On the pricing of non-convertible preferred stock offerings

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Abstract

Existing research encompassing pricing of preferred stock offerings is limited and it seems as if researchers have ignored to investigate it. As such, and given the recent years' momentum in the Canadian preferred stock market, in this study we examine the pricing of non-convertible preferred stock issues by assessing initial returns of 266 seasoned offerings on the Toronto Stock Exchange over the period 2002-2016. We find significant evidence of new preferred stock issues being overpriced, yielding negative first-day excess returns of 0.60%. This overpricing is strongly tied to illiquidity discounts in the aftermarket. We also find that increased interest rate uncertainty at the time of the issue renders in more overpricing, demonstrating increased difficulty in assessing the preferred stock's true value. No significant support for overpricing being a result of underwriter competition is evident. Finally, we find that new offerings made by firms that recently have issued preferred stock are priced more accurately. This is suggested to be a result of investors having a recent firm-specific issue available acting as reference upon evaluating the new issue.

Keywords: Preferred Stock, Seasoned Offerings, Overpricing, Liquidity, Interest Rate Uncertainty

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Table of content

1. Introduction

Preferred stock is a hybrid instrument featuring characteristics similar to those of both equity- and debt instruments (Fabozzi and Mann, 2005). The amount of issues of preferred stock has increased extensively in Canada for the past 15 years, constituting roughly USD 7.9bn in novel issues in 2016 according to Bloomberg. As a result, the portion of preferred stock to total external financing has increased heavily in recent years[1]. It appears as if Canadian firms are finding it to be an increasingly beneficial way of raising capital instead of solely seeking to traditional equity- or debt offerings. Preferred stock increasing in size relative to equity financing might partly be explained by the low interest rate environment[2]. Moreover, distributions from preferreds are regarded as dividends according to the Canada Revenue Agency, which has favorable tax effects in Canada as compared to bond coupon payments, subsequently rendering in higher after-tax yields compared to bonds. Arguably, this could be a reason for why preferred stock in recent years gradually has substituted bonds as a means of external financing. Lastly, the financial sector[3] accounts for approximately 62% of the issue proceeds over the period 2002-2016 according to Bloomberg. The seemingly high ratio might be explained by the fact that financials, in accordance with the Basel framework, could attribute preferred shares as Tier-1 capital, subsequently incentivizing them to raise capital using preferred stock.

Previous literature suggests that new issues of common stock are underpriced (Ibbotson, 1975; Kooli and Suret, 2004) while studies on bonds are more ambiguous as it documents both over- and underpricing (Datta et al., 1997; Cai et al., 2007). Literature on pricing of preferred stock is limited. The only existing study in this field of research is Loderer et al. (1991), studying whether underpricing in seasoned offerings of preferred stock exists on the U.S. market. The authors make concluding remarks stating that the offerings are accurately priced, regardless if they are convertible or non-convertible. Given the scarce literature on the pricing of preferred stock in conjunction with the findings by Williams and Shutt (2000) stating that the Canadian market is more efficient than that of the U.S, and also in light of the recent years' momentum in the Canadian preferred stock market, we deem it important to document pricing of new issues of preferred stock in Canada and compare it to the findings made by Loderer et al. (1991).

[1] See appendix figure I.
[2] See appendix figure II.
[3] This denotation include insurance companies and is used throughout the thesis.

To our knowledge, we are the first to examine the pricing of preferred stock offerings in the Canadian market. This study is restricted to solely encompass seasoned offerings[4] of non-convertible preferred stock due to the vast amount of research made on Initial Public Offerings, IPOs, as well as due to the different characteristics of convertibles and non-convertibles. We assess initial returns of 266 seasoned offerings on the Toronto Stock Exchange over the period 2002-2016. Contrary to Loderer et al. (1991), we find that new preferred stock issues are overpriced, yielding negative first-day excess returns of 0.60%. This finding is similar to that documented on bonds by Datta et al. (1997) and Matsui (2006). Furthermore, measuring seven- and thirty-day excess returns, we find indicative evidence of overpricing diminishing shortly after issuance.

Enhanced liquidity in the aftermarket is found to have a significant positive impact on initial returns. Our findings demonstrate that aftermarket liquidity is not accurately estimated by underwriters, subsequently rendering in mispricing as additional illiquidity discounts (liquidity premiums) have to be offered in the aftermarket. This is in line with literature on bonds (Amihud and Mendelson, 2006; Chen et al., 2007) and common stock (Amihud and Mendelson, 1986; Brennan et al., 1998; Chordia et al., 2001), suggesting that illiquidity risk is priced and consequently that the prices of illiquid securities must fall sufficiently to attract investors. Moreover, we find evidence that overpricing has diminished over the years 2002-2016, arguably a result of incremental aftermarket liquidity over time and subsequently decreasing illiquidity discounts in the aftermarket following new issues.

Additionally, we find that overpricing increases with interest rate uncertainty, demonstrating increased difficulty in assessing the preferred stock's true value. Furthermore, we see that aftermarket liquidity tends to improve in times of high interest rate uncertainty. Ultimately, this indicates that the total effect on initial returns from a change in interest rate uncertainty, to some extent, is mitigated by the consequent change in liquidity (ceteris paribus) due to their opposite impact on initial returns.

No evidence of underwriter competition significantly affecting the level of overpricing is made apparent in this study. This is contrary to findings put forward by Datta et al. (1997) and Matsui (2006). However, this may be due to the limitations of our used proxy – number of

[4] A seasoned offering is, throughout this thesis, defined as an offering made by an already public firm that is not made with the same ISIN code as an already outstanding security. This is sometimes referred to as "new classes of shares" in literature.

underwriters – or that underwriters compete on alternate dimensions than offer price, e.g. underwriter fees.

Lastly, we make evident that stock offerings issued by firms that recently have issued preferred stock are priced more accurately. This is arguably a result of investors having a recent firm-specific issue available acting as reference when assessing the price of the new issue, consequently mitigating underwriters' ability to overprice preferred stock issues in close conjunction with other issues.

The highly interesting findings made in this study are argued to be useful for all market participants, including issuing firms, underwriters and investors. It is our belief that enhanced awareness and knowledge of pricing accuracy in preferred stock offerings is essential, especially given the recent years' growth in the Canadian preferred stock market. More specifically, our results are valuable for an investor with a short investment horizon intending to trade her holdings rather than holding them until maturity. Such investor should be aware of new preferred issues being short-term overpriced, and she should consider liquidity, interest rate uncertainty and subsequent issues to be important factors when evaluating whether to participate in new issues.

2. Literature review and our contribution

2.1 Pricing of equity offerings

Underpricing in equity IPOs is a well-documented phenomenon first supported by the findings of Ibbotson (1975). Several research papers have tried to explain the underpricing phenomena in IPOs using *asymmetric information* (Baron, 1982; Rock, 1986), *signaling theory* (Allen and Faulhaber, 1989; Grinblatt and Hwang, 1989: Welch, 1989) and *book-building theory* (Benveniste and Spindt, 1989; Benveniste et al., 2002; Sherman and Titman, 2002). Contrary to the findings of short-term underpricing in equity IPOs, long-term underperformance of equity IPOs is documented by Aggarwal and Rivoli (1990), Ritter (1991), Loughran et al. (1994) and Loughran and Ritter (1995). By investigating the Canadian market, Kooli and Suret (2004) find, similar to studies encompassing the U.S. market, both short-term underpricing and long-term underperformance of IPOs. Though, they conclude that underpricing is less severe in the Canadian market as compared to findings on the U.S. market, pointing at the Canadian market being more efficient. Examining seasoned equity offerings, SEOs, Loderer et al. (1991) find no evidence of underwriters systematically setting offer prices below previous transaction prices, except for possibly in the NASDAQ market. Furthermore, Spiess and Affleck-Graves (1995)

document long-run underperformance following SEOs. Subsequently, more light was shed on the area by the supplementary findings of Spiess and Affleck-Graves (1999), where they find evidence of underperformance of the issuing firm's stock following debt offerings, signaling overvaluation of the issuer. Moreover, Ritter (1991) and Loughran and Ritter (1995) suggest that firms are taking advantage of the transitory windows of opportunity by engaging in IPOs as well as seasoned offerings when the firm's stock is substantially overvalued.

2.2 Pricing of bond offerings

The research on the topic of pricing in bond offerings is not as extensive as the corresponding research on equity offerings. Moreover, the existing research on pricing in bond offerings seems to lack consensus in whether offerings are priced accurately or if mispricing exists, either in the form of over- or underpricing. Several studies present evidence suggesting that yields on newly issued bonds exceed yields on similar bonds outstanding in the market, implying underpricing in new bond offerings (Brimmer, 1960; Conard and Frankena, 1969; Ederington, 1974; Lindvall, 1977). Weinstein (1978) find similar results using holding-period returns rather than yield to maturity. Similarly, Sorensen (1982) presents findings suggesting underpricing but notes that there is a rather quick price adjustment to a new equilibrium post-issuance. Datta et al. (1997) examine bond IPOs exclusively, as compared to previous studies which have included seasoned issues. Although they find no statistically significant evidence of underpricing on the full sample, the findings in the study point towards underpricing in IPOs of high yield bonds while IPOs of investment grade bonds rather are overpriced. The authors argue that the discrepancy in pricing stem from high yield bonds being equity-like instruments, suffering more from information asymmetry than bonds rated investment grade, while investment grade issues are more sought-after by underwriters which may lead to price competition between them. Furthermore, using high quality bond prices in the form of actual trader quotes; Fung and Rudd (1986) do not find any evidence of underpricing in new bond offerings. In a study by Cai et al. (2007), underpricing in bond offerings is deemed to be related to information problems, though not to illiquidity. With regards to research conducted on non-U.S. markets, there are a few interesting documentations in the field of pricing of new bond offerings. Wasserfallen and Wydler (1988) document a slight underpricing of new bonds at issue date on the Swiss market. The underpricing, however, corresponds to the difference in transaction costs between the markets for new and seasoned bonds. Moreover, they find that the underpricing disappears as the new bonds have started to trade on the stock exchange, which is approximately two days after issuance. In the first quantitative study conducted on Japan,

Matsui (2000) provides evidence of overpricing in new offerings of straight bonds. In a subsequent study, Matsui (2006) finds that overpricing is particularly apparent in issues with a smaller number of underwriters, issues made in periods when fewer financial security companies have experience as the lead managing underwriter and lastly issues with high ratings. Similarly to the reasoning by Datta et al. (1997), Matsui (2006) concludes that overpricing stems from competition between underwriters.

2.3 Pricing of preferred stock offerings

If the existing research on pricing of bond offerings is perceived as limited, the range of previous research papers examining pricing of seasoned offerings of preferred stock is even scarcer. Previous research has focused on the *effect of preferred stock issuance on the common stock* (Mikkelson and Partch, 1986; Linn and Pinegear, 1988; Irvine and Rosenfeld, 2000), *motivation and characteristics of preferred stock issuers* (Fooladi and Roberts, 1986; Houston and Houston, 1990; Ely et al., 2002) and *the long-run performance of preferred stock issuers* (Howe and Lee, 2006). The last mentioned study documents significant abnormal underperformance over a 1-year time-horizon among preferred stock issuers, though they find no abnormal underperformance for financial firms. This is hypothesized to be a result of financial firms having a distinct motive to issue preferred stock due to regulatory requirements for capital adequacy.

Loderer et al. (1991) were the first, and currently still are the only ones, to have studied whether underpricing in seasoned offerings of preferred stock exists. The sample used in their study encompass 251 seasoned offerings of preferred stock in the U.S. between the years 1980-1984, comprising both convertible and non-convertible preferred stock. The researchers fail to document underpricing in these issues, regardless of exchange market, length of holding period, or type of preferred issued. Although the general analysis is attributable to the full sample, the researchers also investigate whether differences in the magnitude of returns for convertibles and non-convertibles exist. They conclude that this is the case, though the results lack statistical significance. The authors argue that a straight non-convertible preferred stock is more debt-like, as compared to its convertible counterpart, and subsequently the pricing of such instrument should be similar to that of coupon bonds. As they formulate their hypothesis, stating that they expect to find small or no underpricing in non-convertible issues, the authors refer to the study conducted on new debt issues by Weinstein (1978) whom documents an average excess return of 0.38% in the first month. While the authors conduct separate tests differentiating between convertible and non-convertible preferred stock, which ultimately indicates significant negative

first-day excess returns for non-convertibles, they simultaneously emphasize the likelihood of this result stemming from inappropriately over-adjusting the excess returns. Consequently, the authors make a concluding remark stating that the new securities, indifferent of differentiating between convertibles and non-convertibles, are accurately priced.

2.4 Liquidity in pricing of securities

Several studies have proved liquidity to be reflected in prices of traded securities. Amihud and Mendelson (1986), Boudoukh and Whitelaw (1993) and Vayanos (1998), to mention a few, suggest that illiquid securities have higher expected return than liquid securities, i.e. there is a price discount (premium) on illiquid (liquid) securities. Liquidity has been found to be priced in both *equity markets* (Amihud and Mendelson, 1986; Brennan et al., 1998; Chordia et al., 2001) and *fixed income markets* (Amihud and Mendelson, 2006; Chen et al., 2007).

