The Long-Run Operating Performance of Canadian Convertible Debt Issuers: Trends and Explanatory Factors

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ABSTRACT

Similar to previously documented evidence for equity offerings, this paper shows, using accounting-based performance measures, that Canadian firms exhibit a poor operating performance following convertible bond offers. These results confirm those obtained in the US context and contribute to explain the puzzling post-issue stock price underperformance of convertible bond issuers. Our findings also illustrate that the decline in operating performance experienced by the issuing firms seems to be partly due to industry specific factors. In addition, using PLS regressions, we find that some issuer and issue features have a significant impact on the issuers' performance. Nevertheless, the signs of the regression coefficients are not always congruent with those predicted by convertible bond financing theories. Lastly, our empirical findings support the capital rationing hypothesis of Lewis *et al*. (2001) according to which firms rely on convertible bonds because they are rationed out of the equity market due to adverse selection and agency costs considerations.

JEL Classifications: *G14, G32*

Keywords: *convertible bonds offering; long-run operating performance; PLS regressions*

I.   INTRODUCTION

Convertible bonds (hereafter referred to as CBs) have been used extensively by corporations to raise funds in the bond market through either public or private offerings. According to the agency and signalling theories, in an imperfect market CB financing is not without incidence on the value of the issuing firm. This report confirms the results of previous empirical studies carried out over various periods and in several countries.[1] Indeed, the main conclusion of these studies, formally termed "short-term event studies", is that the announcement of CB offering is associated with a negative signal, but with it, the impact is less pronounced than with the announcement of equity issuance. Given that straight bond offerings do not involve on average any statistically significant reaction, this result seems coherent with both the pecking order theory of Myers and Majluf (1984) and the "backdoor equity" model of Stein (1992).[2]

These studies have investigated stock market reaction to the CB issuance during short-term announcement period assuming that markets are efficient at least under the semi-strong form. However, more recent literature on the long-term behavior of firms' stock price subsequent to Initial Public Offerings (IPOs) and Seasoned Equity Offerings (SEOs) challenged this assumption. It argued instead that the return decrease taking place at the time of the issue announcement was not proportional to the actual informational content of the news at that moment. Indeed, stock issuers' returns continue to decline during several months after the offering. In other words, investors would interpret in an erroneous way the signal conveyed by the issuing firm at the offering announcement period, with the result being that they would take a long time to appraise its real effects on the value of the firm. This "underreaction" calls into question the principle of informational efficiency.

In light of these studies and since CBs are hybrid instruments with characteristics of both debt and equity, many authors turned towards long-term event studies in order to examine CB issuers' post-offering returns over long horizons to get a full view of their stock price performance. Lee and Loughran (1998) and Spiess and Affleck-Graves (1999), amongst other authors, find that American firms issuing CBs significantly underperform their matched counterparts up to five years after the offering. Similar underperformance was found on both the Japanese (Kang *et al.*, 1999) and the British markets (Abhyankar and Ho, 2006). One key element of these studies is that the long-term drift in stock returns is in the same direction as the initial reaction of the stock price at the time of the announcement. This suggests that, as with equity offerings, investors tend to underreact to the information contained in the announcement, so that the full impact of the CB issue is only recognized over a longer time horizon

Because the primary role of accounting information, more precisely accounting earnings, is to provide useful input to analysts and investors in financial markets, some authors have examined to which extent the decline of firms' long-term stock price profitability subsequent to CB offerings is driven by the fall of their operating performance.

A number of long-term event studies have analyzed the operating performance of American firms following CB issues. The pioneering work of Hansen and Crutchley (1990) shows that issuing firms have an operating profitability significantly lower than that of nonissuing firms over the three year post-issue period. This conclusion was

confirmed by Lee and Loughran (1998) who also find that issuers' operating performance experiences a sharp decline following the offering. Interestingly, CB issuers do not record any significant overperformance prior to the offering as has been documented for equity issuers by McLaughlin *et al*. (1996) and Loughran and Ritter (1997).

The post-issue operating underperformance is also supported by McLaughlin *et al*. (1998) and Lewis *et al*. (2001) findings. Nevertheless, contrary to Lee and Loughran (1998), these authors report a substantial improvement in operating performance prior to the offering for issuing firms vis-à-vis a set of matching firms during the pre-issue period. According to these authors, this outperformance is coherent with an extension of the timing hypothesis of equity issues (Loughran and Ritter, 1997) to explain CBs issuance. More recently, Chou *et al*. (2009) examine whether earnings management, as reflected in discretionary current accruals around the time of the offering, can explain the long-run underperformance of CB issuers. Their findings show that issuers experience declines in operating profitability ratios following convertible debt offers, with these post-issue declines being particularly pronounced for issuers with aggressive earnings management in the issue year.

Even though previous studies carried out in the US market led to mixed results concerning the pre-issue operating performance, all of them clearly show that issuers' post-issue operating profitability is definitely lower than that of their benchmark. The similarity of this post-issue decreasing pattern to that of seasoned equity issuers (McLaughlin *et al*., 1996 and Loughran and Ritter, 1997) reinforces Stein (1992) argues that CBs are issued because the security permits management to infuse the firm's capital structure with equity through the "backdoor".

These conclusions are mainly drawn from studies conducted in the US market, which makes it important to provide further evidence on the Canadian context. In fact, although the Canadian and American financial systems have much in common, there are nevertheless significant differences that may affect issuing firms' operating performance. First, Canadian firms are much smaller than their American counterparts. As pointed out by Loncarski *et al*. (2008), this would potentially imply "*that the issuers in the Canadian market differ from their US counterparts, thus having a different motivation for the use of convertible bond loans*". Secondly, the two countries differ in terms of industry structure as well as in terms of institutional and regulatory aspects, and this is more likely to affect differently issuing firms' performance in these two countries. Thirdly, Canada and U.S. also differ in several features of corporate governance. Indeed, the ownership structure in US public companies is widely diffused, but highly concentrated in their Canadian counterparts. In fact, Morck *et al*. (2000) point out that about 50% of the 500 biggest Canadian companies are privately held, and among the remaining firms, only 20% have large ownership. Moreover, whereas the US governance regime is mandatory, the Canadian regime is widely voluntary (Anand, 2005). Such divergences in corporate governance pattern could potentially lead to performance differences between firms conducting major corporate events (such as CB offerings) in the two contexts.

Our research is also motivated by data mining hypothesis. Fama (1998) argues that it is useful to investigate whether the performance pattern following securities issuance, referred to as "the new issues puzzle", documented in the US context holds true in other countries so that to make sure that such pattern is not a manifestation of

data mining. Hence, our evidence on the performance of Canadian CB issuers might help to elucidate this puzzle. Finally, despite the importance of CBs in the Canadian market (about CA$30 billion over the period 1990-2005), to the best of our knowledge little has been done to study the motivations and the wealth effect associated with the issuance of CBs in the Canadian market.[3] This paper intends to fill this gap by measuring and analyzing the long-run operating performance of Canadian CB issuing firms.

For all above stated reasons, analyzing CB issues performance in the Canadian context and contrasting the findings with those coming from the US market would contribute to a better understanding of the reactions induced by the issuance of this financial vehicle.

