NEW EVIDENCE ON MARKET IMPACT OF CONVERTIBLE BOND ISSUES ON UNITED STATES FIRMS

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ABSTRACT

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This study examines the market impact of recent convertible bonds new issues of United States listed firms. The thesis focus mainly on the market reaction surrounding the announcement dates and the issue dates of convertible bonds. The evidence suggests that firms experience negative abnormal returns around the announcement of new issues of convertible bonds. The determinants of these abnormal returns are the total market value of firms, their price-to-book ratio, the period 2000-2001 and the outstanding amount of the issues. A simulation made using convertible arbitrage strategies suggests that investor could take advantage of these negative abnormal returns by going long on the firm's convertible bond and short on the firm's stock at the issue date.

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1. INTRODUCTION

With the recent equity bear market of the early 2000's, firms have searched for alternatives to pure equity issues to finance their investment projects. Convertible bonds, which are bonds that can be converted into a firm's stock at a specified price during a given period, have become more popular financing instruments through time. Indeed, convertible bonds may provide a cheap source of funds in periods of low interest rates and struggling equity markets. Moreover, a growing number of investors and investment funds, especially hedge funds, have sought to invest in this category of assets. New issues of convertible bonds represent approximately the same proportion of the United States corporate bond market as the high-yield sector, amounting for an estimated 92 Billions US $ in 2002, or about 14.4% of all new corporate bond issues in the U.S. in 2002.[1]

There are many incentives for firms to use convertible bond financing. For example, new issues can be consummated rapidly since they tend to be marketed via conference calls rather than road shows. Moreover, the execution of these bonds has limited risk. Convertible bonds can also be flexible tools for balance sheet management since coupons and conversion price can be tailored to the issuer's needs. Additional features can even be added to the asset in order to meet issuer's needs as well as investors' needs. Convertible bonds are also useful to companies trying to add some ballast on the balance sheet to stave off concerns about liquidity and leverage. The firm

[1] The Bond Market Association, U.S. Market Outlet, January 2002.

can thus enjoy lower interest costs. Nevertheless, accountants and rating agencies treat convertible bonds as debt.[2]

Investors may also benefit from the asset characteristics of the convertible, for risk reduction purposes, as they may provide investors with the protection of a bond combined with some of the upside potentials of a stock. However, to the extent that stock and bond markets movements are synchronized, diversification benefits may be limited. The main risks of convertible bonds are in the reduction of the firm's credit rating, as its debt ratio rises in the short term, which could affect equity prices directly, as well as indirectly, to the extent that conversion leads to significant dilution of the firms' stock.[3]

This paper serves two purposes, first to re-examine the market impact of new convertible issues using recent data. Secondly, it proposes a new test of market efficiency, through simulation of a hedge fund strategy that has been touted in the popular press. For example, in Business Week (November 16th 1998), it is suggested that a company's convertible bond tends to rise at two-thirds the rate of its common stock price. However, it is also suggested that when a stock sags, the average convertible suffers only half the

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[2]Knutson (1971) looks at the accounting implications of convertible bond costs and their impact on the financial statements of firms. He suggests that manager should be aware of how costly convertible securities are likely to be. Further, caution should be taken by both manager and investors when analyzing the effect of convertible securities could have on firms' statements. In his research, Knutson found that, on average convertibles securities are more costly than indicated in the firm's financial statements. The understatement of the real cost of convertibles is, on average, 55 % for debt convertibles. This explains the undervaluation of costs in financial statements. These misrepresentation caused by convertible securities tend to overstate earning per share. Further, he found that in many cases the "fully-diluted earnings per share more closely approximates real earnings per share that does primary." This means the real cost of convertibles is clearly higher than the nominal interest on face value of the securities and mangers and investor should give a special attention to the real costs of these securities.

[3]Recent examples of convertible bond issues show a boom in zero-coupon bonds as well as in short-dated puts. Firms choose to issue bonds featuring a short-dated put structure in order to make the bonds more attractive for investors. The structure has been used in many large issues recently. For instance, Calpine Corp., Tyco International Corp., ComCast Corp., Cox Communications Inc, and many others have included it in their convertible bonds issues. In fact, the record sales of $4.5 billion in convertible bonds by Ford in January 2002 clearly shows that interest in short-dated put structures is rising. It is likely to continue to be popular for a certain period of time.

damage. Accordingly, it is argued that profits could be made by combining a long position on the convertible bond and a short position on the stock.

In this paper, I will look at an implementable zero investment strategy used by many hedge funds manager to take advantage of prices variations that follow convertible issues. This strategy under study will consist of a long position in the firm's convertible bond and a short position in the same firm's stock. The strategy has a zero initial investment since the amount of the short sale equals the amount of the long position in the convertible bonds. I want to determine if this strategy earned abnormal returns for investors over the period under study. Therefore, I will show the returns for an investor throughout the period under study. Doing so, I will see if the premium for the conversion factor in convertible bonds is correctly priced. Indeed, if the strategy showed no significant positive returns, one can argue that there are no free lunches in the market for such a strategy using convertible bonds and firms' stocks.[4] To the extent that such a trading strategy is profitable, it provides evidence against market efficiency unlike Fama (1991).[5]

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[4] Funds using convertible arbitrage have purported to show great returns from their strategies in the last decade. The Convertible Arbitrage Index of Credit Suisse First Boston/Tremont claims to have beaten the S&P500 since its inception in December 1993. Since inception the convertible index has a cumulative return of 150.04 % with an average yearly return of 10.62% as of February 2003. During the same period, the cumulative returns of the S&P 500 were 74.65% and its average yearly returns were 6.33%. The difference got larger in the bear market of the last 3 years. Indeed, the yearly average of the convertible index during the 3 years was 13.84% versus –14.93% for the S&P 500. Furthermore, investments in such an index provided good diversification for investors. The Convertible Index has very low coefficients of correlation with other majors' index such as 0.13 with the S&P 500. A beta of 0.04 also shows the diversification benefits that an investor could gain by including such an index in his portfolio. The benchmark used to calculate the beta was the S&P 500. The beta was calculated on a monthly basis and also on the same period beginning on January 1994 and ending on February 2003. The Index monthly Sharpe ratio of 1.27 also proved the strength of the returns. Again, during the same period, the S&P 500 Sharpe ratio was only 0.12. The Sharpe ratios were calculated by Credit Suisse First Boston/Tremont Index LLC and the rolling 90 day T-bill rate was used.

[5] Fama found that on average stock prices adjust quickly to information about investment decisions such as changes in capital structure. Thus, prices adjust efficiently to firm-specific information.

This paper is structured as follows. The next section provides a brief review of the extant literature. Section three describes the data collection. Section four explains the methodology used in the empirical tests, results, follow in section five. A summary and conclusion are found in section six.

2. LITERATUE REVIEW

The choice made by firms to use convertible bonds may in part be explained by the theory of capital structure. Early studies, such as Myers and Majluf's (1984) "pecking order" theory, have focused on pure debt or equity issues, ignoring hybrid securities like convertibles. Myers and Majluf's (1984) introduced a pecking order theory that incorporates the information asymmetry between investors and firm's management. In most situations, a firm's manager will know both the present value of an investment opportunity as well as the value of the firm in the absence of the investment; investors do not have this information. Myers and Majluf assume that capital markets show semi-strong form efficient and are perfect. Even if firms tend to issue debt securities before stock related securities, sometimes when managers feel their stock are overpriced, they prefer to issue stocks and take advantage of new investors. Under this assumption, manager should issue stocks when they are overvalued and issue debt when investors undervalue the firm. Asquith and Mullins (1986) provide empirical support for this, when they show that announcement of new equity issues are followed on average by a 3% abnormal drop in stock returns. This contrasts with Modigliani and Miller (1961) where a firm's capital structure is deemed irrelevant to determine its total value.

Myers and Majluf (1984) further note that a firm will issue different kinds of securities depending on the managers' expectations of the value of projects undertaken.

Specifically, firms are expected to issue stocks when a bad state of the world is expected to happen and will issue debt when a good state is most likely to occur. If the project will have a beneficial impact on the firm's value, the manager will not want to share the profits with new investors and therefore will tend to finance by internal sources or by debt. However, if the project has the possibility of increasing the risk of the firm and/or decreasing the firm's value, the manager will want to share this downside risk with new investors and will issue stocks. They explain that the profit per share in good states will be higher if the firm uses debt instead of stocks. This is mainly due the tax shield provided by the debt components and the dilution effects included in stock issues. This risk sharing phenomenon associated with stock issues serves as a signal to the market. This is one of the reasons why stock issues announcement are generally followed by decrease in firms' stock price. This signalling process also explains why investors usually react favourably when firms announce new debt issues. Indeed, Masulis (1983) found that events increasing firm's leverage are generally associated with positive abnormal returns and events decreasing firm leverage are usually associated with negative abnormal returns.

Myers (1984) further notes that firms choose to avoid having to finance real investment by issuing common stock or other risky securities, since they do not want to run the risk of having to finance positive NPV projects when the potential new stock issue price is too low. Hence, firms are expected to cover new investments opportunities with the maximum reasonable debt level that is considered safe for the firm. In doing so, firms avoid costs associated with financial distress and maintain a portion available as a reserve to borrow more if unexpected positive NPV opportunities are presented to the firm. Myers' last conclusion relates to situation where firms do not have any additional internal cash flows or are unable to issue safe debt; the pecking order theory will prevail. This means that firms will tend to issue less risky securities first. Therefore, firms will prefer to issue convertible debt instead of common stock.

