The Performance and Pricing of Dividend Rate-Reset Preferred Shares in Canada

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Abstract

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This study provides novel evidence of dividend rate-reset preferred shares issued in Canada from January 2010 – December 2019 by financial and industrial firms. Using an event study approach, we examine how the issuance of dividend rate-reset preferred shares affect common stock returns of companies that issue them. We also value the embedded Bermudan call option in the dividend rate-reset preferred shares through a binomial tree model. Furthermore, this study tests how efficient these prices obtained from the binomial tree model are when compared with the actual prices. We discovered from our analyses that dividend rate-reset preferred shares do not negatively impact common stock returns as new equity issues often do. We also find that the prices are not efficient based on the Bermuda call option binomial model. This implies that the theoretical model underpriced the actual prices and that these preferred shares are overpriced relative to the theoretical model.

Keywords: dividend rate-reset preferred shares, event study, binomial tree model, Bermudan call option

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1. Introduction

The concept of dividend rate-reset preferred shares became increasingly popular in both the Canadian and U.S markets following the market crash in 2008 as investors seek a stable source of income. As reported by S&P Dow Jones Indices (2014), the dividend rate-reset preferred shares made up only 17% of the S&P/TSX Preferred Share Index on December 31, 2008, and by the end of 2013, this composition has gone up to 57%. This is a very interesting observation in the Canadian preferred shares market. More recently, Allentuck (2021) wrote in The Globe and Mail that the composition of dividend rate-reset preferred shares could further increase if investors are positive that the interest rates will increase.

Dividend rate-reset preferred shares are preferred shares that pay investors a series of payments at a fixed dividend rate for a specified period of time, typically five years until the dividend rate is reset at a pre-established spread above a government bond with a similar term. In Canada, the dividend rate of the dividend rate-reset preferred shares are usually reset at a spread above the five year Government of Canada bond yield. Investors who own dividend rate-reset preferred shares have two options at the reset date if the shares are not called by the issuing company. The first option is for the investor to hold on to the preferred shares at the new dividend rate while the second option is for the investor to convert the dividend rate-reset preferred shares to a floating rate preferred share.

We provide an example below of a dividend rate-reset preferred shares highlighting the components of dividend rate-reset preferred shares.

> *Company A issues 400,000 dividend rate-reset preferred shares at a price of CA$25.00 on February 12, 2015, at a dividend yield of 4% per annum. The dividend rate will be reset every five years at a rate equal to 5% above the 5-year Government of Canada bond yield. The first reset date will be February 12, 2020, and February 12 every five years thereafter if the company does not call the shares. Shareholders have the right to convert these shares on the reset date to a floating rate preferred share of Company A.*

Firms have marketed these instruments to investors for a varying number of benefits. Some of the benefits include how these shares favour investors who want dividend income in an environment with variable rates and wish to diversify their portfolios. Investors can also benefit from the tax efficient yield of preferred shares.

Dividend rate-reset preferred shares can provide some benefits to the issuing companies. First, these shares provide great source of financing for these companies in an environment where there is a huge investor demand for less volatile assets such as preferred shares. Second, preferred shares are generally less costly to issue when compared to common shares. In addition, these companies have the option to call back the shares when they speculate the dividend rate at the reset date will be higher and may not be favourable to them. In the last decade, financial and industrial firms in Canada have resorted to financing using this type of shares. According to a recent report published in 2019 by CIBC Private Wealth Management, banks make up the largest issuers in the preferred shares market.

Although the use of dividend rate-reset preferred shares can be beneficial to both the investors and issuing company, we find that these shares may pose some risks to the investors. One major risk is that due to the mechanism of how the dividend rate is set at reset date, when the interest rates are low and are trending down, this will affect the variable component of the dividend rate that is based on the government bond yield and the dividend yield will invariably be low. Another risk these investors face is the credit risk of the issuers of the dividend rate-reset preferred shares. If these issuers experience a decline in their credit worthiness during the initial five-year holding period, this will impact the prices of these shares negatively and this would affect their returns.

In view of the growing attention paid to dividend rate-reset preferred shares in the past years, examining them will help provide findings that would be valuable to investors, issuing companies and market analysts. We find a few papers that have examined the valuation and performance of preferred shares (Pinegar & Lease, 1986; Linn & Pinegar, 1988; Abhyankar & Dunning, 1999; Irvine & Rosenfield, 2000, Kallberg et al., 2013). We provide a summary of the findings from these papers in the literature review portion of this paper. However, to the best of our knowledge, no papers have examined the valuation and performance of dividend rate-reset preferred shares.

This paper provides new evidence on the dividend rate-reset preferred shares in Canada. We focus on two aspects in this paper. First, we examine the impact of the issuance of these shares have on common stock shareholders using an event study analysis. Second, we examine the valuation of these shares using the option pricing framework adapted by Leisen and Reimer (1996). Since the dividend rates are reset on a regular schedule i.e., every five years as options, we can view these shares as stocks with an embedded Bermudan call option. If the call option is not exercised by the issuer, the investor can decide to hold on to the shares with the new reset rates for the next five years and thereafter every five years up until it is called, or the investor exchanges the dividend rate-reset preferred shares into a floating rate preferred shares.

The structure of the remaining portion of this paper is as follows. Section 2 gives a brief review of the related literature. Section 3 presents the hypotheses for the research, Sections 4 and 5 describes the data and discusses the event study methodology and option pricing model respectively. Section 5 discusses the results from the adapted methodology. The paper concludes with Section 7 where we summarize the implications of the findings and make suggestions for further research.

2. Literature review

Empirical research surrounding the concept of dividend rate-reset preferred shares is lacking in the existing literature. More commonly seen in the existing literature are papers that focus on other kinds of preferred shares such as convertible preferred shares, fixed-rate preferred shares and floating-rate preferred shares. However, a few publications from financial institutions that describe the basics of dividend-rate-reset preferred shares are available for public consumption.

In this section, we discuss a few hypotheses that provide a basis on how market participants are expected to react to the announcement of preferred share issues. We also summarize a few findings from the existing literature on preferred shares.

2.1. Information Asymmetry Hypothesis

Information asymmetry occurs when one party possesses superior information to the other party in a transaction. Oftentimes, it is assumed that managers have valuable information about the firm than investors do. Based on the information managers have, they would make certain investing decisions on behalf of the firm. This hypothesis is based on Myers and Maljuf (1984) and Narayanan (1988).

Myers and Maljuf (1984) assumed that the managers are often faced with the decision of using internal funds, issuing new equity or debt in order to finance an investment opportunity. They hypothesized that managers possess superior information about a firm's assets than its investors and this superior information managers have influence their financing option. Based on the model adopted by Myers and Maljuf, they found that a firm's stock price will fall when a firm issues new equity to finance investment compared to when safe debt is issued by the same firm. They also advocated in their paper that external financing via debt is better than financing with equity. Furthermore, they posited that a firm's market value is below the true value of the firm as perceived by the managers.

Narayanan (1988) examined the choice between debt and equity within the context of information asymmetry and theorized that even if a risky debt is issued, it is still preferable to a firm than when equity is issued. Narayanan (1988) concluded that issuing equity will lead to a negative effect on the stock price. Another conclusion was that issuing debt will be preferred by undervalued firms.

Based on the conclusions from the aforementioned research, announcements of new equity issues are expected to be accompanied by a negative reaction while that of new debt issues would generate a positive reaction.