The purpose of this article is twofold. First it aims at evaluating the operating performance attained by the Canadian issuing firms before and after the CB issue by means of long-term event study methodology. Second, from our empirical results, we examine the explanatory factors of the Canadian CB issuers' performance. Previous theoretical and empirical studies about the American issuers indicate that financing by CBs is particularly well adapted to young, small-size firms, showing high levels of informational asymmetry, high risk and a strong potential of growth. It also shows that some issue features as well as the dynamism of the CBs market impact the performance of CB issuers. Consequently, one can suppose that the extent of the operating performance in the long-run of CB issuers is related to three groups of explanatory variables characterizing, respectively, the issuing firm, the CB offer and the offering market conditions. To achieve this aim, we draw on the multivariate analysis of issuers' operating performance using the PLS approach.

The remainder of the article is organized as follows. In the next section we present the theoretical factors underlying the issuance of CBs. In the third and forth section we describe, respectively, the data and the methodology used in the study. In the fifth section we present the results of the event study. The sixth section is devoted to the analysis of the explanatory factors of CB issuers' performance. The final section wraps up the study with a conclusion.

II.   UNDERLYING MOTIVATIONS FOR A CB ISSUE

Given their hybrid nature, CBs are theoretically perceived as a solution to the market imperfections associated primarily with agency conflicts of interest, moral hazard, financial distress and sequential financing problems. These problems generate costs which are likely to affect the firm's operating performance and consequently its value. Several theories coexist and can be used as conceptual framework to explain the long-run operating performance following CB issues.

A.   Insensitivity to Issuer Risk

According to Brennan and Schwartz (1988), CBs are likely to be issued by firms perceived by investors as being risky, firms whose risk is difficult to assess, or firms whose investment policies are hard to forecast. Thus, the stock price of these firms will likely undergo a dramatic discount in the event of financing by common equity issues, due to potential adverse selection costs. In the same way, if these firms choose to issue straight bonds, capital suppliers will require a higher interest rate resulting from an

important risk premium in remuneration of the default risk that they are exposed to. However, the value of CBs is relatively insensitive to the issuer operating and financial risk. That is explained by the fact that the decline in the value of the debt component which would be induced by an increase in the issuer risk would be outweighed, at least partially, by the improvement in the value of the optional component which would result from the same increase in risk.

B.   Reduction of Debt Agency Conflicts

Green (1984) models the conflicts of interest between shareholders and bondholders - also known as risk shifting or asset substitution problem - within the particular framework of CB financing. In fact, the optional component of the CB enables bondholders to benefit from a possible increase in the value of the stockholders' equity and to reduce wealth transfers due to managerial incentive to place more risk on the debt holders without providing them with additional compensation. Hence, the conversion feature of the CB can be viewed as a managerial commitment not to carry out asset substitution.

C.   Reduction of Equity Agency Conflicts

Green (1984) considers CBs as a substitute of debt and thus, he does not explicitly address the issue of agency costs inherent in the conflicts of interests between managers and shareholders. According to Jensen (1986) and Stulz (1990), in mature firms cash flow abundance and scarcity of genuinely profitable investment opportunities often lead to injudicious financial choices. CBs however can enhance the value of the firm through mitigating the equity agency costs. Indeed, CBs constrain managers to adhere to a more strict financial discipline so as to encourage bondholders to exercise the conversion option, leaving funds in the firm.

D.   Reduction of Adverse Selection and Financial Distress Costs

Stein (1992) argues that CB is a suitable way to raise external capital in a deferred way for firms facing significant asymmetric information and financial distress costs, and thus they are regarded as a substitute of equity ("backdoor equity").[4] More formally, Stein's model shows that firms with strong informational asymmetry and/or high level of debt will be more likely to issue CBs rather than issuing common stocks or straight bonds for two main reasons: (1) Relying on straight debt increases the probability of bankruptcy (cost of financial distress) for these firms; (2) Issuing new equity is likely to be very expensive because of adverse selection costs (Myers and Majluf, 1984). Consequently, theory predicts that firms with significant amount of financial leverage and adverse selection costs will tend to issue CBs to reduce these external financing costs.

E.   Minimization of Sequential Financing and Overinvestment Costs

Mayers (1998) states that CBs are useful in economizing on costs associated with the sequential financing while controlling overinvestment problems. Indeed, if the firm has valuable investment opportunities, bondholders will prefer to exercise the conversion option, leaving funds in the firm and reducing financial leverage. Whereas, if firm's investment opportunities turn out to be unprofitable, bondholders will not exercise the

conversion option, but in turn, surrender their bonds for redemption, thus controlling managers' incentive to overinvest.

These various theoretical models differ in their assumptions about the specific causes of equity- and debt-related external financing costs. Nevertheless, all of them suggest that CBs are issued with the aim of mitigating these costs and inducing managers to improve firm's profit through making efficient investment decisions. It is thus interesting to check if the implications of the theories on CB financing are consistent with patterns emerging from our analysis of the long-run operating performance of Canadian issuers.

III.   SAMPLE SELECTION AND DESCRIPTIVE CHARACTERISTICS

Our original sample is made up of 310 completed domestic CB offerings carried out on the Canadian market over the period of January 1990 to December 2002.[5] CB offerings-related data was retrieved from the annual reports "Record of New Issues" published by Financial Post Data Group. Whenever the offer data were not available in these reports, or more certainty was needed, they are taken directly from the offering prospectuses available either from the System for Electronic Document Analysis and Retrieval (SEDAR) (issues after January 1997) or from the manual records of the Montreal's Autorité des Marchés Financiers (issues before January 1997). Among the original CBs sample we excluded certain issues in the following order: (1) The sample is limited to public CB offerings conducted by nonfinancial firms. Indeed, private issues are not considered since no formal disclosure documents need to be prepared for these issues, making it difficult to gather all issue features needed in our analysis. Financial firms are excluded due to their specific financial structure and corporate governance (Berger *et al.*, 1997); (189 issues excluded). (2) Drawing on Spiess and Affleck-Graves (1999), we exclude issues including warrants as well as all issues involving exchangeable bonds; (6 issues excluded). (3) In the final sample, we only keep issuing firms for which accounting data are available in Worldscope database at least for the fiscal year-end prior to the CB offering. Insofar as it is possible, missing data, if any, were drawn from Stock Guide database. No other restriction was imposed regarding the availability of accounting data during the pre- or post-issue period. The panel sample is unbalanced, reducing the impact of the survival bias and maximizing the sample size; (14 issues excluded). (4) Finally, some firms are multiple issuers of CBs. Because we examine the multi-year pre- and post-operating performance, a CB offering is kept in the sample insofar as it is neither preceded by a CB offer during the last three years, nor followed by another CB offer in the three subsequent years. Such restriction aims to accommodate dependence for statistical tests which would be induced by overlapping operating abnormal returns; (6 issues excluded). Applying these refining criteria results in a final list of 95 offerings.

Summary statistics for issuers and issues are reported in Table 1. Values reported are those of the fiscal year before the offering unless stated otherwise.