However, the signal sent by new issues of securities can become mixed when firms begin to finance positive NPV projects using new equity for many different reasons that are not anticipated in the traditional theories of capital structure. Indeed, a recent study by Baker and Wurgler (2002) shows that firms try to time the market and will issue stocks when their market values are high relative to past market values and book price and will repurchase stocks when they are low. Baker and Wurgler show that several mixed signals were sent to the market in the late 90's where many firms financed their positive NPV projects with stocks to take advantage of the bull equity market.

To date there have been relatively few studies on the impact of convertible bond issues. The theoretical literature typically postulates ambiguous effects of new convertible issues on stock price in reflection of the trade off of tax and agency benefits against a dilution effect that occurs when the bonds are converted into stocks. The usual finding is that such issues represent bad news to shareholders. Empirical studies have generally shown that the tax and agency benefits are indeed outweighed by the stock conversion dilution effect. Dann and Mikkelson (1984), for example, found negative abnormal stock returns of –2.31%, on the announcement day of a new convertible bond issue. Furthermore, they find that the abnormal returns are less negative when the new convertible bonds have an important impact on the increase in leverage compared to those that have a small impact on firm leverage. On average, convertible debt usually increases financial leverage.

Kim (1990) shows that the signals sent by convertible debt issues are mainly related to the conversion ratio and the market reactions to the new issues can be positive or negative. The reactions depend mainly on the expected time that the convertible debt is likely to become at-the-money. Kim demonstrated that the convertible debt would send the same positive signal to the market as a straight bond issue if the conversion ratio is large and therefore the time to become at-the-money is also large. Furthermore, a lower conversion ratio and a short expected time to become at the money will send a similar signal to that of a stock issue.

Stein (1992) provides an alternative argument for a firm's use of convertible debt. The main idea of his theory is that firms will issue different securities depending on the nature of these firms. He separates firms into three types: good, medium and bad. The good and bad firms are less likely to issue convertible bonds. A good firm has many incentives to issue straight debt, the alternative would be sell under priced securities with no compensating advantage. Bad firms will not issue convertible bonds due to the high probability of having an overhanging position that would limit both future debt and equity issues. Convertible bonds are more appropriate to serve medium firms. Indeed, these companies need equity in their capital structure but want to send positive signals to the market. Medium firms see advantages to correctly use convertible bonds in good states since if negative earnings occur, they will not have an optimal level of debt and its future issues of equity and debt would be compromised. Therefore, Stein put more emphasis on financial distress and expected earnings to evaluate the choice of convertible debt issues.

To explain the use of convertible debt, Stein also mentioned that the expected rate of growth is a determinant variable that will also have an impact on the stock price. Indeed, the expected rate of growth will impact the probability that the bond become at-the-money. Stein also stated that the market can anticipate the amount of time before the bond is converted. It can be done by setting the conversion price equal to the stock price in the formula: $E(S_T) = S_o e^{\mu T}$. In this function, S_o, is the current price of the stock, μ, represents the drift or the growth rate of the stock and ,T, represents time. Therefore, investors can determine the conversion time, T, that it will take for the bond to become at-the-money. In sum, Stein (1992) differs from Kim (1990) by adding market expectations to the model. Indeed, Stein's hypotheses are similar to the ones by Kim (1990) where in good states, firms will issue convertible debt with high relative conversion price and high expected time to conversion. On the opposite, firms will use shorter expected time to conversion and lower conversion price when bad states are expected by managers.

In the same vein, Davidson, Glascock and Schwartz (1995) note that the average expected time for a convertible security to become at-the-money is between one, and one and a half years. They find that the lower the expected time to become at-the-money, the more negative are the abnormal returns on the firm's stock. However, they expect firms to experience negative abnormal returns surrounding the announcement date even if the expected time to become at-the-money is longer than one and a half year. They found an average significant negative abnormal return of –1.4% from the day prior until to the day of the announcement of the issue is made. Their findings confirm Kim's (1990) argument that low conversion prices send more negative signals to the market and high conversion prices send more positive signals. Growth is shown to be significant as expected by Kim (1990) and Stein (1992) but only in one of the two samples tested by Davidson, Glascock and Schwartz (1995).

Previous studies of new security issues typically look at ***announcement dates*** for capital structure changes. There are only few studies that analyze the impact of the convertible bond on the ***issue date***. The issue date is relevant for the hedge funds who purportedly profit by taking a short position in the underlying stock surrounding the issue date. They ostensibly use the proceeds of the short sell to buy convertible bonds. The profitability of the strategy will depend, in part, on the extent of the negative abnormal returns around the issue date. The impact of hedge funds on firm's finance cannot be ignored since they bought for nearly 70% of all convertible bond new issues in 2001 on financial markets as mentioned in the Evans (2002). This phenomenon also has an impact on firm's stock value since many of their investment strategies on convertible bonds involve the use of short selling of stocks. This is why an overview of the arbitrage hedge funds industry and convertible bond characteristics are needed to fully understand the subject.[6]

[6] The market of hedge funds that invest in these bonds using arbitrage strategies is increasing at a very rapid rate. The overall value of convertible hedge funds has grown from $10 billion in mid 2001 to over $25 billion by the end of 2002. Hedge funds are major participants in the convertible bond market. Indeed, hedge funds accounted for almost 70%, or about $15.5 billion, of this market in 2002. The proportion of the market they occupy has doubled since 1994. This trend should not be a problem unless we get into scenarios where everybody wants to sell and the only buyers are other hedge funds that are looking to get out as well. Obviously there would be major liquidity problems in such a case. On the other hand, leverage in convertible arbitrage was low and no particular problems occurred surrounding September 11th 2001. Thus, it seems that hedge funds provide liquidity in the market by trading a lot. Moreover, they provide liquidity to other institutions by taking over their convertible bond positions when the underlying stock price begins to rise. In such cases, the convertible bond starts to track the stock's performance, making the security less appealing to institutions preferring to own the stock outright rather than the bond. Convertible arbitrage funds have showed good returns in recent years. For example, these funds had the second best performing strategy in the industry in 2001, with a performance of 14.6%. They had a net of $2.1 billion in new assets in the third quarter of 2001 alone, due mainly to the record level of new convertible issues of $ 104 US billion.

3. DATA SELECTION

Firms in this study were selected if their stock trade on either the New York Stock Exchange (NYSE), the American Exchange (AMEX), or the over-the-counter (NASDAQ) market. As a first step, I identified all the offerings of convertible bonds during the period beginning January 1993 and ending December 2001 as reported in the Bloomberg list on July 1st 2002. Most of the convertible bonds issues completed during the period will be included in the sample, since my sample includes bonds that were still traded as on July 1st 2002 on Bloomberg data set. However, converted and matured bonds are not included in my study. Eighteen bonds have to be dropped from the sample since they did not have enough data to compute one month of bond returns mainly because they were issued late in 2001. The daily returns, including dividends, of firms' common stocks were obtained from CRSP and Bloomberg. The final sample consisted of 229 convertible issues, as shown in Table I.

The first part of the analysis is to compute the returns for the sample of convertible bonds issues as well as for the underlying stock. The announcement date is the date the issue first appears in the press, from Bloomberg. The issue date corresponds to the first day the bond is traded. Bond data were obtained from Bloomberg on a daily basis. Accrued interest was added to these prices to compute daily returns. All the categories of convertible bonds were included in my sample and for liquidity purposes, the outstanding amount of the bonds has to be more than 100M US dollars. There were no upper limits on the outstanding amount. The sample included both coupon and zero coupon bonds.

As we can see in Table I, the issues were completed between January 1993 and December 2001. Table I shows the sample of companies along with event dates including issue dates, announcement dates and amount outstanding. The sample under study contains both bull and bear equity market periods. However, events are clustered in the latter part of the sample, which consists of a period characterized by a general decrease in stock prices and by a less favourable economic environment.

4. METHODOLOGY

4.1 Event Studies

The first step of my analysis, for both the announcement dates and the issue dates, is to compute the abnormal returns on firm's stock for my sample of convertible bond issues. In theory, the effect of a convertible bond announcement on the stock price is ambiguous. First, the issue may be good news for the firm's shareholders since the company is issuing more debt. However, the impact may be negative due to the possible dilution effect that would occur if the bonds were to be converted into stocks. Looking at the announcement date, I will be able to test whether the effects documented in previous literature are sustained using more recent data. Furthermore, I will also look at the effect surrounding the issue dates of these convertible bonds. For the purpose of my study, the convertible bonds' issue dates correspond to the first trading day. This allows analyzing stock price reactions surrounding the issuance of a convertible bond. Assuming that many investors, such as hedge funds managers, take a long position in convertible bonds at the issuing date, I expect negative abnormal returns for the stock surrounding this date. This is primarily because hedge funds take a short position in the underlying stock and then use the proceeds to buy the convertible bonds. In the next section of this paper I will study the returns of such a zero investment strategy, which mean that the short position on firm's stock has the same value as the long position on the same firm's convertible bond.

Abnormal returns are computed using the market model approach. I assume that security returns follow a single factor market model:

$$R_{jt} = \alpha_1 + \beta_j R_{mt} + \varepsilon_{jt} . \tag{1}$$

Where R_{jt} is the rate of return of the common stock of the j^{th} firm on day t; R_{mt} is the rate of return of the market index on day t; e_{jt} is a random variable; β_j measures the sensitivity of R_{jt} to the market index. Accordingly, the abnormal return of j^{th} firm's stock on day t is defined as:

$$A_{jt} = R_{jt} - \left(a_j + b_j R_{mt}\right). \tag{2}$$

Where the coefficients a_j and b_j are the ordinary least squares estimates from the regression above. The market returns are calculated using an estimation period that has 250 days (1 year) in length. The estimation period is the same for both the announcement and issue event studies and ends 40 days before the announcement date. In Tables II and IV, I use the Equally Weighted Index from the CRSP database as the benchmark. This index is relevant for my purpose because the dataset includes firms from different industries and listed on NYSE, AMEX or NASDAQ. The Tables III and V follow the same methodology, but uses the Value Weighted Index as a benchmark instead. Later, I will perform calendar-time tests adapted for long horizon event studies.

