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An Examination of the Interest Rate Sensitivity of Business Development Company (BDC) Stock Returns

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Abstract

This paper examines the interest rate sensitivity of Business Development Companies (BDCs). The results of this study are intended to lend insight to investors about the viability and timing of investments in BDCs during the business cycle. Similar to previous research that has examined interest rate sensitivity of financial companies, this paper employs a two-factor market model to see whether BDCs are responsive to changes in short, medium, and long-term interest rates. My particular interest in BDCs is motivated by their unique asset-liability structure and requirements, as well as their high dividend payouts. Monthly data is drawn from the period ranging from January 2004 through December 2012. Using a sample of 30 BDCs, I estimate the sensitivity of BDC stock returns to stock market and interest rate changes in general. I then proceed to test whether size and Small Business Investment Company (SBIC) licensure status affect these sensitivities.

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Chapter 1: Introduction

This paper examines whether Business Development Company (BDC) stock returns are sensitive to movements in interest rates. Typically structured as publicly traded closed-end funds, BDCs possess a government mandate to make private growth capital investments in small to middle-market companies. The notion of a BDC was first established in 1980, when Congress amended the Investment Company Act of 1940 in order to encourage private investments in businesses with limited financing options. The amendment, known as the Small Business Incentive Act of 1980[1] (SBIA), called for the development of BDCs to bridge the capital markets gap for those companies that had trouble accessing traditional means of financing.

I expand upon prior research on interest rate sensitivity (e.g. Flannery and James [1984]; Allen, Madura, and Springer [2000]) by focusing solely on BDCs. Doing so will extend the existing literature in two ways. First, this study will add to the ongoing discussion of whether the stock returns of financial companies are sensitive to movements in interest rates due to the interest rate risk surrounding their asset-liability structures. Past studies that have examined the interest rate sensitivities of such entities (e.g. commercial banks) have reached varying conclusions. Examining BDCs, whose assets primarily consist of debt investments in small to middle-market companies, will provide further commentary on the matter and contribute towards a more comprehensive review of the issue at hand.

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[1] The Investment Company Act of 1940 was legislation set forth by Congress outlining the laws and regulations that would govern investment companies and placed these companies under the supervision of the SEC. The Small Business Incentive Act of 1980 was enacted by Congress in response to complaints from private equity and venture capital firms about the restrictions placed on small business investments set forth in the Investment Company Act of 1940. In order to loosen these restrictions and encourage investments in small businesses, Congress passed the SBIA, which led to the advent of BDCs.

Second, examining the interest rate sensitivity of BDCs will help towards a more comprehensive review of the thesis that high-dividend yielding stock prices maintain a negative correlation to changes in interest rates. Past studies have considered the sensitivity of companies like REITs and utilities firms, but the existing literature on BDCs is thin, if not nonexistent. Finding results that are compatible with this hypothesis will consequently do more in the way of providing important insight into the timing and viability of investments in BDCs throughout the business cycle.

My findings primarily support the results found by Flannery and James (1984) with respect to the presence of interest rate sensitivity among companies that maintain financial assets. The current study expands the focus of the discussion regarding the sensitivity of financial companies and contributes towards a more detailed picture of the matter by addressing a non-bank segment of the financial market. This paper also seeks to reaffirm the interest rate sensitivity of high-dividend yielding stocks and add to the relevant existing literature in a positive way. In sum, this study lends support to prior research on the interest rate sensitivity of both financial companies and high-dividend yielding entities by showing that BDCs do exhibit responsiveness to changes in interest rates.

I believe that the results of this study will provide investors with insight into the viability and timing of their investments in BDCs, as well as financial stocks and high-dividend yielding securities. The inverse relationship found in this study between the stock price returns of BDCs and short-term interest rates serves as an indication that changes in interest rates do in fact negatively affect the stock performance of financial companies, as well as companies with dividend yields that are high in nature. As more

trading data becomes available for BDCs, I believe that further research would do well to test intertemporal changes in sensitivity in order lend even greater insight to investors.

The paper proceeds as follows: Section 2 provides further background and discusses previous literature that is relevant to this study. Section 3 discusses hypothesis development, data selection, and research methods. Section 4 documents the study's empirical results. And finally, Section 5 offers the conclusions of this study.

Chapter 2: Background and Literature Review

2.1 Background and Motivation

My motivation to study the interest rate sensitivity of BDCs in particular is threefold. My first point of interest revolves around i) the BDC business model. Similar to other financial companies, BDCs aim to generate earnings from the net interest margin created between their assets (i.e. debt investments) and liabilities (i.e. borrowed funds). My next two points of interest lie within the provisions of the Small Business Incentive Act of 1980. The SBIA outlines certain provisions that must be met in order for a fund to be recognized as a BDC. The legislation offers guidelines in the way of distributions (i.e. dividends), leverage, asset diversification, income generation, and managerial assistance. Of particular interest to this paper are the (ii) distribution and (iii) leverage provisions. These three motivations are expanded upon below.

2.1.1 The BDC Business Model

The primary objective of BDCs is to maintain a well-diversified portfolio of private growth capital investments in small to middle-market businesses. An overwhelming majority of investments made by BDCs are debt investments, and can reach across various segments of the debt capital structure (e.g. first lien, second lien,

subordinated debt, etc.). Due to the nature of the businesses that they invest in, BDCs are able to price their investments at relatively higher yields than other lenders and produce earnings based on their ability to produce a high net interest margin between their investments and their cost of capital (i.e. between their assets and liabilities). While BDCs do have the ability to tap the public equity markets, debt capital is both less expensive and easier to come by for these entities. As such, BDCs are largely dependent on modestly priced floating rate bank debt to finance their investments. This business model produces an asset-liability structure that is not unlike other financial firms (i.e. commercial banks) and gives reason to suspect that BDC stock returns are sensitive to movements in interest rates.