The average (median) issuer has a book value of assets of CA\$1.2 billion (CA\$219 million). Although these values are close to those reported by McLaughlin *et al.* (1998) and Lewis *et al.* (2003) in the American context, this pattern does not hold when the original sample is considered. In fact, our final sample is somewhat tilted toward relatively large firms because our selection criteria keep private placement,

Table 1
Summary statistics for issuing firms in the final sample

	Mean	Media	Standard deviation
Panel A : Issuer features			
(1) TA (in millions of CA$)	1203.94	291.16	2179.10
(2) MV (in millions of CA$)	732.55	159.63	1618.60
(3) M/B	1.63	1.31	2.41
(4) Levrage	0.31	0.31	0.21
(5) Age	24.84	15.24	26.01
(6) Volatility	0.50	0.45	0.27
(7) Beta	0.65	0.48	0.71
(8) Run-up	-0.04	-0.03	0.29
Panel B : Issue features			
(9) Relative issue size	0.24	0.16	1.32
(10) Maturity	8.20	7.05	4.71
(11) Conversion premium	0.35	0.20	0.60

Notes: (1) Book value of total assets. (2) Market capitalization. (3) Market capitalization scaled by book value of equity. (4) Total debt scaled by book value of total assets. (5) Number of years from the incorporation date to the offering date. (6) Annualized historical volatility estimated over the 250-trading-day period preceding the offering announcement date. (7) Equity systematic risk estimated by beta of the standard two-parameter market model over the 250-trading-day period preceding the offering announcement date. (8) Issuer stock returns cumulated over the 75-trading-day period preceding the offering announcement date. (9) Offering proceeds scaled by total assets. (10) Number of years until the expiration date of the CB. (11) The percentage amount by which the price of the CB exceeds the underlying stock price at the offering announcement.

typically conducted by small firms, out of our analysis. One can also observe a wide gap between the mean and the median of the variables proxying for firm size (total assets and market capitalization), suggesting that their distribution is skewed. This pattern can be explained by the presence in our sample of ten large firms representing approximately two thirds of the total value of each of these size variables. The book to market ratio (B/M), which proxies for growth opportunities and informational asymmetry, is particularly high among issuing firms. The average value of this ratio is 1.63 compared to 1 for nonissuing firms' sample. This coincides with the prediction from Stein (1992) who argues that CBs are an effective means of raising external capital in the presence of information asymmetry, and also with the empirical findings of Essig (1991), who points out that issuing firms have more growth opportunities than their counterparts. Also, in accordance with both Stein's model and Essig's findings, the table reveals that issuing firms are highly levered. Indeed, the average "total debt/total assets" ratio is 31%, which is greater than 24% reported recently by King and Santor (2008) for a set of more than 600 Canadian firms. Estimated issue average proceeds is 24% of total assets. This high percentage confirms that CBs are a tool providing substantial financing to firms on the Canadian market.[6] Furthermore, it shows that CB financing decision is regarded as an important event which is likely to have a significant incidence on the firm's financial structure and value. Finally, the maturity of Canadian issues is much shorter than that of US offerings. While we record an average CB maturity of only 8.2 years, Kim and Stulz (1992) find average maturities of around 16 years for US convertibles.

The control sample is composed of all Canadian industrial companies listed in the Datastream database over the study period. To be retained in the control sample, a firm should not have carried out any offer of CBs during the seven years surrounding the year of the CB offering conducted by the corresponding issuing firm. Moreover, its accounting and stock price data must be available on the aforementioned databases.

The construction of the match firm sample is relatively more difficult in the Canadian than the American context, given the small number of listed companies in the former relative to the later.[7] Indeed, it is difficult to find public firms matching perfectly our selection criteria. The final match sample is made up of 958 firms, including 371 delisted firms as of December 31st 2006.

IV.   METHODOLOGICAL FRAMEWORK

A.   Operating Performance Measures

We examine CB issuers' operating performance over a period of seven[8] fiscal years centered around the offering fiscal year. We chose the Earnings Before Interest, Taxes, Depreciation and Amortization (EBITDA: Worldscope item #18198) as a principal measure of the operating performance in our study. We favour the use of this metric because it is a cleaner measure of the profitably of firms assets than the earnings (Barber and Lyon, 1996). In fact, EBITDA can not be obscured by special items, interest expense, tax considerations and depreciation which are likely to matter during some corporate events affecting the firm capital structure such as CB offerings.[9] Furthermore, in order to make operating profit comparable across firms and through time, we compute the ROA (Return On Assets), i.e., the EBITDA of each firm in year t scaled by the year t book value of total assets. This is the operating performance measure most commonly used by previous studies.

Barber and Lyon (1996) argue that when offering proceeds are used to fund new assets, scaling operating profit by total assets may lead to a temporary decline in the post-issue ROA if these assets take a long time to start generating profit. We address this issue in two ways. Firstly, by tracking the issuer performance three years after the CB offering to ascertain that an eventual decrease in operating performance is due to a transitory expansion of assets. Secondly, by using the Return On Sales (ROS) metric which is not affected by changes in the level of operating assets.[10]

B.   Matching Firm Procedure

The performance of each CB issuer was measured against a benchmark. This later consists in a control firm selected according to criteria defined in advance, so that its profitability mimics the profitability of the issuer in the absence of the studied event, namely the CB offering. Abnormal profitability (i.e., profitability induced by the CB offering) is thus expressed as follows:

$$AP_{it} = P_{it} - E(P_{it} \mid X_t) \tag{1}$$

where P_{it} is the ROA in year t for firm i and $E(P_{it} \mid X_t)$ is the expected ROA of this firm in the absence of a CB offering, given the complementary information X_t available in year t. Not being observable, this expected performance is approximated by the benchmark ROA (P_{It}).

In order to provide evidence on the robustness of our results, we estimate the expected operating performance of CB issuers by means of three different methods. The first one employs the issuer's lagged performance, referred to hereafter as unadjusted performance. This method does not require the use of any matching firm and assumes that the best estimate of the expected operating performance of the issuer in year t is simply its operating performance in year t-1. More formally:

$$E(P_{it} \mid X_t) = P_{i,(t-1)} \tag{2}$$

The two other methods implemented in this study are based on the use of the control firm. For the second one, the control firm was selected according to the dual criterion "industry, past performance". Thus, each issuing firm is matched with a control firm belonging to the same industry (retrieved from the Industry Classification Benchmark – ICB) and minimizing the absolute deviation of the ROA from the issuing firm in year -1. According to Barber and Lyon (1996), the use of these two matching criteria makes it possible to control the cross sectional variations of operating performance and to adjust for the mean reversion effect which is likely to affect the operating income. In the third method, the benchmark consists of a control firm selected according to the dual criterion "size, past performance". In this case, we construct a portfolio made up of all matching firms with a size, defined as the book value of total assets in year -1, oscillating between 70% and 130% of the issuer's size. The firm with the closest past performance from among these nonissuing firms is picked as the control firm.[11] In the two matching procedures described above, if the control firm is delisted from Worldscope database while the issuer is still trading, a replacement nonissuing firm is spliced in on a point forward basis. Whereas when an issuing firm gets delisted, we remove at the same time its control firm.

Two models were implemented to estimate the abnormal performance when we resort to a matching firm. The first model is of static nature. It measures the abnormal performance by substracting the operating performance of the control firm (P_{It}) from that of the issuing firm (P_{it}). More formally, the first model of expected performance is:

$$E(P_{it} \mid X_t) = P_{It} \tag{3}$$

The second model is dynamic, where the abnormal performance corresponds to the difference between the change in the issuer's operating profitability over the event window (t-1;t) and that of the control firm over the same period.

$$AP_{It} = \left(P_{it} - P_{i,(t-1)}\right) - \left(P_{It} - P_{I,(t-1)}\right) \tag{4}$$

Thus, the second model of expected performance is:

$$E(P_{it} \mid X_t) = P_{i,(t-1)} + \Delta P_{It} \tag{5}$$

where $\Delta P_{It} = P_{It} - P_{I,(t-1)}$.

It should be noted that the two matching methods used in this study have the common feature to adjust operating returns for the mean reversion effect that reflects, according to Barber and Lyon (1996), a transitory component of operating income.[12]

Finally, due to high skewness of accounting-based measures of performance, it is typical to report median values in empirical studies analyzing firms' operating profitability. Thus, we rely on the nonparametric Wilcoxon signed-rank test statistic in testing the null hypothesis that the median abnormal performance is equal to zero. To reduce the influence of extreme observations, we have also used the 25% trimmed mean as a measure of centre. This measure averages the middle 50% of the data and ignores the smallest 25% and largest 25%. The bootstrapping procedure suggested by Hesterberg *et al.* (2003) was implemented to test the statistical significance of the truncated mean. The results obtained (not reported here) are qualitatively and quantitatively in agreement with those based on median values and Wilcoxon test.