The tables for a short term conventional event study show length of windows in days, the number of stock in the test, the mean cumulative abnormal returns, the precision weighted cumulative average abnormal return (CAAR), the number of positive abnormal returns versus negative ones, the value of the z-test and a generalized z-test too.

First, the average abnormal returns are the sample mean of the abnormal return calculated in formula (2). This is defined as:

$$AAR_t = \frac{\sum_{j=1}^{N} A_{jt}}{N}, \tag{3}$$

where t is defined in days relative to the event date.

The mean cumulative abnormal returns or the cumulative average abnormal return (CAAR) is calculated as follows:

$$CAAR_{T1,T2} = \frac{1}{N}\sum_{j=1}^{N}\sum_{t=T1}^{T2} A_{jt}. \tag{4}$$

Where N is the number of securities included in the analysis.

The precision weighted cumulative average abnormal return (PWCAAR) is calculated with a standard abnormal return method and is constructed using the relative weights implied by the definition of Z_{T_1,T_2}. Therefore, the precision weighted CAAR will always have the same sign as the corresponding Z_{T_1,T_2}. Before calculating the PWCAAR, some computations of the standardized abnormal returns that follow Pattell (1976) are needed. This test means that under the hypothesis, each abnormal return, A_{jt}, has a mean zero and variance $\sigma^2_{A_{jt}}$. The maximum likelihood estimate of the variance is as follows :

$$s^2_{A_{jt}} = s^2_{A_j}\left[1 + \frac{1}{D_j} + \frac{\left(R_{mt} - \overline{R_m}\right)^2}{\sum_{k=T_{Db}}^{T_{De}}\left(R_{mk} - \overline{R_m}\right)^2}\right]. \tag{5}$$

Where $S^2_{A_j}$ is defined as:

$$s^2_{A_j} = \frac{\sum_{k=T_{Db}}^{T_{De}} A^2_{jk}}{D_j - 2}. \tag{6}$$

In these equations, R_{mt} is the observed return on the market index on day t. $\overline{R_m}$ is the mean market over the estimation period and D_j is the number of non-missing trading day returns in the D-day interval T_{D_b} through T_{D_e} used to estimate the parameters for firm j. K is equal to T_{D_b}.

Therefore, the standardized abnormal return is as follows:

$$SAR_{jt} = \frac{A_{jt}}{S_{A_{jt}}}. \tag{7}$$

Under the null hypothesis, each SAR_{jt} follows a Student's t distribution with $D_j - 2$ of degrees of freedom. The summation of the SAR_{jt} across the sample, we obtain:

$$TSAR_t = \sum_{j=1}^{N} SAR_{jt}. \tag{8}$$

The expected value of $TSAR_t$ is zero and its variance is:

$$Q_t = \sum_{j=1}^{N} \frac{D_j - 2}{D_j - 4}. \tag{9}$$

Therefore, the z test statistic for null hypothesis that $CAAR_{T1,T2} = 0$ is :

$$Z_{T1,T2} = \frac{1}{\sqrt{N}} \sum_{j=1}^{N} Z_{T1,T2}^{j}, \tag{10}$$

where

$$Z_{T1,T2}^{j} = \frac{1}{\sqrt{Q_{T1,T2}^{j}}} \sum_{t=T1}^{T2} SAR_{jt}, \tag{11}$$

and

$$Q_{T1,T2}^{j} = (T_2 + T_1 + 1)\frac{D_j - 2}{D_j - 4}. \tag{12}$$

Equation (10) follows the conditions that there is cross-sectional independence of $Z^j_{T1,T2}$. Furthermore, $Z_{T1,T2}$ follows the standard normal distribution under the null hypothesis.

The precision weighted cumulative average abnormal returns can now be calculated as follows:

$$PWCAAR_{T_1,T_2} = \sum_{j=1}^{N} \sum_{t=T_1}^{T_2} w_j A_{jt} \ , \tag{13}$$

where

$$w_j = \frac{\left(\sum_{t=T_1}^{T_2} s^2_{A_{jt}}\right)^{-\frac{1}{2}}}{\sum_{i=1}^{N}\left(\sum_{t=T_1}^{T_2} s^2_{A_{it}}\right)^{-\frac{1}{2}}} \ . \tag{14}$$

A generalized z-test is also calculated with the event study for each period. The main difference with the z-test is that the null hypothesis stipulates that the fraction of positive returns is the same as the estimation period. The results of the test reports if the difference is significant at different levels of confidence. The test uses normal approximation to the binomial distribution and is based on Sprent (1989) and Cowan (1992).

The event study results provide mean cumulative abnormal returns for the different event windows that I specified. I compute the abnormal returns for 9 different event windows. Each window is somewhere within 5 days prior to the event and 5 days after the event. As mentioned previously, I expect hedge funds managers to take action prior or at the issuing date. I also analyze the stock price behaviour after the bond issuing date.

4.2 Long Term Horizon Studies

The calendar-time tests followed a slightly different methodology. These tests are designed to study long term effects. Like the short term event studies above, it starts from the equilibrium in the capital-asset-pricing model, which addresses the relationship between risk and expected return for each asset as follows:

$$E(\tilde{R}_i) = E(\tilde{R}_0) + [E(\tilde{R}_m) - E(\tilde{R}_0)]\beta_i \, , \qquad (15)$$

where $E(R_i)$ corresponds to the expected rate of return on asset *i*. $E(R_0)$ is the expected rate of return on any asset that is uncorrelated with the market portfolio. $E(R_m)$ stands as the expected rate of return on the market portfolio. Finally, the beta, β_i, represents the covariance between the expected rate of return on asset *I* and the expected rate of return on the market portfolio over the variance of the last one ; cov $(R_i, R_m)/\sigma^2(R_m)$. Mainly, it shows the risk of an asset *i* relative to the total risk of the market portfolio *m* and is proportional to the contribution of asset *i* to the total risk of the market portfolio.

The model used in the calendar-time test is a variant of the model described above. This is a model developed by Sharpe (1964) that followed a stochastic process generating period-by-period returns and it is consistent with the capital-asset-pricing model.

The model is as follows:

$$\tilde{R}_{jt} = \tilde{\gamma}_{ot} + \tilde{\gamma}_{1t}\beta_{jt} + \tilde{\varepsilon}_{jt} \, , \qquad (16)$$

where $\tilde{R}_{jt}$ is for the rate of return on security *j* during period *t*. $\tilde{R}_{m,t}$ equals the rate of return on the portfolio of all assets in period *t*. In the equation, $\tilde{\gamma}_{0t}$ and $\tilde{\gamma}_{1t}$ represents market determined parameters that shows the ex post relationship between risk and returns in different time period. Further, $E(\tilde{\gamma}_0) = E(\tilde{R}_0)$ and $E(\tilde{\gamma}_1) = E(\tilde{R}_m) - E(\tilde{R}_0)$ have to hold in the equation above. The ε_{it} term represents the disturbance of the *j*th security at time *t*. $\tilde{\varepsilon}_{jt}$ is assumed to have a zero mean, to be independent of β_i and uncorrelated across *j*. The return of a security is a function of this disturbance, which is specific to each individual security. Therefore, this disturbance, $\tilde{\varepsilon}_{jt}$, in the equation can be used as a measure of the abnormal performance of a security since the effects of $\tilde{\gamma}_{0t}$, $\tilde{\gamma}_{1t}$ and β_j are netted out.

The beta, β_{jt}, account for the covariance between the two rates divided by the variance of the overall portfolio, R_{mt}. β_{jt} is assumed to be constant over time and is stated as β_j. The meaning of the beta is that it measures the relative risk of the *j*th security compared the total risk of the overall market portfolio. Indeed, β_j is proportional to the contribution of the *j*th security to the risk of the market portfolio. The beta can also be estimated by the formula: $\hat{\beta}_i = \operatorname{cov}(\tilde{R}_i \tilde{R}_m) / \hat{\sigma}^2(\tilde{R}_m)$. This two-factor model in the equation above removes most of the residual correlation.

We can rearrange the formula to isolate the abnormal returns in the next formula :

$$\hat{\varepsilon}_{jt} = R_{jt} - \hat{\gamma}_{0t} - \hat{\gamma}_{1t}\hat{\beta}_{jt}, \tag{17}$$

where ε_{it} is the abnormal return of an asset *j* at period *t* and $\hat{\beta}_{jt}$ is estimated by an ordinary lest squares regression of each asset by using the period in months of (–62, –2). Until here, the computation is quite similar to the first two event studies.