2.2. Leverage hypotheses

The leverage hypotheses as described by Barclay and Litzenberger (1988) can be subdivided into the tax advantage of debt hypothesis and the redistribution hypothesis. The tax advantage hypothesis is based on Modigliani and Miller (1959) while the redistribution hypothesis is based on Merton (1974), Galai and Musulis (1976) and Smith and Warner (1976).

The assumption under the tax advantage of debt hypothesis is that issuing new equity causes an unexpected decrease in the firm's financial leverage and because of the tax advantage of debt, this reduction in financial leverage would lead to a negative impact on stock prices. Also, it is hypothesized that if the proceeds of the new equity issues are for retiring debt, the announcement of these issues would lead to a larger negative effect than when the proceeds are for financing new investment projects. For new debt issues, they are anticipated to reduce future tax liabilities (i.e., the tax advantage of debt), hence, their issues will lead to a positive impact on the stock price.

The redistribution hypothesis assumes that for firms with a fixed investment policy, an unexpected decrease in leverage will make their debt less risky. The premise here is that if the firms' firm total value remains constant even after this change in leverage, bondholders would gain at the expense of equity holders by an increase in their value.

Based on the leverage hypotheses, it is expected that the announcement of new equity issues should have a negative reaction while the announcement of new debt issues should have a positive reaction.

2.3. Price-pressure hypothesis

This hypothesis was described by Barclay and Litzenberger (1988) and Linn and Pinegar (1988). This hypothesis simply predicts that there will be a negative effect only on existing preferred shares that are perfect substitutes for the new preferred shares being issued during the announcement period.

2.4. Bondholder and Stockholder hypotheses

Kallberg et al. (2013) described the bondholder and stockholder hypotheses in their study on the reactions to preferred share issues.

The bondholder hypothesis posits that when firms announce an issue of preferred stock, bondholders react favourably, and this is because this issue reduces the firms' leverage and financial distress. This hypothesis also suggests that this favourable reaction by bondholders is larger for firms with more earnings potential.

The stockholder hypothesis theorizes that stockholders when firms announce an issue of a straight preferred stock, there is no significant reaction from stockholders. This is because this issue creates no dilution and can be used to mitigate potential adverse selection issues between managers and stockholders. On the other hand, it is assumed that when distressed firms issue preferred stock particularly convertible preferred stocks, stockholders would react negatively because of possible wealth transfer to bondholders.

2.5. Reactions to the issuance of preferred shares

Pinegar and Lease (1986) analyzed the impact of preferred-for-common exchange offers on firm value. Employing data from July 1962 – December 1980, they estimated the returns to both preferred and common stocks. In their empirical analysis, they divided the entire sample into leverage-increasing and leverage-decreasing events. Leverage-increasing events refers to scenarios when firms retire common stocks by issuing preferred stocks while leverage-decreasing events are related to when firms retire preferred stocks by issuing common stocks.

For returns on common stocks, on average they observed positive and significant returns around the announcement period of (0, 1) for leverage-increasing events, whereas for leverage-decreasing events, the returns were negative and significant. For returns on preferred stocks, they observed positive and significant returns from both leverage-decreasing and leverage-increasing events. Their findings overall indicated that an increase in firms' leverage can positively affect the firm value while a decrease in firms' leverage, could have either positive or negative impact on the firm value given the varying signs obtained from the estimation of the returns.

Abhyankar and Dunning (1999) studied the effect of issuing convertible bonds, convertible preference shares and convertible capital bonds on shareholders' wealth in the UK using data on these types of convertible securities from 1986 – 1996. They found on average, that for all these securities that there is a significant and negative effect on shareholder wealth with convertible capital bonds having the largest negative reaction. They also showed that when firms issue convertible bonds to refinance previous debts or specific acquisitions, there is a negative effect on shareholders' wealth. On the other hand, when these bonds are issued to finance capital expenditure projects, they find a positive effect on shareholders' wealth.

Irvine and Rosenfeld (2000) carried out an empirical study to determine the reaction of the market to raising capital through monthly income preferred stocks. They conducted an event study on 185 public corporations that issued these stocks around a 2-day event window using data from October 1993 and December 1998. Their main results showed that when the proceeds from the monthly income preferred stocks are used to retire bank debt there is a negative reaction. However, when these proceeds are used to redeem outstanding preferred shares or retire long-term debt, there is a positive reaction. Additionally, they found that the negative reaction for bank-related debt is more severe for those firms that have low credit ratings.

Linn and Pinegar (1988) examined the effects of issuing straight fixed-rate preferred, convertible fixed-rate preferred, and adjustable-rate preferred shares on both common and preferred shareholders' wealth. They used a sample of 308 public issues by 156 firms ranging from domestic utilities to industrial and financial firms. The results of the average abnormal returns to common shareholders who issued straight fixed-rate preferred shares on average showed positive average abnormal returns for utilities and financial firms during the announcement period (-1, 0) although the returns to financials were statistically insignificant. On other hand, for the industrial firms' sample, the returns were negative and insignificant during this same. For industrial firms and utilities that issued convertible fixed-rate preferred shares, their returns were negative and significant while that of financials were positive and insignificant. The results for the adjustable-rate preferred shares on average across the industrial firms and utilities were insignificant with varying signs for the average abnormal return. However, the returns to financials were positive and slightly significant. On average, we could conclude that the returns to firms that issue adjustable rate-preferred shares were insignificant. Linn and Pinegar (1988) had argued that their results highlighted how the characteristics of the different categories of firms in their sample could impact investors' perception of information asymmetry which could be a factor behind the positive and negative reactions.

For the returns to the preferred shareholders, Linn and Pinegar (1988) calculated the mean-adjusted returns of 34 outstanding preferred shares of industrial and financial firms in their initial sample that traded during the announcement period and on the issue date. Their results on average showed no statistical significance for the estimated mean-adjusted returns. Their finding indicated that the preferred shares returns were not as a result of a redistribution of wealth from preferred shareholders to common shareholders or an indication of the price-pressure hypothesis.

Kallberg et al. (2013) studied the short–term reaction of equity holders and bondholders to the issuance of 427 preferred share issues from 1999 – 2005. Utilizing an event study analysis at event windows (-3, -2), (-1, 1), (2, 3) and (2, 4), they found only significant and negative cumulative abnormal return (CAR) of 0.65% at the (-1, 1) window. On average, their results implied that the characteristics of the preferred share issue and how it is recognized in the financial statement affected equity holders' reaction. For instance, a convertible preferred share issue recognized as equity could induce a negative reaction by equity holders as equity holders may view the conversion provision in the preferred share to have a dilution effect on their existing shareholding. They also examined the CARs based on the issuer type and found that bank issuers, on average, had positive CARs compared to non-bank issuers.

They estimated the average credit default swap spread for each of the preferred share issues to determine how bondholders react to the issues. Their findings showed a decrease in the average default spread by 19% (49.8 basis points) and a decrease in dispersion by 16%. They also found that this decrease is larger for firms who have more creditworthiness and are transparent such as banks. Their results on the decrease in credit default swap could also imply how regulation of firms comes into play given that banks are subject to various regulations.

A broad spectrum of the existing literature suggests that the effects of preferred shares issuance are largely negative although they could also be positive depending on the reason for the issuance and the firm characteristics. The intention is to incorporate these findings as we develop the hypotheses for this research.