V.   TIME-SERIES PATTERN OF OPERATING PERFORMANCE

Table 2 presents the evolution of the operating profitability for the issuing firms prior and subsequent to the CB offering. Panel A shows that the overall trend of the median ROA around the offering year is that of an U-pattern. This is consistent with a mean-reverting component in the issuers' long term operating performance. Measured by EBITDA/TA ratio, the median ROA displays a decreasing tendency over the window (-3;0). It goes down from 8.49% in year -3 to 7.59% the year of the offering, and then to 8.5% the year +3.

Table 2

Operating performance (in %) of the issuing firms around the offering year

	Year relative to offering fiscal year						
	-3	-2	-1	0	+1	+2	+3
Panel A : Issuer's ROA							
Median	8.49	8.45	7.01	7.59	7.96	9.81	8.50
Panel B: Issuer's ROA adjusted for industry and mean reversion effects							
Median	-0.13	-0.95	-0.01	-2.08[**]	-1.67[*]	-2.46[**]	-3.95[***]
z-wilcoxon	(0.07)	(0.58)	(0.54)	(-2.16)	(-1.79)	(-2.18)	(-2.62)
Panel C: Issuer's ROA adjusted for size and mean reversion effects							
Median	-2.60	-1.53	-0.01	-2.11[**]	-3.12[**]	-4.53[***]	-5.31[***]
z-wilcoxon	(-1.54)	(-0.12)	(-0.98)	(-2.43)	(-2.39)	(-3.19)	(-3.03)
N	69	79	95	90	88	80	68

Notes: Panel A reports issuers' median ROA computed as EBITDA divided by the book value of total assets. In panel B, the industry and mean-reversion adjusted ROA is defined as the issuer's ROA minus that of the control firm chosen by matching each issuing firm with a nonissuing firm belonging to the same industry and with the closest year -1 ROA. In panel C, the size and mean-reversion adjusted ROA is defined as the issuer's ROA minus that of the control firm. This later is chosen as follows: all nonissuers with year -1 book value of total assets of 70-110% of the issuer are ranked, and the firm with the closest year -1 ROA is used as a matching firm. If the control firm is delisted from Worldscope database while the issuer is still trading, a replacement nonissuing firm is spliced in on a point forward basis. Whereas when an issuing firm gets delisted, we remove at the same time its control firm.[*], [**], [***] denote statistically significant at 10%, 5%, and 1% level, respectively, using Wilcoxon signed-rank test.

Panel B shows that after controlling for industry and mean reversion effects, issuing firms exhibit negative post-offering operating performance changes which become bigger and more significant as one moves away from the offering year. Thus, the median underperformance is estimated at 3.95% (significant at 1% level). Panel C reports the issuers' operating performance adjusted for size and mean reversion effects. The results obtained show that CB issuers exhibit median abnormal returns which are negative and statistically significant after the offering year. For example, the median size and mean reversion adjusted performance in year +3 is -5.31% (z-wilcoxon = -3.03). However, although some pre-issue operating abnormal returns in the two panels B and C are positive, we note that none of them is statistically significant at the conventional levels. Note that since the matching procedure is designed to select comparison firms on the basis of ROA metric, it is not surprising that the median adjusted performance in year -1 is nearly zero and is statistically insignificant.

Interestingly, the comparison of the two panels B and C in Table 2 makes clear that the decline of issuing firms' performance is much stronger and significant in panel C than in panel B. This suggests that the poor post-issue operating performance of Canadian CB issuers is attributable at least partially to industry-specific factors. Lewis *et al*. (2001) came to same conclusion in the US market.

Table 3 presents the median changes in issers' operating performance around the issue fiscal year. The first panel of this table indicates that the median unadjusted changes of ROA ratios remain weak and statistically non significant for all the event windows considered. The adjustment of operating profitability for industry and mean reversion effects (panel B) reveals negative and significant changes over the window (-1;+3). Indeed, the median difference between the change in the issuers' ROA and that of their matched counterparts in the same industry is negative and is widening. Panel C shows that changing the matching criteria does not seem to alter the content of our conclusions resulting from the preceding panel. Thus, compared to control firms matched on the basis of size and past performance, the issuing firms experience a more consistent decline in their operating performance over the windows (-1;+1), (-1;+2) and (-1;+3). On the other hand, whatever the matching criteria employed, no significant operating performance could be detected on the windows (-3;-1) and (-2;-1) intended to capture the pre-issue abnormal returns.

The M/B (stock price over book value per share) ratio is a proxy for the level of growth opportunities in the firm and should reflect the degree to which the market anticipates subsequent operating performance improvements. To this aim, we examine the M/B of issuers and their matching firms to determine whether the low subsequent operating performance for the CB issuers is reflected in low post-offering stock returns relative to nonissuing firms.

A clear trend is observable for the M/B ratio in panel A of Table 4. The median M/B ratio peaks at 1.31 at the end of the fiscal year before the offering and falls monotonically to 0.99 three years later. Panels B, C and D confirm the sharp decline in the issuers' growth opportunities subsequent to the offering. All post-issue changes in the M/B are statistically significant. Nevertheless, the decline is less severe and statistically less significant when changes are adjusted for the industry effect. Once more, this evidence appears congruent with the explanation that the post-offering drop in M/B is at least partially attributable to trends in the growth opportunities in the issuer's industry. Another explanation of the decline in the issuers' M/B ratio

subsequent to the CBs offering could be the expected dilution. In fact, according to Liu and Switzer (2010), investors perceive CBs as equity securities and, thus, react negatively to their offering announcements. This negative signal is progressively integrated in the issuer's stock price, leading to a decreasing pattern in the M/B over the post-issue period.

The significant decline in the Canadian firms' M/B after the issue is similar to the stock price deterioration found for equity issuers in the Canadian market (Desrosiers *et al*. 2004). This similarity supports the conclusion by Stein (1992) that CBs are used as a "backdoor" equity substitute. Interestingly, our evidence shows that there is no significant improvement in the stock price performance of the issuing firms prior to the issuance of CBs as has been documented in previous studies carried out in the US market (i.e., McLaughlin *et al*., 1998; Spiess and Affleck-Graves, 1999). Nonetheless, this pattern is in line with our findings on the issuers operating performance prior to the offering (see Tables 2 and 3).

Overall, our median results suggest that, for Canadian firms, issuing CBs is likely to be followed by a period of relative underperformance. Our evidence fails, however, to show any significant improvement in the issuers' profitability prior to the offering. In the next section, we investigate factors - suggested by theoretical models as well as by previous empirical evidence - which may affect Canadian firms' post-offering performance.