However, the major changes are the simultaneous computation together of all these abnormal returns. The first long-horizon calendar time test follows the methodology used by Jaffe (1974) and Mandelker (1974). The method consists of calculating the mean residual, e_t, of all securities in the portfolio at time *t*, where *t* is in months instead of days. The formula is as follow:

$$\bar{e}_{\tau} = \left(\frac{1}{N} \sum_{j=1}^{N} \hat{\varepsilon}_{jt} \right) \times H_j \, , \tag{18}$$

where ε_{it} equals the estimated for security *j* at month τ. *N* represents the number of securities included the portfolio. The H_j term is to identify if the event on the security is a purchase, $H_j = 1$, or if it is a sell, $H_j = -1$. For the purpose of my study, all the events are purchase of securities and therefore H_j always equals one. Therefore, the cumulative average residual, C.A.R., is represented by e_T and is computed as follows :

$$\bar{\bar{e}}_T = \sum_{\tau=-K}^{T} \bar{e}_{\tau} \, . \tag{19}$$

The computation of the significance of such a calendar-time test is evaluated by a t-test. To determine if the residuals are statistically different from zero. This specific calendar time test is obtained through a six step method developed by Jaffe (1974) and the results are presented in the next section under Table VI. The first step under this method is to build portfolios. A specific portfolio corresponding to time *t* is formed by including all securities of firms with an issue date between or included in month *t* and *t*-X, where X represents a specific integer. There is only one portfolio corresponding to time *t* and it is called portfolio *t*. The second part of the test is to measure the performance of a portfolio built as above. The measurement of a portfolio *t* during period t and t + 1, a period that will be called for now on, month t +1, is defined as follows:

$$\hat{e}_{t,t+1} = \frac{\sum_{i=1}^{S} \left(\hat{e}_{i,t+1}\right)}{S}, \tag{20}$$

where $\hat{e}_{t,t+1}$ is the residual of portfolio t in month $t + 1$, $\hat{e}_{i,t+1}$ is equal to the residual of the ith security if portfolio t in month t +1 and S is the number of securities in portfolio t.

The third step in the process of calculating the t value is the measurement of the variability of each portfolio's performance. This measure of variability is the standard deviation of the residual of the portfolio, $\hat{SD}_t$. The formula to calculate the variable is defined as:

$$\hat{SD}_t = \sqrt{\frac{1}{49} \sum_{j=1}^{50} \left(\hat{e}_{t,t-j+1} - \frac{1}{50} \sum_{i=1}^{50} \hat{e}_{t,t-i+1} \right)^2}. \tag{21}$$

The formula uses data during the period from month t – 49 to month t. Furthermore, the standardized residual for portfolio t at time t +1 is define by $\hat{se}_{t,t+1}$ and is written as:

$$\hat{se}_{t,t+1} = \frac{\hat{e}_{t,t+1}}{\hat{SD}_t}. \tag{22}$$

The next step of the procedure is the measurement of standardized performance across all portfolios. As a different portfolio is formed for each calendar month, for a given value of X, portfolio t is just one of many portfolios. The average standardized residual across all of these portfolios, called $\overline{sr}$ is defined as:

$$\overline{sr} = \frac{1}{n} \sum_{t=51}^{104} \hat{se}_{t,t+1} D_t, \tag{23}$$

where $D_t = 1$, when there is at least one security in portfolio t and $D_t = 0$, when there are no securities in portfolio t. n equals the number of months in which the portfolio corresponding to the month has at least one security. n can be expressed as follows :

$$n = \sum_{t=51}^{104} D_t \,. \tag{24}$$

Finally, the t –test to determine whether $\overline{sr}$ is significantly different from zero is calculated by the following formula:

$$t = \frac{\overline{sr}}{s/\sqrt{n}} \,. \tag{25}$$

Where the variable s is the estimate of standard deviation of each standardized portfolio. The value is constrained to be one due to the standardization process. Thus, this test statistic of the above equation measures a portfolio's residual variance directly and it takes account of the correlation between residuals of different securities in a given month. Indeed, even if the first equation of the two-factor model removes most of the residual correlation, there are still many factors, such as industry effect, that can cause some residuals across securities in a given month to be correlated. Under these circumstances, a statistic test should not assume independence of residuals across securities in a given month.

The other long-term event study follows methodology used in Lyon, Barber and Tsai (1999). This test is based on a buy-and-hold strategy. The computation of the monthly mean abnormal returns is the same as for Jaffe (1974) and Mandelker (1974) describe before. However, a mean compound abnormal return is calculated from these mean abnormal returns. The calculation of the average compounded abnormal return for an interval of two or more months with beginning month T_1 and ending with T_2 is as follows:

$$ACAR_{T_1,T_2} = \frac{1}{N}\sum_{j=1}^{N}\left[\prod_{t=T_1}^{T_2}(1+R_{jt})-1\right]-\left[\left(1+\hat{\gamma}_0\right)^{(T2-T1+1)}-1\right]-\hat{\beta}_j\left[\prod_{t=T_1}^{T_2}(1+\gamma_{1t})-1\right]. \quad (26)$$

Furthermore, the t-test used to evaluate the statistic significant is also different. The *t* test they used is defined as follows:

$$t(MMAR) = \frac{MMAR}{\sigma(MAR_t)/\sqrt{T}}, \quad (27)$$

where T is the total number of calendar months and *MMAR* is defined as follows:

$$MMAR = \frac{1}{T}\sum_{t=1}^{T} MAR_t, \quad (28)$$

where MAR_t is the mean abnormal returns and is calculated as shown earlier in this section.

4.3 Cross-Sectional Tests of Abnormal Returns

A cross-sectional regression is performed to identify the determinants of the abnormal returns on announcement and issue dates of convertible bonds. The OLS regression is as follows:

$$AR_{ij} = \alpha_0 + \alpha_1 \ln(\text{Total Market Value}) + \alpha_2 \text{ Hot} + \alpha_3 \text{ Price to Book Ratio} +$$
$$\alpha_4 \ln(\text{Outstanding Amount of the Issues}) + \varepsilon_{ij}. \quad (29)$$

Where, AR_{ij}, is the abnormal returns observed in the event windows (-1, 0) and (-2, +2) for each company. The size of the company is represented by the variable, Total Market Value. The Hot variable is a dummy variable who takes a value of one if the issue is in the period 2000-2001 and zero if not.

4.4 Trading Strategy Simulation

I also perform a test using an empirical simulation, which recreates a zero investment trading strategy purportedly used by hedge funds managers with convertible bonds, which is commonly called a convertible bond arbitrage. By buying convertible bonds and simultaneously selling short the underlying stock, the positions are immune to some of the market fluctuations. The strategy consists of going long of 1000 $ on each convertible that is available in the market on their issue date. At the same time on each firm, a short sale of 1000 $ is done on the firm's stock. This simulated portfolio consists of all the 229 firms included in the sample. Returns are calculated from issue date. Therefore, returns are not calculated chronologically since issues are spread all over the period of 1993 through 2001. Returns at time *t* from the issue date consists of all the long and short positions in the strategy at time *t*. The returns of positions are determined on a day to day basis. The summation of all the long, *L*, and short, *S*, positions on a particular day represents the returns of the overall portfolio. Profits are calculated as follows:

$$\mathrm{P}_t = \sum_{j=1}^{N} \left(L_{jt} - S_{jt} \right). \qquad (30)$$

The return on stocks in the strategy includes the variation in stock prices and the dividends payments as well. The returns on convertible bonds consist in the variation of the market prices to which I add the daily accrued interest, and the coupon payments. Since the returns are computed on a daily basis, reinvestment of dividends and coupons are not included in the portfolio returns. This is a buy and hold strategy. Returns are presented from issue dates plus X number of months. I carryout the simulation for up to 36 months following the first trading date when data where available to do so.

The analyses include the round trip transactions costs related to the 458 transactions made under the strategy using a ceiling commission of 1.5%. Taxes could have an impact on for investors since tax rates on returns on coupons differ from rates on capital gains for arbitrageurs using convertibles in this trading strategy. As an additional test, I will also explore limited arbitrage where the arbitrageur may only be able to take a limited short position. In particular we use the short sale constraint whereby the investor must have 150% of the value of shorted assets in his portfolio. In my simulation, investors would have to borrow an additional 500 $ to cover the 1000 $ dollars short sale and invest the 500 $ at the risk free rate. This technicality would influence the returns of the strategy by the difference between the borrowing and the lending rate on the amount of 500 $ for each short sale, while the position is open.

The monthly standard deviation within the portfolio at time t is defined as:

$$\sigma_p = \left[\sum_{j=1}^{N} \left(P_{jt} - \overline{P_{jt}} \right)^2 \right]^{\frac{1}{2}}. \tag{31}$$

The test at time t was calculated as fallowed:

$$t = \frac{\mu_p}{\left(\sigma_p / \sqrt{n} \right)}, \tag{32}$$

where , n, is the number of convertible bonds at time t in the portfolio and , μ_p, represents the average returns of each position of a convertible bond and stock in the portfolio.

A regression of the simulated strategy's returns over the risk premium was also done to determine the alpha and beta of such a global strategy. I first perform an ordinary least square (OLS) and therefore equal weight is assigned to every observation. It does not account for the variability in the dependent variables. The test followed CAPM assumptions where the return of assets during a period is explained by the market risk exposure, beta, and the risk free rate during the same period. The regression matched positions of each pair of firm's of convertible bond and stock and was regressed on the associate market risk. Therefore, the overall regression contains all the 229 positions. I present a monthly regression of the simulated strategy given the assumed long holding period of hedge fund arbitrageurs in such strategies. The market return in the test is the S&P 500 and the risk free rate is represented by the 90 day t-bill. Returns of the portfolio follow the same assumptions as before, where transactions costs of 1.5% are included in the returns and reinvestments of both dividends and coupons are not included in the returns. Outliers where R student test of its residuals was below –2 and over + 2 were dropped from the regression.[7]

The regression is as followed:

$$Ri_{jt} - Rf_{jt} = \alpha_0 + \beta_1 * (Rm_{jt} - Rf_{jt}) + \varepsilon_{jt}, \tag{33}$$

where, $Ri_{jt,}$ is the monthly returns of positions, j, at time , t, $\alpha_{0,}$ is the alpha of the portfolio on a monthly basis, β_1, is the monthly beta of the portfolio, Rm, is the monthly returns of the S&P 500, Rf, is the monthly returns of the one month T-Bill, and ε_{jt}, represents the error terms associated with position , j, at time , t.