The concept of dividend rate-reset preferred shares has not empirically been studied. This absence of empirical presents an opportunity for us to look into how these shares are priced and how they perform.

Considering the available data on dividend-rate preferred shares, we are particularly interested in two matters pertaining to the issuance of these shares in Canada. The first, is testing whether the negative impact on common shareholders' wealth holds across an industrial firm sample and a financial firm sample. The second, is estimating the value of the option for the investors (i.e., the preferred shareholders) can exercise by converting the dividend rate-reset preferred shares into a floating-preferred shares every five years if the issuer does not redeem the shares. These two matters form the basis of the hypotheses which is discussed in detail in the next section.

3. Hypotheses

Based on the afore-mentioned literature (Linn & Pinegar, 1988; Abhyankar & Dunning, 1999; Kallberg et al., 2013), we can assume that the issuance of preferred shares negatively impacts the value of common shareholders. Another assumption is that the negative impact on the common shareholders can vary based on a firm's line of operations (for instance, banks vs non-banks).

The first hypothesis for this research is introduced below:

> *Common stock prices of companies that issue dividend rate-reset preferred shares should fall due to the cash flow implications to ordinary shareholders.*

The basis of the second hypothesis stems from the option embedded in the dividend rate-reset preferred shares. This option can be regarded as a Bermudan call option since it can only be exercised at specified dates typically every five years. The preferred shareholders can choose to convert the dividend-rate reset preferred shares into a floating rate preferred share every five years if the shares are not called by the company or hold on to the dividend rate-reset preferred shares for another five years.

The second hypothesis for this research is introduced below:

> *The preferred share prices are efficient i.e., the actual price of the preferred shares is close to the Bermudan call option price estimation.*

4. Data

4.1. Sample selection and construction

We collect the data on all preferred shares issued in Canada ranging from January 1, 2010, to December 31, 2019, from the Securities Data Company (SDC) database. The initial sample comprises of 385 preferred share issues from 105 companies. These issues included both dividend rate-reset and non-dividend rate-reset preferred shares since the database does not have a filter for sorting preferred shares by their type.

Since the focus of this research is on dividend rate-reset preferred shares, we follow a systematic process in order to ascertain these shares from the initial sample. However, before implementing this systematic process, we remove all closed-end, open end investment funds, mutual funds, and REITs. The reason for excluding REITs is due to their unique characteristics.

The systematic process that we use to identify the dividend rate-reset preferred shares is as follows. First, we obtained press releases of the 105 companies in the initial sample from FactSet database. In addition to the press releases, we made use of relevant data from prospectus and filings of the companies available on the SEDAR database.
Second, we searched for keywords in these documents in order to identify these issues as dividend rate-reset preferred shares. These keywords included "reset', "every five years", "each fifth year', "Government of Canada bond yield". The total number of dividend rate-reset preferred shares issues after adapting this process was 189 from 50 companies.

After identifying the dividend rate-reset preferred shares, we split the dividend rate-reset preferred shares sample into two groups: financial institution and industrial subsample. To do this, we use the SIC (Standard Industrial Classification) code. The financial institution group comprised of companies within the revised sample of 189 issues with SIC code 6000 – 6999 excluding real estate classification with SIC code 6512 - 6553. These real estate companies are categorised under the industrial subsample. All other companies that are not included in the financial institution group form the industrial subsample. The financial institution subsample consists of 24 firms with 102 issues, and the industrial subsample include 26 firms with 87 issues.

Table 1 shows the number of issues left after we followed the systematic process described above.

[Insert Table 1]

In addition to Table 1, we present a bar chart showing the number of reset preferred per year over the entire sample period. This is labelled as Figure 1.

From the bar chart, we show that there was a slight increase in the number of dividend rate-reset preferred shares issued from 2010 to 2011. However, from 2011, there seems to be a gradual decline up until 2014 and then there was a surge in the number of shares issued in 2014. The number of shares issued in 2014 is 20.63 per cent of the total number of the shares in our sample. This jump in the number of issues was not retained because from 2014 up until the end of our sample period, 2019, the number of issued shares dropped.

When we examined a few factors that could have contributed to the decline in the number of issued shares from 2014, a major one was the fall in the Government of Canada bond yield. Since these shares are usually reset based on the 5-year Government of Canada bond yield and a set premium, perhaps firms decided to issue less shares due to this.

[Insert Figure 1]

4.2. Firm and Market Data

We obtain the daily security price data for the companies from the CFMRC (Canadian Financial Markets Research Center) TSX database from January 1, 2010, to December 31, 2019. We also obtain the daily price data of the S&P/TSX Composite Price Index from the CFMRC TSX database for the afore-mentioned period. The S&P/TSX Composite Price Index serves as a proxy for estimating the market return which is a fundamental part of the event study analysis for our first hypothesis.

We extract dividend yield per annum and ex-dividend dates of the dividend rate-reset preferred issues from the Bloomberg Terminal for use in the Bermudan call option pricing model.

4.3. Yield Curves Data

We extract data on yield curves for zero-coupon bonds from the Bank of Canada website. This was considered as the risk free rate and was a necessary input in the Bermuda call option pricing model.

4.4. Summary Statistics

We present the summary statistics of the 189 issues in Table 2. In Panel A, we show the summary statistics for financial institution subsample and in Panel B, those for the industrial subsample.

Comparing the statistics in both panels, we find that the average number of dividend rate-reset preferred shares issued by the financial institution firms is 6.657% greater than those issued by the industrial subsample. We also find that the aggregate proceeds from the financial institution firms is 6.383% greater than the industrial firms.

Across both panels, we notice a few similarities; the average issue price is CA$25.00, the average dividend yield per annum is 4.7% and the maximum aggregate proceeds from shares issued is CA$1 billion.

Based on the summary statistics, we can assume that financials tend to issue more dividend rate-reset preferred shares than firms in the industry sector. This also coincides with what has been mentioned in news articles. Another suggestion might be that for investors, the decision to invest in a financial or otherwise non-financial-type firm would depend on other factors, given that on average, both firm types have the same dividend yield per annum.

[Insert Table 2]

We show in Table 3 a distribution of the dividend rate-reset preferred shares daily returns compared to the common stock returns for the companies. I only include in this distribution firms for which there is complete data for both the dividend rate-reset preferred shares and common stock.

We observe some similarities between the mean return for both the financial institution and industrial firms, their returns, on average is 0.009% for the dividend rate-reset preferred shares and 0.045% for common stock returns. Industrial firms' dividend rate-reset preferred shares and common stock returns have a high skewness and kurtosis when compared with their counterparts in the financial institution group. I also find that the standard deviation of the dividend rate-reset preferred shares are lower than common stock returns in both the financial institution and industrial groups. This is as expected since common stocks are riskier.

[Insert Table 3]

5. Methodology

5.1. Event Study Analysis

We test whether common stock prices fall due to announcement of dividend rate-reset preferred shares issues through an event study methodology. This approach involves estimating the abnormal returns to firms over a certain period of time. These abnormal returns are estimated from the price data of firms incorporated in an empirical model. The event study approach has been used in several empirical papers to evaluate performance of companies in response to specific events such as stock splits, mergers and acquisitions, earnings announcements. The announcement date of the preferred share issues is being regarded as the event date. However, in a few cases where the announcement date was after the date the underwriting agreement was signed, we consider the latter as the event date.