Flannery and James (1984) utilized a two-factor model to argue that firms who hold financial assets should be responsive to movements in interest rates, particularly when the maturity of their assets differed from the maturity of their liabilities. Other studies have examined the same issue, but the results have varied (e.g. Chance and Lane [1980]). Examining BDCs provides a way to add more breadth to the discussion. My inclination at the outset of this study was that BDCs generally stand to face interest rate sensitivity commensurate with the sensitivity of financial institutions. My results indicate that BDCs do exhibit sensitivity to movements in interest rates, but sensitivity tends to depend on the size and SBIC status of the BDC.

2.1.2 SBIA Distribution Requirement

I will next expand upon the motivation involving (ii) the BDC distribution requirement. In order to qualify as a BDC, a fund is required to distribute at least 90% of its income to shareholders in the form of a dividend. In order to avoid paying a 4% excise

tax on residual earnings, a BDC must distribute at least 98% of its income as a dividend. By examining the interest rate sensitivity of these BDCs, I elaborate on prior research that has tested the rate sensitivity of other high-dividend yielding stocks, such as REITs and utilities. Chen and Tzang (1988) found that REITs were sensitive to changes in long-term interest rates, and had reason to believe that they were also sensitive to short-term interest rates during a portion of their sample period. Additionally, Sweeney and Warga (1986) were able to show that utility companies were very sensitive to changes in long-term interest rates (more so than a general index of NYSE companies), which could be explained by the nature of their dividends. In general, this current study finds that BDCs are sensitive to changes in the level of interest rates but these results are not necessarily limited to just long-term interest rates, as previous studies have found.

2.1.3 SBIA Leverage Provision

Finally, I turn my attention to (iii) the leverage provisions of the SBIA. The legislation states that BDCs cannot fall below an asset coverage ratio (total assets-to-total debt) of 200%. That is, a BDC's debt-to-equity ratio cannot exceed 1:1. Interestingly, BDCs can circumvent this provision by obtaining an SBIC license from the US Small Business Administration (SBA). Under the SBIC program, a BDC can borrow up to $225 million of limited covenant, fixed rate debt from the SBA. The cost of capital for borrowing from the SBA is generally much lower than bank debt and any money borrowed from the Administration does not count against the 1:1 leverage ratio outlined in the SBIA. As such, BDCs with an SBIC license appear to hold a marginal advantage in that 1) they can generate a higher net interest margin on the cheaper capital borrowed from the SBA, 2) they have the ability to deploy more capital (i.e. carry more leverage)

than any given, similarly sized BDC, and 3) they are guarded from movements in interest rates to the extent that SBIC funds limit the BDC's use of floating rate debt. I compare the interest rate sensitivities of BDCs with SBIC licenses to those without and find that SBIC licensure does in fact mitigate interest rate sensitivity. These results suggest that SBIC licensed BDCs do in fact hold some advantages over their non-licensed counterparts and can consequently provide investors with less volatile, if not higher, returns.

2.2 Literature Review

2.2.1 Asset Pricing

The dense literature on financial asset pricing was first introduced by Sharpe (1964) when he developed the capital asset pricing model (CAPM), which postulated that a stock's excess returns over the risk-free rate were tied to excess market returns. Stone (1974) extended the CAPM model by creating a two-factor model that related stock returns to changes in not only market returns, but changes in interest rates as well. Stone reasoned that including an interest rate factor in his model would capture the potential effects that interest rates had on stock returns beyond the indirect effect that rates had through their inherent influence on the broader stock markets as a whole.

The validity of the use of a two-factor model has been confirmed by numerous studies that have documented an inverse relationship between changes in interest rates and stock price returns. For instance, Bae (1990) found an inverse relationship between inflationary expectations (seen through changes in long-term interest rates) and the stock returns of depository institutions. This current study seeks to find a similar relationship for BDCs.

The Stone two-factor model has been of critical use for studies that have examined the interest rate sensitivity of stock returns. There are generally two types of these studies that are particularly relevant to this current paper. The first type of study examines the interest rate sensitivity of financial companies. The second type looks at high-dividend yielding stock returns and their sensitivity to changes in interest rates.

2.2.2 Interest Rate Sensitivity of Financial Firms

Flannery and James (1984) found that the stock returns of financial institutions are in fact responsive to changes in interest rates. They posited that this sensitivity was attributable to the maturity discrepancies between the assets and liabilities of these entities. Booth and Officer (1985) expanded upon the results of Flannery and James (1984) and were able to confirm that bank stock returns are sensitive to interest rates. They buttressed these results by also documenting that no such sensitivity existed in portfolios consisting of non-financial stocks. These findings stand contrary to the results found by Chance and Lane (1980), who found insufficient evidence to support the notion that stock returns of financial institutions were affected by movements in interest rates. Chance and Lane (1980) suggested that any sensitivity exhibited by financial institutions pertained to market returns and was attributable to broader systemic risk.

The contradictory results found in the existing literature leaves more to be desired in the way of reaching a consensus on the sensitivity of financial companies.

2.2.3 Interest Rate Sensitivity of High-Dividend Paying Stocks

The second type of study that is relevant to this paper is that which has focused on the interest rate sensitivity of high-dividend yielding stocks. Sweeney and Warga (1986) found that high-dividend paying stocks like utilities were highly sensitive to changes in

interest rates and attributed this partly to the idea that such stocks are suitable substitutes for fixed-income securities. That is, due to the stable, recurring nature of dividend payments, investors may shift towards these stocks in times when yields on fixed-income securities (i.e. interest rates) are low. Numerous studies (e.g. Mengden [1988], Hartzell, Shulman, Langetieg and Liebowitz [1987]) have used this theory as motivation to expand upon Sweeney and Warga (1986) and examine REITs in particular, primarily due to their high-dividend yields, postulating that REITs too would bear heightened interest rate sensitivity.

