their fundamental value in the period of the Asian crisis, which is between 1997 and 1998. The primary aim of their study was to investigate whether, during the crisis, clear differences in sentiments had emerged, in respect of the valuation of funds among domestic (US) and foreign investors (in countries where the NAV is invested). An important finding of this study was that, before the crisis, stock prices in Asia had been affected by domestic information about the financial markets returns, while, during the crisis, they were affected by the foreign investor sentiment. The behavior of closed-end country funds backs up the hypothesis that the sentiments of US investors were more optimistic than those of Asian investors, both during and after the crisis in some countries. Thus, in the course of the crisis the daily fund stock returns proved to be less dependent on news from Asian countries (discounts change to premiums), suggesting a difference in perceptions regarding the valuation of the funds prices and their NAV and confirming the earlier findings of Frankel and Schmukler (1996) over the Mexican crisis of 1994.

Flynn (2012), after studying closed-ended funds from the US and the UK, completed the literature on mispricing observed in the CEFs market, taking into account the behavior of noise traders and the existence of costly arbitrage. The author's findings suggest that the observed behavioral differences in the sample of funds between the two countries might be due to the following factors: firstly, because British closed-end funds were included in his analysis, for which arbitrage might be performed avoiding high costs (and, therefore, be easily accessible to rational investors); secondly, due to the fact that UK closed-end funds belong rather to institutional investors, compared with the corresponding US funds. However, among other things, two important findings emerged from Flynn's study: US closed-end fund discount is not caused by arbitrage barriers, nor is it a result of high managerial cost. Instead, it is due to the involvement of several irrational investors, whose behavior does not promote convergence between the internal value of funds and their respective market value.

Appreciating Miller's *overvaluation hypothesis* (1977)[19], Sanning, Skiba and Skiba (2013) have investigated the effect of the discount, comparing US closed-end country funds which invest their assets in countries with short-selling restrictions, with a sample of CECFs investing in countries without short sales constraints. In times when investors have heterogeneous beliefs, the available evidence seems to suggest that the values of US funds are correctly priced (with the presence of short selling). Contrarily, in countries with short-selling restrictions, the failure of pessimist investors to use short selling increases the underlying fundamentals (a NAV increase widens the discount), because only optimist investors seem to drive the share values higher.

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[18] Thailand, Malaysia, Philippines, Korea and Indonesia.
[19] According to Miller (1977), the share prices are overestimated when barriers and restrictions on short selling transactions exist. On the other hand, stock prices are overestimated as the divergence in opinions between optimistic and pessimistic investors increases.

5. International Equity Flows and CEFs

Based on both the *feedback trading model*[20] and the *information contribution hypothesis*[21], Tsai (2009) examined the relationship between returns of 35 closed-end country funds investing in 22 developing countries and US equity flows in these economies, from 1994 to 2007. Concurrently with that, the author further explored the impact of the 1997 Asian crisis on the behavior of country funds and the existence of volatility dynamics within these relationships. His research findings seem to validate those of Tsai, Swanson and Sarkar (2007) concerning the effects of the Asian crisis on international capital, yet he argued that the crisis has a less direct effect on those CECFs that invest in Asian markets. On top of that, Tsai (2009) showed that the relationships between stock price, intrinsic value of the country funds and international capital flows are better explained by the *market segmentation hypothesis* than by changes in investor sentiment (*investor sentiment hypothesis*). In addition to that, he supported Froot and Ramadorai's *information contribution hypothesis* (2008) regarding the effects of cross-border equity flows and the intrinsic values of CECFs. Eventually he confirmed that institutional investors base their trading decisions on information relating to the efficiency of domestic returns (feedback trading).

Using again the period 1994-2006 and a sample of 35 CECFs investing in 22 countries, Tsai (2010) extended his previous research for the interpretation of the relationship between international equity flows and pricing of CECFs. While taking account of the relation between funds performance and volatility of international equity flow in developed and developing markets, the new findings of the author point out the following:

   a. The arguments of Froot, O'Connell and Seasholes (2001), as well as those of Froot and Ramadorai (2001) are confirmed, regarding the important relation between international equity flows, returns and closed-end funds NAVs.

   b. Market returns of country funds have a more direct relationship with the US market return[22] than they have with countries in which their underlying assets are invested.

   c. The influence of the Asian crisis of 1997 had a stronger impact on closed-end funds investing in Asian markets, considering that it was the CECFs price returns that had been mainly affected compared with the changes of their fundamental values invested in non-US countries. In the course of the same period of crisis, there was a stronger correlation between the performance of closed funds that invest in emerging Asian markets and the movement of international capital flows in these economies.

   d. The observed overreaction of US investors in the Asian crisis, relatively to the respective Asian traders, can be interpreted in accordance with the *information dissemination hypothesis*.

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[20] According to Tsai (2009), the feedback trading model maintains that the flow of international investment funds is affected by the performance of domestic market returns (i.e. there is a Granger causality relationship between international equity flows and closed-end country funds returns).

[21] The information contribution hypothesis considers that domestic equity returns are the result of the international equity flows (there is a Granger causality from the flow of investment capitals toward the country mutual funds).

[22] The S&P 500 Index is used as a proxy for the US equity market.

e. There has been reported a negative relationship between international capital flows and funds premiums (or discounts) investing in emerging markets and a positive relationship in developed economies.

Koufadakis (2015) dealt with the closed-end fund puzzle from a different viewpoint that is taking into account the monetary announcements in foreign countries where the NAV is invested. Having at his disposal a sample of 20 CECFs originating from eight developed and six developing countries for the period between 2000 and 2013, he has made use of Bloomberg surveys for the recording of the interest rate expectations, studying, in parallel, various asymmetries (i.e. bad and good monetary news and monetary directions). Among the various conclusions reached by the author and explained by the different investor sentiment between US (domestic) and foreign investors in the countries of NAV, it is worth noting that the unexpected change in monetary policy rates has no impact on the CECFs premiums. Furthermore, it was pointed out, that bad monetary news affect fund premia negatively, while directional unexpected decrease of monetary rates (i.e. the decrease of the monetary rate levels that are smaller or greater than the expected ones) have a negative impact on the premium of country funds in developed countries.

On the other hand, Koufadakis's (2015) findings also indicate that, in respect of emerged funds, the unexpected raise in monetary rates (a raise higher or smaller than the expected one) is negative and statistically significant at the 5% level.

6. Conclusions

Despite the wide variety of investment products with which an investor may seek opportunities for returns, closed-end funds still offer a number of advantages including the following: active management, the achievement of profits (when after the purchase of a discounted CEF the market value approximates its intrinsic value), opportunities for international diversification (through international and country funds), regular cash flow or income (through CEFs' distributions), as well as liquidity trading or lower expenses compared to open-end funds. In academic literature, there are often controversies between academic professionals and investment practitioners. This survey is an attempt to capture the key assumptions which justify the existence of the closed-end fund puzzle over time.

However, despite the extensive research interest in explaining the closed-end fund puzzle, in the light of both the *Efficient Marker Hypothesis* and the *Behavioral Finance,* the CEFs mispricing issue still exists, lacking a mutually acceptable explanation.

Traditional financial interpretations (such as incorrect estimates of NAV, agency costs hypothesis, tax liabilities, market segmentation, dividend yield hypothesis among others), as well as behavioral explanations (concerning the investor sentiments), offer a wide range of competing explanations for this pricing anomaly. As there are no reasons to doubt that, in the future, researchers will continue to investigate and explain the closed-end fund puzzle, this survey can contribute significantly to the classification of the basic theories associated to it.

Acknowledgements

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