The relationship between liquidity and pricing of new issues has also been cataloged. Miller and Reilly (1987) find that underpriced issues exhibit significantly greater trading volumes on the first day of trading, compared to overpriced issues. Booth and Chua (1996) find that firms seek ownership dispersion, where underpricing is a way of reaching it. In turn, ownership dispersion implies greater aftermarket liquidity. Moreover, Ellul and Pagano (2006) suggest that underpricing is higher in IPOs that feature lower expected liquidity, while Zheng and Li (2008) find that underpricing renders in enhanced aftermarket liquidity.

2.5 Contribution to existing research

As aforementioned, existing research directly investigating the pricing of seasoned offerings of preferred stock is limited to the study conducted by Loderer et al. (1991). The authors conclude that the new securities, indifferent of differentiating between convertibles and non-convertibles, are accurately priced. In light of the scanty research on seasoned offerings and preferred stock, and also considering the shortcomings of the study by Loderer et al. (1991), we strive to shed additional light on this field of research through this paper. This study is restricted to solely encompass seasoned offerings of non-convertible preferred stock. This somewhat narrowed research scope is legitimized considering the vast amount of research made on IPOs, as well as due to the different characteristics of convertibles and non-convertibles. Data paucity is also a contributing factor.

Firstly, to our knowledge we are the first to examine the pricing of preferred stock offerings on the Canadian market. The Canadian market is smaller than the U.S. market according to

Bloomberg, making our results possible to extrapolate to other markets of similar size. Kooli and Suret (2004) argue that Canadian institutional investors are smaller than U.S. institutional investors and also that they tend to be less aggressive and more passive, which could imply that Canadian institutional investors have less ability to have an influence on pricing of new offerings. Moreover, Williams and Shutt (2000) document evidence of the Canadian market being more efficient than the U.S. market with regards to equity issuance, though this is a notion in need for additional supportive findings on issues of other financial instruments. Abovementioned differences in market characteristics are valid reasons for why this study will add new insights into the pricing of preferred stock offerings, hopefully fueling supplementary future research on the area.

Secondly, one of the shortcomings of the paper by Loderer et al. (1991) is that the researchers lack an appropriate portfolio of comparable assets to apply as benchmark when calculating excess returns. In the paper, a beta to the CRSP value-weighted index of 1 is used. This methodology rests on the assumption that preferred stock has a similar beta to that of common stock. However, the documentation made by Bildersee (1973) suggests that betas of preferred stocks are less than that of common stock, supporting the fact that the excess returns calculated in the paper of Loderer et al. (1991) are flawed. More specifically, they are probably over-adjusted. This notion is further supported by more recent market data[5]; the beta of preferred stock to common stock has historically been below 1 and holds true for both the U.S. and Canadian market. For that reason, and as compared to Loderer et al. (1991) we use an adjusted and more relevant market model which instead adjusts for returns of an index of more comparable assets.

Thirdly, and contrary to the study by Loderer et al. (1991) which solely investigates the level of initial returns, we address the determinants on pricing of preferred stock offerings. We investigate differences in pricing between company- and issue-specific characteristics. Also, this study probes liquidity, interest rate volatility and underwriter competition as factors potentially impacting initial returns. Lastly, we also investigate whether firm-specific issues made within a short-time distance are more accurately priced in the subsequent issue.

[5] See appendix table I and II.

3. Hypotheses

Since our sample is solely comprised of non-convertible preferred stock, we hypothesize our sample to be priced more similar to that of bonds rather than common stock. Aforementioned research suggests that new issues of common stock are underpriced (Ibbotson, 1975; Kooli and Suret, 2004), while the research on bonds is ambiguous as it documents both over- and underpricing (Datta et al., 1997; Cai et al., 2007). Loderer et al. (1991), however, find no evidence of underpricing in their sample comprising both convertible and non-convertible preferred stock. They conclude that first-day excess returns are not significantly different from zero, implying that there is no evidence of any mispricing in these issues. While the authors conduct separate tests differentiating between convertible and non-convertible preferred stock, which ultimately indicates significant negative first-day excess returns for non-convertibles, they simultaneously emphasize the likelihood of this result stemming from inappropriately over-adjusting the excess returns. The authors make concluding remarks stating that the new securities, indifferent of differentiating between convertibles and non-convertibles, are accurately priced. In light of these findings, we expect to find similar results on non-convertible preferred stock. Findings made by Williams and Shutt (2000) show that the Canadian stock market is more efficient than that of the U.S., which adds further support for preferred stocks being accurately priced.

Hypothesis I: Seasoned offerings of non-convertible preferred stock are accurately priced.

Studies point towards liquidity being a factor affecting the pricing of fixed income securities (Amihud and Mendelson, 2006; Chen et al., 2007). Therefore, expected aftermarket liquidity is a factor which underwriters have to consider upon pricing a new preferred stock issue. Differences in the (by underwriters) expected- and actual aftermarket liquidity render in mispricing. In the case of the new issue being more illiquid (liquid) than expected, negative (positive) excess returns will be greater as illiquidity discounts (liquidity premiums) have to be offered in the aftermarket.

Hypothesis II: Illiquidity discounts (liquidity premiums) offered in the aftermarket render in mispricing in the form of initial negative (positive) excess returns.

Non-convertible preferred stock is a debt-like instrument, yielding fixed dividend payments which are decided upon issue. The price of such instrument is thus, as in the case of bonds, inversely related to the level of interest rates as the value originates from future

discounted cash flows. Hence, prices of fixed income securities, including non-convertible preferred stock, are a function of not only issuer and issue characteristics but also market conditions (Sorensen and Hawkins, 1981). Due to the influence interest rates have on the price of preferred stock, market participants (including investors and underwriters) have to make assumptions regarding future interest rates which might consequently render in increased difficulty in assessing the preferred stock's true value in times of high interest rate uncertainty.

Hypothesis III: High interest rate uncertainty at the time of a preferred stock issue is cause for mispricing.

Arguably, underwriters competing for the mandate by pitching favorable issuing terms, including an excessive issue price, render in negative initial excess returns. Underwriter competition has been documented as a cause for bond overpricing by Datta et al. (1997) and Matsui (2006). The later study attributes the total number of underwriters involved in the issue as a proxy for underwriter competition, suggesting that a small number of underwriters renders competition to intensify as the opportunity to participate as a member in the underwriting syndicate lessens. In light of previous documentations, we anticipate underwriter competition to be a factor affecting initial excess returns.

Hypothesis IV: Offerings with higher underwriter competition are subject to mispricing in the form of initial negative excess returns.

If underwriters overprice a preferred stock issue, presumably investors will be reluctant to overpay in a subsequent preferred stock issue conducted in the near future by the same firm, thus putting force on underwriters to lower the price in the subsequent issue. If, however, underwriters underprice a preferred stock issue, according to the information acquisition theory this will render the underwriters able to acquire additional insights regarding the demand from investors, subsequently they will not need to underprice a subsequent issue equally as much. Consequently, it is reasonable to expect that offerings closely preceded by other preferred stock offerings issued by the same firm are less mispriced than issues made with a great timely distance.

Hypothesis V: Preferred stock offerings issued by firms that recently have issued a preferred stock will be priced more accurately.

4. Data

4.1 Sample collection

Our sample of preferred stock offerings on the Toronto Stock Exchange is gathered from Bloomberg and includes matured, redeemed, defaulted and currently active preferred stock. By including non-active preferred stock, we strive to mitigate the risk for survivorship bias. The collected data is constituted by issue-specific variables including issue date, offer price, historical prices, issued- and historically traded volumes, underwriting syndicate, rating, perpetual-, convertible- and IPO flag. Furthermore, the data is constituted by market-specific variables such as interest rates and various indices, and by the firm-specific variables industry, founding year and market capitalization.

While the complete sample encompasses 422 issues, whereby the oldest observation dates back to 1960, we have chosen a 15-year time horizon ranging between the years 2002-2016. This is done for mainly two reasons, namely that the numbers of preferred issues pre-2002 are few but also the fact that the suggested period includes both recessions and booms, thereby capturing potential market differences. Furthermore, the interesting macro economical dynamics such as the development of CORRA[6] over the specified time period add further incentives for our choice of time horizon. We limit our sample to solely comprise seasoned offerings of preferred stock, thereby rendering it free from IPOs and tap issues[7]. Given the fact that the sample data only include 14 IPO observations and six tap issues, this does not have a great impact on the number of observations. For natural reasons, issues that lack offer prices and first-day midpoint closing prices are excluded from our sample.[8] As aforementioned, convertible stocks are more equity-like than its non-convertible counterpart and for comparability reasons we therefore exclude these observations from our sample as well. Lastly, market capitalization is deemed necessary in controlling for firm size as well as measuring the relative gross proceeds. Hence we exclude all observations lacking this variable data. In the process of doing so, and which we would had done regardless had it not occurred in this process (for comparability reasons), we simultaneously exclude all equity investment instruments. Coincidentally, and favorably, the majority of all observations lacking market capitalization are equity investment instruments and thus only few observations are excluded in essence.

[6] Abbreviation for Canadian Overnight Repo Rate Average, CORRA.
[7] A tap issue is defined as an issue with the same ISIN code as an already outstanding preferred stock.
[8] Observations lacking seven- and/or thirty-day midpoint closing prices are not excluded due to first-day returns being our main dependent variable, as stated in section 5.1, and we strive not to decrease the number of observations.

Ultimately, we observe that our sample only consists of perpetual preferreds. We also conclude that all observations in our sample that were rated by S&P upon issue, and which are not reported as "not available" by Bloomberg, were rated investment grade with only one exception.

Table 1: Summary statistics

	Number	Percent (%)
Full sample	266	100.0
By period		
2002-2006	30	11.3
2007-2011	69	25.9
2012-2016	167	62.8
By sector		
Financial	136	51.1
Non-financial	130	48.9
By rating		
Investment grade	240	90.2
Not available	25	9.4
Non-rated	1	0.4
By key terms		
Perpetual	266	100.0
Non-convertible	266	100.0
Seasoned offerings	266	100.0

The table above illustrates, by number of observations and subgroup ratio, the subgroups that form our sample. Sector is a dichotomous variable, whereby "financial" signifies that the issuing company is active within the financial sector and "non-financial" signifies that the company is active within any other industry sector. Offerings are classified as investment grade if the issue rating provided by S&P at issue was at least BBB-.

Our final dataset[9] includes a total of 266 seasoned offerings of preferred stock, ranging between the period 2002 and 2016. This represents approximately 63% of our initial dataset.

4.2 Data discussion

While we do consider our sample data to be sufficiently exhaustive in order for us to test our hypotheses, we are aware of the potential limitations and gaps in the dataset.

Firstly, it can be argued that only using one main source of data, Bloomberg, might be limited or act as a source of risk. Furthermore, actual transaction data is not available through Bloomberg but instead quoted broker prices are presented. That is, prices presented in Bloomberg are computed using price quotes from brokers in combination with the Bloomberg proprietary pricing service, BVAL. BVAL in itself combines other price quotes for the stock as

[9] See appendix table III for detailed data sample filter log.

well as additional information found relevant by Bloomberg (such as historical correlations). While it is optimal to use actual transaction data, to our knowledge no such data is available for the Canadian preferred stock market. Thus, and given Bloomberg's high reputation within the fixed income segment, we argue that Bloomberg acts as a trustworthy source of data. Furthermore, various research papers, both outside and within the U.S. bond market, have been conducted using broker quotes. Fung and Rudd (1986) is an example of such a research paper.

Moreover, excluding equity investment instruments from our sample may render in an exclusion bias and subsequently distort our findings. This is noticeable when we filter for issues lacking market capitalization, which in effect simultaneously renders in an exclusion of nearly all non-perpetual issues, the majority of which coincidentally also are equity investment instruments. For comparability reasons, however, we find it necessary to disregard equity investment instruments in this thesis, considering the fact that they do not share similar characteristics to that of the large bulk of our sample.

5. Methodology

5.1 Dependent variable

In studies investigating pricing of new issues of common stock, holding period return is naturally used as proxy for expected return. However, there are two main approaches to assess pricing of new issues of fixed income securities. While e.g. Conard and Frankena (1969), Ederington (1974) and Lindvall (1977) investigate the difference in yield to maturity between newly issued bonds and similar bonds outstanding in the market, more recent studies focus their analysis on holding period returns (e.g. Weinstein, 1978; Fung and Rudd, 1986; Wasserfallen and Wydler, 1988; Datta et al., 1997; Cai et al., 2007). The rationale for using yield to maturity in studies on fixed income securities is that it approximates the expected return to the holder of the instrument over the holding horizon. However, for an investor with a short holding horizon the holding period return may act as a more appropriate proxy for the expected return compared to yield to maturity (Weinstein, 1978). Moreover, the use of holding period returns enables comparisons of findings on fixed income securities with findings in the equity market. Due to the hybrid characteristics of preferred stock, comparability with previous findings on both fixed income and equity is of great importance for the interpretation of our results. Additionally, Loderer et al. (1991) use holding period returns when examining pricing of preferred stock issues. Consequently, we have chosen to use holding period return as our proxy for the expected

return on the preferred stock. Thus, we define the holding period raw return for an individual preferred stock as:

$$R_{i,t} = \frac{P_{i,t}}{P_{i,0}} - 1 \quad (1)$$

$P_{i,t}$ is the midpoint closing price on day t of trading for preferred stock i and $P_{i,0}$ is the offer price for stock i. We compute first-, seven- and thirty-day returns in order to compare our results with that of Loderer et al. (1991). However, we attribute the first-day return as our main dependent variable going forward, as we strive to eliminate the risk of additional information reaching the market and potentially impacting the price. In order to assess the pricing of the full sample, we use an equally-weighted average according to the formula below:

$$R_{a,t} = \frac{1}{n}\sum_{i=1}^{n} R_{i,t} \quad (2)$$

$R_{i,t}$ is the holding period return of an individual preferred stock as defined in equation (1), n the number of preferred stock offerings in the sample, t the holding period and a the full sample. Conversely, we could have used value-weighted returns. Such method, however, would cause larger firms to have the greatest impact on our results, making the results more difficult to interpret on smaller firms. Our ambition is to explain the overall pricing in the Canadian preferred stock market, which is comprised of both large and small firms, and therefore we argue that an equally-weighted approach is preferable for this paper's purpose. However, we do find it interesting to control for firm size and do so in the thesis by adding firm size as a control variable. Lastly, by using equally-weighted first-day returns we are able to compare our results to the findings of Loderer et al. (1991).