For the purpose of this research, we use a short-term event window of 20 days (-10, + 10) to estimate the cumulative average abnormal returns (CAARs) and average abnormal returns (AARs) of the financial institution and industrial subsamples. After running normality tests on the daily stock price returns and market returns, we discovered that they were not normal. Since Brown and Warner (1985) find that there is no obvious impact of non-normality of daily returns data on event study methodologies, we proceed with using the returns data in this state for the analysis.

The market model, which is a one factor-model is used to estimate the abnormal returns over an estimation window of (-180, -11) and an estimation length of 170 days. Three events are removed from the event study analysis due to insufficient data required for the abnormal estimation. The final sample of events were 186 consisting of 99 events from the financial institution subsample and 87 events from the industrial subsample.
To estimate the abnormal returns, first we regress the daily stock returns on the market index returns for each stock over the estimation period specified above. This initial step is shown in the equation below:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}, \qquad (1)$$

where R_{it} is the daily return of firm i at day t, α_i and β_i are the regression coefficients of the market model, R_{mt} is the returns on the S&P/TSX Composite Price Index and ε_{it} is the error term.

Once we obtain calculated estimates of α_i and β_i from (1), the next thing we do is to compute the expected returns as:

$$E(R_{it}) = \hat{\alpha}_i + \hat{\beta}_i R_{mt}, \qquad (2)$$

where $E(R_{it})$ is the expected return of firm i at day t, $\hat{\alpha}_i$ and $\hat{\beta}_i$ are the estimated regression coefficients from (1).

After estimating the expected return, we compute the abnormal return for each event in my sample. The abnormal return is simply the difference between the actual return (R_{it}) and the expected return $E(R_{it})$, This is shown in (3) below:

$$AR_{it} = R_{it} - E(R_{it}) \qquad (3)$$

where AR is the abnormal return of firm i at day t, t represents a day in the event window, R_{it} is the actual return on the event day and $E(R_{it})$ is the expected return.

We compute the cumulative abnormal return (CAR) of each event as:

$$CAR_t = \sum AR_{i,t} \qquad (4)$$

The cumulative average abnormal returns (CAAR) and average abnormal returns (AAR) are calculated by taking the average ARs and CARs for the number of events.

$$CAAR_t = \frac{1}{n} \sum CAR_t \qquad (5)$$

$$AAR = \frac{1}{n} \sum AR_{i,\,t} \qquad (6)$$

5.2. Bermudan Call Option Price Estimation

To test whether the dividend rate-reset preferred shares' prices are efficient. By the prices being efficient, we mean the actual prices of the rate-reset preferred shares are close to the Bermudan option prices. First, we estimate the price of the Bermudan call option. The dividend rate-reset preferred shares are treated as a Bermudan call option in this research because the shareholder has the right to convert the shares into a floating-rate share only at specified dates, usually every five years.

We employ the binomial tree model for option valuation as described by Leisen and Reimer (1996). This model which they call "extended lattice approach" involved a refinement of existing binomial tree models to achieve faster convergence between option prices and the price of the underlying asset. This model involves approximately the normal distribution in the Black-Scholes model. The assumption of their model is that there is convergence i.e., the price of the option moves towards the price of the underlying price. Another assumption is that the no-arbitrage condition holds. Leisen and Reimer's extended lattice model when compared to Cox et al (1979), Jarrow and Rudd (1982) and Tian (1993) lattice approaches produced a convergence with order 2 for European call and put options. Cox et al (1979), Jarrow and Rudd (1983) and Tian (1993) lattice approaches all resulted in a convergence with order 1 .

Leisen and Reimer (1996) binomial tree approach was adopted in this research given its efficiency in terms of its convergence speed when compared with other binomial tree methods as highlighted above. Asides the convergence speed, the authors tested the efficiency of their extended lattice approach by estimating the relative root mean squared error (RMSE) and their model resulted in a small error.

The Leisen-Reimer binomial tree model is generated using the following parameters:

$$p'_n = h^{-1}(d_1) \tag{7}$$

$$p_n = h^{-1}(d_2) \tag{8}$$

$$u_n = r_n \frac{p'_n}{p_n} \tag{9}$$

$$d_n = \frac{r_n - p_n u_n}{1 - p_n} \tag{10}$$

where p and p′ are the binomial distribution parameters, h^{-1} is a discrete approximation of the cumulative distribution function for a normal distribution, n is the number of time points in the model, u_n and d_n are the binomial tree parameters, d_1 and d_2 are the definitions from the Black Scholes model.

We make the following assumptions in implementing the Leisen-Reimer binomial tree model:

- The option has a time to maturity of 20 years and is exercisable every 5 years.
- The strike price is set to 0.
- Dividend payments will occur every 91 days and will continue up until the time to maturity.

We present Table 4 which shows the distribution of the actual price, the theoretical price, and the difference between the actual and theoretical price of the dividend rate-reset preferred shares. The theoretical price here means the estimated Bermudan call option prices. Panel A of the Table 4 shows the distribution for the financial firms while Panel B shows the distribution for the industrial

Sample. We further test the nature of the difference between the actual price and the theoretical price by carrying out a simple t-test. The t-statistic for the difference for the financial firms subsample is 51.978 with a p-value of $<.0001$. For the industrial firms subsample, the t-statistic is 58.268 with a p-value of $<.0001$.

On average, these results imply that in both the financial and industrial subsamples, the theoretical prices underestimate the actual prices. This is an indication that the Bermudan call option estimation are a bit biased downwards.

[Insert Table 4]

After estimating the Bermudan call option price, we proceed to test for efficiency by using a simple regression model incorporating firm-fixed effects and time-fixed effects. This model is described below:

$$P_{it} = \alpha + \beta TP_{it} + \gamma + \delta + \varepsilon_{it} \quad (11)$$

where P_{it} is the price of the preferred share of firm i, at time t, α and β are the regression coefficients, TP_{it} is the Bermudan call option price, γ is used to connote firm-fixed effects, δ is used to connote time-fixed effects, ε_{it} is the error term. The assumption in (11) is that $\alpha = 0$ and $\beta = 1$.

In addition to the regression model above, we perform a Wald Test to jointly test that in (11), $\alpha = 0$ & $\beta = 1$ to show efficiency of the computed dividend rate-reset preferred shares prices.

6. Empirical Results

6.1. Event Study Results

Table 5 reports the average abnormal returns (AARs) to the common stocks of the dividend rate-reset preferred share issuers in the financial institution subsample which comprises of 99 events. We report the AARs for the event window -10 + 10 i.e., 10 days before the preferred share announcement and 10 days after the announcement. The AARs were calculated using the market model from 180 days to 11 before the event. We establish statistical significance of the estimated AARs by using parametric and non-parametric tests. The test statistics are reported in Table 5.

We observe from – 10 to - 6, a mixture of positive and negative average abnormal returns, however none of the returns are statistically significant. Interestingly, from – 5 to – 3, we see positive average abnormal returns to the firms in the financial institution sample. These returns are statistically significant at 5% level of significance. The positive abnormal returns do not necessarily indicate any rumours of a share issuance. This is because we hypothesize if there was any, we would expect a negative average abnormal return as common shareholders would want to avoid any wealth dilution.

