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ARTICLE INFO Ahmed F. Salhin (2013). The impact of hard discount control mechanism on the discount volatility of UK closed-end funds. *Investment Management and Financial Innovations*, *10*(3)

RELEASED ON Thursday, 03 October 2013

JOURNAL "Investment Management and Financial Innovations"

FOUNDER LLC “Consulting Publishing Company “Business Perspectives”

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The impact of hard discount control mechanism on the discount volatility of UK closed-end funds

Abstract

The impact of hard discount control mechanisms on the discount volatility of UK closed-end funds is investigated. Using ten years data, the paper starts by analyzing the main factors that influence the variation in discount volatility across the sector. Standard deviation of net asset value returns, market value and the percentage of unquoted assets in the fund's portfolio are found to be highly significant. As a robustness test, the whole period is split into two five years periods which has no effect on the significance of the variables. The analysis is then extended to show that closed-end funds which commit to a hard discount control mechanism tend to have lower discount volatility. However, the last finding is not highly significant suggesting that in general hard discount control mechanisms could be used more effectively to control discount volatility.

Keywords: discount, discount volatility, closed-end funds, buybacks, discount control mechanism.
JEL Classification: G11.

Introduction

One of the main ideas that investors consider in managing their investments is the diversification of the assets within their investment portfolio. However, investors have to invest large amounts of money to be able to diversify their portfolios well. Closed-end funds are companies that raise capital from investors and invest it in a diversified portfolio of assets. These companies enable small investors to obtain diversi-fication benefits for a relatively modest outlay.

Closed-end fund shares usually trade at a discount to net asset value. This is one of the most puzzling issues in finance. The puzzle is not only concerned with the typically wide discounts across the sector but also the variation of these discounts both over time and across funds. One of the most successful solutions to the widening in discounts and its volatility is the shares repurchase or "buybacks". Closed-end funds have been allowed to buy back shares since 1980 but the actual number of buybacks has increased dramatically since the end of 1999 when restrictions that prevented closed-end funds distributing their capital profits by buying back shares were removed (Adams and Angus, 2011).

The purpose of this work is to analyse the extent to which discount volatility has been reduced by the buyback transactions conducted by closed-end funds that have a hard discount control mechanism during the period from July 2008 to June 2011. Our analysis will start by investigating the main factors affecting discount volatility across funds. We will then analyze the differences in discount volatility between closed-end funds that have hard discount control mechanisms and those that do not.

In section 1, an overview of discount, discount volatility and buybacks has been presented. Section 2 reviews the literature related to this work. Possible factors that might influence the discount volatility have been described in section 3. The models employed will also be described in this section. Section 4 describes the data and the methodology. Empirical findings have been discussed in section 5 and the final section concludes.

1. Discount, discount volatility and buybacks

1.1. Discount. Closed-end funds are allowed to have loans in their capital structure. The amount obtained by subtracting these loans from total assets is called "net asset value (NAV)" which is regularly disclosed on a per share basis. NAV is the main determinant of the company's performance during its life. However, closed-end fund shares are listed in the stock exchange and the determinant of their prices is the forces of supply and demand. The difference between the price and the NAV per share is called a discount if the price is lower than the NAV per share or called a premium in the reverse case.

Closed-end funds' shares are often traded at a discount rather than a premium, which means that the buyer of the fund's share will be benefit from the underlying assets of the fund for less than their value in the market. This is one of the most puzzling issues in the financial world. Figure 1 shows the average discount to NAV over the period 1975 till the end of 2010 in the UK's conventional closed-end fund sector.

In their survey of closed-end fund' Dimson and Minio-Kozerski (1999) classified the explanations of the closed-end funds discount puzzle into two main