In order to isolate the excess return, i.e. the return an investor could earn in excess of an index comprised of comparable assets, we adjust our observed raw returns for systematic risk. Considering that our sample is solely comprised of seasoned offerings, measures of systematic risk for individual preferred stock offerings are impossible to calculate as there is no trading history. Consequently, an appropriate return, representing the return of the general market, has to be applied and used. Previous studies on equity offerings have altered in their conducted methodology regarding if and how to adjust for the market return. Ibbotson (1975) regresses a one-stock portfolio excess return against both the same and previous calendar month market excess return, while Ritter (1984) uses raw returns unadjusted for market movements. Loughran et al. (1994) suggest that when investigating long-run returns, one should report both raw and market-adjusted returns. In studies encompassing bonds, methodologies for adjusting for the

market-return include matching the bond with a treasury bond with similar characteristics (Fung and Rudd, 1986; Datta et al., 1997), matching the bond with a corporate bond with similar characteristics (Weinstein, 1978; Wasserfallen and Wydler, 1988) and matching the bond with an appropriate bond index (Sorensen, 1982; Cai et al., 2007). In the study by Loderer et al. (1991) on preferred stock, the researchers adjust the raw returns with the value-weighted equity CRSP index. However, in the process of doing so the authors suspect that they ultimately over-adjust the returns, which is also supported by evidence provided by Bildersee (1973) whom find that betas of preferred stock are less than that of common stock. This is further supported by more recent market data[10].

In our study, we use an index when adjusting our raw returns. Our intention is to apply a more appropriate index for the purpose of adjusting returns of preferred stock, compared to Loderer et al. (1991). Not only will our decision to use an index as proxy for the market return be in line with the study by Loderer et al. (1991), but also in accordance with methodologies used in recent studies conducted on bonds, such as Cai et al. (2007).

We apply the S&P/TSX Preferred Share Index, comprising investment grade preferred stock listed on the Toronto Stock Exchange meeting certain criteria with respect to minimum size, liquidity and exchange listing (Soe and Brzenk, 2014). Considering the fact that the index is of investment grade quality, it is arguably a portfolio of assets suiting our sample well, as our sample almost exclusively consists of investment grade issues (see section 4.1). The index represented approximately 82% of the publicly traded Canadian preferred stock market as of December 31, 2013[11].According to Bloomberg, the first historical index data available for the S&P/TSX Preferred Share Index is as of July 19, 2002. Our sample, however, includes observations in the period prior to this date and therefore we need to complement the index for the period January 1, 2002 – July 18, 2002. This is done using the S&P Composite Index, adjusted for the beta of the S&P/TSX Preferred Share Index. The beta is derived through an Ordinary Least Squares, OLS,-regression of daily returns for the two indices for the period July 19, 2002 – July 18, 2003, as this is the closest period and subsequently share similarities with the period we are estimating. Henceforth, we refer to this extrapolated S&P/TSX Preferred Share Index simply as the Preferred Stock Index. Naturally, as we lack historical trading data for our seasoned offerings at the date of the issue, making beta estimations impossible, we need

[10] See appendix table I and II.
[11] According to S&P Dow Jones Indices.

to make the assumption that each preferred stock's beta to the Preferred Stock Index equals 1. Thus, the holding period excess return for an individual preferred stock is defined as:

$$ER_i = \left(\frac{P_{i,t}}{P_{i,0}} - \frac{P_{i,m,t}}{P_{i,m,0}}\right) \quad (3)$$

$P_{i,t}$ is the midpoint closing price on day t of trading for stock i, $P_{i,0}$ is the offer price for stock i, $P_{i,m,t}$ is the closing level of the Preferred Stock Index on day t and $P_{i,m,0}$ is the closing level of the Preferred Stock Index on the day before the first day of trading for stock i. Finally, our main dependent variable is the equally-weighted excess return and is defined as:

$$ER_{a,t} = \frac{1}{n}\sum_{i=1}^{n} ER_i \quad (4)$$

ER_i is the holding period excess return for an individual preferred stock as defined in equation (3), n the number of preferred stock offerings in the sample, t the holding period and a the full sample.

5.2 Independent variables

Below, we discuss the nine variables included in our OLS regression model[12].

LN_GROSS_PROCEEDS: The natural logarithm of respective issue gross proceeds, measured in CADm. Beatty and Ritter (1986) define gross proceeds as a proxy for ex-ante uncertainty and find that smaller IPOs of common stock are subject to more speculation and as such experience higher average initial excess returns. Moreover, a similar variable has been used as a proxy for liquidity in bonds (Houweling et al., 2005; Cai et al., 2007), where larger issues are deemed more liquid. We control for issue-specific characteristics using this variable.

LN_MARKET_CAP: The natural logarithm of the issuing company's equity market capitalization at the preferred stock issue date. This variable acts to control for company-specific characteristics.

D_GROSS_PROCEEDS_TO_MARKET_CAP: A 0-1 dummy variable, whereby 1 signifies that the gross proceeds relative to the issuing company's equity market capitalization at the time of the preferred stock issue is equal to or above the average across all issues. A similar variable was used by Beatty and Ritter (1986) and Datta et al. (1997) for the purpose of controlling for issue-specific risk. We control for issue-specific characteristics using this variable.

[12] See appendix table IV for mathematical derivations.

LN_AGE: The natural logarithm of 1 + the age of the issuing company, defined as the time from preferred stock issue date to founding date. This variable has been used in many studies investigating pricing of new equity issues, including Beatty and Ritter (1986) and Ljungqvist and Wilhelm (2003). We use it to control for company-specific characteristics.

D_FINANCIAL: A 0-1 dummy variable, whereby 1 signifies that the issuing company is active within the financial sector and 0 signifies that the company is active within any other industry sector. Taking into consideration that approximately half of our sample is constituted by the financial sector, we find it reasonable to control for sectorial differences.

LIQUIDITY: First-day stock turnover, computed as the first-day preferred stock trading volume divided by total issued volume. We use it as a proxy for liquidity, as supported by Houweling et al. (2005). There are many alternative proxies for liquidity, such as the bid-ask spread and trade frequency. However, due to paucity in the number of observations for these proxies, we find it reasonable to use the first-mentioned proxy. This variable is tied to Hypothesis II.

INTEREST_RATE_VOLATILITY: Previous research states that fixed income security prices are not only functions of issuer and issue characteristics, but also market conditions (Sorensen and Hawkins, 1981). We assess how interest rate uncertainty affects pricing of preferred stock offerings by measuring the trailing three-week standard deviation of the natural logarithm of the daily percentage change of the yield on the ten-year Canadian government bond index[13]. This variable serves to answer Hypothesis III.

NUMBER_OF_UNDERWRITERS: The number of underwriters involved in the offering. Matsui (2006) find that Japanese bonds with fewer underwriters comprising the underwriting syndicate tend to experience more negative initial returns as the opportunity to participate as a member in the underwriting syndicate lessens. We consider this to be a proxy for underwriter competition, in line with Matsui (2006), and it serves to answer Hypothesis IV.

D_SUBSEQUENT_ISSUE: A 0-1 dummy variable, whereby 1 signifies that the issue is made within or exactly six months from the firm's most recent preferred stock offering. If underwriters overprice a preferred stock issue, presumably investors will be reluctant to overpay in subsequent preferred stock issues conducted in the nearby future by the same firm. If, however, underwriters underprice a preferred stock issue this will render them able to acquire

[13] Government of Canada Benchmark 10 Year Bond Yields (V39055). Henceforth referred to as the "ten-year Canadian government bond index".

additional insights regarding the demand from investors for a particular type of issue and subsequently enhance their ability to price the next issue more accurately. This variable is tied to Hypothesis V.

5.3 Regression model

In order to successfully test our stated hypotheses, we apply OLS-regressions. Due to heteroscedasticity, and in line with previous research such as Cai et al. (2007), we apply the Huber-White (1980) theory on robust standard errors[14]. Our final regression model is as follows:

$$ER_t = \beta_0 + \beta_1\, LN\_GROSS\_PROCEEDS + \beta_2\, LN\_MARKET\_CAP + \beta_3\, D\_GROSS\_PROCEEDS\_TO\_MARKET\_CAP + \beta_4\, LN\_AGE + \beta_5\, D\_FINANCIAL + \beta_6\, LIQUIDITY + \beta_7\, INTEREST\_RATE\_VOLATILITY + \beta_8\, NUMBER\_OF\_UNDERWRITERS + \beta_9\, D\_SUBSEQUENT\_ISSUE \quad (5)$$

5.4 Test statistics

In our ambition to test the stated hypotheses and verify our findings, we utilize a broad scope of test statistics as mentioned below.

Descriptive statistics summaries are presented and aim to provide the reader with an introduction to the dataset in terms of key issuer and issue characteristics, as well as other variable data deemed relevant. By stating key variable values at certain percentile levels, we facilitate the reader's ability to review and analyze several statistical aspects of our sample.

Univariate independent student's t-tests are applied using raw- and excess returns in order to determine whether the full sample of preferred stock issues is accurately priced or mispriced, which serves to answer Hypothesis I. By conducting independent student's t-tests and a two-sample t-test on first-day excess returns using two subgroups (first- and third quartile) on the basis of liquidity, we gather insights into answering Hypothesis II. Furthermore, and with the exception for the liquidity variable, we investigate for subgroup differences among our regression model variables as well as over the sample time period (by three equal time periods of five years respectively) using independent student's t-tests on first-day excess returns (complemented with average liquidity levels). The findings made evident enable us to assess each group's respective first-day excess return and significance level, consequently providing

[14] This is discussed more elaborately in section 5.4.

us with valuable evidence for answering Hypothesis II while providing insights into answering Hypothesis III and IV. In order to answer Hypothesis V, we apply two-sample t-tests on first-day excess returns on the basis of our dummy subsequent issue. This depicts the differences in the pricing accuracy associated with having conducted two preferreds in a short time distance.

We illustrate and analyze the correlations among our independent variables using both a Pearson's bivariate correlation matrix and the variation inflation factor, VIF. This is done for the purpose of controlling for multicollinearity, and we then adjust our regression model for the statistical phenomenon accordingly. Also, we include the dependent variable in the correlation matrix and analyze its respective correlation to the independent variables so as to get an indication of respective variable's explanatory value on the dependent variable.

By scatter plotting our first-day excess returns[15], we observe only few outliers. None are, however, considered extreme and consequently we find no need for winsorizing our data. Also, plotting the regression model residuals and using the Breusch-Pagan (1979) test on each model throughout the analysis we find evidence of heteroscedasticity. More specifically, we reject the null hypothesis of homoscedasticity at the 1% significance level. Therefore, we find it necessary to adjust for this phenomenon in our regression models using the Huber-White (1980) theory on robust standard errors.

Subsequently, having reviewed the descriptive statistics in conjunction with the independent student's t-tests and two-sample t-tests as well as the correlation matrix, we begin to assess a multivariate analysis. We run six regressions (hierarchical), whereas the first two only include the control variables and each following regression thereafter adds an explanatory value. The sixth regression is therefore considered our complete and final model. The dependent variable in each regression is the first-day excess return, as defined in section 5.1. Reviewing the results from the various regressions enables us to answer Hypothesis II-V and demonstrates the drivers of first-day excess returns.

Lastly, we run several robustness tests in order to validate our findings. This is successfully done by controlling for fixed effects and clustered standard errors. Moreover, we test for robustness using various dependent variables as well as replacing the natural logarithm of gross proceeds with that of market capitalization.

[15] See appendix figure III and IV.