From day -2 up until 1 day after the event date, we observe negative average abnormal returns but none of the returns hold any statistical significance. Specially, on day 0, i.e., the announcement date, we find the AAR to be -0.09%. This result is indicative of the notion that dividend rate-reset preferred shares may not necessarily provide some form of dilution of wealth to common stockholders in the financial sector.

On days 2 - 8 following the event day as well as on day 10, we find a combination of positive and negative but insignificant average abnormal returns. However, on the ninth day after the event day, we observe a positive average abnormal return of 0.11% significant at 5 % level of significance. This perhaps might be indicative of the market slowly reacting to the news of the issuance in the market.

Given the results discussed above and shown in Table 5, we do not categorically accept the belief that issuance of dividend rate-reset preferred shares would be accompanied by a fall in common shareholders' wealth for firms in the financial sector. We also posit that these findings might be due to inherent characteristics of these types of firms.

[Insert Table 5]

We report the average abnormal returns in Table 6 for the industrial subsample. This sample consists of 87 events. We also show test statistics for the parametric and non-parametric tests.

We find from day -10 to day –9, positive but insignificant average abnormal returns. On day – 8, we observe a negative and insignificant average abnormal return, however on day – 7, we find a positive average abnormal return of 0.22%. The return on day – 7 is statistically significant at 5% level of significance. On day – 6, we also observe a positive abnormal average return of 0.17% but it is only significant at 10% level of significance. From day -5 to – 4, we have negative and insignificant average abnormal returns. On day – 3, the AAR was approximately 0%.

When we consider the AARs from day – 2 to the event day, I observe positive yet insignificant average abnormal returns. The AAR at day 0 was 0.01%. This result does not imply a negative reaction by the market. Compared to the results from the financial subsample, day 2 after the event day, I observe a positive average abnormal return of 0.22% that is significant at 5% level of significance. We could posit that the market reacts favorably to dividend rate-reset preferred announcements from firms in other industries than those in the financial sector. There could be several reasons for this reasons, ranging from the reason why the shares were issued to other announcements that might have surrounded the share issuance.

We still observe positive returns from day 2 up until day 8 where there is a negative AAR of 0.03%. Nevertheless, on days 9 & 10, we observe statistically and positive returns and generally. The results perhaps imply that the issuance is accepted favorably by the market when the issuer is not in the financial sector.

[Insert Table 6]

We report the cumulative average abnormal returns (CAARs) and precision-weighted CAARs for event window (-10 + 10) for the financial and industrial subsamples in Tables 7 & 8 respectively. The precision-weighted CAAR is considered a better measure than CAAR since it incorporates the forecast-error corrected variance.

In Table 7, we show that the CAAR and the precision-weighted CAAR for the financial firms is -0.28% and -0.34% respectively. These values are not statistically significant and as such, I am unable to make an inference from the results. These findings are somewhat similar with what I found with the average abnormal returns around the event day being negative but insignificant.

[Insert Table 7]

The CAAR and the precision-weighted CAAR for the industrial subsample as shown in Table 8 are 0.76% and 0.62%. They are statistically significant at 5 % level of significance and based on these estimates, we can infer that there is a positive reaction for dividend rate-reset preferred share issues by firms in other industries outside the financial sector. These findings corroborate with the average abnormal returns estimates.

[Insert Table 8]

Furthermore, we display in line charts, the CAARs from event window (-10, 10) for both the financial and industrial firms. These line charts are labelled Figure 2 and Figure 3 respectively.

[Insert Figure 2]

[Insert Figure 3]

6.2. Test of efficiency of the Bermudan Call Option Prices

As earlier stated in the methodology section of this paper, we test whether the prices derived from the Leisen-Reimer binomial tree model are efficient using the simple regression model in equation (11). The results from the model are presented in Table 9; Panel A shows the results for the financial institution firms while Panel B shows the results for the industrial firms. We report results when there are no firm-level and time fixed effects.

We find from Panel A that coefficient of the Bermudan call option price, β is 1.019 and the intercept, α is -0.2726 respectively where there are no fixed effects. These results are statistically significant at 1%, 5% and 10% levels of significance. We also find that when fixed effects are controlled, β is 0.991 and α is -0.334. These values are also statistically significant.

In Panel B, the coefficient, β is 1.0204 and α is -0.263 when there are no fixed effects. These values show statistical significance at 1%, 5% & 10% levels of significance. When fixed effects are controlled, $\beta = 0.986$ and $\alpha = 0.410$. Like the results from the financial institution firms, these values exhibit statistical significance.

[Insert Table 9]

We show the results from the Wald test of the joint hypothesis that $\alpha = 0$ and $\beta = 1$ in Table 10. In Panel A where the results for the financial institution firms are reported, when firm level and time fixed effects are not considered, the Wald Test statistic is significant and thus we reject the joint test that $\alpha = 0$ and $\beta = 1$. Also, when firm level and time fixed effects are considered, we also reject that $\alpha = 0$ and $\beta = 1$. These results mean that these preferred share prices are not efficient based on the Bermudan call option binomial tree model.

In Panel B, the results for the industrial firms are shown, we find that both when firm level and time fixed effects are not considered and are ignored in the model, we reject that $\alpha = 0$ and $\beta = 1$. These results for the industrial firms show that the prices are not efficient just like the financial institution firms.

[Insert Table 10]

7. Conclusion

In this paper, we provide new evidence on the concept of dividend rate-reset preferred shares in Canada for firms in the financial institution and industrial sectors. The findings in this paper sets the pace for more research in this topic as we find no prior empirical study on these type of shares.

We analyzed the effects of the dividend rate-reset preferred shares issues on common stock shareholders and the valuation of these shares using an event study methodology and a binomial tree model respectively. The findings from our analyses are summarised in the following paragraphs.

First, we show that there are no negative effects on common stock returns to firms who issue dividend rate-reset preferred shares both in the financial institution and industrial sectors. Although from my sample, we observe negative average abnormal returns to firms in the financial sector, and positive average abnormal returns to firms in the industrial sector around the announcement period (-1 + 0), these values were not statistically significant. These findings imply that these shares do not necessarily have dilution effects of new common stock issues. Another implication we draw from these findings is that performance of the dividend rate-reset preferred shares could vary across firm characteristics. It is worth recalling again that banks and other companies in the financial sectors are typically the bulk of the rate-reset preferred shares issuers. Perhaps there is some explanation there is regarding the variation in the returns to the two distinct group of firms in this research. This is something future research could dig more into.

Second, we show that we can compute the theoretical price of the dividend rate-reset preferred shares by adapting a binomial tree model. The option in the dividend rate-reset preferred shares can be considered a Bermudan call option since it is only exercisable at a specified date usually every five years. We tested the efficiency of the computed Bermudan call option prices against the realized preferred shares price using a regression model with and without firm-level and time fixed effects for both the financial institution and industrial firms. The results obtained from the regression model and Wald Test show that these preferred share prices are not efficient based on the Bermuda call option binomial model. This finding implies that we have overpricing in the market with the Bermuda option theoretical benchmark. In other words, the theoretical model underpriced the actual prices. One possible explanation is that the theoretical model underestimates the actual volatility of the dividend yields that prevail at expiration. Or equivalently, investors overestimate the value of reset option.

A suggestion for further research would be to examine the investors that hold dividend rate-reset preferred shares and perhaps develop a prototype of investors that hold a significant portion of these kind of shares and how these investors perform across time in Canada or in the US.