5. RESULTS

5.1 Announcement Date Effects

Tables II and III show the announcement date event study results. Table III presents in order different event windows in days, the number of stocks in the event study, the mean

[7] This led to the decline of 41 observations from the overall 4117 observations to generate the regression.

cumulative abnormal returns for each period, the precision weighted CAAR, the number of positive and negative returns, a z test and a generalized z test. The computation of each of these variables was explained in details in the previous section. The event study presented in Table II is a market model, where the market is represented by the equal weighted index built by CRSP. An equal weighted index as benchmark calculation seems more appropriate here, since in my simulation, I invested equally across stocks and convertible bonds with equal short and long positions of 1000 $ in each security. The market model with a value weighted index is also presented in Table III. As can be seen, the results are not sensitive to the equal versus value weighted benchmark employed. Day 0 represents the event date, thus the day of the announcement.

At the exception of the (0, +5), all windows show strong significance at 0.1% under the z test, even if the number of firms under study is reduced for this test. Indeed, due to difficulty to find clear announcement dates and the fact that some convertible bonds were re-sales of older bonds, only 85 bonds were kept to perform these tests.

From Tables II and III we note that the announcements of new convertible issues represent negative events. In the (–1, 0) interval, the firms experience a significant decline in share price of about 3%. These results are quite consistent with those reported by Dann and Mikkelson (1984) and Davidson, Glascock and Schwartz (1995) who find significant negative abnormal returns surrounding announcement dates, for earlier historical periods. Furthermore, it may suggest that potential dilution effects may be outweighing tax/agency effects for convertible bond issuer.

5.2 Issue Dates Results

In an efficient market, the effects of a new issue of convertibles should be concentrated at the announcement date. However, to the extent that there is short selling pressure from hedge funds arbitrageurs, some negative abnormal returns might be expected on the issue date as well. Tables IV and V below show that, indeed, this seems to be the case, although the absolute magnitude of the issue effect is somewhat less than half the announcement day effects.

For the period following the issuing date, I also find negative mean cumulative abnormal returns, but they were not significant. Indeed, the negative reactions are not significant on the day after the issue. This can show that the impact is only concentrated on the few days surrounding a convertible issue. Furthermore, it suggests that the significant losses surrounding the issue dates are offset by an increase in stock prices following the event. A possible explanation is that the selling pressure from hedge funds managers might come to an end. From this perspective, the gains from such short sale would be for only few days surrounding the issue date. Therefore, it will be interesting to see if an investor can take advantage of the event by shorting the firm's stock and buying the firm's convertible bond on the issue date. Testing whether this strategy can effectively provide a near "free lunch" is the purpose of the last section of tests.

5.3 Holding Period Results

Tables VI and VII present abnormal returns for long-term horizons. Table VI presents different event windows in months, the number of stocks in the event study, the mean cumulative abnormal returns for each month, the number of positive and negative positions, a z test, a calendar time t-test and a generalized z test. The computation of each of these variables was explained in detail in the previous section. To test for statistic significance, the calendar t-test is a more precise and complete test than the z-test and the generalized z.

The results in Table VI are presented on a monthly basis, starting a month prior to the issue date up to 36 months after. The number, *N*, showed that most of the events have a year or less of data, where the number of firms on month 12 is 139. This number falls to 62 by month 24 and 37 by month 36. This decrease in number of stocks helps explain why under the generalized z-test, the mean abnormal returns are not statistically significant after month 24. Most of the abnormal returns before month 24 are significant. However, the calendar time t-test shows statistically significant at a level of 5% only for months 0, 8, 9 and 18. Panel A of Table VI reveals that almost every month has negative mean abnormal returns until the second half of the third year where they become positive. During the third year, the mean cumulative abnormal returns show a very little variation. Indeed, by the end of month 36, the number of positive positions is greater than negative ones with a ratio of 21 to 16 and this month presents also a positive mean abnormal return of 3.53%.

Panel B of Table VI shows that the 12, 24 and 36 month event windows from either month 0 or 1 are all significant at a level of 0.1% under the calendar t-test. The month prior and the windows (–1, 0) and (–10, +10) are significant at 10%. Over the interval of one month prior to the issue dates and the month of the issue dates, stocks fell abnormally by –3.89%. Furthermore, it is interesting to note that negative mean cumulative abnormal returns tend to persist through time.[8] Indeed, event windows, including 36 months after issue dates, have the more negative CAAR with –43.33% for the window starting on month 0 and –44.92% with the one starting one month before issue dates. The total of firms in the calculation of the event study is 216. The ratio of negative versus positive positions increases in favour of negative as time passes. Another

[8] This may be due in part by the greater likelihood of conversion as time passes.

interesting fact is that the CAAR do not move much between months 24 and 36. This means that average abnormal returns during the 3rd year following the issue dates remain stable.

Table VII also presents a long-term event study, but the test follows the method used in calendar-time tests of Lyon, Barber and Tsai (1999) study as described before. Panel A of Table VII presents different event months, the number of stocks in the event study, the mean cumulative abnormal returns for each period, the number of positive and negative positions, a calendar time t-test and a generalized z-test. The computation of each of these variables was explained in detail in the previous section. Here again, as mentioned in Lyon, Barber and Tsai (1999), the use of calendar *t* test is more accurate and useful to test statistical significance than the generalized *z* test in long-term event study, but still the generalized *z* test remains relevant in the analysis.

The results of this event study in Table VII are qualitatively similar but less significant than those using the Jaffe (1974) and Mandelker (1974) approach. This may be due to the greater sensitivity of the buy and hold approach to starting and ending points, as well as skewness problems associated with compounded returns (e.g. Fama (1998)).

5.4 Cross-Sectional Tests of Abnormal Returns

The results of the cross-sectional tests are presented in Table VIII. The window (-1, 0) of announcement dates have three determinants significant, thus ln(Total Market Value), Price to Book Ratio and ln(Outstanding Amount of the Issues). The coefficient of the Outstanding Amount of the Issues is negative and indicates that bigger convertible bond issues would lead to more negative abnormal returns on the announcement date. A possible explanation could be that if the conversion of these big issues occurs, it would have a major impact on firms' capital structure. Furthermore, the Price to Book ratio is also negative and reveals that growth firms are more likely to be negatively affected by the announcement of convertible bonds issue. The positive coefficient of Total Market Value reveals that larger firms experience less negative abnormal returns. Again, one can argue that the risk associated with an eventual conversion are smaller on big firms compare to ones on smaller firms. The Total Market Value variable is also positive and significant for the period (-2, +2) for the announcement regression and for the period (-1, 0) on the issue regression. The Hot dummy variable is significant for the announcement window of (-2, +2) and its negative sign suggests that during the period of 2000-2001, firms experienced more negative abnormal returns surrounding the announcement of a convertible bond issue.

For the issue regression, only the Hot and the Total Market Value have explanatory power for the window (-1, 0). Their impact is similar for both the announcement and the issue regressions. None of the determinants seems to explain the abnormal returns in the (-2, +2) window of the issue event study. These tests also suggest that the effects of convertible bond issue are more ambiguous than the ones of convertible bond announcement. Furthermore, I try to include coupon rate in the determinants but it has no significant explanatory power in all windows for both the announcement and the issue abnormal returns.

5.4 Trading Strategy Simulation

Table IX shows the results of the strategy of going long on a firm's convertible bond at the issue and, at the same time, going short on the firm's stock for the same amount, 1000 $. The first column represents the period of time after issue dates. The second column represents the total gains of the long and short positions undertaken in the strategy. The cumulative total gains are not presented since the number of positions tends to diminish as time passes. Therefore, the month x represents the total gains after x months from issue date only for the positions that I have the data to compute returns. Therefore, positions with only few months of data, for example issues at the end of 2001, are not included for the calculation of longer term returns. The t test showed the level of significance of the returns of the portfolio. The last three columns represent the number of positive and negative positions on each firm and the total number of firm included in the month under study.

Table IX shows that the strategy used is always positive after the second month. It is quite surprising to find the first two months of the simulation to be negative since early in the paper we saw with the event studies that firm's stock surrounding the issue date shown significant negative abnormal return. It may suggest that there is a mark-up in the stock price after the event. This mark-up offsets the effect of the issue of a convertible bond, which shows that the effect lasts only for few days. Furthermore, these negative returns may be due in part to the transaction costs associated with implementing such a strategy. However, the returns for the first two months are not significant and show that there is a lot of volatility and instability in the portfolio positions. However, by three month after the issue dates, returns become significant for 15 months in a row with the exception of month 4. Returns are positive and strongly significant at a level of 1% surrounding one year after the issue dates. Indeed, the gain realized on my zero investment after 12 months is 29 131 $.

However, around the second year after the issue date there is a drop in both gains in dollars and level of significance of these gains. This could be attributed to two negative outliers that drastically drive down the total profit and substantially increase the standard error of the portfolio. The proportion of positive and negative positions remains relatively constant around the second year and is consistent with this conjecture. The proportion of positive versus negative positions from month 1 to month 36 tends to increase in favour of positive positions. By month 28, the situation reverted mainly due to the drop of one outlier and the adjustments of the other one. Therefore, the total gains after 3 years from the issue date is 55 181 $ and is significant at 1% even if there are only 42 pairs of convertible bond and stock positions remaining in the sample. The few available long term data clearly show the clustering effect that happened in convertible bond markets in the early 2000's where firms turned to convertible bonds to finance projects. A possible explanation for this phenomenon rely in the decrease in the stock market and therefore stock issues. The few available long term data could also be caused by the sample selection where converted and default bonds were not included. Further, if we include a differential cost of borrowing of 1 % per year in the analysis, the cost would be 630 $ for 36 months after the issue dates. This represents the results of 1% multiplied by 500 $, then by 3 years and finally by the 42 positions used in the 36 month strategy. These costs will only reduce the returns of the 36 months from 55 181 $ to 54 551 $, which is quite negligible.