6. Results and Discussion

6.1 Descriptive statistics

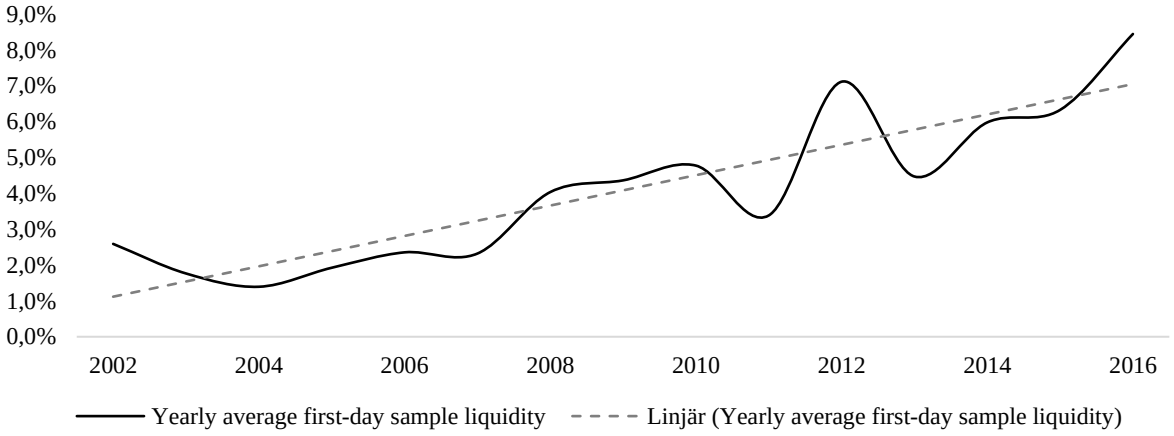
Table 2: Variable descriptive statistics

Variable	First quartile	Median	Average	Third quartile	No. of observations
Age (years)	9.8	19.1	34.9	38.4	262
Gross proceeds (CADm)	150	250	260	300	266
Market cap (CADbn)	4.9	20.8	27.0	37.9	266
Gross proceeds to market cap (%)	0.8	1.4	2.9	3.7	266
Liquidity (%)	2.7	4.8	5.3	6.8	266
Interest rate volatility (%)	1.2	1.6	1.9	2.3	266
Number of underwriters	1.0	2.0	2.5	3.0	259

The table above illustrates descriptive statistics for some key variables for the full sample. The returns are depicted at the 25^{th}, 50^{th} and 75^{th} percentile levels, as well as at the average level while also revealing the number of observations. Age is the time between the preferred stock issue date and founding date. Gross proceeds is the offer price times the total number of shares issued. Market cap is the issuing firm's equity market capitalization at the preferred stock issue date. Gross proceeds to market cap is defined as gross proceeds divided by market capitalization. Liquidity is the first-day preferred stock trading volume divided by total issued volume. Interest rate volatility is calculated as the trailing three-week standard deviation of the natural logarithm of the daily percentage change of the yield on the ten-year Canadian government bond index. Number of underwriters is simply the number of underwriters involved in the issue.

There is some variation in age among our sample firms. However, as implied by the median age of 19.1 years, the bulk of sample firms are to be considered mature. This is quite natural, as our sample contains seasoned offerings exclusively. Firms engaging in seasoned offerings are, per definition, already public firms, most probably with additional history as a private company before going public. The fact that the majority of all issues were rated investment grade upon issue further supports our theory on mature firms. The range in gross proceeds is deemed relatively narrow, where the difference between the 25^{th} and 75^{th} percentile is roughly CAD 150m. Interestingly, there is a wider span in market capitalization of the issuing firms, indicating that there are not large differences in gross proceeds between small- and large companies. Though, one should also consider the fact that many large companies in our sample for some years systematically issued preferreds on a half-year or quarterly basis, which could infer that they compensate for relatively small gross proceeds by issuing more frequently. Moreover, in our sample, relative preferred stock gross proceeds to outstanding equity at the time of issue is deemed small, representing a median of only 1.4% of the market capitalization. Using the same variable, Loderer et al. (1991) find the median for their sample to be approximately 11%, suggesting their sample involve greater issue-specific risk. Our median of 1.4% signifies relatively low issue-specific risk, in accordance with the reasoning by Datta et al. (1997), as capital raised through the preferred stock offering is modest in comparison to the already established equity financing.

Figure 2: Yearly average first-day sample liquidity



Liquidity, as measured by first-day stock turnover, averages 5.3% in our sample. The number of shares traded on the first day averages 0.6 million for our sample, while the average shares issued is 10.4 million. In general, fairly low first-day trading activity is what can be expected of fixed income securities, as many investors arguably have the intention to hold them for some time or even until maturity. As our sample exclusively comprises *perpetual* preferred stock, which are securities configuring long maturities, it comes natural to assume that the majority of investors buying such instrument have relatively long investment horizons. An interesting notion, as depicted in figure 2 above, is that our sample yearly average liquidity increases over time. This observation will be further discussed in section 6.2.

With regards to interest rate volatility, no dramatic discrepancies are noticed when comparing the 25^{th} and 75^{th} percentiles of 1.2% and 2.3% respectively. The interest rate volatility is based on the ten-year Canadian government bond index, which is sensitive to macroeconomic factors such as economic growth, inflation, political factors and monetary policy. Given the characteristics of the bond index, the volatility in the yield is expected to be low, as evident in our sample. The number of underwriters in each issue in our sample is on average 2.5, which is somewhat lower than the average number of underwriters of 4.8 in the sample used by Matsui (2006) on bond issues.

Previous research, such as Datta et al. (1997), has successfully included issue rating as a variable, documenting differences in pricing between investment grade- and high yield issues. Unfortunately, and as noted in section 4.1, as our sample almost exclusively consists of investment grade issues it is impossible for us to appropriately examine differences in pricing between investment grade- and high yield issues.

6.2 Univariate analysis

We begin our univariate analysis by reviewing initial returns for the full sample.

Table 3: Raw- and excess returns, as measured in percent

	First quartile	Median	Average	Third quartile	t-statistic p-value	No. of observations
			(A) Raw returns			
R_1	-1.20	-0.20	-0.61***	0.24	0.000	266
R_7	-1.00	0.00	-0.49***	0.60	0.000	266
R_{30}	-1.04	0.40	-0.19	1.40	0.158	248
			(B) Excess returns			
ER_1	-1.15	-0.24	-0.60***	0.28	0.000	266
ER_7	-1.11	-0.03	-0.40***	0.78	0.002	266
ER_{30}	-1.10	0.35	0.13	1.67	0.261	248

The table above illustrates holding period returns (in percent). The returns are depicted at the 25th, 50th and 75th percentile levels, as well as at the average level while also revealing p-values and number of observations. R_t is the equally-weighted raw return yielded from buying at the offer price and selling at the midpoint closing price on day t. ER_t is the equally-weighted excess return yielded from buying at the offer price and selling at the midpoint closing price on day t. ***/**/* denotes statistical significance at 1%/5%/10% level respectively.

As illustrated in table 3 above, our sample experiences negative first-day excess returns on average by 0.60%. Similar findings are made when examining the first-day raw returns, yielding negative returns of 0.61%. Both results are statistically significant at the 1% level. We observe that 64% (36%) of the first-day excess returns are negative (positive), as compared to 55% (45%) as found by Loderer et al. (1991). Furthermore, comparing the raw first-day returns we note that 62% of our sample yields negative returns while Loderer et al. (1991) only observe 37%. The large discrepancy in the portion of issues yielding negative first-day excess- and raw returns respectively in said study adds suspicion as to if the authors over-adjust when computing the excess returns, which the authors argue to be prevailing in their study.

While no severe overpricing is evident in our sample, statistically significant negative first-day excess returns are still identified, as compared to Loderer et al. (1991) which makes concluding remarks stating that their sample seems to be accurately priced. Consequently, we conclude that our findings are not in line with those of said study. Considering the findings by Williams and Shutt (2000), in which the authors state that the Canadian stock market is more efficient than that of the U.S., our results are somewhat counterintuitive and not in line with Hypothesis I – that preferred stock issues are accurately priced on the Canadian preferred stock market. The fact that our sample yields negative first-day excess returns signify that underwriters do not accurately account for the total risk upon determining the price.

Our findings are similar to studies pointing towards overpricing in bonds (Datta et al., 1997; Matsui, 2006). Datta et al. (1997) document an average first-day excess return of -2.88% on

investment grade bond IPOs, which is a more severe level of negative excess return as compared to our results. Based solely on this comparison, though not perfectly comparable due to differences in the offerings being initial or seasoned, investment grade preferred stock seem to experience negative first-day excess returns similarly to investment grade bonds, though not as distinctly. Additionally, the comparison provides some insights on pricing of new issues of hybrid instruments being in between that of equity and bonds, considering that equity issues are documented to be underpriced on average (Ibbotson, 1975; Kooli and Suret, 2004). We are unable to make direct comparisons to the findings of Matsui (2006), given the fact that he employs relative yields as a proxy for overpricing while we apply holding period returns. Nevertheless, similarities between the instruments can be identified with regards to overpricing being present.

We find excess returns to average -0.40% and 0.13% over a seven- and thirty-day holding period respectively, implying that prices in the aftermarket of newly issued preferred stock tend to revert to the offer price shortly after issuance. Hence, though the thirty-day holding period lack statistical significance, on an indicative basis it seems as if the initial mispricing fades rather quickly. Loderer et al. (1991) document an average excess return over the first five- and thirty trading days of -0.09% and -1.28% respectively on the full sample (including both convertible and non-convertible preferred stock). However, only the thirty-day excess return is statistically significant. Our findings on the seven- and thirty-day returns are not perfectly comparable to that of aforementioned research paper, due to differences in the definitions of return and the inclusion of convertible/non-convertibles. Whereas we consider total number of days when measuring returns, the authors of said paper instead consider trading days. Despite the differences, we still find it interesting to compare our results with theirs as this further strengthens ours and the authors' suspicion that they over-adjust for the market returns.

Table 4: Univariate analysis of first-day excess returns, as measured in percent, over liquidity

	Liquidity ≥ 6.8%			*Liquidity ≤ 2.7%*			*Average diff*
	Average	t-statistic p-value	Obs.	Average	t-statistic p-value	Obs.	t-statistic p-value
Full sample	0.45***	0.001	66	-1.56***	0.000	67	0.000

The table above illustrates first-day excess returns (in percent) by two subgroups on the full sample, based on the liquidity variable. The returns are depicted at the average level while also revealing subgroup p-values and number of observations. P-value of the difference between the subgroup averages is depicted in the rightmost column. The subgroup labeled "Liquidity ≥ 6.8%" constitutes issues with first-day liquidity equal to or above 6.8%, which is the 75th percentile. The subgroup labeled "Liquidity ≤ 2.7%" comprises issues with first-day liquidity less than or equal to 2.7%, which is the 25th percentile. ***/**/* denotes statistical significance at 1%/5%/10% level respectively.

Examining the relationship between liquidity and first-day excess returns of newly issued preferred stock, our findings in table 4 show that there is a positive correlation between the two. Issues having relatively poor aftermarket liquidity (as measured by the 25th percentile) yield significantly larger negative first-day excess returns compared to relatively liquid issues (as measured by the 75th percentile). This adds support for Hypothesis II – stating that illiquidity discounts (liquidity premiums) in the aftermarket render in mispricing in the form of negative (positive) first-day excess returns. That is, investors selling illiquid preferreds on the first day of trading seem to offer a discount in order to compensate buyers for additional risk associated with illiquidity. Likewise, as evident from the significant positive first-day excess return of 0.45%, the most liquid preferred stock seem to be selling at a premium in the aftermarket. Our results are similar to studies providing evidence of greater aftermarket liquidity in underpriced issues (Miller and Reilly, 1987; Booth and Chua, 1996; Zheng and Li, 2008). However, rather than interpreting aftermarket liquidity as a consequence of the pricing of the new issue (as in aforementioned studies), we interpret it as aftermarket liquidity affecting the level of pricing directly and subsequently is an important factor for both underwriters and investors to consider when assessing new issue pricing. This notion is in line with findings on bonds (Amihud and Mendelson, 2006; Chen et al., 2007) and common stock (Amihud and Mendelson, 1986; Brennan et al., 1998; Chordia et al., 2001), suggesting that illiquidity risk is priced and consequently that the prices of illiquid securities must fall sufficiently to attract investors. Arguably, first-day excess returns partly stem from a difference between the (by underwriters) expected- and actual aftermarket liquidity. Had underwriters been able to accurately estimate and incorporate aftermarket liquidity upon pricing the new issue, the level of mispricing would presumably be lower. These observations stress the importance of aftermarket liquidity and its impact on first-day excess returns.

Table 5: Univariate analysis of first-day excess returns over time period, complemented with first-day liquidity, measured in percent

	Average excess return	t-statistic p-value	Average liquidity	No. of observations
Full sample	-0.60***	0.000	5.27	266
By period				
2002-2006	-1.02***	0.001	2.19	30
2007-2011	-0.58***	0.000	3.84	69
2012-2016	-0.53***	0.001	6.41	167

The table above illustrates average first-day excess returns (in percent), p-values, average liquidity (in percent) and number of observations, for the full sample as well as by three time period subgroups (three equal groups of five years respectively).

Upon conducting a univariate analysis of the determinants on first-day excess returns in offerings of preferred stock, as illustrated in Table 5, we notice that negative first-day excess returns are more severe in the period 2002-2006 compared to the following periods 2007-2011 and 2012-2016. These findings suggest that negative first-day excess returns diminish over time, i.e. seasoned offerings of preferreds are gradually becoming more accurately priced. Since the Canadian preferred stock market is relatively young, the observed pattern could be argued to be a result of the market maturing and subsequently becoming more efficient over time. It could also be a result of investors increasingly being able to monitor the pricing of previous issues. That is, as underwriters slightly overprice issues in the earliest period their ability to equally overprice issues in subsequent periods decreases, as rational investors arguably become more reluctant to keep overpaying for newly issued preferreds. Thirdly, and most likely, the observed pattern in pricing is linked to the aftermarket liquidity enhancement in new issues of preferreds, as made evident in figure 2 in section 6.1 and table 5 above. We conclude that the yearly average sample liquidity has increased over our sample time period, and given the recent growth in the Canadian preferred market it makes sense that an increment in size and maturity is followed by enhanced liquidity. In turn, increased liquidity render the aftermarket illiquidity discounts to gradually decrease and in effect causes mispricing to diminish. In accordance with this reasoning, the observed liquidity improvements are the primary reason for the observed time period dynamics.