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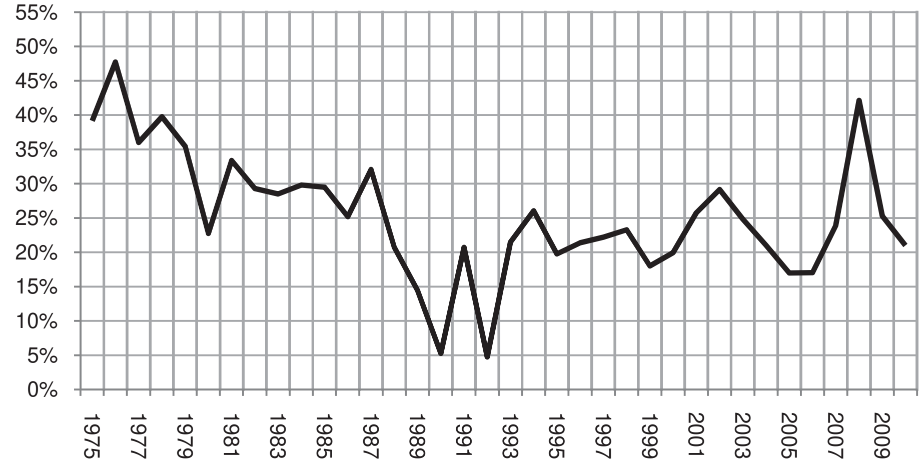
The author would like to thank Andrew Adams from Heriot Watt University for his comments. Also thanks for The Association of Investment Companies (AIC) for their help with the statistical data of investment companies. I gratefully acknowledge the provision of buybacks data by Chris Brown from J.P. Morgan Cazenove.

categories. The first category is the economic explanations which include the miscalculation of net asset value, agency cost explanations, tax timing and segmented markets. The other category is the attempts to explain closed-end fund discounts from the behavioral perspective.



Source: The Association of Investment Companies (AIC), UK.

Fig. 1. Discount of investment companies (Ex VCTs, AIM and Euronext members), %

1.2. Discount volatility. Discount volatility is one part of the closed-end funds discount puzzle and is a component of the risk attached to closed-end fund shares. Discount volatility means that the share returns do not reflect the returns of the underlying net assets in the fund's portfolio. This appears to contradict the Efficient Market Hypothesis which states that share prices should always reflect all the available information (Fama, 1970). Such discount volatility makes closed-end funds less attractive.

One of the underlying causes of the discount volatility, as we will see later, is the volatility of net asset value returns. However, discount returns lead to an excess volatility compared to its net asset value returns volatility. Share price volatility as reported by (Pontiff, 1997) exceeded the volatility of underlying assets returns by 64 percent in the US. Adams (2000b) investigated both the excess volatility in the UK and the part that discount volatility is taking as a component of the closed-end funds risk.

1.3. Buybacks. Closed-end funds have been allowed to repurchase their shares since 1980 by using capital reserves but very few companies used this permission until the end of the twentieth century (Adams and Angus, 2011). However, buyback transactions dramatically increased after changes were made to the Companies Act at the end of 1999 which gives closed-end funds permission to distribute profits by repurchasing their own shares (Investment Companies Distribution of Profits Regulations, 1999).

Shares buybacks offer advantages to closed-end funds in both the short and long run. First, buybacks directly enhance the net asset value per share which will benefit the remaining shareholders after the implementation of the repurchase. Closed-end funds usually buyback shares at a discount compared to net asset value. This means that after the execution of the buyback transaction, the difference between the price that the company paid to repurchase its own shares and the net asset value per share beforehand will enhance the existing net asset value per share.

As a consequence of reducing the supply of the fund's shares at the implementation of the buyback transaction, share prices will increase and discounts will narrow. The other benefit, which we will test in this work, is that share buybacks affect on the level of discount volatility (AIC, 2010).

Closed-end funds can choose between two different buybacks strategies in attempting to manage discounts and discount volatility. The first one is to commit to a hard discount control mechanism (HDCM), which require that the company buy its own shares when discount reaches a pre-specified level. The other strategy is to buy back shares when discount widen but closed-end funds in this case retain flexibility as to when, how and at what level of discount the buyback strategy will be implemented. This strategy is called a Soft Discount Control Mechanism (SDCM).

Shares buybacks improve the liquidity of the closed-end fund shares through satisfying the supply of shares when the fund repurchases its own shares and satisfying the demand for shares by selling these shares in the case of holding them as treasury shares.

As discount narrowing strategy, the question of buybacks was a controversial issue amongst practitioners in the early days. At the start of 1998, Brown et al. (1998) from Cazenove state that although the announcement of the buybacks will make the share price rise and result in a narrowing of the discount, the actual repurchase will enhance the net asset value per share and result in a widening of the discount again. They argue that share buybacks, in theory and over the short term, would narrow the discount until the completion of the actual buyback program. However, in the long term, the main determinants of the level of the discount are the market's point of view on the quality of management of the fund, investment performance and the sentiment in the market. One of the criticisms they mentioned in their report is that share buybacks may be considered a partial open ending of the fund, and this is inconsistent with the nature of closed-end funds.