Table X shows returns in different years to get a clearer chronological view of the returns over time. For these returns, they were not compiled only from the issue dates but from the 1st January of each year as well. For example, the returns for 1999 are the returns of bonds issue prior to 1999 but calculated from taking positions on the 1st January 1999 and also the returns of new issues during the same year. The returns are then calculated in the same way as the portfolio simulation shown before. Table X shows, here again, a clustering effect toward the years 2000 and 2001. The concentration of convertible bond issues happened at the same time that the gains from my zero investment strategy become more positive. This is consistent with theory that firms tend to issue securities when financial conditions are favourable. This could explain the increase in the number of stocks issues in the late 90's with the bull market and the decrease of such issues with the bear market of the early 2000's. These issues were in part replaced by the increase in the number of issues of convertible bonds.

Table X starts in 1998 since the number of convertible bonds in my sample prior to this year is too small to be significant. All years under study showed positive returns with a major increase in 2000 and 2001. In fact, only these two years show significant returns. This could be attributed to the high number of convertible bonds for these two years in my sample. Table X shows that the zero investment strategy tend to give positive returns especially in bear markets with returns of 20 324 $ and 36 249 $ for years 2000 and 2001. The years 1998 and 1999 show small insignificant positive returns, where the low degree of significance could also be due to the small number of convertible bonds available in my sample, thus 65 or less.

The next section presents a comparison with other passive strategies. A passive strategy of investing only 1000 $ in the S&P 500 without shorting anything else at the same time is presented in Table XI. The investments are made at the same time as the strategy previously undertaken. This means a 1000 $ long position is taken in the S&P 500 at each issue date of a convertible bond. The same thing is done with 3 months T-Bills and 30 years Treasury Bills also. These strategies are not zero investment strategies like the one tested in this paper. These strategies required an investment of 1000 $ at 229 different times, thus 229 000 $ in total for each of the passive strategies. Therefore, these strategies mainly give a good overview of the markets behaviour during the period under study. We can see again in the Table XI the clustering effect in the early 2000's. Indeed, most of the issues of convertible bonds were during this period of the bear equity market. This could also explain why it takes more than a year after the issue dates for a passive strategy in the S&P 500 to show positive returns. As the length of time extends, all passive strategies exhibit positive returns, especially the one on the S&P 500. Both T-Bills showed total returns increasing at a slow rate. Indeed, the longer term T-bills give higher gains in dollars than the 3 months since the level of risk is also higher. The use of a passive S&P 500 strategy accounts for higher returns, higher variability and of course a higher exposure to risk than the other passive ones in the T-Bills. The simulation strategy showed really good results compared to these strategies since the gains on the simulated portfolio are from a zero investment compared to 229 000 $ for the other strategies.

The next table also presents the returns of the same strategy of going long 1000$ in convertible bonds on issue dates and going short 1000$ of the firm's stock. The difference with the computation of these returns is that every position is closed as of 31st December 2001 since my data sample ends on that day. This means issue dates that happened late in the year 2001 have only few months of activities. These positions are closed only few months after the issue date. Therefore, the gain or loss that results from these closing positions remains stable in the portfolio after their closing date. For example, if payoffs for positions closing after 3 months result in a gain X, this gain X will still be included in the overall gains in month 4. This means that as time passes from the issue date, the portfolio experiences fewer variations in returns and becomes more stable since only the remaining live positions explain the monthly variation of total gains. Table XII presents the results of such a strategy.

The first column of Table XII corresponds to the number of months after the issue date. The total profit in dollars and the monthly variations in the total profit, calculated as stated above, are presented in the next two columns. The t test for each month was computed as follows: $t = \frac{\mu_i}{\sigma_i / \sqrt{N}}$. The table also presents the number of positive and negative positions closed or not in the portfolio. The last column gives the number of live pairs of convertible bond and stock positions for each month.

Table XII gives interesting results since each month after 9 months from issue date is significant at 1% level except for month 25, which is significant at 5%. Furthermore, of the 29 months that show significant gains, only 5 of them present a monthly significant decrease in total gains. Indeed, total gains continue to increase even during the 3rd year where only a few of the positions, 68, are still opened during the months following the 24th month. Total gains during the 3rd year jump from 23 329 \$ to 38 126 \$ against positive variations of 19 872 \$ and 3 457 \$ for the first and second year respectively. However, the gains for this strategy in the first 8 months are not significant at the 5% level. Under this strategy, the general trend for the total gains is upward and is positive over the 36 months period that follows issue dates. The ratio of the positive over negative pair of positions also confirms this trend toward positive positions. This ratio over the entire period changes from 1.18 to 2.70 at the end in favour of positive trades. The Sharpe ratio and Jensen's alpha of this strategy also indicates abnormal performance. Specifically, the Jensen alpha, using an S&P 500 benchmark, indicates abnormal performance of 4.5% per annum. The Sharpe Ratio for the strategy is 4.62. The corresponding Sharpe ratio for the market portfolio (S&P 500) is –1.48. The strategy has an overall beta of -0.2265. Under CAPM, this means that the returns of the strategy will tend to change by 0.2265 in the opposite direction to the market. This also means the strategy has a market risk and an increase in the market will more likely have a negative effect on such a strategy.[9]

6. CONCLUDING REMARKS

In this paper, I looked at the convertible bonds market. More specifically, I examined the impact of convertible bonds issues and announcement dates have on firms and investors. I first performed an event study on the firms' stock, traded on NYSE, NASDAQ or AMEX. I have focused on firms that issued convertible bonds during the period from 1993 to 2001. The results showed significant negative cumulative abnormal returns of –2.19% during the period of two days before through two days after the issuance of convertible bonds. Event study on the announcement dates for the period (–1, 0) also gives significant negative cumulative abnormal returns of around –3%. Both event studies have strong explanatory power. The results were consistent with previous literature such as those by Dann and Mikkelson (1984) and Davidson, Glascock and Schwartz (1995), which argue that convertible announcement have negative impacts on stock prices. Thus, in most cases convertible bonds issues are perceived negatively by the market. The determinants of these abnormal returns are the total market value of firms,

[9] The recent drop in the market could easily explain the significant positive returns of this zero investment strategy. This could be interpreted that the premium for the call option decreases less in down market than the market itself. The phenomenon on call prices is well documented and it is relevant to say that when a call becomes far out of the money, a decrease in the underlying asset would have a small effect on the price. This could explain how, as the market continues to drop, the call portion of the convertible bond decreases slowly. Another explanation is that the bond part of the price of the convertible bond increases more during the period than the fall in the call price of the convertible bond. Indeed, the recent period of down markets was paired with a decrease in interest rates, which have a direct positive impact on all bond prices. Therefore, the strategy will perform better especially in period of down markets and falling interest rates. Furthermore, the use of convertible bonds by firms to finance projects seems to increase during such periods. Therefore, managers tend to issue financial assets which will give them the most advantages as possible. As shown earlier, in the recent years convertible bonds became very attractive to both investors and firms.

their price-to-book ratio, the period 2000-2001 and the outstanding amount of the issues. Only the total market value have a positive impact on abnormal returns while the other ones have negative impacts. I also test for long run abnormal returns on issue dates using the calendar test methods suggested by Jaffe (1974) and by Lyon, Barber and Tsai (1999). In both cases I found significant negative abnormal returns, even 36 months after the issue date of convertible bonds.

In the second part of my study, I intended to mainly look at investors' payoff using a trading strategy frequently adopted by hedge fund managers. Such strategies can also serve to test for the existence of a "free-lunch" on the market. Therefore, I took the position of a manager of hedge funds and replicated one of his strategies. The main strategy is to buy convertible bonds for 1000 $ and short the firm's stock for the same amount. The strategy requires no real investment since the 1000 $ invested in the convertibles comes from the proceeds of the firm's stock short sale. The only amount necessary is the margin required for the short sale. The payoff from this strategy is a significant gain of 55 181 $ on average after 36 months following the first trading day of the bonds. Furthermore, the strategy has both annually significant alpha and beta of 4.5% and –0.2265 respectively. This clearly shows that such a strategy gives interesting returns, especially in down equity market periods.

Overall, the results from the trading strategy simulation are very interesting. However, limitations from the clustering effect in my sample and the non available data of converted and matured bonds do not allow me to draw strong conclusions. Furthermore, the period of late 2000 and 2001 was one of down equity markets and most of the issues happened during this period. Thus, it is expected to see strategies using short sales on stocks to be profitable. However, the tests provided a good overview of the market reactions surrounding convertible bond issues and announcements during the recent years.

Table I. Convertible bonds Issues from January 1993 to December 2001

This Table presents the firms' name, the outstanding amount of the issue in US dollars, the announcement date and the issue date of convertible bonds. N/A refers when the data were not available for this company.