The observed price reversion over the thirty-day holding period, as illustrated in table 3 and discussed in the beginning of this section, is an interesting finding. As a way of explaining this phenomenon, and given the importance of liquidity in our findings, we look at how liquidity develops over the holding period and conclude that the average liquidity decreases over the seven- and thirty-days respectively following issue as compared to the first-day liquidity (not illustrated in any table). This signifies that mispricing is not mitigated by liquidity improvements shortly after issue. Given the scope of this thesis, which is to assess the initial returns following an issue, we solely use this indicative result for the purpose of measuring the persistence of initial mispricing.

Table 6: Univariate analysis of first-day excess returns, complemented with first-day liquidity, measured in percent

	Average excess return	t-statistic p-value	Average liquidity	No. of observations
Full sample	-0.60***	0.000	5.27	266
By gross proceeds				
More than or equal to CAD 300m	-0.27*	0.062	5.20	85
Between CAD 150-300m	-0.51***	0.001	5.29	112
Less than or equal to CAD 150m	-1.17***	0.000	5.32	69
By firm size				
More than or equal to CAD 37.9bn	-0.41**	0.032	5.50	66
Between CAD 4.9-37.9bn	-0.62***	0.000	4.90	134
Less than or equal to CAD 4.9bn	-0.76***	0.001	5.79	66
By relative issue size				
More than or equal to 2.9%	-0.54***	0.002	5.90	78
Less than 2.9%	-0.62***	0.000	5.01	188
By age				
Older than or equal to 38 years	0.01	0.478	5.68	66
Between 10 and 38 years	-0.75***	0.000	5.23	130
Younger than or equal to 10 years	-0.96***	0.000	5.05	66
By sector				
Financial	-0.47***	0.000	4.81	136
Non-financial	-0.74***	0.000	5.74	130
By interest rate volatility				
More than or equal to 2.3%	-0.80***	0.004	6.69	67
Between 1.2-2.3%	-0.37***	0.004	5.57	133
Less than or equal to 1.2%	-0.86***	0.000	3.21	66
By number of underwriters				
Four or more	-0.64***	0.003	4.88	56
Two or three	-0.67***	0.000	6.03	121
One	-0.41**	0.023	4.83	82
By subsequent issue				
Less than or equal to 6 months	-0.27**	0.017	5.58	104
More than 6 months	-0.81***	0.000	5.07	162

The table above illustrates average first-day excess returns (in percent), average p-values, liquidity (in percent) and number of observations, by three subgroups (≤25th, 25th-75th and ≥75th percentile) on the full sample based on independent variables. In order to achieve an even distribution among the number of underwriters, we subgroup by issues that have one, two or three and four or more underwriters respectively. Gross proceeds is the offer price times the total number of shares issued. Firm size denotes the issuing company's equity market capitalization at the preferred stock issue date. Relative issue size is based on the dichotomous variable defined as gross proceeds divided by market capitalization, whereby 1 signifies that the ratio is equal to or above the average. Age is denoted as the time between the preferred stock issue date and founding date. Sector is constituted by a 0-1 dummy variable, whereby 1 signifies that the issuing company is active within the financial sector and 0 signifies that the company is active within any other industry sector. Liquidity is the first-day preferred stock trading volume divided by total issued volume. Interest rate volatility is calculated as the trailing three-week standard deviation of the natural logarithm of the daily percentage change of the yield on the ten-year Canadian government bond index. Number of underwriters is simply the number of underwriters involved in the issue. Dummy subsequent issue is a dichotomous variable, whereby 1 signifies that the issue is made within or exactly 6 months from the firm's most recent preferred stock offering while 0 signifies that the issue is made more than 6 months after the firm's most recent preferred stock offering. ***/**/* denotes statistical significance at the 1%/5%/10% level respectively.

The univariate analysis in table 6 suggests that negative first-day excess returns decrease with increased gross proceeds, meaning that smaller issues suffer more from negative excess returns compared to larger issues. This is not consistent with the findings by Beatty and Ritter (1986), stating that smaller issues are subject to greater excess returns compared to larger issues. These contradictive results may indicate that gross proceeds is not a proxy for information asymmetry but liquidity instead, as suggested by Houweling et al. (2005) and Cai et al. (2007). According to this notion, smaller issues are subject to illiquidity and consequently render in illiquidity discounts in the aftermarket. This is, as shown in the average liquidity column in table 6, however not directly evident in our sample. Moreover, standardizing issue size by dividing it with market capitalization at the time of issue, we see that relatively large issues yield less negative first-day returns, which is inconsistent with the reasoning by Datta et al. (1997). In line with our economical intuition, though, it could simply be the case of smaller issues being more difficult to price correctly as they are not monitored and scrutinized by market participants as extensively as in the case of larger issues.

Similarly, negative excess returns are more apparent in smaller firms, as measured by market capitalization. These findings are rationalized through the same reasoning as that of gross proceeds and implies that issues conducted by larger firms are monitored by more market participants. This gives some suggestions for why issues made by larger firms are more accurately priced. Also, and as evident in our sample, larger firms issue preferreds more frequently. This enables market participants to review more close-by issues when assessing the price on a new issue, thereby rendering in potential accuracy improvements.

Our findings suggest further that younger firms generally suffer more from negative excess returns than older firms. We also find that the eldest firms in our sample significantly yield zero first-day excess returns at the 5% level (not illustrated in any table). This is inconsistent with the findings of Beatty and Ritter (1986) and Ljungqvist and Wilhelm (2003).

Ultimately, an increase in gross proceeds, age or firm size points towards decreasing negative excess returns. In literature examining IPOs, ex ante uncertainty renders in underwriters having to underprice issues in order to compensate for information asymmetries between them and investors. However, we find no indications of underpricing in small issues, nor do we find it in issues made by young- or small firms. Contrariwise, we establish that such issues yield more negative initial excess returns. This strengthens our intuition about the effects of market attention/involvement by market participants on how accurately priced the issue will be. It is also possible that aftermarket liquidity is a contributing factor, as these issues arguably

could suffer more from illiquidity. However, no such connection can easily be made in our sample, as evident in the average liquidity column in table 5.

In Hypothesis III, we put forward the notion that higher interest rate volatility could serve as an explanatory variable for the negative excess returns. As it turns out, such notion cannot be supported on the basis of our univariate analysis findings. Even though negative excess returns are more apparent in times of high interest rate volatility, the same is true for periods when the interest rate volatility is low. Hence, no linear relationship between interest rate volatility and mispricing is apparent solely from reviewing the results of the univariate analysis.

Furthermore, our univariate analysis indicates that an increased number of underwriters is associated with increased negative excess returns, which is in sharp contrast to findings presented by Matsui (2006) and our Hypothesis IV, both suggesting the opposite relationship. This inconsistency to previous studies could stem from the fact that the number of underwriters is not a perfect proxy for underwriter competition, but also that underwriter competition does not in fact explain the negative excess returns. One should bear in mind that there are alternate dimensions than offer price in which underwriters can compete on, such as on the basis of underwriter fees, offering additional services (e.g. research coverage) or offering more favorable issue terms (other than offer price). Naturally, these dimensions of competition would not affect the pricing directly. Furthermore, the competition dynamics may differ geographically with regards to if e.g. underwriter fees are fixed or not. Since Matsui (2006) finds support for the number of underwriters having an impact on the level of pricing, the findings might only be applicable as a proxy of underwriter competition on the Japanese market. Contrary to the reasoning of Matsui (2006), the fact that increased number of underwriters yield in more negative first-day excess return could signify that underwriters acting as sole underwriters have a monopolistic position. This would imply that competition in issues where few underwriters are involved are not as intense as in issues with syndicates consisting of several underwriters, where there is more of a free market.

In the process of controlling for sectorial pricing differences, we find that the financial sector suffers less from negative excess returns than the non-financial sectors. This finding might partly be interpreted in conjunction with an explanation of issue-incentives put forward by Howe and Lee (2006), stating that financial firms have a clear purpose for issuing preferred stock – namely to live up to capital adequacy requirements. This suggests that non-financial firms time their issues to coincide with high valuations, while financial firms time their issues with regards to capital adequacy as they care less about windows of opportunity related to

valuation. In our sample, and as measured by dummy subsequent issue, we find that financial firms tend to issue preferreds more frequently (not illustrated in any table). This might be related to the aforementioned capital requirements and could potentially be a reason for why issues in this sector are priced more accurately - in line with Hypothesis V.

Table 7: Univariate analysis of first-day excess returns, as measured in percent, over subsequent issue

	Subsequent issue ≤ 6 months			*Subsequent issue > 6 months*			*Average diff*
	Average	t-statistic p-value	Obs.	Average	t-statistic p-value	Obs.	t-statistic p-value
Full sample	-0.27**	0.017	104	-0.81***	0.000	162	0.009

The table above illustrates average first-day excess returns (in percent) by two subgroups on the full sample, based on the dummy subsequent issue. The returns are depicted at the average level while also revealing p-values and number of observations. P-value of the difference between the subgroup averages is depicted in the rightmost column. The subgroup labeled "Subsequent issue ≤ 6 months" constitutes issues made within or exactly 6 months from the firm's most recent preferred stock offering. The subgroup labeled "Subsequent issue > 6 months" comprises issues that have been issued more than 6 months after the firm's most recent preferred stock issue. ***/**/* denotes statistical significance at 1%/5%/10% level respectively.

By separating our full sample into two subgroups, based on subsequent issue activity, we find discrepancies in the level of initial negative excess returns, as shown in table 7. While both subgroups still yield negative first-day excess returns, we find their respective returns to be significantly different from each other at the 1% significance level. That is, offerings preceded by other preferred stock offerings issued by the same firm within a six-month period suffer significantly less negative excess returns compared to issues made with a greater timely distance. This is in accordance with Hypothesis V - and the underlying economical intuition behind it – stating that subsequent issues are more accurately priced. It could, besides being tied to liquidity differences, stem from recent firm-specific preferred issues acting as references for investors when assessing pricing of new preferred stock offerings, thereby mitigating underwriters' ability to overprice preferred stock issues in close conjunction with other issues.

6.3 Multivariate analysis

Table 8: Pearson's bivariate correlation coefficients

Variable	First-day excess return	Ln gross proce-eds	Ln market cap	Dummy gross proceeds to market cap	Ln age	Dummy financial	Liquid-ity	Interest rate volati-lity	Number of underw-riters	Dummy subseq-uent issue
First-day excess return	1.00									
Ln gross proceeds	0.24	1.00								
Ln market cap	0.11	0.68	1.00							
Dummy gross proceeds to market cap	0.02	-0.47	-0.83	1.00						
Ln age	0.18	0.23	0.38	-0.28	1.00					
Dummy financial	0.07	0.09	0.31	-0.20	0.38	1.00				
Liquidity	0.39	0.03	-0.09	0.11	0.10	-0.13	1.00			
Interest rate volatility	-0.01	0.07	0.06	0.00	0.08	-0.05	0.34	1.00		
Number of underwriters	-0.05	-0.08	-0.24	0.13	-0.27	-0.31	-0.05	-0.05	1.00	
Dummy subsequent issue	0.15	0.24	0.42	-0.35	0.09	0.07	0.07	0.02	-0.03	1.00

Table 8 depicts the various correlation coefficients between our dependent and independent variables.

We find that the natural logarithm of market capitalization tends to correlate highly with other predictor variables, in particular that of the dummy gross proceeds to market capitalization and the natural logarithm of gross proceeds. The correlations are -0.83 and 0.68 respectively. For natural reasons, considering that the aforementioned dummy variable is constituted by market capitalization, we anticipate a high negative correlation between the two variables. For the natural logarithm of gross proceeds, however, a correlation with the natural logarithm of market capitalization close to 0.7 is cause for concern as it may indicate multicollinearity. Subsequently, taking into consideration that the dependent variable correlates less with the natural logarithm of market capitalization than that of the natural logarithm of gross proceeds, and by reviewing the Variance Inflation Factor[16], VIF, we find it appropriate to omit the natural logarithm of market capitalization going forward in order to avoid multicollinearity.

We find it interesting that two variables, liquidity and the natural logarithm of gross proceeds – both of which have been cited in literature to be proxies for liquidity - correlate by only 0.03. Simultaneously, they correlate with our dependent variable by 0.39 and 0.24 respectively, indicating large explanatory value.

[16] See appendix table V.

Interest rate volatility correlates with the dependent variable by -0.01, which is somewhat understandable given the subgroup non-linearity as seen in table 6 in section 6.2. However, this does not necessarily suggest that the variable is limited in explaining the level of excess return, as it may have a more profound explanatory value when combined with our other variables. Another interesting notion we make is that of the correlation between interest rate volatility and liquidity of 0.34, signifying that increased interest rate uncertainty renders in improved aftermarket liquidity.