Chen and Tzang (1988) extended research on the rate sensitivity of REITs and separately examined equity and mortgage REITs. Their study showed that both types of REITs were sensitive to movements in interest rates. However, the study also found that sensitivity in equity REITs was caused by changes in expected inflation, while mortgage REITs were sensitive to both expected inflation and real interest rates. Of particular importance is the explanation that Chen and Tzang (1988) offer for the sensitivity of mortgage REITs to real interest rates (i.e. the prevailing interest rate). They postulate that an increase in real interest rates reduces the present value of REIT dividends (through the dividend discount model[2] [DDM]), producing a lower valuation for these REITs and consequently turning investors away from paying a premium for the high-dividend yield of these entities. Similar results were found by Liang et al. (1995), with REITs exhibiting

[2] The most commonly used dividend discount model is the Gordon growth model, which is given as follows:

$$P_0 = \frac{Dividend_1}{r - g}$$

Where P_0 is the value of the company at time 0, $Dividend_1$ is the expected dividend in the next period, r is the appropriate discount rate, and g is the assumed dividend growth rate. Changes in interest rates necessarily affect r and, as such, affect the ultimate valuation P_0 produced by the model.

strong sensitivity to real interest rates. I believe that the same can prove to be true for BDCs due to similar valuation dynamics.

The results given by studies examining the interest rate sensitivity of high-dividend yield stocks provides this current study with strong motivation to examine the sensitivity of BDC stock returns. The ambiguity of the existing literature on the interest rate sensitivity of financial companies provides additional motivation to complete this research. In this paper, I aim to extend the breadth of the discussion on financial companies and provide more evidence that such entities are sensitive to movements in interest rates.

Through introducing BDC research, this paper presents a hybrid study between the two types of existing literature on interest rate sensitivities. I expect that this current study will produce results that confirm the inverse relationships between interest rates and stock returns for both niches in a more robust manner. BDCs are unique in that they exhibit the characteristics of both a high-dividend yielding stock and a financial company. While REITs can also be categorized as such, I believe that the difference in asset composition between REITs and BDCs is significant enough to warrant the addition of BDCs to the existing literature on a standalone basis.

The markets in which BDCs operate are much more similar to those of banks, and as such could provide interesting insight into how BDC asset-liability structures affect sensitivity related to the high-dividend yielding nature of BDCs. The inconclusive evidence on the rate sensitivity of banks and other financial companies introduces the possibility that the theory may not be strong enough to hold true under all circumstances, and that there are other prevailing factors beyond the valuation given by the dividend

discount model. Results documenting the interest rate sensitivity of BDCs would only further confirm the validity behind the theory.

In the same way, showing that BDCs exhibit interest rate sensitivity would discount the strongest argument against the sensitivity of financial institutions, which is that they are only influenced by systemic risk. Favorable results would imply that the particular characteristics of a given financial entity (e.g. dividend payouts, relative leverage), beyond just market risk, could also influence its interest rate sensitivity.

Chapter 3: Hypotheses Development and Research Methods

3.1 Hypotheses Development

I will first present the reasoning behind my primary hypothesis, and then proceed to formally state the hypothesis. First, as previously mentioned, there is strong evidence in the existing literature which shows that high-dividend yielding stock price returns move inversely with changes in interest rates (e.g. Chen and Tzang [1988]; Allen, Madura, and Springer [2000]). One of the primary rationales behind these findings revolves around the effect that interest rates have on the valuation of high-dividend yielding stocks. A popular valuation model among investors to value such securities is the dividend discount model which, in essence, discounts the expected dividend payout of a stock at an appropriate discount rate in order to arrive at a present value for the security. Interest rates are an integral component of this model as the discount rate is often either the prevailing risk-free interest rate, or presented as a margin over the risk-free rate. As such, changes in the level of interest rates will affect the valuation that the model produces. The expectation is that a higher discount rate will yield a smaller present value of dividends and thus a lower valuation for the stock. In a rising interest rate

environment, these mechanics should cause a reduction in the demand for high-dividend yielding stocks, put downward pressure on prices, and ultimately generate negative stock price returns. This rationale provides me with a strong inclination to believe that BDC stock returns should exhibit a negative correlation to changes in the level of interest rates.

An alternative explanation behind the interest rate sensitivity of high-dividend yielding stocks is the yield-play argument referenced by Glascock, Lu, and So (2000). That is, due to the stable, recurring nature of dividend payouts, it is feasible that investors view dividend yielding stocks as suitable substitutes for fixed-income securities when yields on such securities are low. That is, when yields on fixed-income securities fall (i.e. interest rates decline), there is a reasonable expectation that investors will shift their investments to dividend yielding stocks in search of higher, yet stable, yields. This movement will increase the demand for these stocks, put upward pressure on prices, and consequently produce positive returns. This alternative possibility provides my second source of rationale to believe that BDCs, given the nature of their dividend payouts, should be sensitive to movements in interest rates.

The third basis for believing that BDCs should exhibit sensitivity to changes in interest rates is the BDC business model. Past research has documented the interest rate sensitivity of financial companies (e.g. Flannery and James [1984]; Booth and Officer [1985]), and has posited this sensitivity to the interest rate risk surrounding the asset-liability structure of these entities. Companies such as commercial banks, and other depository institutions, aim to generate a positive net interest margin between their assets and liabilities by drawing from their deposits in order to make loans to individuals and businesses. Earnings for a given institution are largely tied to its ability to maximize this

net interest margin. However, doing so can prove to be difficult to do, as the maturities of the assets and liabilities of a financial company often differ; that is, deposits are characterized by short-term maturities, while loans have longer maturities. As such, changes in different interest rates (i.e. short-term versus long-term) will have varying effects on the two sides of the balance sheet for a given financial entity; and since rates do not necessarily move in lock-step with one another, the supply and demand for both deposits and loans can be reasonably expected to also shift disproportionally to one another, making it necessarily difficult to maintain a desirable margin.

The same disconnect can occur for BDCs. Again, while BDCs do have access to public equity markets, a substantial portion of these entities draw capital from revolving credit facilities underwritten by banks. Funds drawn from these facilities are typically priced at a modest margin over a benchmark interest rate, and are used to make private growth capital investments in small to middle-market companies. As previously mentioned, BDCs are able to price their investments at what would be considered high-yields in the public bond markets due to the risky nature of the businesses that they invest in. Like financial companies, BDCs generate a significant portion of earnings from the net interest margin between their assets (i.e. debt investments) and liabilities (i.e. bank debt).