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Figure 1: Number of dividend rate-reset preferred shares over the sample period

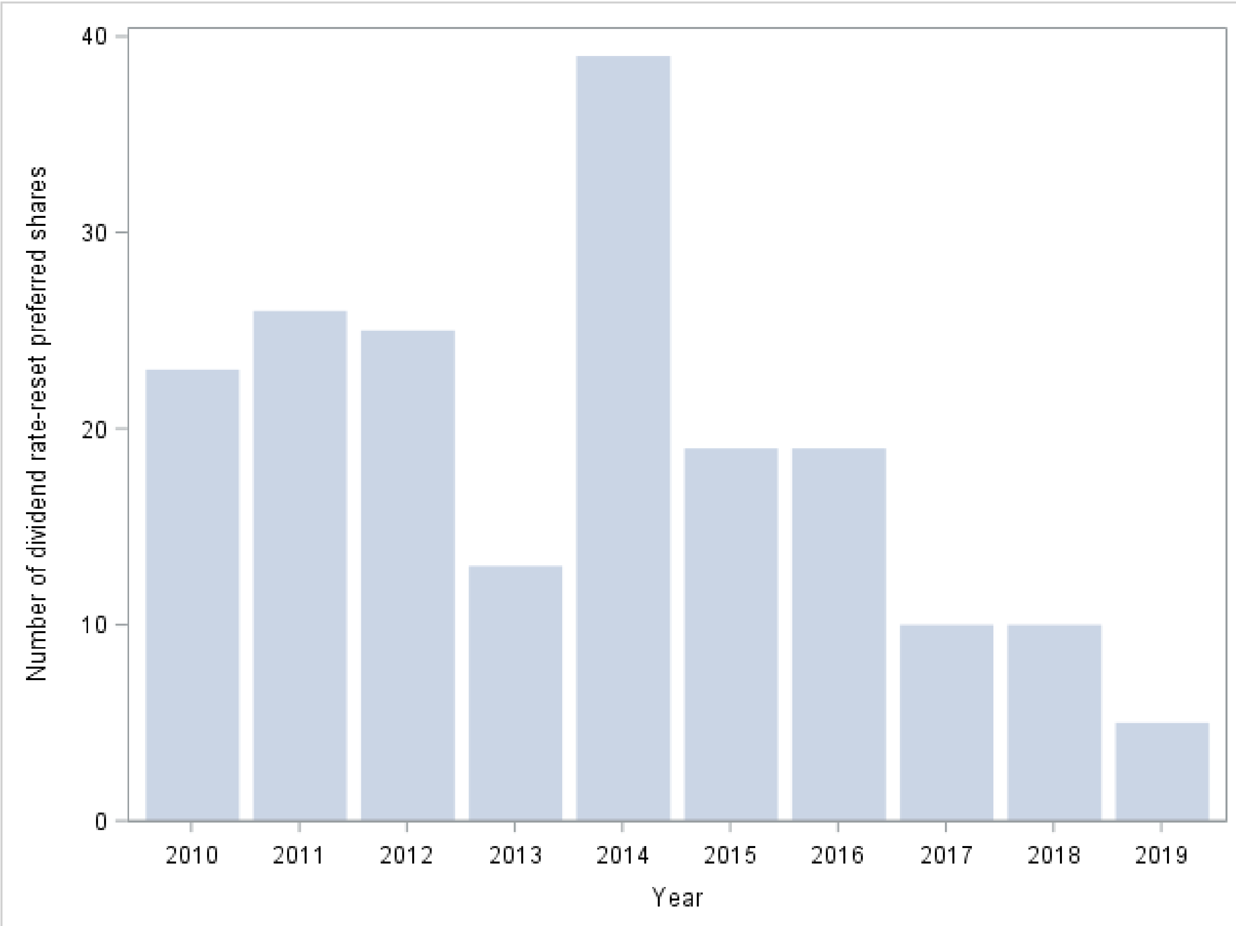


Figure 2: Cumulative Average Abnormal Returns (CAARs) for the financial firms

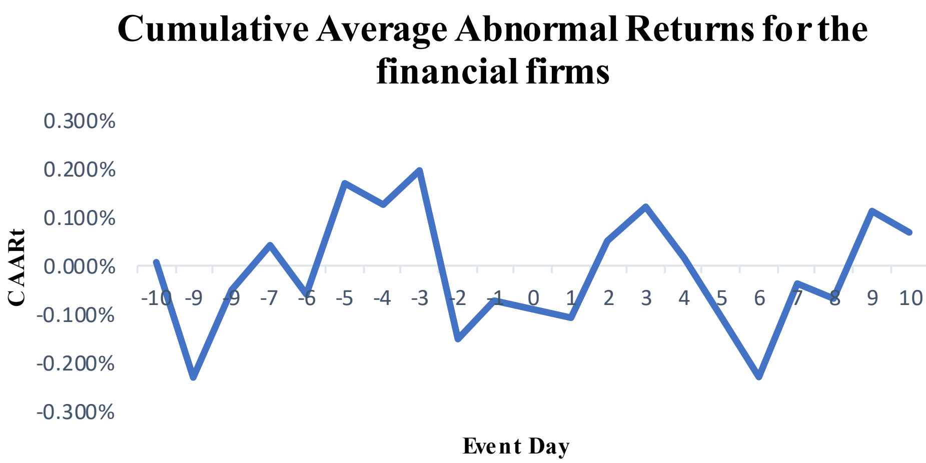
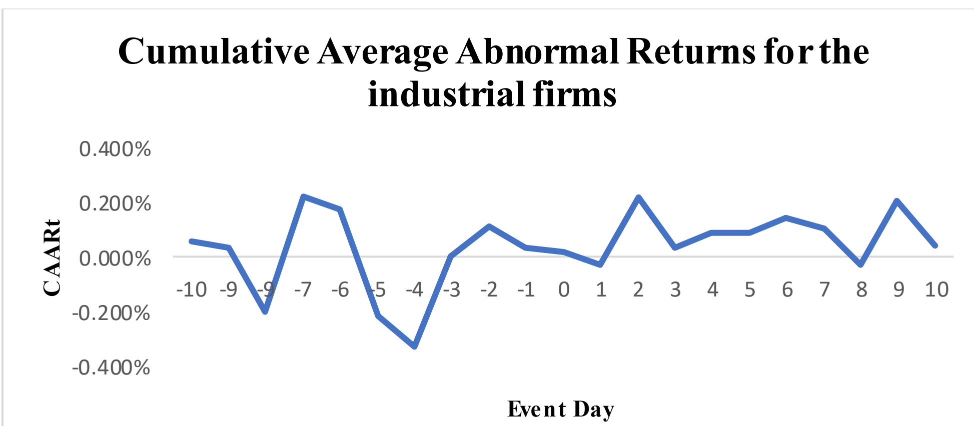


Figure 3: Cumulative Average Abnormal Returns (CAARs) for the industrial firms



Note. These figures display the cumulative average abnormal returns (CAARs) around the event window (-10, 10). The event day is denoted as 0.