Company Name	Amount Outstanding	Announcement Date	Issue Date
MOTOROLA INC	102 500 000	9/20/1993	9/27/1993
INTEGRATED HEALTH SVCS	143 750 000	12/17/1993	12/27/1993
MASCOTECH INC	305 000 000	1/13/1994	1/21/1994
USF&G CORPORATION	141 373 000	2/25/1994	3/3/1994
JOHNSON & JOHNSON	223 700 000	7/7/1994	7/14/1994
US CELLULAR CORP	400 271 000	6/7/1995	6/13/1995
HILTON HOTELS CORP	500 000 000	5/9/1996	5/14/1996
TOTAL RENAL CARE HLDGS	125 000 000	N/A	9/3/1996
PLIANT SYSTEMS INC	115 000 000	9/17/1996	9/25/1996
AAMES FINANCIAL CORP	113 970 000	N/A	9/25/1996
POGO PRODUCING CO	115 000 000	N/A	9/27/1996
NDCHEALTH CORP	112 000 000	10/31/1996	11/6/1996
S3 INCORPORATED	103 200 000	N/A	2/7/1997
WORLD ACCESS INC	115 000 000	N/A	2/25/1997
CENTRAL GARDEN & PET CO	108 000 000	N/A	3/18/1997
ADAPTEC INC	100 000 000	N/A	6/26/1997
PARKER DRILLING CO	124 509 000	7/21/1997	7/25/1997
QUANTUM CORP	287 000 000	7/29/1997	8/1/1997
SILICON GRAPHICS	230 591 000	8/7/1997	9/4/1997
SYSTEM SOFTWARE ASSOC	138 000 000	9/8/1997	9/12/1997
LOEWS CORP	1 150 000 000	9/16/1997	9/19/1997
HEWLETT-PACKARD CO	505 121 000	N/A	10/14/1997
MERISTAR HOSPITALITY CRP	154 300 000	10/9/1997	10/16/1997
PERSONNEL GROUP OF AMER	115 000 000	N/A	10/21/1997
COSTCO WHOLESALE CORP	851 860 000	N/A	11/26/1997
TOWER AUTOMOTIVE INC	200 000 000	N/A	12/5/1997
PTEK HOLDINGS INC	172 500 000	N/A	12/24/1997
FRIEDE GOLDMAN HALTER	185 000 000	N/A	12/30/1997
THERMO ELECTRON CORP	231 158 000	1/15/1998	1/21/1998
INTERPUBLIC GROUP COS	228 500 000	N/A	2/13/1998
OMNICARE INC	345 000 000	N/A	2/13/1998
CLEAR CHANNEL COMMUNICAT	100 000 000	3/25/1998	3/30/1998
PRIDE INTERNATIONAL INC	228 645 000	4/21/1998	4/24/1998
CORNING INC	100 000 000	5/6/1998	5/6/1998
HUTCHINSON TECHNOLOGY	105 000 000	N/A	5/8/1998
WHOLE FOODS MARKET INC	308 807 000	N/A	5/26/1998
SPHERION CORP	206 997 000	5/21/1998	5/27/1998
NETWORK ASSOCIATES INC	498 500 000	N/A	6/1/1998

Table I. Continued.

HEALTHSOUTH CORP	354 150 000	N/A	6/3/1998
BRIGHTPOINT INC	129 000 000	N/A	7/2/1998
LENNAR CORP	495 650 000	7/24/1998	7/29/1998
DEVON ENERGY CORPORATION	443 807 000	N/A	8/3/1998
AES CORPORATION	150 000 000	8/4/1998	8/10/1998
XEROX CORPORATION	1 012 198 000	N/A	8/10/1998
WESTERN DIGITAL CORP	106 000 000	N/A	9/2/1998
GENESCO INC	103 245 000	N/A	11/6/1998
ANTEC CORP	124 000 000	N/A	11/20/1998
ASPECT COMMUNICATIONS	490 000 000	N/A	2/2/1999
TRIBUNE CO	1 256 000 000	4/7/1999	4/13/1999
AMAZON.COM INC	1 249 807 000	N/A	5/18/1999
NTL COMMUNICATIONS CORP	489 800 000	N/A	6/7/1999
CITRIX SYSTEMS INC	849 000 000	N/A	6/11/1999
AT HOME CORP	437 000 000	N/A	6/30/1999
LSI LOGIC CORP	344 935 000	N/A	7/1/1999
WELLPOINT HEALTH NETWORK	106 000 000	6/28/1999	7/2/1999
SEPRACOR INC	111 900 000	N/A	7/28/1999
CNET NETWORKS INC	114 115 000	N/A	8/6/1999
LAMAR ADVERTISING CO	287 500 000	8/4/1999	8/10/1999
ATMEL CORP	340 400 000	N/A	8/11/1999
INTERPUBLIC GROUP CO INC	320 000 000	N/A	8/13/1999
VERITAS SOFTWARE CORP	464 750 000	8/9/1999	8/13/1999
DOUBLECLICK INC	154 800 000	N/A	8/18/1999
LEVEL 3 COMMUNICATIONS	413 000 000	9/14/1999	9/20/1999
ITC DELTACOM INC	100 000 000	N/A	10/1/1999
SANMINA-SCI CORP	350 000 000	N/A	10/12/1999
ALPHARMA INC	138 300 000	N/A	10/14/1999
COMCAST CORP	1 149 642 000	10/12/1999	10/15/1999
AMERICAN TOWER CORP	212 700 000	N/A	11/2/1999
AMERICAN TOWER CORP	268 931 000	N/A	11/2/1999
SUNBEAM CORPORATION	2 014 000 000	N/A	11/8/1999
IDEC PHARMACEUTICALS	345 000 000	N/A	11/12/1999
ANNTAYLOR STORES CORP	199 072 000	N/A	11/23/1999
COX COMMUNICATIONS INC	1 272 187 500	11/22/1999	11/29/1999
NEXTEL COMMUNICATIONS	284 000 000	N/A	12/3/1999
AOL TIME WARNER INC	2 323 135 000	12/1/1999	12/6/1999
SAFEGUARD SCIENTIFICS	200 000 000	N/A	12/6/1999
INTERNET CAPITAL GRP INC	283 556 000	12/15/1999	12/21/1999
CYPRESS SEMICONDUCTOR	283 000 000	1/20/2000	1/25/2000
SIEBEL SYSTEMS INC	300 000 000	N/A	2/4/2000
LATTICE SEMICONDUCTOR CO	260 000 000	N/A	2/8/2000
LIBERTY MEDIA CORP	868 780 000	N/A	2/9/2000
COMMSCOPE INC	172 500 000	N/A	2/9/2000
AFFYMETRIX INC	150 000 000	N/A	2/9/2000
KERR-MCGEE CORP.	600 000 000	2/7/2000	2/11/2000
EXODUS COMMUNICATIONS	443 920 000	N/A	2/17/2000
LSI LOGIC CORP	500 000 000	2/14/2000	2/18/2000
LEVEL 3 COMMUNICATIONS	671 000 000	2/24/2000	2/29/2000
ALKERMES INC	103 176 000	3/6/2000	3/9/2000

Table I. Continued.

ANADARKO PETROLEUM CORP	102 000 000	3/2/2000	3/7/2000
JUNIPER NETWORKS INC	942 114 000	3/2/2000	3/8/2000
SCI SYSTEMS INC	575 000 000	3/9/2000	3/15/2000
IBASIS INC	100 330 000	3/10/2000	3/15/2000
AETHER SYSTEMS INC	207 300 000	3/17/2000	3/22/2000
CONEXANT SYSTEMS INC	615 000 000	N/A	3/23/2000
HUMAN GENOME SCIENCES	199 900 000	N/A	4/3/2000
I2 TECHNOLOGIES INC	350 000 000	N/A	4/6/2000
COX COMMUNICATIONS INC	1 837 819 000	4/13/2000	4/19/2000
KULICKE & SOFFA IND INC	175 000 000	N/A	4/24/2000
SOLECTRON CORP	853 000 000	5/2/2000	5/8/2000
AMERICAN INTL GROUP	210 000 000	5/8/2000	5/11/2000
HUMAN GENOME SCIENCES	300 000 000	N/A	5/16/2000
TRIQUINT SEMICONDUCTOR	268 800 000	N/A	5/16/2000
E*TRADE GROUP INC	535 000 000	N/A	5/19/2000
AMERICAN TOWER CORP	450 000 000	N/A	5/22/2000
TRANSOCEAN INC	865 000 000	5/19/2000	5/24/2000
BEA SYSTEMS INC	550 000 000	N/A	5/30/2000
SEMTECH CORP	397 338 000	N/A	5/31/2000
ETOYS INC	150 000 000	N/A	6/2/2000
AT HOME CORP	500 000 000	N/A	6/7/2000
PROTEIN DESIGN LABS INC	150 000 000	N/A	6/7/2000
NEXTEL COMMUNICATIONS	724 000 000	N/A	6/16/2000
BURR-BROWN CORP	125 000 000	N/A	6/23/2000
SEPRACOR INC	440 000 000	N/A	6/26/2000
CYPRESS SEMICONDUCTOR	185 900 000	6/21/2000	6/26/2000
LIBERTY MEDIA CORP	810 000 000	N/A	6/27/2000
AMKOR TECHNOLOGIES INC	258 750 000	N/A	6/29/2000
CV THERAPEUTICS	196 250 000	N/A	6/29/2000
ECHOSTAR COMMUNICATIONS	1 000 000 000	N/A	7/5/2000
AFFYMETRIX INC	220 000 000	N/A	7/11/2000
RATIONAL SOFTWARE CORP	500 000 000	N/A	7/21/2000
DUPONT PHOTOMASKS INC	100 000 000	7/19/2000	7/24/2000
QUANTA SERVICES INC	172 500 000	7/19/2000	7/25/2000
REDBACK NETWORKS	467 500 000	N/A	7/26/2000
IMCLONE SYSTEMS	240 000 000	N/A	7/31/2000
INVITROGEN CORPORATION	172 500 000	N/A	7/31/2000
CHECKFREE CORP	172 500 000	N/A	7/31/2000
PERKINELMER INC	542 027 250	8/2/2000	8/7/2000
COR THERAPEUTICS	300 000 000	N/A	8/18/2000
ALEXION PHARMACEUTICALS	120 000 000	N/A	8/23/2000
PROVIDIAN FINANCIAL CORP	345 300 000	8/17/2000	8/23/2000
NTL (DELAWARE) INC	1 200 000 000	N/A	8/30/2000
ANIXTER INTL INC	792 000 000	N/A	8/30/2000
NABORS INDUSTRIES LTD	825 000 000	N/A	9/8/2000
VITESSE SEMICONDUCTOR	195 100 000	N/A	9/8/2000
KOHLS CORPORATION	551 450 000	N/A	9/12/2000
WEATHERFORD INTL INC	909 727 000	N/A	9/13/2000
UNITED PARCEL SERVICE	300 000 000	9/21/2000	9/27/2000
GLOBALSANTAFE CORP	600 000 000	N/A	10/2/2000

Table I. Continued.