Since funds drawn from their credit facilities are typically tied to a short-term rate such as LIBOR, BDCs, similar to other financial companies, should experience greater short-term interest rate risk on the liabilities side of their balance sheet compared to the assets side, where investments can range anywhere from 5 to 10 years in maturity. This presents a clear mismatch in maturities and changes in short and long-term interest rates

can presumably affect BDC balance sheets to varying degrees (primarily through respective shifts in supply and demand for the assets and liabilities of BDCs), consequently affecting the net interest margin generated on their investments. As a rudimentary illustration, one can reasonably expect that in a declining interest rate environment, BDCs will be able to borrow funds at lower rates and widen net interest margins. Doing so would translate to higher earnings and potentially boost investor demand for BDC stocks, consequently putting upward pressure on prices and leading to higher stock price returns.

I predict that this study will show results that are commensurate with studies that have examined the interest rate sensitivity of high-dividend yielding stocks and financial companies. I have no inclination to believe that the asset composition of BDCs will deter such results. Perhaps, if anything, the interest rate risk surrounding the asset-liability structure of BDCs will do more in the way of influencing interest rate sensitivity. In this way, I state my first hypothesis formally:

> **H1:** BDC stock returns should be sensitive to movements in interest rates, and demonstrate interest rate *betas* that are not equal to zero.

After first testing the primary hypothesis, this current study also tests a secondary hypothesis surrounding the SBIC status of BDCs. As stated before, an SBIC licensed BDC can circumvent the 1:1 leverage ratio requirement that is outlined in the SBIA. Any such BDC can borrow up to $225 million from the SBA and still not have it count against the SBIA's leverage restrictions. Furthermore, this fixed-rate SBA debt comes at a relatively lower cost compared to bank debt and is provided with limited covenants. As such, a BDC with an SBIC license should have several advantages over any other

similarly sized, non-SBIC BDC. Not having to count the SBA's debt against leverage restrictions allows a BDC to potentially deploy more capital towards profitable investments. Furthermore, with a lower cost of capital, an SBIC licensed BDC can generate wider net interest margins and enhance earnings through the use of SBA debt. The fixed-rate feature of this debt will also guard these BDCs from movements in interest rates, and any subsequent change in net interest margins, to the extent that using SBA debt limits the use of revolving bank debt. My secondary hypothesis is stated formally:

> **H2:** The SBIC licensure status of BDCs will mitigate interest rate sensitivity, and such BDCs should exhibit an interest rate *beta* that is equal to zero.

3.2 Data Selection and Research Methods

I began the data collection process by collecting daily trading data (i.e. prices) for 35 individual BDCs from the Center for Research in Security Prices (CRSP) database, with a sample period ranging from December 31, 1996 through December 31, 2012. This search yielded 52,898 daily observations. As a number of BDCs did not start trading until part way through the selected sample period, I extracted any trading data for companies that occupied a given ticker before a BDC began using it upon its respective IPO date. I also deleted trading information for WhiteHorse Finance, Inc. (WHF) since it did not start trading until December 6, 2012. Upon further examination of the available data, I narrowed the sample period to only include trading information for the period between January 1, 2004 and December 31, 2012. Doing so allowed me to better control for BDC size since most of the trading data available prior to 2004 was limited to BDCs that were considered large. After deleting this data, I was left with 37,772 daily observations spread across 30 individual BDCs. While I originally planned to be consistent with Lee and

Brewer (1990) by using daily stock price returns, I found it to be more pragmatic to conduct the current study in a manner similar to Allen, Madura, and Springer (2000) and decided to instead use monthly stock price returns. Upon retrieving monthly return data for the 30 individual BDCs previously mentioned, I was left with 1,811 observations.

In addition to monthly returns data for the BDCs included in this study, I also obtained, from CRSP, monthly returns data for the S&P 500 Index over the sample period, as well as data for three different interest rate measures: the yields on one-month, 5-year, and 10-year constant maturity Treasury securities. These yields serve as a proxy for short, medium, and long-term interest rates, respectively.

The first part of my analysis involves estimating the sensitivity of BDC stock returns to market returns and changes in interest rates in general. I begin by aggregating the monthly price returns of the BDCs and subsequently using the following two-factor model to estimate sensitivity:

$$R_t = \alpha_0 + \alpha_1 R_{M,t} + \alpha_2 i_t + e_t \quad (1)$$

In the model seen above, R_t represents the monthly stock price return of a given BDC at time t. The returns data is regressed against two independent variables, $R_{M,t}$ and i_t, which represent market returns and changes in interest rates, respectively. α is the estimated coefficient for each of the variables, and e is the error term in this equation.

I regress the returns three separate times against three measures of i_t, approximated by the yields on one-month, 5-year, and 10-year constant maturity Treasury securities. The use of three different proxies for short, medium, and long-term interest rates is consistent with Chance and Lane (1980), and is done so to provide a more thorough examination of interest rate sensitivities.

The independent variable $R_{M,t}$ is represented by the monthly returns of the S&P 500 Index over the sample period. However, in order to avoid any potential collinearity between market returns and interest rates, I orthogonalize the two variables by regressing the market return observations against each of the interest rate proxies (Allen, Madura, and Springer [2000]), then take the residuals from these regressions and insert them back into equations (1) to be used as the proxy for $R_{M,t}$. Doing so captures market returns that are unexplained by changes in interest rates, and provides a more reasonable basis to discern the sensitivity of BDC returns to the two independent variables.

I choose to aggregate the monthly price returns of all the BDCs in order to first answer the high-level question of whether BDCs are sensitive to changes in interest rates in general. So as to provide additional insight, I proceed to split the data into two equally sized portfolios based on market capitalization. I classify those with a market capitalization greater than $350 million as large, and consider BDCs with a market capitalization under $350 million to be small. Doing so allows me to understand whether size affects interest rate sensitivity in BDCs. I choose not to divide the sample into a higher number of portfolios (i.e. deciles) as this would leave a number of groups with an insufficient number of observations, which would consequently affect the usefulness of the study's results. Using the same methodology as in (1), I estimate sensitivity according to size in the following manner:

$$R_{L,t} = \beta_0 + \beta_1 R_{M,t} + \beta_2 i_t + u_t \qquad (2)$$

$$R_{S,t} = \theta_0 + \theta_1 R_{M,t} + \theta_2 i_t + v_t$$

In the models seen above, $R_{L,t}$ and $R_{S,t}$ represent average monthly returns for the portfolios of the large BDCs and small BDCs, respectively. The portfolio returns are

regressed against the same independent variables seen in equations (1). β and θ are the estimated coefficients, and u and v are the error terms for the respective equations.