Table 1: Sample Selection & Construction

Stage	Filter	Number of issues
1	Total number of preferred shares issues recorded by SDC database with the domicile nation as Canada from 01/01/2010 - 12/31/2019	385
2	Closed-end investment funds removed	322
3	Open-end investment funds removed	307
4	Mutual funds removed	301
5	REITs removed	295
6	Issues that were dividend rate-reset preferred shares based on FactSet press releases, SEDAR filings and companies' websites	189

Table 2: Summary Statistics of the dividend rate-reset preferred shares from 2010 - 2019

Panel A: Financial institution firms

	Mean	Median	Standard Deviation	Minimum	Maximum	N
Issue Price	24.706	25	2.090	10	25	102
Dividend yield per annum	0.047	0.046	0.008	0.036	0.070	102
Aggregate Gross Proceeds ($million)	293.115	250	163.445	14.615	1000	102
Number of shares issued (million)	11.743	10	6.507	1.461	40	102

Panel B: Industrial firms

	Mean	Median	Standard Deviation	Minimum	Maximum	N
Issue Price	25	25	0	25	25	87
Dividend yield per annum	0.047	0.046	0.006	0.038	0.065	87
Aggregate Gross Proceeds ($million)	275.259	250	154.895	75	1000	87
Number of shares issued (million)	11.010	10	6.196	3.000	40	87

Note. This table shows the summary statistics of the dividend rate-reset preferred shares across the entire sample.

Table 3: Distribution of Dividend Rate-Reset preferred shares returns & Common Stock returns

Panel A:Financial institution firms						
	Mean	Median	Standard deviation	Skewness	Kurtosis	N
Dividend rate-resets	0.009%	0%	0.963%	0.203	14.728	133971
Common Stocks	0.045%	0.036%	1.454%	0.088	22.964	55394

Panel B:Industrial firms						
	Mean	Median	Standard deviation	Skewness	Kurtosis	N
Dividend rate-resets	0.009%	0%	1.148%	1.849	105.931	122718
Common Stocks	0.045%	0.027%	1.476%	5.229	490.997	52425

Note. This table shows the distribution of the dividend rate-reset preferred shares returns and common stock return in each subsample.

Table 4: Distribution of the actual price, the theoretical price, and the difference between the actual price and theoretical price of the Dividend Rate-Reset Preferred Shares

Panel A: Financial Institution Firms						
	Mean	Median	Standard deviation	Skewness	Kurtosis	N
Actual Price	21.480	22.145	3.849	-0.709	-0.072	4922
Theoretical Price	21.327	21.988	3.769	-0.750	0.036	4922
Difference	0.153	0.127	0.206	4.240	37.301	4922

Panel B: Industrial Firms						
	Mean	Median	Standard deviation	Skewness	Kurtosis	N
Actual Price	20.126	20.270	4.174	-0.287	-0.853	4808
Theoretical Price	19.981	20.151	4.088	-0.303	-0.826	4808
Difference	0.145	0.113	0.173	1.640	4.768	4808

Note. This table shows the distribution of the actual price of dividend rate-reset preferred shares, the theoretical price computed from the Bermudan option pricing model and the difference between these two prices.

Table 5: Average Abnormal Returns

Financial Institution Firms																					
Event Date	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10
AAR	0.01%	-0.23%	-0.05%	0.04%	-0.06%	0.17%	0.13%	0.20%	-0.15%	-0.07%	-0.09%	-0.11%	0.05%	0.12%	0.02%	-0.11%	-0.23%	-0.04%	-0.07%	0.11%	0.07%
N	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99
Pos:Neg AAR	49:50	41:58	51:48	50:49	47:52	55:44	62:37	49:50	47:52	48:51	49:50	44:55	47:52	52:47	49:50	51:48	42:57	47:52	44:55	56:43	49:50
Patell Z	0.272	-2.161	-0.908	0.462	-0.448	1.566*	1.364*	2.005**	-2.295	-1.047	-0.452	-0.986	-0.563	0.781	-0.767	-0.408	-1.443	0.310	-1.138	1.422*	0.708
Generalized Sign Z	-0.129	-1.737	0.273	0.072	-0.531	1.077	2.484***	-0.129	-0.531	-0.330	-0.129	-1.134	-0.531	0.474	-0.129	0.273	-1.536	-0.531	-1.134	1.2780*	-0.129
Csect T	0.098	-1.955	-0.475	0.455	-0.549	1.524*	1.243	1.504*	-0.839	-0.591	-0.611	-0.884	0.482	1.191	0.159	-0.907	-1.836	-0.326	-0.655	1.1270	0.575
StdCSect Z	0.283	-2.257	-0.973	0.549	-0.399	1.733**	1.451*	1.712**	-1.220	-0.819	-0.342	-0.898	-0.559	0.862	-0.659	-0.453	-1.463	0.302	-1.049	1.642*	0.733
Rank Z	0.061	-2.492	-0.499	0.009	-0.797	1.345*	2.030**	1.050	-1.232	-0.237	0.313	-1.570	-0.339	0.236	-0.330	-0.820	-1.602	-0.040	-1.575	1.580*	-0.270
Generalized Rank T	0.000	-2.472	-0.545	-0.019	-0.868	1.277	2.122**	0.944	-1.060	-0.285	0.028	-1.502	-0.362	0.220	-0.313	-0.886	-1.626	0.015	-1.586	1.724**	-0.285
Adjusted Patell Z	0.271	-2.157	-0.906	0.461	-0.447	1.564*	1.362*	2.001**	-2.291	-1.045	-0.451	-0.984	-0.562	0.779	-0.765	-0.407	-1.441	0.310	-1.136	1.420*	0.707
Adjusted StdCSect Z	0.283	-2.253	-0.972	0.548	-0.398	1.730**	1.450*	1.709**	-1.218	-0.817	-0.342	-0.897	-0.558	0.860	-0.658	-0.452	-1.460	0.302	-1.047	1.640*	0.732
Generalized Rank Z	0.000	-2.349	-0.517	-0.018	-0.825	1.213	2.020**	0.897	-1.008	-0.271	0.027	-1.427	-0.344	0.209	-0.297	-0.841	-1.545	0.014	-1.505	1.6360*	-0.271
Skewness Corrected T	0.089	-2.123	-0.469	0.511	-0.520	1.816**	1.245	1.667**	-0.808	-0.609	-0.654	-0.861	0.528	1.264	0.142	-0.861	-2.076	-0.308	-0.616	1.2005	0.664

Note. This table reports the average abnormal returns (AARs) for the financial institution firms based on the market model for event window – 10 + 10 with an estimation window is (-180, -11). The test statistics for the parametric and non-parametric tests for the AARs are shown and I indicate significance on the test statistics. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels respectively.