Another criticism that related to the buybacks strategy is that it increases the level of the gearing which may expose the fund to more risk when the market falls. It also raises the total expense ratio results from spreading the fixed costs over a small base, due to the buybacks, and hence, increases the expenses for the remaining shareholders (AIC, 2010).

2. Literature review

Many academic papers have tried to explain the closed-end funds discount puzzle in both the US and the UK. The basic puzzle is that existence of a discount contradicts the efficient market hypothesis presented by Eugene Fama in the 1960s. The Efficient Market Hypothesis states that the price of any share should reflect all the information available about that share (Fama, 1970). Closed-end fund discounts arguably represent a breaching to this hypothesis as closed-end fund share prices should reflect mainly the value of the underlying portfolio, which is disclosed regularly as net asset value per share. Explanations of the puzzle have taken two major tracks; one of them is consistent with rational expectations of the investors or "economic explanations" in the words of (Dimson and Minio-Kozerski, 1999). This includes some explanations such as net asset value miscalculations and agency costs.

The other category of explanations is the behavioral approach that argues that irrationality of the market must be taken into account. Dimson and Minio-Kozerski (1999) point out that enthusiasm about equity shares in general and enthusiasm about particular shares such as county-specific shares are accompanied by the existence of premiums. They also argue that high discount volatility of country-specialize funds cannot be explained only by the behavior of the foreign market.

Another part of the closed-end fund puzzle is the time series and cross-sectional volatility of discounts. Discount volatility means that the returns achieved in the underlying assets of the closed-end fund are not exactly captured in the prices of the fund's shares. This again contradicts to the efficient market hypotheses and results in increased risk attached to the closed-end fund shares.

Shiller (1981) argues that volatility of share prices is too high to be explained by changes in the shares' fundamentals. In the US, Pontiff (1997) shows that the volatility of the closed-end fund discounts is 64% higher than the volatility underlying asset returns. This is confirmed in the UK by the work of Adams (2000b) showing the existence of the excess volatility of the closed-end fund shares compared with that of net asset value.

Using three and six months returns, Adams (2000a) shows that discount volatility is an important component of the total risk of closed-end funds in the UK, however, this importance reduces for longer-term return intervals. However, Malkiel and Xu (2005) find no evidence of excess volatility of closed-end fund returns. They find that the volatility of fund returns is 1.31% which is similar to the volatility of net asset value return, which is 1.42%. Their argument for the existence of discounts is that the net asset value can be viewed as the realized value of the fund whereas the fund share prices are the expectation of the future value of the fund.

3. Factors that may have an impact on the discount volatility

There are many factors that may influence discount volatility. We will consider only three factors that we believe are likely to have a significant impact. In this section, we first define discount volatility and show how to measure it. We then discuss the three factors that we expect to have an impact on the discount volatility. Finally, we discuss the likely impact of buybacks on discount volatility and this will be tested in section 5.

3.1. Discount volatility: definition and measurement. Follow Adams (2000a), discount volatility will be defined as the standard deviation of monthly discount returns. The discount return can be calculated as follow:

$$Dis_{rt} = Prc_{rt} - NAV_{rt} = Ln(Prc_t / Prc_{t-1}) - \\ - Ln(NAV_t NAV_{t-1}), \quad (1)$$

where Dis_{rt} is the discount return for period t, Prc_{rt} is the share price return for period t, NAV_{rt} is the net asset value return for period t, Prc_t is the share price in period t, NAV_t is the net asset value in period t, Prc_{t-1} is the share price in period t-1, and NAV_{t-1} is the net asset value in period t-1.

3.2. Factors that may influence the discount volatility. Closed-end funds announce the net asset value per share on regularly basis as it is considered a proxy for evaluating the management performance. In addition, management performance might be the main factor that widen or narrow the discount (Berk and Stanton, 2007). Therefore, we expect that the higher volatility of net asset value return, the higher the fluctuations in the discount. Moreover, high standard deviation of net asset value returns will restrict the ability of discount traders to hedge the underlying assets and result in fluctuations of their discount returns. For this reason, we include the *standard deviation of net asset value return* as an explanatory variable.