The second part of my analysis tests for differences in sensitivity between SBIC licensed BDCs and non-SBIC licensed BDCs. Similar two-factor models are employed for this segment as well:

$$R_{SBIC,t} = \gamma_0 + \gamma_1 R_{M,t} + \gamma_2 i_t + w_t \quad (3)$$

$$R_{NON\text{-}SBIC,t} = \mu_0 + \mu_1 R_{M,t} + \mu_2 i_t + z_t$$

In equations (2), $R_{SBIC,t}$ and $R_{NON\text{-}SBIC,t}$ represent portfolios of SBIC BDCs and non-SBIC BDCs respectively. γ and μ represent the coefficients to be estimated, while w and z represent the respective error terms. The same methodology used in equations (1) and (2) is applied to the analysis in equations (3).

Chapter 4: Results

4.1 Descriptive Statistics

Table 1 shows the descriptive statistics for the monthly returns of all BDCs, each of the four portfolios examined in this study, and the two independent variables included in the models. Generally, between 2004 and 2012, the BDCs in this study had a mean monthly return of -0.31%, with a median of 0.34%, indicating a distribution that was skewed to the left. This skewness is not particularly surprising as asset prices across the financial markets sharply declined following the downturn experienced in the period between 2007 and 2009, a period that can presumably be held accountable for the negative mean return seen in this sample.

The mean monthly return on each of the constructed portfolios was negative over the sample period and the distribution of each respective portfolio was slightly skewed to

the left. The smaller BDCs (i.e. market capitalization less than $350 million) exhibited the highest mean monthly returns (-0.08%) while, in comparison, the large BDC portfolio exhibited a mean monthly return of -0.16% over the sample period. SBIC-licensed BDCs had a mean monthly return of -0.80% while the non-SBIC BDC portfolio exhibited an average monthly return of 0.01%.

The distribution of monthly returns on the S&P 500 Index was also slightly skewed to the left, similar to the distributions of the BDC portfolios. The average return on the Index over the sample period was 0.19%, with a median return of 0.67%. The mean (median) return for each of the interest rate proxies were as follows: one-month constant maturity was 20.6% (2.92%), 5-year constant maturity was -0.59% (-0.80%), and 10-year constant maturity was -0.55% (-0.76%).

4.2 Examining Interest Rate Sensitivity

4.2.1 An Examination of BDCs in General

Table 2 presents the results of equation (1). The results show that BDCs in general are highly sensitive to market returns. The coefficients are all significant at the 1% level and exhibit t-statistics above 20.00.

The results also show that BDCs in general are highly sensitive to interest rates, with all interest-rate coefficients significant at the 5% level or below. BDC stock returns exhibit an inverse relationship (with a coefficient of -0.006) to changes in short-term interest rates, a result that is significant at the 1% level. This particular result is highly consistent with the intuition developed by the existing literature which, again, states that the stock returns of companies like BDCs, either financial companies or those with high-dividend yielding stocks, should move inversely to changes in the level of interest rates

(e.g. Chen and Tzang [1988], Bae [1990]). BDCs also demonstrate sensitivity to medium and long-term interest rates but, contrary to findings in the existing literature, these sensitivities are estimated to have positive, rather than negative, interest rate coefficients of 0.095 and 0.107, respectively. While the results discussed above provide strong support for H1, it is worth taking a moment to discuss the positive medium and long-term interest rate coefficients.

The fact that BDCs exhibit statistically significant interest rate sensitivity is commensurate with findings in the existing literature. However, the positive medium and long-term interest rate coefficients suggest that BDC investors react to interest rate movements in a way that is unique from reactions found in previous interest rate sensitivity studies. Financial institutions and REITs have been found to possess across the board inverse relationships with changes in interest rates (i.e. with short, medium, and long-term rates) (e.g. Flannery and James [1984]; Chen and Tzang [1988]). From these results, I see that investors in these entities indiscriminately react to changes in short, medium, and long-term interest rates, and do so for any one of a number of reasons. This is to say, it is difficult to discern why these investors react in the way that they do. The positive coefficients found in this current study show that BDC investors are more discriminate in their reactions to different interest rates, which consequently provides guidance on the theories behind H1 and at least lends some direction towards understanding what does *not* cause BDC investors to react to changes in interest rates, as discussed below.

Positive coefficients on the medium and long-term interest rate variables do not bode well with the idea that investors are influenced by the affect that interest rate

changes have on DDM valuations, as speculated in Section 3.1. The dividend discount model often does not assume a static discount rate; instead, users of the model incorporate discount rates that change over time, commensurate with projected changes in the user's cost of capital, part of which is determined by interest rates. As such, if the DDM valuations weighed heavily on the minds of BDC investors, then one would expect an inverse relationship between BDC stock returns and interest rates across the board. That is, since investors are assumed to take into consideration short, medium, and long-term interest rates when calculating an appropriate DDM discount rate, increases in these rates would lower valuations and result in depressed demand for these securities. This would consequently lead to lower prices and negative BDC stock returns. However, the positive coefficients found in this study for medium and long-term interest rates imply that such a dynamic does not exist among BDC investors. As such, there is reason to believe that the DDM theory does not account for interest rate sensitivity among BDCs. While this study does not point directly to the root cause of interest rate sensitivity in BDCs, it does offer insight in the way of understanding what does *not* account for this sensitivity.