Table 3

Changes (in %) in operating performance for the issuing firms around the offering year

	From year i to year j				
	-3 to -1	-2 to -1	-1 to +1	-1 to +2	-1 to +3
Panel A : Issuer's unadjusted change in ROA					
Median	-0.98	-1.53	-1.12	0.29	-1.32
z-wilcoxon	(-0.73)	(-1.97)	(-0.80)	(-0.12)	(-0.69)
Panel B : Issuer's industry- and mean reversion-adjusted change in ROA					
Median	0.93	0.13	-1.29	-1.73[*]	-3.48[**]
z-wilcoxon	(0.14)	(0.95)	(-1.26)	(-1.68)	(-2.55)
Panel C : Issuer's size- and mean reversion-adjusted change in ROA					
Median	2.35	1.07	-3.54[**]	-4.29[***]	-5.95[***]
z-wilcoxon	(0.90)	(-0.69)	(-2.08)	(-3.04)	(-3.10)
N	69	79	88	80	68

Notes: ROA is computed as EBITDA divided by the book value of total assets. Panel A reports median changes in ROA relative to year -1. Panel B reports median changes in industry and mean-reversion adjusted ROA relative to year -1. The industry and mean-reversion adjusted ROA is defined as the issuer's ROA minus that of the control firm chosen by matching each issuing firm with a nonissuing firm belonging to the same industry and with the closest year -1 ROA. Panel C reports median changes in size and mean-reversion adjusted ROA relative to year -1. The size and mean-reversion adjusted ROA is defined as the issuer's ROA minus that of the control firm. This later is chosen as follows: all nonissuers with year -1 book value of total assets of 70-110% of the issuer are ranked, and the firm with the closest year -1 ROA is used as a matching firm. If the control firm is delisted from Worldscope database while the issuer is still trading, a replacement nonissuing firm is spliced in on a point forward basis. Whereas when an issuing firm gets delisted, we remove

at the same time its control firm. [*], [**], [***] denote statistically significant at 10%, 5%, and 1% level, respectively, using Wilcoxon signed-rank test.

Table 4
Changes in M/B ratio for the issuing firms around the offering year

	Year relative to CB offering fiscal year						
	-3	-2	-1	0	+1	+2	+3
Panel A: Issuer's M/B ratio							
Median	1.16	1.25	1.31	1.09	1.04	1.04	0.99
N	69	79	95	90	88	80	68

	From year i to year j				
	-3 to -1	-2 to -1	-1 to +1	-1 to +2	-1 to +3
Panel B: Issuer's unadjusted change in M/B ratio					
Median	-0.01	0.04	-0.10[**]	-0.20[**]	-0.21[**]
z-wilcoxon	(0.48)	(0.61)	(-2.02)	(-1.98)	(-2.40)
Panel C: Issuer's industry- and mean reversion-adjusted change in M/B ratio					
Median	0.06	0.20	0.08[*]	-0.24[*]	-0.16[*]
z-wilcoxon	(0.23)	(0.83)	(1.81)	(-1.94)	(-1.87)
Panel D: Issuer's size- and mean reversion-adjusted change in M/B ratio					
Median	0.11	0.02	-0.27[*]	-0.35[***]	-0.72[***]
z-wilcoxon	(0.84)	(0.19)	(-1.65)	(-2.83)	(-2.83)
N	69	79	88	80	68

Notes: Panel A reports issuers' median M/B ratio defined as market capitalization on book value of equity. Panel B reports median changes in industry and mean-reversion adjusted M/B relative to year -1. The industry and mean-reversion adjusted M/B is defined as the issuer's M/B minus that of the control firm chosen by matching each issuing firm with a nonissuing firm belonging to the same industry and with the closest year -1 ROA. Panel C reports median changes in size and mean-reversion adjusted M/B relative to year -1. The size and mean-reversion adjusted M/B is defined as the issuer's M/B minus that of the control firm. This later is chosen as follows: all nonissuers with year -1 book value of total assets of 70-110% of the issuer are ranked, and the firm with the closest year -1 ROA is used as a matching firm. If the control firm is delisted from Worldscope database while the issuer is still trading, a replacement nonissuing firm is spliced in on a point forward basis. Whereas when an issuing firm gets delisted, we remove at the same time its control firm. [*], [**], [***] denote statistically significant at 10%, 5%, and 1% level, respectively, using Wilcoxon signed-rank test.

VI. MULTIVARIATE ANALYSIS OF THE POST-ISSUE OPERATING PERFORMANCE

Canadian CB issuers exhibit a substantial long-term underperformance. While interesting, this conclusion is based on a central tendency measure (i.e., median) and does not provide the determinants of the cross-sectional variation in post-issue performance. This section further investigates the potential explanations for the shortfall of issuers' post-issue profitability by means of PLS[13] regressions.

A.   Methodology

We examine the relationship between dependent variables and independent variables with two variations of the PLS method. The first one - univariate PLS (PLS1) - consists in regressing separately each dependent variable on the whole of independent variables. Three dependent variables are considered in our analysis: unadjusted change in *ROA* (Y_1), industry- and mean reversion-adjusted change in ROA (Y2) and size- and mean reversion-adjusted change in ROA (Y3). This amounts to build as many models we have as endogenous variables; three models in our case, named model 1, model 2 and model 3 according to variables Y_1, Y_2 and Y_3. The second - multivariate PLS (PLS2) - consists in modelling the relation between the vector of the exogenous variables X and the vector of the endogenous variables Y considered in the framework of this analysis ($Y=Y_1$, Y_2, Y_3).

   We test the influence of three groups of exogenous variables on the long-run operating performance. The first group consists of variables suggested by theory as well as previous empirical works to proxy for issuing firms' characteristics, such as issuer size, leverage and M/B. The second group consists of variables related to the CB offering, such as its relative size and its maturity. Lastly, the third group is made up of one variable characterizing the CBs market conditions at the moment of issuance. Note that these independent variables are not exhaustive, but have the advantage of being commonly used in previous studies and of being available, either in the databases listed above, or in the offering prospectuses. Below we present a descriptive framework of these variables, as well as the expected sign of their relationship with the post-issue operating performance.

1.   Issuer-specific variables

•   Issuer Size: Stein (1992) and Brennan and Kraus (1987) both claim that financial distress costs and adverse selection problems are more serious for small firms than larger firms. Hence, small firms face many difficulties to enter the equity market and the straight debt market as a consequence, respectively, of the strong informational asymmetry and the financial distress costs. In this context, CBs appear as a suitable way of financing for dynamic smaller firms seeking to increase their capital in a differed manner. Thus, we expect the post-issue operating performance to be negatively associated with the issuer size. Size is proxied here by the natural logarithm of the book value of issuing firm assets in year -1.

•   M/B, proportion of intangibles and sales growth over the window (-2;-1): According to Essig (1991), the typical issuers of CBs are distinguished from the other firms by future growth opportunities (measured by the M/B ratio) and the ratio of intangible assets to total assets which are higher than the average. The "backdoor equity" model considers these two factors as empirical proxies of adverse selection and financial distress costs. Therefore, firms having many profitable growth opportunities, but facing these costs of external financing, would be tempted to issue CBs in lieu of other financial securities. Thus, we expect to find a positive coefficient for these two variables. Sales growth (calculated as total sales at fiscal year -1 minus total sales at fiscal year -2, divided by total sales at fiscal year -2) is also used as a proxy of growth

opportunities in our regressions. Stein (1992) and Brennan and Kraus (1987) both imply that this variable should have a positive influence on the firm value.

• Stock price run-up: According to Lucas and McDonald (1990), equity(-linked) offerings following a substantial increase in the firm's stock price are often perceived by the market like a reliable signal of overvalued stock price as suggested by the pecking order theory of financing. Lewis *et al*. (2003) unearth in the American context a positive and significant relation between propensity to issue CBs and the issuer stock price run-up. Thus, based on this evidence and in conjunction with Stein's (1992) model, suggesting that adverse selection problems cause firms to substitute CBs for common equity when information asymmetry is high and management is optimistic about the firm's future performance. We expect to find a positive coefficient for the price run-up.