Table 9: OLS regression of first-day excess returns, as measured in percent

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Ln gross proceeds	0.0093**	0.0101***	0.0088***	0.0092***	0.0110***	0.0107***
	(0.0038)	(0.0031)	(0.0031)	(0.0032)	(0.0036)	(0.0036)
Ln market cap	0.0008	*Omitted*	*Omitted*	*Omitted*	*Omitted*	*Omitted*
	(0.0021)					
Dummy gross proceeds to market cap	0.0098**	0.0083***	0.0058**	0.0058**	0.0059**	0.0074**
	(0.0043)	(0.0030)	(0.0028)	(0.0028)	(0.0029)	(0.0029)
Ln age	0.0026***	0.0027***	0.0015**	0.0017**	0.0011	0.0011
	(0.0008)	(0.0008)	(0.0008)	(0.0008)	(0.0007)	(0.0007)
Dummy financial	0.0007	0.0010	0.0034	0.0032	0.0023	0.0022
	(0.0025)	(0.0024)	(0.0022)	(0.0021)	(0.0021)	(0.0021)
Liquidity			0.1823***	0.2101***	0.2213***	0.2160***
			(0.0272)	(0.0321)	(0.0336)	(0.0335)
Interest rate volatility				-0.3346***	-0.3576***	-0.3517***
				(0.1247)	(0.1246)	(0.1241)
Number of underwriters					0.0001	0.0001
					(0.0008)	(0.0008)
Dummy subsequent issue						0.0042*
						(0.0022)
Constant	-0.2045***	-0.2107***	-0.1930***	-0.1959***	-0.2288***	-0.2253***
	(0.0644)	(0.0606)	(0.0601)	(0.0610)	(0.0709)	(0.0700)
Observations	262	262	262	262	255	255
F-statistic	6.69	8.32	14.39	11.90	12.66	11.48
R-squared	0.1099	0.1092	0.2382	0.2648	0.2890	0.3007

The table above illustrates our main dependent variable, the first-day excess returns, computed as the percentage change in price from offer price to the first-day midpoint closing price and adjusted for the market return. We run six regressions, whereas the first two only includes the control variables and each following regression thereafter add an explanatory value. The sixth regression is therefore considered our complete and final model. Ln gross proceeds is the natural logarithm of the offer price times the total number of shares issued. Ln market cap is the natural logarithm of the issuing company's equity market capitalization at the preferred stock issue date. Dummy gross proceeds to market cap is a dichotomous variable defined as gross proceeds divided by market capitalization, whereby 1 signifies that the ratio is equal to or above the average. Ln age is the natural logarithm of the time between the preferred stock issue date and founding date. Dummy financial is a dichotomous variable whereby 1 signifies that the issuing company is active within the financial sector and 0 signifies that the company is active within any other industry sector. Liquidity is the first-day preferred stock trading volume divided by total issued volume. Interest rate volatility is calculated as the trailing three-week standard deviation of the natural logarithm of the daily percentage change of the yield on the ten-year Canadian government bond index. Number of underwriters is simply the number of underwriters involved in the issue. Dummy subsequent issue is a dichotomous variable, whereby 1 signifies that the issue is made within or exactly 6 months from the firm's most recent preferred stock offering while 0 signifies that the issue is made more than 6 months after the firm's most recent preferred stock offering. ***/**/* denotes statistical significance at the 1%/5%/10% level respectively.

Table 9 above depicts six regression models using a hierarchical linear regression structure, based on the regression model defined in section 5.3. Robust standard errors are applied in accordance with Huber-White (1980) due to heteroscedastic data, which we observe using the Breusch-Pagan (1979) test. This is explained more thoroughly in section 5.4. The first (1) and second (2) models are duplicates of each other and solely constituted by control variables, with the single exception for model (2) being adjusted for the multicollinearity phenomenon of including the natural logarithm of market capitalization (i.e. the variable is omitted). Subsequent regression models (3-6) are based on model (2) and add an explanatory variable hierarchically, yielding in the final adjusted regression model (6) being presented in the rightmost column.

Model (1), in its simplicity, does not explain all too much of the negative excess returns, considering its low R-squared. We still find evidence suggesting that the natural logarithm of gross proceeds and age respectively, as well as dummy gross proceeds to market capitalization, with statistical significance positively impact the first-day excess returns. This is not consistent with the findings of Beatty and Ritter (1986), Ljungqvist and Wilhelm (2003) or Cai et al. (2007), suggesting the reverse relationship. Instead, they may instead be interpreted by our stated intuition – that they are an effect of market attention/involvement by market participants. Aforementioned variables remain significantly positive in each subsequent model, with the exception for age which loses its statistical significance in model (5) and (6). Furthermore, controlling for sectorial differences in pricing, we find that issues conducted by financial firms positively impact first-day excess returns, though without statistical significance.

Excluding the natural logarithm of market capitalization in model (2) yields a marginal impact on the model's R-squared and simultaneously render the other variables more statistically significant. This implies that the variable adds modest explanatory value when combined with gross proceeds and support our theory on multicollinearity further.

Adding liquidity results in a large impact on the overall regression model, as illustrated in model (3). Not only does the R-squared double, indicating that the variable adds large explanatory value and thereby further supporting our reasoning on the importance of illiquidity discounts in explaining the observed negative first-day excess return, but it also has an impact on the other variables' significance levels and coefficients. More specifically, the natural logarithm of age and dummy gross proceeds to market capitalization are rendered less significant. This implies that the liquidity variable shares, and subsequently absorbs, some of the explanatory value with aforementioned variables. The positive and statistically significant

coefficient (at the 1% level) of liquidity confirms Hypothesis II – stating that potential mispricing derives from illiquidity discounts or liquidity premiums – seeing as our findings signify that increased liquidity prompts negative first-day excess returns. These results are similar to studies providing evidence of greater aftermarket liquidity in underpriced issues (Miller and Reilly, 1987; Booth and Chua, 1996; Zheng and Li, 2008), though we interpret our findings in terms of aftermarket liquidity directly affecting the level of pricing rather than aftermarket liquidity being a consequence of the pricing of the new issue, as interpreted by Amihud and Mendelson (2006) and Chen et al. (2007). One important factor to highlight is omitted variable bias (OVB) and its potential implication on how we interpret liquidity, as it might be that an OVB in actuality is the true underlying force behind overpricing rather than liquidity. If this was the case, then liquidity could be interpreted to be a result of the pricing instead.

From model (4), we are able to identify that the interest rate volatility coefficient is negative at the 1% significance level. That is, and contrary to our findings in the univariate analysis and correlation coefficient matrix, we conclude that increased interest rate volatility indeed render in more mispricing in the form of negative excess returns, subsequently confirming Hypothesis III. This suggests that market participants have greater difficulty in assessing the price of the preferred stock in times of high interest rate uncertainty. An interesting notion, considering the correlation of 0.34 between liquidity and interest rate volatility, is that the effect on the excess returns from an increment in the interest rate volatility (ceteris paribus) to some extent is mitigated by liquidity due to their opposite coefficient signs in the regression model.

Model (5) confirms our previous findings on the insignificance of number of underwriters when explaining the negative excess returns. With an insignificant coefficient of close to zero, it seems as if including the number of underwriters in our model has a negative effect on the natural logarithm of age, considering the fact that it ultimately loses significance. This might stem from the seemingly high negative correlation of 0.27 between the two variables, in essence rendering it difficult to derive any explanatory value from any of the two variables when combined. Ultimately, and as put forward by Datta et al. (1997) and Matsui (2006), we do not find any evidence of the initial negative returns originating from competition between underwriters – thereby rejecting Hypothesis IV.

Lastly, model (6) confirms the findings we made in section 6.2 regarding Hypothesis V, namely that offerings preceded by other preferred stock offerings issued by the same firm within a six-month period suffer less mispricing compared to issues made with a greater timely

distance. The dummy subsequent issue's positive coefficient, significant at the 10% level, indicates that negative excess returns are mitigated in subsequent issues if made within a short time period from other firm-specific preferred issues. While it might seem as if the variable is rather uncertain, considering it is significant only at the 10% level, it should be stated that it has a p-value of 5.1% and in essence is very close to being significant at the 5% level.

6.4 Robustness test

In order to validate our findings, we run several robustness tests on our model and sample data[17].

We find it appropriate to investigate whether our final regression model remains robust after substituting the main dependent variable. Cai et al. (2007) argue in their study on bonds that seven-day returns act as a better way to measure initial returns compared to first-day returns, given the instrument's illiquid characteristic. Taking this into consideration, and given the similarities between preferred stock and bonds, we find it intriguing to assess whether our findings remain robust given this revised initial return measure. We find that the first-day raw return averages -0.61%, excess seven-day return is -0.40% and seven-day raw return is -0.49%. All returns are significant at the 1% level. Firstly, by instead including the first-day raw returns, we note that the majority of the variables retain their significance levels and coefficient signs. Comparing our standard model to that of the excess seven-day returns, we find that the natural logarithm of age becomes significant at the 10% level. Other than that, no change in coefficient signs or statistical significances is observed for the variables. Lastly, we also test our model using seven-day raw returns and find that the dummy subsequent issue becomes insignificant. This indicates that the variable is somewhat sensitive to how one defines holding period returns. While we do find that dummy subsequent issue becomes insignificant using seven-day raw returns, we still find that the average difference between the subgroups is statically significant at the 5% level, thereby supporting Hypothesis II.

In contrast to our standard model, in which we excluded the natural logarithm of market capitalization and kept the natural logarithm of gross proceeds due to multicollinearity, we now do the inverse to assess how robust the model is. Subsequently, we find that liquidity and interest rate volatility remain statistically significant at the 1% level while the natural logarithm of market capitalization becomes significant at the 5% level. We observe that the dummy subsequent issue is insignificant, as compared to our standard model whereas it served to support Hypothesis II. The change in the dummy significance level might partly stem from the

[17] See appendix table VI, VII and VIII.

fact that the dummy variable correlates more with the natural logarithm of market capitalization than the natural logarithm of gross proceeds.

Next, reviewing our data sample we identify several instances where firms account for multiple observations over the time period. That is, error terms might be correlated within issuers and therefore we find it necessary to control for this using clustered standard errors (by issuer, 57 clusters). Compared to our standard model, we find that the dummy gross proceeds to market capitalization becomes further significant as it goes from the 5%- to the 1% level. Similarly, the dummy subsequent issue has increased in statistical significance from the 10%- to the 5% level. We note that the clustered standard errors for many variables in essence decrease as compared to the standard model, thereby demonstrating negative intra-cluster correlations.

In order to control for unobservable fixed effects, we find it reasonable to conduct a fixed-effect regression. Over our chosen time period, 2002-2016, several major shocks have occurred (e.g. financial crisis 2008). Consequently, as we cannot identify all shocks over our sample period, it is arguably appropriate to control for time-fixed effects. Doing so, we notice that the coefficient of interest rate volatility increases quite substantially while remaining significant at the 1% level. As identified above by controlling for issuer clusters, we find our sample to comprise 57 clusters. Hence, issuer-fixed effects are considered appropriate in order to assess the characteristics of a specific firm that are constant over all observations for that firm. Taking issuer-fixed effects into consideration render the coefficient of interest rate volatility to decrease and become statistically insignificant, implying that the explanatory value of interest rate volatility might to some extent be captured by the issuer-fixed effects. Generally, controlling for both issuer- and time-fixed effects have considerable impact on the standard model. The coefficient sign of the natural logarithm of age changes and becomes significant at the 10% level. Also, the coefficients of the natural logarithm of gross proceeds and the dummy gross proceeds to market capitalization become insignificant. This suggests that these variables actually capture issuer- and time-fixed effects in the standard model. Therefore, our findings in section 6.3, stating that aforementioned variables might be tied to market attention/involvement by market participants, are questionable and could instead be a result of issuer- and time-fixed effects. In conclusion, our fixed effects regressions imply that a considerable part of our variables might be better captured by issuer- and time-fixed effects. Noteworthy is, however, that both the coefficient of liquidity and the dummy subsequent issue stand robust even when fixed effects are accounted for.

7. Limitations and future research

While we argue that this study supplies valuable insights into the pricing of Canadian preferred stock offerings, we are well aware of its potential limitations.

Firstly, the Canadian preferred stock market is to a large extent constituted by firms operating in the financial sector. This bias towards the financial sector might negatively affect the applicability of this study's results on other markets where the financial sector is not as dominant. It might also affect the applicability on the future Canadian market, given the recent changes in the Basel framework[18], which could decrease the incentives for financial firms to issue preferreds.

Secondly, all variables in this study acting as proxies rest on assumptions made by us and their construction is also highly dependent on data availability. First and foremost, while there are many proxies for liquidity, due to data paucity we have limited ourselves to solely use the first-day stock turnover. This is an important subject to shed light on, as liquidity is regarded a key explanatory factor throughout this thesis. Naturally, it would be beneficiary to control for various liquidity proxies, such as the bid-ask spread or trade frequency, but this has not been possible in this thesis. Next, considering our interest rate volatility proxy is trailing, its ability to capture forward-looking expectations might be insufficient. Though no such metric is available for the Canadian market, a forward-looking measure such as the implied volatility on bond index options would be a valuable addition to our model. Similarly, we acknowledge the limitations of simply using the number of underwriters as proxy for underwriter competition. Supplementary proxies would be variables capturing market shares of underwriters, underwriter fees, offered services and other beneficial terms of the issue. Lastly, the dummy subsequent issue could be complemented in terms of also capturing equity- and/or debt issues, compared to solely measuring preferred stock issues. This is reasonable considering that other issues might, likewise a previous preferred stock issue, act as a pricing reference for market participants.