Additionally, the results of this current study offer two important insights into the historical behavior of BDC investors: 1) These investors are responsive to interest rate *expectations* and 2) they consider BDCs on a shorter-term investment horizon. The fact that there is a statistically significant reactionary movement in the stock prices of BDCs is a strong indication that investors feel a change in interest rates will affect BDC performance in *some way.* The positive relationship found between BDC stock returns and movements in longer-term (i.e. 5 to 10-year constant maturity) interest rates is a

potential indication of the sentiment that an expected rise in interest rates will harm BDC performance, a sentiment that is reflected by the increase in investor demand for BDC stocks in the current period (as seen through the positive coefficients exhibited by the model in the medium and long-term interest rate tests), and confirmed by the inverse relationship between stock prices and short-term interest rates. The increases in current demand imply that investors are willing to invest in BDCs now and exhibit little concern that the expected increase in interest rates will harm their position going forward, presumably because they likely plan to exit their BDC investments before such an event can even occur. The willingness to invest in the current period, despite reactions to an expected rise in future interest rates, is a good indication that BDC investors plan to hold on to their investments for a shorter period of time, and thus presumably operate on a relatively shorter investment horizon. So while the results are not commensurate with the existing literature, the tests against medium and long-term interest rates still in fact confirm BDC sensitivity to interest rates and potentially provide important insights into BDC investor behavior.

4.2.2 An Examination of BDCs Controlling for Size

Table 3 presents the results of equations (2). The tests make it clear that the stock price returns of both large and small BDCs share a strong, positive relationship with market returns. The market return coefficients in the respective models are all significant at the 1% level and exhibit t-statistics above 12.00, demonstrating the high sensitivity of BDC stock price returns to the returns of the broader market.

The results are not as consistent when considering interest rate sensitivities for each of the portfolios. I begin by addressing sensitivity to short-term rates. As seen in

Panel A of Table 3, the large BDC portfolio does not demonstrate statistically significant interest rate sensitivity, although it does exhibit a negative interest-rate coefficient (-0.003). Small BDCs, in comparison, show robust sensitivity down to the 1% level and hold an inverse relationship (with a coefficient of -0.009) to changes in the level of short-term interest rates. A more detailed examination of the difference in sensitivities demonstrates that there is a statistically significant difference between the short-term interest rate coefficients of small and large BDCs.[3] That is, small BDCs exhibit statistically significantly more sensitivity to short-term interest rates than large BDCs do. To an extent, the results discussed above provide further support for H1 and suggest that BDC size plays a role in determining interest rate sensitivity.

Results from measuring BDC sensitivity to the yields on 5-year constant maturity Treasuries demonstrate that both large and small BDCs are also responsive to medium-term interest rates. The coefficients for both portfolios are positive, consistent with the results from Section 4.2.1, with smaller BDCs exhibiting a stronger reaction to such changes. The large BDC portfolio had a coefficient of 0.08, while the small BDC portfolio had a coefficient of 0.11, both of which were significant at the 5% level.

Turning to long-term interest rates, the study shows that, similar to short-term interest rates, larger BDCs do not exhibit sensitivity while smaller BDCs do (at the 5% level). Moreover, consistent with the test against medium-term interest rates, the long-

[3] The model used to determine whether there was a statistically significant difference between the interest rate coefficients for small and large BDCs is as follows:

$$R_t = \tau_0 + \tau_1 R_{M,t} + \tau_2 i_t + \tau_3 size_t + \tau_{4(} size_t * i_{t)} + e_t$$

The $size_t$ variable is a dummy variable that indicates whether a given return is exhibited by a large or small BDC. The inclusion of the $(size_t * i_{t)}$ variable measures whether the difference between the interest rate coefficients for large and small BDCs is significant. Since sensitivity only differed for short and long-term interest rates, the results of these two tests are shown in Table 4.

term interest rate coefficient for the small BDC portfolio is positive. While this result lends further support for the thesis offered in Section 4.2.1, the difference between the long-term interest rate coefficients for large and small BDCs is not statistically significant and it thus cannot be asserted that smaller BDCs exhibit greater sensitivity to long-term interest rates.

One possible explanation for the statistically significant discrepancy in short-term interest rate coefficients is the ability for larger BDCs to more easily access the public equity markets. That is, when given the choice between making an equity investment in a large BDC or small BDC, it is likely that an investor will choose the larger BDC due to the fact that, among other things, larger firms are generally perceived to exhibit less risk. As such, larger BDCs may be guarded from interest rate sensitivity as a result of their ability to turn to equity markets during unfavorable borrowing (i.e. interest rate) environments. Conversely, smaller BDCs bear the burden of current unfavorable rate environments due to their limitations in the equity markets, and thus exhibit negative stock return reactions to current interest rate changes. Future studies would do well to further examine the explanation behind the reduced interest rate sensitivity among large BDCs.

4.3 Examining the Effects of SBIC-licensure on Sensitivity

Table 5 presents the results of the second part of my analysis, equations (3). Again, both portfolios exhibit strong, positive correlations to market returns at the 1% level. With t-statistics above 10 across all tests, both SBIC-licensed and non-SBIC BDCs are shown to be highly sensitive to market returns.

Examining the interest rate sensitivities of the respective portfolios provides strong support for H2. SBIC-licensed BDCs do not exhibit interest rate sensitivity at any level, while non-SBIC BDCs do demonstrate sensitivity to short, medium, and long-term interest rates. Panel A of Table 5 shows the results for tests against short-term interest rates. Non-SBIC BDC stock returns are seen as exhibiting a negative relationship to changes in the level of short-term rates at the 5% level, with a coefficient of -0.007. While SBIC BDCs do hold a negative short-term interest rate coefficient, their sensitivity is statistically insignificant.

The same is true for medium and long-term interest rates as well, with non-SBIC BDCs exhibiting sensitivity while SBIC BDCs do not. However, the interest rate medium and long-term interest rate coefficients for the non-SBIC portfolio are positive at the 5% level, with values of 0.08 and 0.15, respectively. These results are consistent with the view that is held to explain the sensitivity to medium and long-term interest rates in Section 4.2.1. Again, the SBIC portfolio does not exhibit any statistically significant interest rate sensitivity. The results for the medium and long-term interest rate tests can be seen in Panels B and C, respectively, of Table 5.