• Issuer age: Diamond (1991) states that young firms do not enjoy a solid "reputation capital" and a sufficiently long history of financial information to enable them to alleviate moral hazard. Though, this barrier can be disrupted if these firms decide to rely on CBs, because, given their contingent nature, CBs could be used by investors to screen issuers in an optimal way (Lewis *et al*. 2001). Such a decision will be appropriate for issuing firms only insofar as they have favourable expectations regarding future prospects and opportunities. We expect a positive coefficient for this variable.

• Financial slacks: CBs do not only contribute, as it is the case of any loan, to diminish free cash flows problems, but also to induce managers to act in the best interests of the company and its shareholders in order to favor conversion and to avoid the redemption of CBs which could be detrimental to the issuing firm. We use the ratio of cash plus marketable securities divided by total assets to control for free cash flow problems. We expect this variable to be positively correlated with issuers post-offering operating performance.

• Financial leverage: As outlined in section 2, Stein's (1992) model suggests that "good quality" firms relative to market expectations, with high financial leverage and/or poor credit quality rating will tend to issue CBs instead of standard debt. Indeed, the low coupons of CBs ("interest sweetener") compared to coupons of straight bonds with similar risk and maturity, allow issuing firms to improve their profitability and, as a result, to increase the likelihood of conversion. We calculate leverage as the book value of total debt scaled by the book value of total assets. We expect a positive impact of this variable on the issuers' performance.

• Change in the issuer's performance over the window (-2;-1): McLaughlin *et al*. (1998) point out that CB issuers, like equity issuers (Loughran and Ritter, 1997), tend to raise funds in the market during periods when their operating profitability is particularly high. In fact, managers have incentive to benefit from these periods, labelled as "windows of opportunity", for the reason that they coincide with times when issuing firms' stock prices are very likely to be overvalued. McLaughlin *et al*. (1998) reveal a negative relationship between the pre-offering performance and the post-offering performance. This evidence leads them to explain the disappointing post-issue performance by the timing of the CB offering. In other words, the post-issue underperformance is probably not a demonstration of a perpetual erosion of the issuer

performance, but it would rather correspond to a mean reversion phenomenon. Thus, we expect to find a negative coefficient for this variable.

• Equity offering before the CB issue: McLaughlin *et al.* (1996) and Loughran and Ritter (1997) report that American firms experience a substantial fall in their long-run operating performance subsequently to stock offerings. Hence, Canadian firms that have conducted an equity offering before the CB issuance are expected to experience a particularly poor post-issue operating performance. To control for this effect, we introduce a dummy variable that is set to one if the issuing firm has conducted an equity offering (IPO or SEO) in the three years preceding the CBs issuance, and zero otherwise. We expect this variable to relate negatively to the issuers' performance.

• Issuer risk: As has been previously discussed in section 2, Green (1984) suggests that convertibles are useful to mitigate asset substitution incentives created by the presence of risky debt. Brennan and Kraus (1987) and Brennan and Schwartz (1988) argue in their models that CBs have a role in the reduction of the adverse selection problems arising when managers and investors do not share the same opinion about firm risk. As an empirical support to these models, Essig (1991) have revealed a positive relation between the use of CBs and the volatility of firms' operating cash flows. Thus, one would expect the issuer risk to have a positive effect on the post-issue operating performance. Two measures of issuer risk are considered in our multivariate analysis. The total risk, computed as the standard deviation of issuer returns, and the systematic risk, computed as the beta coefficient of the standard two-parameter market model. Both of the two variables are estimated over the 250-trading-day period preceding the offering announcement date.

• Change in fixed assets over the window (-1;+3): this ex-post variable, calculated as the change in property, plant and equipments from year -1 to year +3 scaled by the book value of total assets in year -1, aims to capture the effect of the change in fixed assets on the issuers operating performance. Under rational expectations, firms investing proceeds in value-enhancing investment plans will see their operating profitability improving after the offering. Therefore, we predict this variable to be positively associated with the subsequent operating performance.

2.   CB offering-related variables

• Relative issue size: the capital structure decision model of Fama and Miller (1972) argues that, under informational asymmetry, unanticipated outside financing implies that managers expect earnings downturn. This model also states that the extent of the profitability decline is directly proportional to the size of the proceeds raised on the market. The spirit of Fama and Miller model is consistent with Miller and Rock (1985) model predicting that the amount of unexpected external financings are commensurate with the discrepancies between the actual and the forecasted earnings. Hansen and Crutchley (1990) and Bae *et al.* (2002) provide empirical support of the above-mentioned models in the specific context of CB offerings. They argue that the larger the amount of unexpected funding is, the worse the issuing firm's performance after the offering. On the other hand, according to Liu and Switzer (2010) and Loncarsky *et al.* (2008), the relative issue size proxies for the dilution effect which may influence negatively the performance of the issuing firm. As a result, we expect to find a

significant negative relation between the relative offer size, computed as the offering proceeds divided by the book value of assets in year -1, and the post-issue operating performance.

• Use of proceeds: The examination of offering prospectuses reveals that proceeds are mainly meant to fund investment plans and/or to refinance senior debt. According to the models of Green (1984) and Brennan and Kraus (1987), CB issues earmarked for short-term debt refinancing would involve a favourable reaction from investors. This was later confirmed by the empirical study conducted by Mehta and Khan (1995), who indicate that CBs are typically effective for debt refinancing. The effect of the stated use of proceeds is controlled for in our regressions by including a dummy variable which is equal to one if the intended use of issue proceeds is to fund internal or external investment activities, and zero otherwise.[14] This variable, ceteris paribus, is expected to load negatively on the post issue operating performance.

• Conversion premium: The higher the conversion premium, the higher the expected increase in the underlying stock price which is necessary in order for conversion to be attractive to the investor or for a mandatory conversion to be executed by the issuer. Therefore, a high conversion premium acts as a good signal revealing managers' optimism regarding the future opportunities of the issuer (Brennan and Kraus, 1987). We predict a positive association between this variable and the subsequent issuer's operating performance.

• Maturity: According to Flannery (1986), the issuance of short term debt would be perceived as a positive signal about the prospects of the issuing firm. However, both Brennan and Kraus (1987) and Brennan and Schwartz (1988) models suggest that typical CB issuers (i.e., small, highly levered and high-growth firms) should issue CBs with long maturities. The rational behind this hypothesis is the following: the issuance of straight debt with high maturity is generally associated with a lack of visibility regarding the investment policy of the issuing firm, leading to a significant increase of the risk undergone by debt providers. Nevertheless, this potential hazard with long maturities is substantially attenuated by the inclusion of the conversion feature in the bond offering. We expect the CB maturity to relate positively to post-issue operating performance.

3. CBs market conditions

• Dynamism of the CB market: Lewis *et al*. (1998) and Lewis *et al*. (2003) report dramatic cyclical swings in the number of CB issues in the US market. Indeed, "hot" periods are usually followed by "cold" periods. Spiess and Affleck-Graves (1999) showed that firms having issued during "hot" market windows tend to exhibit a strong fall in their stock price performance over the subsequent five years. The most likely explanation to this situation is the earnings management activity which seems particularly plausible around the time of CB issues. Indeed, earnings manipulation causes accounting profitability measures to be inflated up before CB financings and decline thereafter (Urcan and Kieschnick, 2007; Chou *et al*., 2009). To measure the marginal impact of CBs market conditions on the issuer performance, we include a dichotomous variable set to one if the issue occurs in a "hot" market and zero otherwise. We identify "hot" and "cold" periods using a methodology close to that

suggested by Bayless and Chaplinsky (1996) in the context of equity offerings. Thus, initially, we compute the aggregate CB issue volume (expressed in 2002 real CA$) using all offerings in the original sample. In a second step, we identify "hot" periods as being those for which annual turnover of issues exceeds the median annual volume over the period 1990-2002. By applying this definition, we could identify three "hot" periods between 1990 and 2002: 1990, 1993-1994 and 1999-2002.[15] We expect a negative sign for this dummy variable.