Existing research on the topic of pricing of preferred stock offerings is scarce. In excess of the limitations of our study, which is in need for further investigation, this field of research needs additional documentation. A first step would be to survey additional markets, identifying similarities and differences with findings on the U.S. and Canadian market. It would be

[18] Revisions made in the new Basel III framework, launched in 2013, no longer attribute preferred stock as Tier-1 capital.

interesting to examine the impact institutional ownership has on pricing in new preferred issues, especially in light of the notion made by Kooli and Suret (2004) whereby they stated that Canadian institutional investors are small, passive and have limited ability to impact the pricing of new issues. Furthermore, studying negative excess returns from a behavioral finance perspective would yield interesting insights, where one approach could be to probe whether investor sentiment could explain potential overpricing in new issues. Future research could also investigate convertible preferred stock, comparing the results with our findings on non-convertible preferred stock. Likewise, a review of pricing in issues with different terms would render in valuable insights. Lastly, we identify that research is close to non-existent on the long-term performance of preferred stock. This could be an interesting field of study from the perspective of comparing it to the short-term performance of newly issued preferreds, as found in this thesis, as well as to that of long-term performance of new issues of equity and bonds.

8. Conclusion

Existing research on the topic of pricing of preferred stock offerings is limited and it seems as if researchers have ignored to investigate it. As such, this study aims to contribute to existing literature by investigating the pricing of seasoned offerings of non-convertible preferred stock. To our knowledge, we are the first to examine seasoned preferred stock offerings in the Canadian market, and we do so by assessing initial returns of 266 issues on the Toronto Stock Exchange over the period 2002-2016. Contrary to the only previous study on pricing of preferred stock offerings, which is done on the U.S. market by Loderer et al. (1991), our findings make evident that new preferred stock issues are overpriced, yielding negative first-day excess returns of 0.60%. These findings are similar to those documented on bonds by Datta et al. (1997) and Matsui (2006). Measuring seven- and thirty-day excess returns, we find indicative evidence of overpricing diminishing shortly after issuance.

Enhanced liquidity in the aftermarket is found to have a significant positive impact on initial returns, considering relatively liquid issues are underpriced by 0.45% while relatively illiquid issues are overpriced by 1.56%. This is also confirmed through our multivariate analysis and robustness tests. Our findings suggest that aftermarket liquidity is not accurately estimated by underwriters, thus rendering in mispricing as additional illiquidity discounts (liquidity premiums) have to be offered in the aftermarket. These results are in line with current literature on bonds (Amihud and Mendelson, 2006; Chen et al., 2007) and common stock (Amihud and Mendelson, 1986; Brennan et al., 1998; Chordia et al., 2001), suggesting that illiquidity risk is

priced and consequently that the prices of illiquid securities must fall sufficiently to attract investors. Moreover, we find evidence of aftermarket liquidity improving over our sample period 2002-2016, while overpricing simultaneously diminishes. Given the considerable explanatory value of liquidity, as evident in all our tests, we investigate the over-time diminishing overpricing phenomenon using liquidity and ultimately find it to be a result of enhanced liquidity.

Additionally, we demonstrate that overpricing increases with interest rate uncertainty. This is argued to be a consequence of greater difficulty in assessing the preferred stock's true value. Furthermore, we see that investors become more (less) willing to trade their holdings in times of high (low) interest rate uncertainty. Ultimately, this indicates that the total effect on initial returns from a change in interest rate uncertainty, to some extent, is mitigated by the consequent change in liquidity (ceteris paribus) due to their opposite impact on initial returns. Controlling for fixed effects, we find that the interest rate volatility variable becomes insignificant (which serves as proxy for interest rate uncertainty), indicating that the variable might to some degree capture issuer-fixed effects.

As proxied by number of underwriters participating in the syndicate, we are not able to find any significant evidence of overpricing being a result of underwriter competition. This is contrary to findings put forward by Datta et al. (1997) and Matsui (2006). We emphasize, however, that the stated proxy might be ineffective in measuring underwriter competition. That is, the relationship between number of underwriters and competition could be argued to be reverse to that stated by Matsui (2006), namely that underwriters in issues with fewer syndicate members instead have a monopolistic position, implying that competition is more intense in issues with more underwriters where there is more of a free market. It could also be argued that number of underwriters in fact is a good proxy for competition, but that underwriters compete on alternate dimensions than offer price, e.g. underwriter fees.

We also make evident that stock offerings issued by firms that recently have issued preferred stock are priced more accurately, an observation which stands robust throughout several tests. This is arguably a result of investors having a recent firm-specific issue available acting as reference when assessing the price of the new issue, thereby mitigating underwriters' ability to overprice preferred stock issues in close conjunction with other issues.

Our results show that overpricing is most apparent in smaller issues or issues conducted by younger firms. This is inconsistent with previous research suggesting that smaller issues or

issues made by younger firms are subject to more ex ante uncertainty, consequently driving underwriters to underprice these issues (Beatty and Ritter, 1986; Ljungqvist and Wilhelm, 2003). We do not find any clear evidence of this being a matter of illiquidity. Instead, a plausible explanation could be that the issues are not monitored and scrutinized by market participants as extensively as in the case of larger issues or issues conducted by elder firms. Controlling for issuer- and time-fixed effects renders us questioning the validity of these variables, however, as they either become insignificant or significant at the 10% level though with changed coefficient signs. Similar reasoning is applicable on issues that are large relative to the equity market capitalization at the time of the preferred stock issue. Sectorial differences are not found to have a significant impact on pricing of seasoned preferred stock offerings.

The highly interesting findings made in this study are argued to be useful for all market participants, including issuing firms, underwriters and investors. It is our belief that enhanced awareness and knowledge of pricing accuracy in preferred stock offerings is essential, especially in light of the recent years' momentum in the Canadian preferred stock market. More specifically, our results are valuable for an investor with short investment horizon intending to trade her holdings rather than holding them until maturity. Such investor should be aware of new preferred issues being short-term overpriced, and she should consider liquidity, interest rate uncertainty and subsequent issues to be important factors when evaluating whether to participate in new issues.

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Appendix

Figure I: Sources of external financing in Canada (2002-2016)
Source: Bloomberg

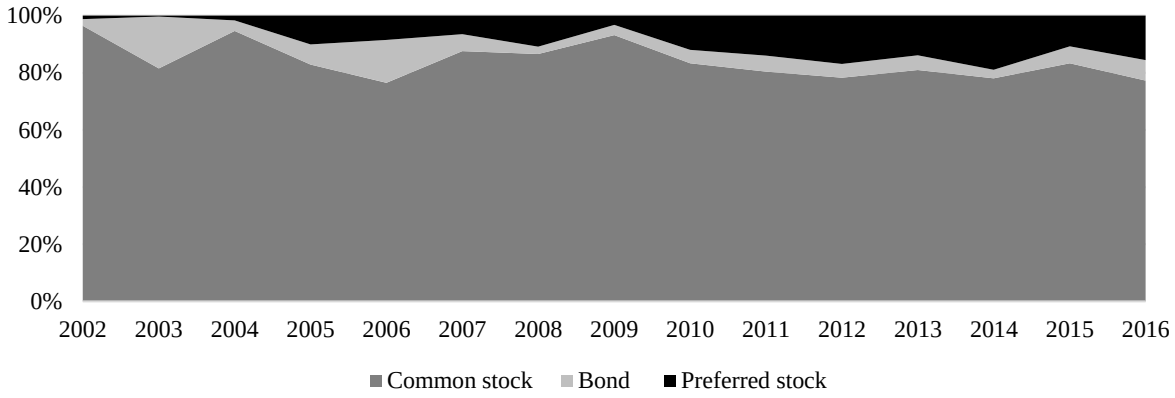

Figure II: Canadian preferred stock market (2002-2016)
Source: Bloomberg

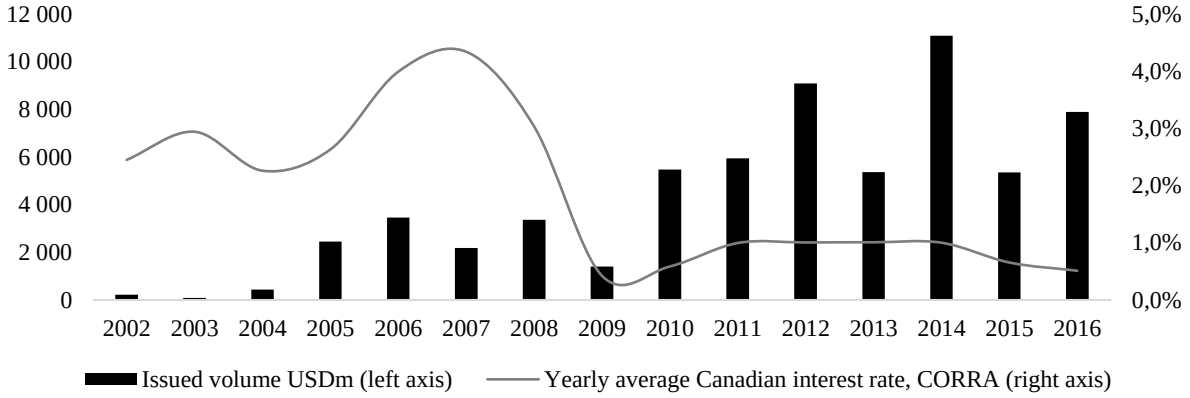

Figure III: Scatter plot of first-day excess returns

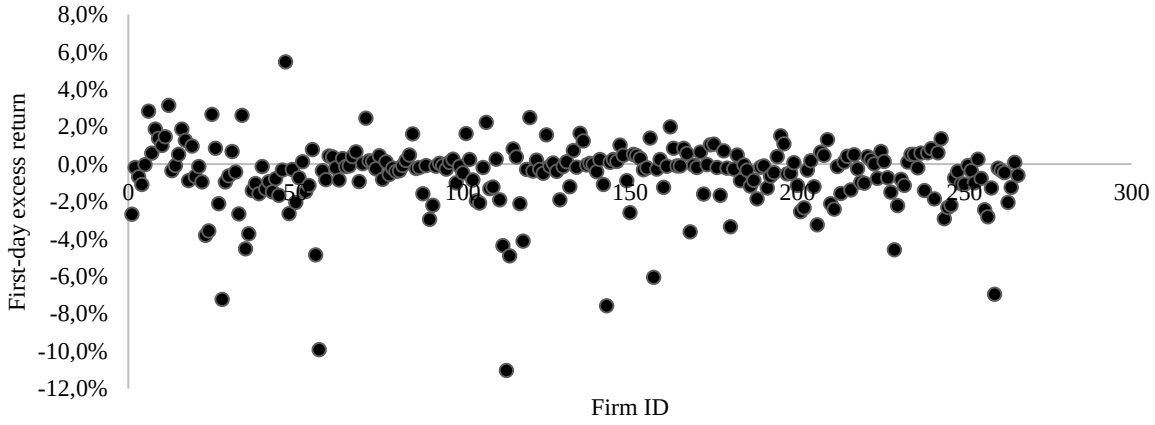

Figure IV: Histogram of first-day excess returns

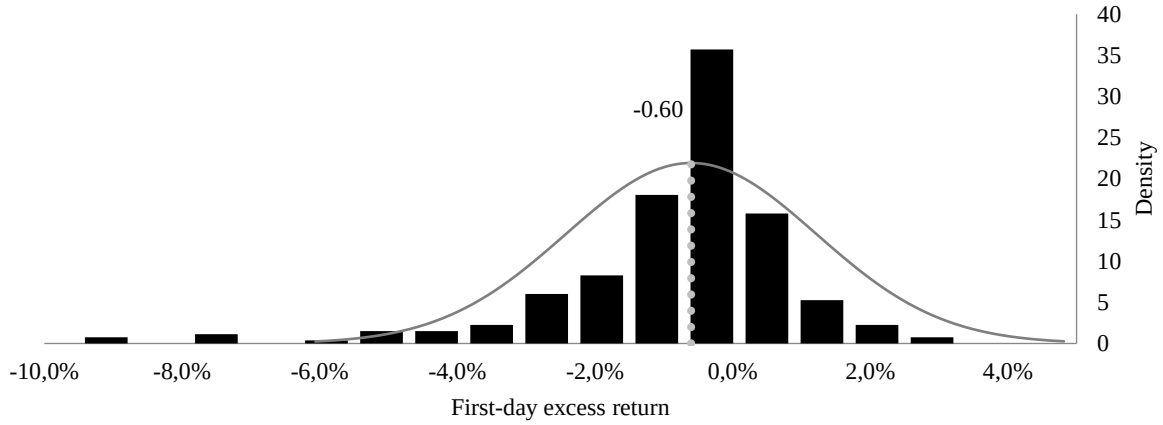

Table I: Indices correlation (Canada, July 22, 2002 – December 30, 2016)
Source: Bloomberg

	S&P/TSX Preferred share index	S&P/TSX Composite	S&P Canada aggregate bond index
S&P/TSX Preferred share index	1.00	0.10	-0.04

Table II: Indices correlation (U.S., September 19, 2003 – December 30, 2016)
Source: Bloomberg

	S&P Preferred stock index	S&P 500 Composite	Nasdaq Composite
S&P Preferred stock index	1.00	0.57	0.56