The outcomes discussed above demonstrate that SBIC-licensed BDCs experience benefits from a lower cost of capital, as well as the ability to maintain higher leverage than its counterparts. In sum, these results support the hypothesis that the interest rate sensitivities of SBIC-licensed BDCs are in fact mitigated by the provisions granted to them by the US Small Business Administration.

Chapter 5: Summary and Conclusion

In this paper, I examined the interest rate sensitivity of BDCs. Past studies have shown that companies with similar characteristics to BDCs exhibit interest rate sensitivity, namely financial institutions and high-dividend yielding entities. While these types of companies have been examined on stand-alone bases, the existing literature shows little in the way of studying BDCs, entities that demonstrate hybrid characteristics between financial companies (e.g. banks) and high-dividend paying stocks. Doing so would provide insight towards understanding how interest rate sensitivity changes, if at all, when these characteristics are intermingled.

REITs have been shown to be sensitive to interest rates, and bear the most similar risk profile to BDCs, but their investments have generally longer maturities. As such, they possess an asset-liability structure that is different than a typical BDC asset-liability structure, where assets tend to have maturities that are generally much shorter compared to REITs. This leaves open the possibility that BDC performance bears interest rate sensitivity that is dissimilar to what has been found in the existing literature. The shorter maturities of BDC investments could create sensitivity that is more heavily weighted towards shorter-term interest rates. This presents the possibility that BDC investors react differently to interest rates and interest rate expectations than do investors in other similarly characterized companies, and as such affect BDC stock price returns in a unique way.

The current study produces three important results that lend interesting insight into the sensitivity of BDC stock returns. First, BDCs are sensitive to changes in interest rates, a result that is consistent with findings in the existing literature and demonstrates

strong support for my hypothesis, but this responsiveness is dependent on size. That is, smaller BDCs exhibit higher sensitivity to interest rates than larger BDCs do, which in some cases do not exhibit statistically significant sensitivity at all. I posit that this disparity is a product of the increased access that larger firms generally enjoy in the capital markets.

Second, BDCs that are sensitive to movements in interest rates show positive coefficients on the medium and long-term interest rate variables. These results stand contrary to findings in the existing literature and confirm the merit of examining the interest rate sensitivity of BDCs on a standalone basis. Additionally, the results of this current study also lend themselves to important insights into how investors evaluate their BDC investment decisions and demonstrate that it is unlikely that dividend discount model valuations have influence over BDC interest rate sensitivity, a finding that contradicts theories set out in the existing literature on the sensitivity of high-dividend yielding stocks.

Third, SBIC licensure status is found to completely mitigate statistically significant interest rate sensitivity, a result that strongly supports my second hypothesis. The outcome of this particular segment of my analysis shows that there are in fact material benefits to holding an SBIC license.

While the current study was able to confirm findings found in the existing literature, it merely scratches the surface of research on the BDC space. As previously mentioned, future studies would do well to examine intertemporal differences in interest rate sensitivities as more data on BDCs becomes available. The increasing importance of BDCs in the capital markets gives me reason to believe that there would be pronounced

differences between periods, namely before and after the recent financial crisis. I would also encourage future studies to examine what the true cause of interest rate sensitivities in BDCs is. That is, is the interest rate sensitivity of BDCs primarily attributable to their high-dividend yielding nature, or their asset-liability structures? In addition, due to the highly regulated nature of BDCs, examining the effects of new legislation and regulatory standards would be worthwhile in determining how BDC stock returns behave, and if this behavior is better explained by variables beyond market factors.

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Exhibits

Table 1a
Descriptive Statistics for Selected Variables (2004-2012)

Panel A: Descriptive Statistics

Variable	Mean	Standard Deviation	1st Quartile	Median	3rd Quartile
BDC Returns	-0.31%	0.155	-4.08%	0.34%	4.50%
Small BDC Returns	-0.08%	0.091	-3.10%	0.46%	4.02%
Large BDC Returns	-0.16%	0.077	-2.24%	0.49%	3.58%
SBIC BDC Returns	-0.80%	0.101	-4.07%	0.73%	4.07%
Non-SBIC BDC Returns	0.01%	0.078	-2.52%	0.55%	3.19%
Δ Short-term Interest Rates	20.60%	1.549	-18.14%	2.92%	16.15%
Δ Med-term Interest Rates	-0.59%	0.114	-7.06%	-0.80%	5.80%
Δ Long-term Interest Rates	-0.55%	0.079	-5.02%	-0.76%	4.49%
Market Returns	0.19%	0.045	-1.80%	0.67%	2.45%

BDC Returns are the monthly returns of all the BDCs examined in this study. *Small BDC Returns* are the average monthly return for BDCs with a market capitalization less than $350 million. *Large BDC Returns* are the average monthly return for BDCs with a market capitalization greater than $350 million. *SBIC BDC Returns* are the average monthly return for BDCs with an SBIC license. *Non-SBIC BDC Returns* are the average monthly return for BDCs without an SBIC license. *Δ Short-term Interest Rates*, *Δ Med-term Interest Rates*, and *Δ Long-term Interest Rates* are represented by the monthly percentage changes in one-month, 5-year, and 10-year constant maturity Treasuries, respectively. *Market Returns* are the monthly returns on the S&P 500 Index.