Particular investment styles of closed-end funds may be associated with lower (higher) standard deviation of net asset value returns. For example, international funds and venture capital funds tend to have lower volatility of net asset value. Diversification of assets within the closed-end funds portfolio lead to eliminate the risk by reducing the idiosyncratic variation in the portfolio. This is considered as one of the attributes of international funds that have diversified portfolio of assets rather than, for example, domestic funds. Therefore, it is expected that this type of funds will have lower discount volatility. Another example is venture capital funds which tend to have low volatility of net asset value. This is because they mainly invest in unquoted assets that, by their nature, are difficult to value, so the net asset value of these funds is not very volatile.

The second factor that we consider in our model is the marketability of the closed-end fund shares. Low marketability of the closed-end fund shares means that arbitrageurs would not be able to capture high discount trading profits resulting in a greater discount trading range and thus, higher level of discount volatility. Funds with a higher level of marketability tend to have higher market value, either because of lower trading expenses or because investors consider marketability in their pricing of the shares (Longstaff, 1995). We therefore include *ln*(*market value*) as a proxy for marketability in the model's explanatory variables.

The last factor that we expect to have an influence on discount volatility is the percentage of unquoted assets in the portfolio of the closed-end fund. Some funds such as venture capital funds have a high percentage of underlying assets which are unquoted. These assets are not valued frequently and result in an artificially stable net asset value of the fund. As share prices reflect the market perspective of the value of these assets, the percentage of unquoted assets in the portfolio of the fund might influence discount volatility. Hence, we add the *percentage of unquoted assets* within the fund's portfolio as an explanatory variable.

The model for discount volatility is, therefore, as follows:

$$Discvol_i = \alpha + \beta_{stdevnavr} \times Stdevnavr_i + \\ + \beta_{\ln mv} \times \text{Ln}mv_i + \beta_{unqi} \times Unqi_i + \varepsilon_i, \quad (2)$$

where $Discvol_i$ is the discount volatility of fund i, α is the regression constant, $Stdevnavr_i$ is the standard deviation of net asset value of fund i, $\text{Ln}mv_i$ is the natural logarithm of the market value of fund i, $Unqi_i$ is the percentage of assets which are unquoted in the portfolio of fund i. $\beta_{stdevnavr}$, β_{lnmv} and β_{unqi} are the regression coefficients and ε_i is the error term that reflects all the factors that the model does not include.

3.3. Hard discount control mechanisms and discount volatility. As discussed in section one, closed-end fund can adopt either soft or hard discount control mechanisms. The latter means that the fund has a rigorous discount level that requires action in order to return the discount to the pre-specified level. Most of closed-end fund that follow a hard discount control mechanism in the UK use a share buyback strategy to influence the discount and thereby stabilize variation in the discounts. We expect that funds with a hard discount control mechanism to be associated with low levels of discount volatility. To examine the effect we add it as an explanatory variable along with the *standard deviation of net asset value returns* and ln(*market value*).

The reason for excluding unquoted assets from the second model is that the sample used does not include most types of fund that have significant amounts of unquoted assets, such as hedge funds, real estate funds, private equity and smaller companies specialists.

Therefore, the model is as follow:

$$Discvol_i = \alpha + \beta_{HDCM} \times HDCM_i + \\ + \beta_{stdevnavr} \times Stdevnavr_i + \beta_{\ln mv} \times \text{Ln}mv_i + \varepsilon_i, \quad (3)$$

where $Discvol_i$ is the discount volatility of fund i, α is the regression constant, and $HDCM_i$ is a dummy variable in which "1" denote the funds that have a hard discount control mechanism (HDCM) and "0" for the funds that do not implement that strategy. $Stdevnavr_i$ is the standard deviation of net asset value of fund i, $\text{Ln}mv_i$ is the natural logarithm of the market value of fund i, B_{HDCM}, $\beta_{stdevnavr}$ and β_{lnmv} are the regression coefficients and ε_i is the error term that reflects all factors that the model does not include.

4. Data and methodology

As discussed, the analysis is divided into two sections; the first considers the main factors that might have an impact on discount volatility and the other investigates the effect of adoption of a hard discount control mechanism on the cross-sectional variation in discount volatility. We use a different sample for each of the two parts due to the different purpose of each of them and due to availability of the required data from DataStream.