Table III: Sample filter log

Filter	Changes	Number of observations
Original sample		422
Time period (2002-2016)	-50	372
IPOs	-14	358
Tap issues	-6	352
N/A offer price	-31	321
N/A first-day midpoint closing price	-21	300
Convertible option	-6	294
N/A market cap	-28	266
Final sample		266

Table IV: Mathematical derivations of independent variables

Variable	Mathematical derivations
Natural logarithm of gross proceeds	$= \ln(Offer\ price_i * Issued\ volume_i)$
Natural logarithm of market capitalization	$= \ln(Market\ capitalization_{f,t})$
Gross proceeds to market capitalization	$= \frac{Gross\ proceeds_i}{Market\ capitalization_{f,t}}$
Natural logarithm of firm age	$= \ln\left(1 + \left(Issue\ date_i - Founding\ date_f\right)\right)$
Dummy financial	N/a
Liquidity	$= \frac{Traded\ volume_{i,t}}{Issued\ volume_i}$
Interest rate volatility	$= \sqrt{\frac{\sum_{z=t-(n-1)}^{z=t}(x_z - \bar{x})^2}{(n-1)}}$ $where\ x_z = \ln\left(\frac{yield_z}{yield_{z-1}}\right), \bar{x} = \frac{\sum_{z=t-(n-1)}^{z=t}(x_z)}{n}, n = 15$
Number of underwriters	N/a
Dummy subsequent issue	N/a

Issue *i* is the individual preferred stock issue, firm *f* is the issuing company related to issue *i*, time *t* is the issue date, *n* the average number of working days in a three-week period, and *yield* the yield on a ten-year Canadian government bond index

Table V: Variance Inflation Factor, VIF

	Original model		*Adjusted model*	
Variable	VIF	SQRT VIF	VIF	SQRT VIF
First-day excess return	1.43	1.20	1.43	1.20
Ln gross proceeds	2.35	1.53	1.48	1.22
Ln market cap	6.79	2.61	*Omitted*	*Omitted*
Dummy gross proceeds to market cap	3.70	1.92	1.58	1.26
Ln age	1.32	1.15	1.30	1.14
Dummy financial	1.35	1.16	1.27	1.13
Liquidity	1.49	1.22	1.47	1.21
Interest rate volatility	1.20	1.09	1.18	1.09
Number of underwriters	1.20	1.10	1.15	1.07
Dummy subsequent issue	1.31	1.14	1.18	1.08
Average	2.21		1.34	

The table above illustrates the Variance Inflation Factor, VIF, for each variable included in our regression model as stated in section 5.3. First-day excess return is our main dependent variable, computed as the percentage change in price from offer price to the first-day midpoint closing price and adjusted for the market return. Ln gross proceeds is the natural logarithm of the offer price times the total number of shares issued. Ln market cap is the natural logarithm of the issuing company's equity market capitalization at the preferred stock issue date. Dummy gross proceeds to market cap is a dichotomous variable defined as gross proceeds divided by market capitalization, whereby 1 signifies that the ratio is equal to or above the average. Ln age is the natural logarithm of the time between the preferred stock issue date and founding date. Dummy financial is a dichotomous variable whereby 1 signifies that the issuing company is active within the financial sector and 0 signifies that the company is active within any other industry sector. Liquidity is the first-day preferred stock trading volume divided by total issued volume. Interest rate volatility is calculated as the trailing three-week standard deviation of the natural logarithm of the daily percentage change of the yield on the ten-year Canadian government bond index. Number of underwriters is simply the number of underwriters involved in the issue. Dummy subsequent issue is a dichotomous variable, whereby 1 signifies that the issue is made within or exactly 6 months from the firm's most recent preferred stock offering while 0 signifies that the issue is made more than 6 months after the firm's most recent preferred stock offering.

Table VI: OLS regression using various dependent variables

Variable	Standard model	First-day raw	Seven-day excess	Seven-day raw
Ln gross proceeds	0.0107***	0.0116***	0.0146***	0.0161***
	(0.0036)	(0.0034)	(0.0036)	(0.0031)
Ln market cap	*Omitted*	*Omitted*	*Omitted*	*Omitted*
Dummy gross proceeds to market cap	0.0074**	0.0087***	0.0089**	0.0117***
	(0.0029)	(0.0027)	(0.0035)	(0.0033)
Ln age	0.0011	0.0010	0.0018*	0.0014
	(0.0007)	(0.0007)	(0.0010)	(0.0010)
Dummy financial	0.0022	0.0029	0.0019	0.0043
	(0.0021)	(0.0019)	(0.0028)	(0.0027)
Liquidity	0.2160***	0.2100***	0.2683***	0.2712***
	(0.0335)	(0.0320)	(0.0400)	(0.0390)
Interest rate volatility	-0.3517***	-0.2983***	-0.4459***	-0.3451***
	(0.1241)	(0.1114)	(0.1394)	(0.1312)
Number of underwriters	0.0001	-0.0001	-0.0001	-0.0001
	(0.0008)	(0.0007)	(0.0010)	(0.0010)
Dummy subsequent issue	0.0042*	0.0046**	0.0043*	0.0037
	(0.0022)	(0.0021)	(0.0025)	(0.0025)
Constant	-0.2253***	-0.2439***	-0.3014***	-0.3347***
	(0.0700)	(0.0648)	(0.0692)	(0.0606)
Observations	255	255	255	255
F-statistic	11.48	13.58	11.63	12.14
R-squared	0.3007	0.3316	0.3194	0.3524

The table above illustrates four regression models based on different dependent variables. Standard model is our final adjusted model and includes the first-day excess return dependent variable. First-day raw denotes an adjusted regression model in which the first-day raw return acts as dependent variable. Seven-day excess denotes an adjusted regression model in which the seven-day excess return acts as dependent variable. Seven-day raw denotes an adjusted regression model in which the seven-day raw return acts as dependent variable. Ln gross proceeds is the natural logarithm of the offer price times the total number of shares issued. Ln market cap is the natural logarithm of the issuing company's equity market capitalization at the preferred stock issue date. Dummy gross proceeds to market cap is a dichotomous variable defined as gross proceeds divided by market capitalization, whereby 1 signifies that the ratio is equal to or above the average. Ln age is the natural logarithm of the time between the preferred stock issue date and founding date. Dummy financial is a dichotomous variable whereby 1 signifies that the issuing company is active within the financial sector and 0 signifies that the company is active within any other industry sector. Liquidity is the first-day preferred stock trading volume divided by total issued volume. Interest rate volatility is calculated as the trailing three-week standard deviation of the natural logarithm of the daily percentage change of the yield on the ten-year Canadian government bond index. Number of underwriters is simply the number of underwriters involved in the issue. Dummy subsequent issue is a dichotomous variable, whereby 1 signifies that the issue is made within or exactly 6 months from the firm's most recent preferred stock offering while 0 signifies that the issue is made more than 6 months after the firm's most recent preferred stock offering. ***/**/* denotes statistical significance at the 1%/5%/10% level respectively.

Table VII: OLS regression of first-day excess returns, as measured in percent, with robustness adjustments

Variable	Standard model	Market cap	Clustered SE	FE time and issuer
Ln gross proceeds	0.0107*** (0.0036)	*Omitted*	0.0107*** (0.0033)	0.0096 (0.0060)
Ln market cap	*Omitted*	0.0042** (0.0018)	*Omitted*	*Omitted*
Dummy gross proceeds to market cap	0.0074** (0.0029)	0.0107*** (0.0041)	0.0074*** (0.0027)	0.0050 (0.0124)
Ln age	0.0011 (0.0007)	0.0012 (0.0008)	0.0011 (0.0008)	-0.0139* (0.0078)
Dummy financial	0.0022 (0.0021)	0.0007 (0.0022)	0.0022 (0.0020)	*Omitted*
Liquidity	0.2160*** (0.0335)	0.2248*** (0.0345)	0.2160*** (0.0290)	0.2015*** (0.0463)
Interest rate volatility	-0.3517*** (0.1241)	-0.3613*** (0.1257)	-0.3517*** (0.1249)	-0.3933 (0.2527)
Number of underwriters	0.0001 (0.0008)	0.0003 (0.0008)	0.0001 (0.0008)	0.0000 (0.0021)
Dummy subsequent issue	0.0042* (0.0022)	0.0031 (0.0024)	0.0042** (0.0020)	0.0057** (0.0029)
Constant	-0.2253*** (0.0700)	-0.0605*** (0.0185)	-0.2253*** (0.0643)	-0.1738 (0.1280)
Observations	255	255	255	255
F-statistic	11.48	10.41	21.12	4.70
R-squared	0.3007	0.2490	0.3007	0.4778

The table above illustrates various regressions on our main dependent variable, the first-day excess returns, which is computed as the percentage change in price from offer price to the first-day midpoint closing price thereafter adjusted for the market return. Standard model is the final regression model as discussed in section 6.3, market cap denotes an adjusted regression model in which ln gross proceeds is omitted and ln market cap instead is utilized. Clustered SE in column five adjusts for clustered robust standard errors using issuing company. Lastly, FE time and issuer is the standard model adjusted for both time- and issuer-fixed effects. Ln gross proceeds is the natural logarithm of the offer price times the total number of shares issued. Ln market cap is the natural logarithm of the issuing company's equity market capitalization at the preferred stock issue date. Dummy gross proceeds to market cap is a dichotomous variable defined as gross proceeds divided by market capitalization, whereby 1 signifies that the ratio is equal to or above the average. Ln age is the natural logarithm of the time between the preferred stock issue date and founding date. Dummy financial is a dichotomous variable whereby 1 signifies that the issuing company is active within the financial sector and 0 signifies that the company is active within any other industry sector. Liquidity is the first-day preferred stock trading volume divided by total issued volume. Interest rate volatility is calculated as the trailing three-week standard deviation of the natural logarithm of the daily percentage change of the yield on the ten-year Canadian government bond index. Number of underwriters is simply the number of underwriters involved in the issue. Dummy subsequent issue is a dichotomous variable, whereby 1 signifies that the issue is made within or exactly 6 months from the firm's most recent preferred stock offering while 0 signifies that the issue is made more than 6 months after the firm's most recent preferred stock offering. ***/**/* denotes statistical significance at the 1%/5%/10% level respectively.

Table VIII: OLS regression of first-day excess returns, as measured in percent, with robustness adjustments

Variable	Standard model	FE time	FE issuer	FE time and issuer
Ln gross proceeds	0.0107***	0.0103***	0.0115**	0.0096
	(0.0036)	(0.0037)	(0.0049)	(0.0060)
Ln market cap	*Omitted*	*Omitted*	*Omitted*	*Omitted*
Dummy gross proceeds to market cap	0.0074**	0.0071**	0.0066	0.0050
	(0.0029)	(0.0030)	(0.0118)	(0.0124)
Ln age	0.0011	0.0013	-0.0080	-0.0139*
	(0.0007)	(0.0008)	(0.0055)	(0.0078)
Dummy financial	0.0022	0.0014	*Omitted*	*Omitted*
	(0.0021)	(0.0021)		
Liquidity	0.2160***	0.2224***	0.2013***	0.2015***
	(0.0335)	(0.0412)	(0.0403)	(0.0463)
Interest rate volatility	-0.3517***	-0.5221***	-0.1559	-0.3933
	(0.1241)	(0.1944)	(0.1544)	(0.2527)
Number of underwriters	0.0001	-0.0002	-0.0005	0.0000
	(0.0008)	(0.0011)	(0.0015)	(0.0021)
Dummy subsequent issue	0.0042*	0.0045**	0.0055**	0.0057**
	(0.0022)	(0.0023)	(0.0027)	(0.0029)
Constant	-0.2253***	-0.2137***	-0.2139**	-0.1738
	(0.0700)	(0.0737)	(0.0934)	(0.1280)
Observations	255	255	255	255
F-statistic	11.48	9.41	8.76	4.70
R-squared	0.3007	0.3246	0.4503	0.4778

The table above illustrates the standard model and three regressions adjusted for fixed effects. Standard model is the final regression model as discussed in section 6.3. FE time is the standard model adjusted for time-fixed effects. FE issuer is the standard model adjusted for issuer-fixed effects. FE time and issuer is the standard model adjusted for both time- and issuer-fixed effects. Ln gross proceeds is the natural logarithm of the offer price times the total number of shares issued. Ln market cap is the natural logarithm of the issuing company's equity market capitalization at the preferred stock issue date. Dummy gross proceeds to market cap is a dichotomous variable defined as gross proceeds divided by market capitalization, whereby 1 signifies that the ratio is equal to or above the average. Ln age is the natural logarithm of the time between the preferred stock issue date and founding date. Dummy financial is a dichotomous variable whereby 1 signifies that the issuing company is active within the financial sector and 0 signifies that the company is active within any other industry sector. Liquidity is the first-day preferred stock trading volume divided by total issued volume. Interest rate volatility is calculated as the trailing three-week standard deviation of the natural logarithm of the daily percentage change of the yield on the ten-year Canadian government bond index. Number of underwriters is simply the number of underwriters involved in the issue. Dummy subsequent issue is a dichotomous variable, whereby 1 signifies that the issue is made within or exactly 6 months from the firm's most recent preferred stock offering while 0 signifies that the issue is made more than 6 months after the firm's most recent preferred stock offering. ***/**/* denotes statistical significance at the 1%/5%/10% level respectively.