Table 1b
Correlations for Selected Variables (2004-2012)

Panel A: Correlation Table [1]

Variable[2]	*small_avg*	*large_avg*	*sbic_avg*	*nonsbic_avg*	*shortreturn*	*medreturn*	*longreturn*	*res2short*	*res2med*	*res2long*
small_avg	1	0.8036****	0.8094****	0.9044****	0.1277	0.1378	0.1548	0.6598****	0.6418****	0.6465****
large_avg	0.747****	1	0.837****	0.9352****	0.1986***	0.1239	0.1352	0.8016****	0.7818****	0.796****
sbic_avg	0.629****	0.884****	1	0.7529****	0.1763	0.0861	0.0769	0.6412****	0.6339****	0.6468****
nonsbic_avg	0.929****	0.864****	0.631****	1	0.1524	0.1177	0.1518	0.7674****	0.745****	0.751****
shortreturn	-0.158	-0.0571	-0.0759	-0.134	1	-0.0215	-0.0698	0.0878	0.1274	0.1163
medreturn	0.144	0.121	0.108	0.123	-0.198**	1	0.8907****	0.207***	-0.0042	0.0327
longreturn	0.155	0.0717	0.00321	0.151	-0.0994	0.877****	1	0.2523***	0.0655	0.0708
res2short	0.772****	0.839****	0.709****	0.815****	0	0.211**	0.220**	1	0.9653****	0.9722****
res2med	0.763****	0.834****	0.705****	0.812****	0.0126	0	0.0341	0.977****	1	0.9929****
res2long	0.761****	0.846****	0.729****	0.806****	-0.00857	0.0213	0	0.975****	0.994****	1

* p<0.1 / ** p<0.05 / *** p<0.01 / **** p<0.001

[1]Pearson correlations are shown in the lower diagonal. Spearman correlations are displayed in the upper diagonal.
[2]The variables are defined in the following way: *small_avg* is the average monthly return realized among BDCs with a market capitalization less than $350 million. *large_avg* is the average monthly return realized among BDCs with a market capitalization greater than $350 million. *Sbic_avg* is the average monthly return realized by BDCs with an SBIC license. *Nonsbic_avg* is the average monthly return realized by BDCs without an SBIC license. *Shortreturn, medreturn,* and *longreturn* represent the monthly percentage change in one-month, 5-year, and 10-year constant maturity Treasuries, respectively. *Res2short, res2med,* and *res2long* represent the average monthly return of the S&P 500 Index unexplained by changes in one-month, 5-year, and 10-year constant maturity Treasuries, respectively, and are used as proxies for market returns in the models presented in this study.

Table 2
Examining the Interest Rate Sensitivity of BDC Stock Returns in General (2004-2012)

Panel A: Short-term Interest Rates			
Intercept	Market Return Coefficient	Interest-Rate Coefficient	R-Squared
-0.002	1.411***	-0.006***	19.72%
(-0.66)	(20.71)	(-3.75)	

Panel B: Medium-term Interest Rates			
Intercept	Market Return Coefficient	Interest-Rate Coefficient	R-Squared
-0.004	1.441***	0.095***	19.38%
(-1.11)	(20.36)	(3.68)	

Panel C: Long-term Interest Rates			
Intercept	Market Return Coefficient	Interest-Rate Coefficient	R-Squared
-0.004	1.468***	0.107**	19.51%
(-1.12)	(20.36)	(2.81)	

* p<0.1 / ** p<0.05 / *** p<0.01

Table 3
Examining the Interest Rate of Sensitivity of BDCs after Splitting the Data into Separate "Size" Portfolios Based on Market Capitalization (2004-2012)

Panel A: Short-term Interest Rates

Size	Intercept	Market Return Coefficient	Interest-Rate Coefficient	R-Squared
Large	-0.001	1.419***	-0.00283	70.70%
	(-0.24)	(15.89)	(-1.08)	
Small	0.00113	1.545***	-0.00929***	62.00%
	(0.21)	(12.83)	(-2.63)	

Panel B: Medium-term Interest Rates

Size	Intercept	Market Return Coefficient	Interest-Rate Coefficient	R-Squared
Large	-0.0011	1.444***	0.0813**	71.00%
	(-0.27)	(15.88)	(2.31)	
Small	-0.00012	1.564***	0.114**	60.30%
	(-0.02)	(12.44)	(2.33)	

Panel C: Long-term Interest Rates

Size	Intercept	Market Return Coefficient	Interest-Rate Coefficient	R-Squared
Large	-0.0012	1.466***	0.0693	72.10%
	(-0.30)	(16.40)	(1.39)	
Small	0.000184	1.561***	0.178**	60.30%
	(0.03)	(12.36)	(2.52)	

* p<0.1 / ** p<0.05 / *** p<0.01

Table 4
Determining Statistical Significance between the Interest Rate Coefficients of Large and Small BDC Portfolios

Panel A: Short-term Interest Rates

Intercept	Market Return Coefficient	Interest-Rate Coefficient	Size Coefficient	Size * Interest-Rate Coefficient	R-Squared
-0.004	1.412***	-0.011***	0.003	0.008**	19.99%
(-0.73)	(20.74)	(-4.21)	(0.41)	(2.33)	

Panel B: Long-term Interest Rates

Intercept	Market Return Coefficient	Interest-Rate Coefficient	Size Coefficient	Size * Interest-Rate Coefficient	R-Squared
-0.007	1.465***	0.161***	0.005	-0.089	19.61%
(-1.32)	(20.31)	(2.65)	(0.79)	(-1.14)	

* p<0.1 / ** p<0.05 / *** p<0.01

Table 5
Examining the Interest Rate Sensitivity of BDCs after Splitting the Data into Separate Portfolios Based on SBIC Licensure Status (2004-2012)

Panel A: Short-term Interest Rates

Status	Intercept	Market Return Coefficient	Interest-Rate Coefficient	R-Squared
SBIC	-0.00702	1.569***	-0.00493	50.90%
	(-1.02)	(10.38)	(-1.11)	
Non-SBIC	0.00145	1.393***	-0.00670**	68.20%
	(0.34)	(14.82)	(-2.43)	

Panel B: Medium-term Interest Rates

Status	Intercept	Market Return Coefficient	Interest-Rate Coefficient	R-Squared
SBIC	-0.00748	1.596***	0.0948	50.80%
	(-1.09)	(10.3)	(1.58)	
Non-SBIC	0.000559	1.420***	0.0835**	67.40%
	(0.13)	(14.56)	(2.21)	

Panel C: Long-term Interest Rates

Status	Intercept	Market Return Coefficient	Interest-Rate Coefficient	R-Squared
SBIC	-0.00801	1.654***	0.00406	53.20%
	(-1.20)	(10.92)	(0.05)	
Non-SBIC	0.000873	1.411***	0.148***	67.20%
	(0.2)	(14.4)	(2.7)	

* p<0.1 / ** p<0.05 / *** p<0.01