4.1. Data for section one. The sample consists of 184 funds operating in the UK over the period from 1st July 2001 till the end of June 2011. There are three types of closed-end fund in the UK; conventional funds, venture capital funds and split capital funds. Our sample contains only the first two types of funds and we exclude the spilt capital funds due to their complicated structure.

Net asset value and share prices (which are used to calculate the discount volatility and the standard deviation of net asset value returns) and market value are obtained from DataStream. The percentage of unquoted assets is also obtained from the same source, although DataStream only reports the latest value of the variable rather than a time series.

Table 1 contains the descriptive statistics of the variables over the period from 1 July 2001 to 30 June 2011. The average value of the discount volatility is 4.88% but this may be affected by extreme values, as suggested by the median and the maximum value of discount volatility. This is not the case in the standard deviation of net asset value returns which has closed values for both the mean and the median. The median value of the standard deviation of NAV returns is 5.48%, which is 1.85% greater than the median of the discount volatility.

The standard deviation of both discount volatility and standard deviation of NAV returns is relatively high. Market value ranges between approximately £2m for Talisman 1st venture capital and £3670m for 3I Group. This wide range makes the standard deviation of the market value very high (£382m).

Table 1. Descriptive statistics for the period from 1 July 2001 to 30 June 2011

	Discvol	*Stdevnavr*	*mv*(£m)	*Unqi*
Mean	4.88%	5.57%	198	22.86%
Median	3.63%	5.48%	81	0.15%
Maximum	22.99%	14.04%	3670	100%
Minimum	1.25%	1.43%	2	0%
Std. dev.	3.20%	1.85%	382	36.28

The average value of the percentage of unquoted assets is 22.86%, however there is a great variation between closed-end funds in their holding of unquoted assets in their portfolios.

4.2. Data for section two. The second part of the analysis is concerned with the influence of hard discount control mechanisms on the discount volatility. The sample consists of 121 funds that operate in the UK over the period from 1 July 2008 till 30 June 2011. The reason for choosing only three years is to reduce the effect of changing the adoption of a hard discount control mechanism within the period.

Four types of closed-end fund are excluded from the study because they are considered to be unsuitable for the adoption of hard discount control mechanism. These types of fund are private equity funds, real estate specialists, hedge funds and smaller companies specialists. These funds have high percentage of unquoted assets in their portfolios which reduce liquidity which is needed for a hard discount control mechanism. In excluding these types of funds, adding the percentage of unquoted assets in the model has little value and is not significant.

As shown in Table 2, the average value of discount volatility is 3.43% which is relatively close to the median, with maximum level of 19.1% for Blue Planet Worldwide Financials Investment Trust. The average value of the standard deviation of net asset value returns is approximately twice the average value of the discount volatility.

Table 2. Descriptive statistics for the period from 1 July 2008 to 30 June 2011

	Discvol	*Stdevnavr*	*mv*(£m)	*Unqi*
Mean	3.43%	7.43%	249	0.83%
Median	3.01%	7.16%	128.00	0.00%
Maximum	19.10%	16.32%	2080	16.50%
Minimum	1.13%	2.15%	8.72	0.00%
Std. dev.	2.22%	2.12%	335	2.67%

The four types of closed-end funds that we excluded tend to have lower market values than the others. This affects the average market value for this sample so that it is £51m more than the average for the first sample. The lowest market value is £8.72m for Blue Planet International Financials Investment Trust and the maximum value in this sample is £2,080m for Alliance Trust.

Data on whether funds have a hard discount control mechanism is obtained from J.P. Morgan Cazenove Investment Companies annual review in 2008, 2009 and 2010. As mentioned in the last section, hard discount control mechanism is included as a dummy variable with value "1" for the funds that have such a mechanism and "0" for the funds that do not apply this mechanism.

There are 31 funds in the sample that adopt a hard discount control mechanism representing 26% of the whole sample. As shown by Table 2, the exclusion of hedge funds, private equity, smaller companies and real estate specialists reduces the average of the percentage of unquoted assets to 0.83% rather than 22.86% in the first sample. The maximum value of the percentage of unquoted assets in this case is 16.5% and its standard deviation declines from 36.28% to 2.67%.

5. Empirical findings

This section contains both an analysis of the factors that may influence the discount volatility and an examination of the effect of hard discount control mechanisms on the discount volatility. We carry out regressions using the ordinary least squares method to implement both of these studies. In the first section, we start by using the whole sample period to examine the factors that influence the discount volatility. Then we split this period into two five periods to test the robustness of the regression coefficients. In the second section, we add the hard discount control mechanism as an explanatory variable to the regression to show its effect on discount volatility.