Table 6: Average Abnormal Returns

Industrial Firms																					
Event Date	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10
AAR	0.06%	0.03%	-0.20%	0.22%	0.17%	-0.21%	-0.33%	0%	0.11%	0.04%	0.01%	-0.03%	0.22%	0.03%	0.09%	0.09%	0.15%	0.10%	-0.03%	0.21%	0.04%
N	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87
Pos:Neg AAR	41:46	40:47	41:46	53:34	47:40	36:51	28:59	42:45	48:39	48:39	48:39	38:49	51:36	44:43	45:42	49:38	47:40	46:41	43:44	49:38	51:36
Patell Z	0.244	0.214	-1.669	1.425*	0.952	-2.093	-2.698	0.473	0.822	0.019	0.699	-0.645	1.505*	-0.189	0.904	1.239	1.320*	0.621	-0.057	1.813**	0.7275
Generalized Sign Z	-0.521	-0.735	-0.521	2.052**	0.766	-1.593	-3.308	-0.307	0.980	0.980	0.980	-1.164	1.623*	0.122	0.337	1.195	0.766	0.551	-0.092	1.195	1.6233*
Csect T	0.648	0.333	-1.702	2.139**	1.186	-2.059	-3.450	0.015	0.884	0.365	0.078	-0.261	1.750**	0.296	0.896	0.790	1.396*	1.099	-0.338	1.621*	0.3857
StdCSect Z	0.290	0.279	-1.630	1.5868*	0.905	-2.525	-3.383	0.585	0.681	0.020	0.571	-0.591	1.421*	-0.252	0.976	1.294*	1.361*	0.804	-0.076	1.655**	0.9613
Rank Z	0.196	-0.013	-1.099	2.097**	0.868	-2.259	-3.232	0.108	0.640	0.312	0.378	-0.457	1.897**	-0.063	0.560	1.430*	1.222	0.830	-0.393	0.989	0.9139
Generalized Rank T	0.185	-0.114	-1.123	2.286**	0.920	-2.466	-3.755	0.049	0.707	0.375	0.361	-0.317	1.904**	0.065	0.614	1.497*	1.315*	0.875	-0.432	1.067	1.0830
Adjusted Patell Z	0.244	0.214	-1.670	1.426*	0.953	-2.094	-2.699	0.473	0.822	0.019	0.700	-0.645	1.506*	-0.189	0.905	1.240	1.321*	0.622	-0.058	1.813**	0.7279
Adjusted StdCSect Z	0.290	0.280	-1.630	1.588*	0.906	-2.527	-3.384	0.585	0.682	0.020	0.572	-0.592	1.422*	-0.253	0.977	1.295*	1.361*	0.804	-0.076	1.654**	0.9617
Generalized Rank Z	0.180	-0.111	-1.093	2.224**	0.896	-2.402	-3.655	0.048	0.689	0.365	0.352	-0.308	1.854**	0.063	0.597	1.457*	1.279	0.851	-0.420	1.038	1.0534
Skewness Corrected T	0.641	0.389	-1.834	2.021**	1.300*	-2.070	-3.598	-0.041	0.960	0.347	0.104	-0.256	1.737**	0.329	0.874	0.763	1.392*	1.120	-0.339	1.740**	0.3463

Note. This table reports the average abnormal returns (AARs) for the industrial firms based on the market model for event window – 10 + 10 with an estimation window is (-180, -11). The test statistics for the parametric and non-parametric tests for the AARs are shown and I indicate significance on the test statistics. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels respectively.

Table 7: Cumulative Average Abnormal Returns

Financial Institution Firms	
Event Window	(-10, 10)
CAAR	-0.28%
Precision Weighted CAAR	-0.34%
Pos:Neg CAR	50:49
N	99
Patell Z	-0.813
Csect T	-0.461
Generalized Sign Z	0.072
StdCSect Z	-0.740
Rank Z	-1.130
Generalized Rank T	-0.725
Adjusted Patell Z	-0.821
Adjusted StdCSect Z	-0.929
Generalized Rank T	-0.688
Skewness Corrected T	-0.468
ABHAR Csect T	-0.398
ABHAR Skewness Corrected T	-0.397

Note. This table reports the cumulative average abnormal returns (CAARs) for the financial institution firms based on the market model for event window – 10 + 10 with an estimation window is (-180, -11). The test statistics for the parametric and non-parametric tests for the AARs are shown and I indicate significance on the test statistics. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels respectively.

Table 8: Cumulative Average Abnormal Returns for the Industrial Firms

Industrial Firms	
Event Window	(-10, 10)
CAAR	0.76%
Precision Weighted CAAR	0.62%
Pos:Neg CAR	51:36
N	87
Patell Z	1.228
Csect T	1.482*
Generalized Sign Z	1.623*
StdCSect Z	1.308*
Rank Z	1.075
Generalized Rank T	1.775**
Adjusted Patell Z	1.316*
Adjusted StdCSect Z	1.266
Generalized Rank T	1.727**
Skewness Corrected T	1.495*
ABHAR Csect T	1.415*
ABHAR Skewness Corrected T	1.433*

Note. This table reports the cumulative average abnormal returns (CAARs) for the industrial firms based on the market model for event window – 10 + 10 with an estimation window is (-180, -11). The test statistics for the parametric and non-parametric tests for the AARs are shown and I indicate significance on the test statistics. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels respectively.

Table 9: Regression results for the financial institution & industrial firms

Panel A: Financial Institution Firms		
TP	1.019***	0.991***
t-statistic	(1402.495)	(1052.361)
Constant	-0.2726	0.334***
t-statistic	(-17.307)	(16.633)
Firm & Time Fixed Effects	No	Yes
Observations	4922	4922
R-square	0.997	0.999
Panel B: Industrial Firms		
TP	1.0204***	0.986***
t-Statistic	(1915.177)	(1018.750)
Constant	-0.263***	0.410***
t-Statistic	(-24.232)	(21.153)
Firm & Time Fixed Effects	No	Yes
Observations	4808	4808
R-square	0.998	0.999

Note. This table reports the regression results for the model, $P_{it} = \alpha + \beta TP_{it} + \varepsilon_{it}$ for the financial institution and industrial firms in the sample. P_{it} is the actual price of the dividend rate-reset preferred shares & TP_{it} is the Bermudan call option price. The t-statistics are shown in the parentheses below the coefficients. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels respectively.

Table 10: Wald Test Results of the financial institution and industrial firms

Panel A: Financial Institution Firms			
Equation: Pit = α + βTPit + εit			
	α = 0	β = 1	Joint Assumption α = 0, β = 1
Coefficient	-0.2726***	0.0199***	α = -0.2726***, β = 0.0199***
Wald Test Statistic	-17.307	27.436	1933.648
p-value	0.0000	0.0000	0.000
No Firm & Time Fixed-Effects			No
Equation: Pit = α + βTPit + εit			
	α = 0	β = 1	Joint Assumption α = 0, β = 1
Coefficient	0.334***	-0.008***	α = 0.334***, β = -0.008***
Wald Test Statistic	16.633	-9.047	9124.747
p-value	0.0000	0.0000	0.000
With Firm & Time Fixed Effects			
Panel B: Industrial Firms			
Equation: Pit = α + βTPit + εit			
	α = 0	β = 1	Joint Assumption α = 0, β = 1
Coefficient	-0.263***	0.0204***	α = -0.263***, β = 0.0204***
Wald Test Statistic	-24.232	38.354	2952.234
p-value	0.0000	0.0000	0.0000
No Firm & Time Fixed-Effects			
Equation: Pit = α + βTPit + εit			
	α = 0	β = 1	Joint Assumption α = 0, β = 1
Coefficient	0.410***	-0.0132***	α = 0.410***, β = -0.0132***
Wald Test Statistic	21.154	-13.707	6460.213
p-value	0.0000	0.0000	0.0000
With Firm & Time Fixed Effects			

Note. This table reports the Wald statistics results of the joint hypothesis that $\alpha = 0$ & $\beta = 1$ in the model, $P_{it} = \alpha + \beta TP_{it} + \varepsilon_{it}$ for the financial institution and industrial firms in the sample. P_{it} is the actual price of the dividend rate-reset preferred shares & TP_{it} is the Bermudan call option price. The p-values of the Wald test statistic is shown in parentheses. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels respectively.