B.   Results of the PLS Regressions

The PLS regressions results are shown in Table 5. Note that, in order to save space, PLS1 regressions results are not presented, but they match perfectly those of PLS2 regressions.

Table 5

Multivariate analysis of the determinants of issuers' long-term operating performance using PLS2 regressions

Independent variables	Expected sign	Model 1	Model 2	Model 3
tercept		-45.51	-44.15	-34.24
Panel A : Issuer-specific variables				
[1] Size Issuer	(-)	2.16^{***}	1.88^{***}	1.60^{**}
[2] M/B	(+)	0.62	0.54	0.46
[3] Intangibles	(+)	21.79^{**}	18.92^{**}	16.13^{*}
[4] Sales growth	(+)	-0.50	-0.43	-0.37
[5] Price run-up	(+)	13.44^{*}	11.67^{***}	9.95^{**}
[6] Age	(-)	0.14^{*}	0.12^{*}	0.10
[7] Financial slack	(+)	-21.74^{***}	-18.87^{**}	-16.08^{**}
[8] Leverage	(+)	23.76^{**}	20.63	17.58
[9] Performance$_{(-2;-1)}$	(-)	-0.54	-0.47	-0.40
[10] Stock issue	(-)	-0.59	-0.51	-0.43
[11] δ	(+)	20.41	17.72	15.10
[12] β	(+)	1.86	1.62	1.38
[13] ΔFixed assets$_{(-1;+3)}$	(+)	44.22^{***}	38.39^{**}	32.72^{***}
Panel B : CB offering-related variables				
[14] Relative issue size	(-)	-1.06	-0.92	-0.78
[15] Use of proceeds	(-)	-13.47^{***}	-11.69^{**}	-9.97^{***}
[16] Conversion premium	(+)	5.24	4.55	3.88
[17] Maturity	(+)	0.53	0.46	0.39
Panel C : CBs market conditions				
[18] Hot/cold	(-)	-3.36	-2.91	-2.48
N		68	68	68
R²		21.68	11.93	13.96

Notes: Dependant variables are the issuer's unadjusted change in ROA (model 1), industry- and mean reversion-adjusted change in ROA (model 2), and size- and mean reversion-adjusted change in ROA (model 3). ROA is defined as EBITDA as a percent of the book value of total assets. The window retained in all models to measure the operating performance is (-1;+3). Except indication, the values taken by the independent variables are computed on the data of the issuing firms at the end of year -1. The optimal number of principal components in the PLS regression is determined by cross validation (Jackknife). The values of regression coefficient are expressed in percentage. (1) Natural logarithm of the book value of total assets. (2) Market capitalization scaled by book value of equity. (3) Total intangible assets divided by the book value of total assets. (4) Sales growth over the period (-2; -1). (5) Issuer stock returns cumulated over the 75-trading-day period preceding the offering announcement date. (6) Number of years from the incorporation date to the offering date. (7) Cash and short term investments scaled by the book value of total assets. (8) Total debts divided by the book value of total assets. (9) change in issuer adjusted performance over the period (-1; -2). (10) Dummy being one if the issuer have undertaken an equity offering during the three years preceding the CB issue, and zero otherwise. (11) Annualized historical volatility estimated over the 250-trading-day period preceding the offering announcement date. (12) Equity systematic risk estimated by beta of the standard two-parameter market model over the 250-trading-day period preceding the offering announcement date. (13) Change in property, plant and equipments over the window (-1;+3) scaled by the book value of total assets in year -1. (14) Gross proceeds of the issue standardized by the book value of total assets. (15) Dummy variable being one when the intended use of the proceeds is the financing of an investment plan and zero otherwise. (16) The percentage amount by which the price of the CB exceeds the underlying stock price at the offering announcement date. (17) Number of years until the expiration date of the CB. (18) Dummy variable taking the value one if the CB offer took place during a "hot" period and zero if not. To identify "hot" periods, we adopted a methodology close to that applied by Bayless and Chaplinsky (1996) in the context of stock offerings. Thus, initially, we computed the aggregate CB issue volume (expressed in 2002 real CA\$) over the period 1990-2002. In a second step, we identified the "hot" periods as being those for which annual turnover of issues exceed the median annual volume over the period 1990-2002. By applying this definition, we could identify three "hot" periods between 1990 and 2002: 1990, 1993-1994 and 1999-2002. [*]: $p < 0.1$; [**]: $p < 0.05$; [***]: $p < 0.01$.

Panel A shows that the size of the issuing firm influences its long-term operating performance favourably. The regression coefficient associated with this variable is positive in all models and statistically significant at least at five percent level. Thus, the post offering under performance proves to be stronger for the smaller issuers. This evidence, however, contradict the normative models of Brennan and Kraus (1987), Brennan and Schwartz (1988) and Stein (1992). It is also not congruent with the empirical findings of Spiess and Affleck-Graves (1999) who point out in the US market that the underperformance is less pronounced for small issuers (1st and 2nd quintiles) during the five years following the offering.

With respect to variables proxying for growth opportunities and informational asymmetry between investors and managers (i.e., M/B, proportion of intangibles, sales growth and price run-up), we find that only proportion of intangibles and price run-up are statistically significant at conventional levels. In addition, their regression coefficients are positive as hypothesized. The changes in operating performance are positively and significantly (except in model 3) related to the issuer age, considered also as a proxy of adverse selection costs. Although this result is inconsistent with our expectations, it is however in harmony with Spiess and Affleck-Graves (1999) empirical findings that long-run underperformance is more severe for young firms. It is worth mentioning as well that Loughran and Ritter (1995) or Spiess and Affleck-Graves (1995) came to the same conclusion while examining the long-run performance of American SEOs. Contrary to our predictions, the regression coefficient of the "financial slack" variable, proxying for the agency costs induced by the free cash flows, is negative and statistically significant at least at five percent level in all models.

Consistent with the assumption derived from Stein's (1992) model and the empirical reports of McLaughlin *et al*. (1998), issuer leverage appears to load positively on the operating performance changes. This indicates that highly levered issuers have better operating performance.

With regard to the run-up in operating performance before the CB offering (i.e., Performance$_{(-2;-1)}$ variable), the estimated coefficients are negative as expected, but they lack statistical significance. Thus, the regression results do not support the timing hypothesis. Also, the influence of new equity issue activity prior to the CBs offering does not seem strong enough to explain the performance decline. In conformity with our expectations, the systematic and idiosyncratic risk load positively on the issuer performance. However, the regression coefficients of these two variables are not statistically significant in none of the three models. This calls into question the theoretical models of convertible debt financing stating that CB issues are conducted by firms anticipating an improvement in business conditions, but facing asset substitution costs or adverse selection costs resulting from uncertainty about firm risk (Brennan and Kraus, 1987; Brennan and Schwartz, 1988). The coefficient of changes in the level of fixed assets is significantly positive in all models, implying Canadian firms allocate offering proceeds to value enhancing investments.