5.1. Factors that influence discount volatility. In model (1), there are three explanatory factors in the regression, namely standard deviation of net asset value returns, the natural logarithm of market value and the percentage of unquoted assets within the fund's portfolio. Table 3 shows high negative correlation between standard deviation of net asset value returns and the percentage of unquoted asset in the fund's portfolio. This is a reasonable relation as the unquoted assets are not subject to frequent changes in value and hence the aggregate value of the underlying portfolio of assets will be more stable than that of the underlying portfolio for funds that have a low percentage of unquoted assets.

There is also a negative correlation between the market value and the percentage of unquoted assets. This relationship results from the nature of the investment style of funds that have relatively low market value. These funds mainly invest in smaller companies, private equity and real estate sectors which tend to have a high percentage of unquoted assets in their portfolios. This correlation will not be a problem when such types of fund are excluded from the sample.

The expected sign of the correlation between discount volatility and standard deviation of net asset value returns is positive. As we discussed in section three, the high standard deviation of net asset value returns will make it more difficult for discount anomaly traders to hedge the underlying assets, and therefore the discount returns will be volatile.

It is to be expected also that the correlation between discount volatility and the percentage of unquoted assets will be positive. The high percentage of unquoted assets will result in a historical valuation of the underlying assets and this will create difficulties in the pricing of shares based on the net asset value. This in turn will reduce the correlation between the share price and the net asset value per share, hence increasing the discount volatility.

On the other hand, the expected sign for the correlation between discount volatility and market value is negative. Funds with higher market value tend to have higher levels of marketability, which will work to reduce the variation in the discount. Table 3 shows the correlation coefficient between the dependant variable and its explanatory variables together with the correlations between the explanatory variables.

Table 3. Correlation matrix for the period from 1 July 2001 to 30 June 2011

	Stdevnavr	Ln(*mv*)	*Discvol*
Stdevnavr			0.037833
ln(*mv*)	0.093741		-0.542985
Unqi	-0.505994	-0.4081	0.561962

As expected, the correlation coefficient between discount volatility and both the standard deviation of net asset value returns and the percentage of unquoted assets is positive and with the market value is negative. However, the correlation between the percentage of unquoted assets and market value is high suggesting the possibility of a multicollinearity problem in the regression.

The multiple regression results support the expectations that all the explanatory variables in the model have an effect on the level of discount volatility. The explanatory variables are all significant at the 0.5% significance level.

Table 4. Regression results of the effect of explanatory variables on discount volatility for the period from 1 July 2001 to 30 June 2011

Explanatory variables	Coefficients (Standard error)	*t*-statistic	*p*-value
Constant	0.031863 (0.009562)	3.332403	0.001
Stdevnavr	0.663658 (0.102239)	6.491255	0.0000
Ln(*mv*)	-0.007574 (0.001305)	-5.80558	0.0000
Unqi	0.000551 (0.000057)	9.672514	0.0000
R^2 = 0.53			

As mentioned in the previous section, the percentage of unquoted assets within the fund's portfolio is a historical value which not subject to high changes. This might explain the high significance of its coefficient. However, its coefficient might be affected by the multicollinearity problem indicated by the high correlation with the standard deviation of net asset value returns.

The adjusted *R*-square is 0.53 indicating the percentage of the discount volatility explained by the explanatory variables in the model.

As a robustness test, we divide the sample period into two five years periods; the first starts from 1 July 2001 to 30 June 2006 and the second starting from 1 July 2006 to 30 June 2011. Table 5 and Table 6 show the regression results for the two periods.

Table 5. Regression results of the effect of explanatory variables on discount volatility for the period from 1 July 2001 to 30 June 2006

Explanatory variables	Coefficients (Standard error)	*t*-statistic	*p*-value
Constant	0.0508220 (0.0076590)	6.635731	0.0000
Stdevnavr	0.4835610 (0.0763450)	6.333896	0.0000
Ln(*mv*)	-0.0093110 (0.0010990)	-8.47453	0.0000
Unqi	0.0003380 (0.0000467)	7.22948	0.0000
R^2= 0.56			

Table 6. Regression results of the effect of explanatory variables on discount volatility for the period from 1 July 2006 to 30 June 2011

Explanatory variables	Coefficient (Standard error)	*t*-statistic	*p*-value
Constant	0.012023 (0.011208)	1.072731	0.2848
Stdevnavr	0.914954 (0.116725)	7.838556	0.0000
Ln(*mv*)	-0.006961 (0.001627)	-4.27794	0.0000
Unqi	0.000719 (0.0000722)	9.958527	0.0000
R^2 = 0.49			

The second set of regressions show no changes in the signs for all the explanatory variables compared with the 10 years period regression; however, there are some differences in both the coefficients and the degree of the significance for these variables. The results show that both the standard deviation of net asset value returns and the percentage of unquoted assets in the second period are more highly significant than the first period. Moreover, the market value variable has a higher significance in the first period compared to the second and the whole period. This change in the level of the significance might partly reflect the correlation between market value and the percentage of unquoted assets in the fund's portfolio.

5.2. Hard discount control mechanism and discount volatility. In this second part of the analysis, the signs of coefficients for standard deviation of net asset returns and the percentage of unquoted assets will be the same as for the first part of the analysis. It is expected that the sign of the coefficient of the hard discount control mechanism variable will be negative, as control of the discount should lower the discount volatility. If the discount widens in a short period, funds that adopt the hard discount control mechanism should directly take an action to keep the discount at the pre-specified level. The correlation matrix between the explanatory variables is shown in Table 7. There is no correlation between the explanatory variables in the model; therefore, there is no multicollinearity problem in this case. The correlation between discount volatility and all the explanatory variables supports the expectation of signs in the relationship.

Table 7. Correlation matrix for the period from 1 July 2008 to 30 June 2011

	HDCM	*Stdevnavr*	*Discvol*
HDCM			-0.130303
Stdevnavr	-0.079126		0.391217
Ln(*mv*)	-0.071193	-0.079079	-0.54129

Table 8 shows the regression results of the impact of the hard discount control mechanism along with the standard deviation of net asset value returns and the market value on the discount volatility of closed-end funds. As in the last regression, standard deviation of net asset value returns and market value are significant at the 0.5% significance level. Market value is more highly significant than both the hard discount control mechanism and the standard deviation of net asset value returns.

The sign of the hard discount control mechanism is as expected but its coefficient is only significant at the 5% level. This result raises questions about the strength of the implementation of the hard discount control mechanism as a strategy for controlling the discount and managing its volatility.

Table 8. Regression results of the impact of HDCM on discount volatility for the period from 1 July 2008 to 30 June 2011

Explanatory variables	Coefficient (Standard error)	*t*-statistic	*p*-value
Constant	0.204037 (0.027076)	7.535688	0.0000
HDCM	-0.007136 (0.003543)	-2.013992	0.0463
Stdevnavr	0.35534 (0.073442)	4.838399	0.0000
Ln(*mv*)	-0.010389 (0.001385)	-7.50009	0.0000
R^2 = 0.42			

A likely explanation of the low level of the significance of the hard discount control mechanism is that closed-end funds that adopt such mechanisms do not apply them with sufficient rigour. Data from J.P. Morgan Cazenove Investment Companies Annual Reviews support this explanation. The reviews report on the closed-end funds that have a hard discount control mechanism and whether or not these funds are at its discount control target. In 2008, only 29% of the funds that were adopting a discount control mechanism were at their discount target, while in 2009, the percentage rose to 38%. In 2010, the percentage rose even further to approximately twice its figure in 2009 to reach 64% of the funds that were adopting a hard discount control mechanism.

Conclusions

This work examines the factors that might influence the discount volatility of closed-end funds in the UK. Standard deviation of net asset value returns, market value and percentage of unquoted assets in the fund's portfolio, are highly significant.

As a robustness test, we split the sample period into two five years periods and carry out the regression. The result supports the first regression with high significance of all the three factors. However, for both the regressions, there is high correlation between market value and percentage of unquoted assets and between the latter and the standard deviation of net asset value returns, suggesting the possibility of a multicollinearity problem.

The second part of the work considers the effect of the hard discount control mechanism on the discount volatility of closed-end funds. The results show that the adoption of a hard discount control mechanism reduces the level of the discount volatility. However, this relationship is only just significant at the 5% level. An explanation of this weak result is that closed-end funds that commit to a hard discount control mechanism do not apply it sufficiently rigorously.

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