The analysis of the variables related to the offering (panel B) seems to show that all of them present signs which are consistent with our expectations. Nevertheless, only the coefficient associated to the potential use of proceeds is statistically significant at customary thresholds in all models. This negative sign suggests that Canadian issuers planning to use the offer proceeds to fund their internal and/or external growth are characterized by a stronger post-issue underperformance than those intending to use the proceeds to repay existing senior debt. These results support the rationales of Brennan and Kraus (1987) and Brennan and Schwartz (1988), and are congruent with the early empirical findings of Mehta and Khan (1995). However, they seem somewhat contradicting our previous result on the relationship between the change in fixed assets and the operating performance. Two explanations can be proposed to explain this conflicting evidence. First, the formally stated motive of the offering may diverge from the actual intentions of the issuer (Akhigbe *et al*., 1997). Second, the issue motive remains ambiguous in several offerings in the sample (e.g. mixed use rather than either investment or refinancing). This renders the method employed to determine issuer motivation to some extent arbitrary, thus increasing the likelihood of measurement error in this independent variable.

Lastly, in accordance with our expectations, the coefficient associated to the variable proxying for CBs market dynamism exhibits a negative sign, although it is not significant at conventional thresholds.

VII.   CONCLUSION

The objective of this study is twofold. First, we evaluate the long-run operating performance of CB issuing firms in Canada; and second, we identify factors which are likely to explain this performance.

In the first place, drawing on the long-run event study methodology, we find that Canadian CB issuing firms' exhibit significantly lower operating performances vis-a-vis their matched counterparts during the post-offering period. This conclusion is robust

with respect to a range of performance measures and benchmarks suggested in the theoretical and empirical literature. Consistent with the conclusions of previous studies undertaken in the American context, CB offerings can be used to forecast poor subsequent operating performance. The similarity of our results to those reported within the prior literature on IPOs and SEOs supports the conclusion by Stein (1992) that convertible debt is used as a "backdoor" equity substitute. Our findings also provide evidence that this post-issue downturn is partially attributable to an industry effect. However, contrary to previous research on the topic, our study fails to show any significant improvement in CB issuers' performance before raising funds on the market. This result, thus, does not lend support to the "window of opportunity" hypothesis which puts forward the opportunistic timing by management as the main motivation of equity-linked offerings.

Secondly, we perform a multivariate analysis based on the PLS approach in order to examine the link between issuers' operating performance and three groups of variables characterizing, respectively, the issuing firm, the offering and the market conditions where the offer took place. The results suggest that the level of the operating performance is significantly correlated, on one hand, with factors related to the issuing firm, such as its size, financial leverage and future growth opportunities, and on the other hand with the intended use of the offering proceeds. The offering market conditions however do not seem to have a perceptible impact on the operating performance of the issuing firm. Furthermore, it is worth noticing that the signs of the regression coefficients are not always in conformity with those predicted by the theories providing explanation for the use of CBs. This suggests that the CB offering is not inevitably the result of a rational decision made in order to signal the good profitability prospects of the issuer in a context of information asymmetry or to eliminate ex-post agency costs. Rather, our findings appear to reinforce the capital rationing hypothesis by the equity market. According to this hypothesis, in the presence of adverse selection and moral hazard costs, the financial market, fearing an ineffective allocation of resources, does not intend to satisfy all the demand that it receives. This obliges firms seeking equity financing ("would be" equity issuers) to rely on CB offerings in the hope that they will be later converted into equity (Lewis *et al*., 2001).

Lastly, Lewis *et al*. (2003) in the American context and Loncarski *et al*. (2008) in the Canadian context show that the wealth effect associated with the announcement of convertible debt offerings is conditional to the CB design (equity-, mixed- or debt-like). Thus, the natural extension of this article would be to check whether our conclusions on the issuers' operating performance and its determinants could be altered when the CB design is taken into consideration.

ENDNOTES

1. See Cheng *et al*. (2005) or Abhyankar and Dunning (1999) for a literature survey.
2. Stein's "backdoor equity" model is an adaptation of the adverse selection model suggested by Myers and Majluf (1984). It identifies the most suitable financing vehicle depending on the firms' characteristics in terms of information asymmetry and financial distress. This model predicts that high quality firms issue straight bonds and low quality firms issue equity, whereas medium quality firms choose CBs.

3. Published studies on Canadian CBs include Loncarski *et al*. (2008) and Loncarski *et al*. (2009). The former analyzed the issuer motives and the announcement effects of CBs, whereas the later focused on the pricing and arbitrage on CBs.

4. Early surveys directed to managers of several American firms show that about two-thirds of the managers surveyed indicate that their ultimate desire was to raise equity and that they believe their stock price would increase over time (Pilcher, 1955; Brigham, 1966; Hoffmeister, 1977). However, more recent survey analyses provide evidence both for the delayed equity and the sweetened debt viewpoints on CBs (Billingsley and Smith, 1996; Graham and Harvey, 2001).

5. Since issuers' operating performance is studied over seven fiscal years surrounding the offer fiscal year (i.e., (-3;+3)), the overall time period covered by our study is 1987-2006. We do not use data prior to 1987 because several variables in our analysis are not available in a consistent fashion prior to that year.

6. Empirical studies have shown that proceeds from CB offerings (in both absolute and relative terms) are higher than the average proceeds raised in the context of equity or straight debt offerings (see, for instance, Mikkelson and Partch (1986), Lewis *et al*. (1999), Eckbo *et al*. (2000) and Bae *et al*. (2002)).

7. According to the World Federation of Exchanges, the average number of quoted companies in the TSX Group is 978 over the period 1995-2006, whereas the corresponding number for the US market (NYSE and NASDAQ) is 13,440 during the same period.

8. Unless specifically stated otherwise, these years will be noted henceforth as year -3, year -2, year -1, year +1, year +2, and year +3; with year 0 being the offering fiscal year.

9. Teoh *et al*. (1998a) and Teoh at *al*. (1998b), amongst others, present evidence indicating that managers of firms that considering to make an IPO or a SEO have incentive to boost earnings relative to cash flows by means of discretionary accruals. Recently, Kieschnick and Urcan (2007) came to the same conclusion for CB issuers.

10. The general tenor of our results is unaffected when we use *ROS* as an alternative measure of operating performance. Thus we prefer to not report them in the current article.

11. In their simulations, Barber and Lyon (1996) have tested several combinations of control variables. They have shown that matching sample firms to control firms on size and pre-event performance, without regard to industry, provides well specified test statistics.

12. Barber and Lyon (1996, p. 396) state that "*without exception, the models that yield well specified, powerful test statistics incorporate a firm's past performance*".

13. PLS (partial least squares) regression is a recent technique that generalizes and combines features from principal component analysis and ordinary multiple regression. We preferred this technique to other traditional regression techniques, such as OLS regression, for a number of reasons. In fact, PLS regression functions with missing data (2% observations in the independent variables matrix are missing in our sample). Moreover, this method is based on few probabilistic assumptions (e.g. normality is not required). It also addresses the multicollinearity issue which makes OLS estimates irrelevant (the absolute value of six correlation coefficients in our sample is larger than 40% with *p*-values less than 1%). Finally, the use of

PLS technique has been strongly recommended in situations where the number of exogenous variables is large (18 variables in the current study), surpassing even the number of observations.

14. The majority of offering prospectuses indicates more than one single purpose for the offering, thus rendering difficult the calculation of this variable. To deal with this problem, and in line with Akhigbe *et al*. (1997), we consider the issue motive that is listed first under the heading "Use of proceeds" of the offering prospectus as being the main motivation of issue.

15. Similarly to us, Loncarski *et al*. (2008) report that CB offerings exhibit some bunching in the Canadian market, with "hot" periods being 1993-1994 and the end of the 1990s forwards.

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