NMS COMMUNICATIONS CORP	125 000 000	10/5/2000	10/11/2000
DIAMOND OFFSHORE DRILL	805 000 000	N/A	10/12/2000
NVIDIA CORP	300 000 000	10/5/2000	10/12/2000
CIENA CORP	48 300 000	10/23/2000	10/27/2000
UNIVERSAL HEALTH SVCS	586 922 000	N/A	11/2/2000
JOHNSON & JOHNSON	1 088 000 000	N/A	11/2/2000
CORNING INC	2 712 546 000	11/2/2000	11/8/2000
IVAX CORP	250 000 000	N/A	11/8/2000
MERCURY INTERACTIVE CORP	339 800 000	N/A	11/17/2000
SOLECTRON CORP	2 727 000 000	11/14/2000	11/20/2000
AKAMAI TECHNOLOGIES INC	300 000 000	N/A	11/22/2000
INTL RECTIFIER CORP	550 000 000	N/A	11/24/2000
DEVON ENERGY CORPORATION	760 000 000	N/A	12/1/2000
AVON PRODUCTS INC	840 938 000	N/A	12/5/2000
TRANSWITCH CORP	114 050 000	N/A	12/7/2000
ALLERGAN INC	100 000 000	N/A	12/8/2000
SANMINA-SCI CORP	1 660 000 000	N/A	12/12/2000
ANALOG DEVICES INC	1 200 000 000	N/A	12/12/2000
RF MICRO DEVICES INC	300 000 000	N/A	12/14/2000
COMCAST CORP	107 666 000	12/14/2000	12/19/2000
PRIDE INTERNATIONAL INC	133 008 000	1/10/2001	1/16/2001
HEALTH MANAGEMENT ASSOC	488 750 000	N/A	1/17/2001
TERAYON COMMUN SYSTEMS	200 100 000	N/A	1/21/2001
ADELPHIA COMMUNICATIONS	862 500 000	1/18/2001	1/23/2001
INHALE THERAPTIC SYSTEMS	230 000 000	N/A	2/2/2001
AVIRON	200 000 000	2/1/2001	2/7/2001
CHARTER COMMUN INC	750 000 000	N/A	2/7/2001
CIENA CORP	690 000 000	2/5/2001	2/9/2001
GILEAD SCIENCES INC	250 000 000	N/A	2/9/2001
EXODUS COMMUNICATIONS	509 500 000	2/5/2001	2/9/2001
SPECTRASITE HOLDINGS INC	200 000 000	N/A	2/9/2001
PROVIDIAN FINANCIAL CORP	884 000 000	2/9/2001	2/15/2001
DDI CORPORATION	100 000 000	2/14/2001	2/20/2001
ARROW ELECTRONIC INC	1 523 750 000	2/15/2001	2/21/2001
OMNICOM GROUP INC	850 000 000	N/A	2/28/2001
FIRST DATA CORPORATION	542 000 000	2/22/2001	2/28/2001
XM SATELLITE RADIO HLDGS	125 000 000	3/1/2001	3/6/2001
DANAHER CORP	829 823 000	N/A	3/16/2001
HANOVER COMPRESSOR CO	192 000 000	3/15/2001	3/21/2001
PROVINCE HEALTHCARE	150 000 000	N/A	3/27/2001
LENNAR CORP	632 807 000	3/30/2001	4/4/2001
ADELPHIA COMMUNICATIONS	575 000 000	4/20/2001	4/25/2001
JABIL CIRCUIT INC	345 000 000	4/27/2001	5/2/2001
SPX CORPORATION	994 750 000	N/A	5/10/2001
D.R. HORTON INC	381 113 000	5/4/2001	5/11/2001
NABORS INDUSTRIES LTD	1 381 200 000	N/A	5/11/2001
TRANSOCEAN INC	400 000 000	5/8/2001	5/11/2001
COOPER CAMERON CORP	320 756 000	5/9/2001	5/16/2001
COOPER CAMERON CORP	200 000 000	5/9/2001	5/16/2001
MERRILL LYNCH & CO	2 350 968 000	5/18/2001	5/23/2001

Table I. Continued.

TJX COMPANIES INC	517 500 000	N/A	5/24/2001
AFFILIATED COMPUTER SVCS	316 990 000	N/A	5/29/2001
CHARTER COMMUNICATIONS	632 500 000	5/23/2001	5/30/2001
AMERISOURCE HEALTH CORP	300 000 000	N/A	6/1/2001
MARKEL CORP	288 110 000	5/30/2001	6/5/2001
ORION POWER HOLDINGS INC	125 000 000	5/31/2001	6/6/2001
EL PASO CORPORATION	1 766 500 000	N/A	6/8/2001
SERVICE CORP INTL	345 000 000	6/18/2001	6/22/2001
MEDAREX INC	175 000 000	6/21/2001	6/26/2001
MEDIACOM COMMUNICATIONS	172 500 000	6/22/2001	6/27/2001
ANADARKO PETROLEUM CORP	100 000 000	N/A	6/27/2001
INTERMUNE INC	149 500 000	6/28/2001	7/5/2001
ATMEL CORP	511 500 000	N/A	7/16/2001
COX COMMUNICATIONS INC	441 655 000	N/A	7/16/2001
BARNES & NOBLE INC	300 000 000	N/A	7/17/2001
ENRON CORP	1 907 698 000	N/A	7/18/2001
MASCO CORP	1 875 009 000	7/13/2001	7/20/2001
CENDANT CORP	658 763 000	N/A	7/25/2001
LIBERTY MEDIA CORP	600 000 000	N/A	7/30/2001
GLOBESPANVIRATA INC	130 000 000	N/A	8/10/2001
LAM RESEARCH CORP	300 000 000	N/A	8/10/2001
GENZYME CORP-GENL DIVISN	575 000 000	N/A	8/10/2001
LOWE'S COMPANIES INC	1 005 000 000	N/A	8/14/2001
COUNTRYWIDE CREDIT INDUS	675 000 000	N/A	8/16/2001
LIBERTY MEDIA CORP	817 729 000	N/A	8/22/2001
DIAMOND OFFSHORE DRILL	460 000 000	N/A	8/23/2001
HCC INSURANCE HOLDINGS	172 500 000	8/20/2001	8/23/2001
CENDANT CORP	1 000 000 000	N/A	8/27/2001
CHIRON CORP	730 000 000	N/A	9/10/2001
COR THERAPEUTICS	300 000 000	N/A	9/21/2001
E*TRADE GROUP INC	325 000 000	N/A	9/24/2001
BEST BUY	492 400 000	N/A	10/10/2001
ELECTRONIC DATA SYSTEMS	1 000 756 000	10/4/2001	10/10/2001
PERFORMANCE FOOD GR COMP	201 250 000	10/10/2001	10/16/2001
LOWE'S COMPANIES INC	580 700 000	10/16/2001	10/19/2001
AMERICAN GREETINGS	175 000 000	N/A	10/23/2001
AVAYA INC	859 206 000	10/25/2001	10/31/2001
REEBOK INTL LTD	250 000 000	N/A	10/31/2001
AMERICAN INTL GROUP	1 519 734 000	11/7/2001	11/9/2001
CORNING INC	665 000 000	11/8/2001	11/14/2001
QUEST DIAGNOSTIC INC	250 000 000	11/19/2001	11/26/2001

Table II. Mean Cumulative Abnormal Returns Surrounding Convertible Bonds Announcement Using a Market Model, From January 1993 to December 2001.

The event windows in days are presented in the first column. The Mean Cumulative Abnormal Returns (Ares) are computed following the methodology described previously. Precision weighted Caars take the relative weight of each firm into account. The benchmark used is the equally weighted index of CRSP. Proportions of positive and negative observations are also included. Under cross-sectional independence, the z-statistics follow the standard normal distribution under the null hypothesis (Patel, 1976). The generalized sign z-statistics are in the last column. The symbols $,*, **, and *** denote statistical significance at the 10%, 5%, 1% and 0.1% levels, respectively, using a 1-tail test.

Days	N	Mean Cumulative Abnormal Return	Precision Weighted CAAR	Positive: Negative	Z	Generalized Sign Z
(-5,0)	85	-5.24%	-3.93%	25:60	-4.789***	-3.266***
(-5,+1)	85	-5.61%	-4.13%	21:64	-4.658***	-4.135***
(-5,+2)	85	-5.79%	-4.40%	28:57	-4.636***	-2.614**
(-5,+5)	85	-6.00%	-4.53%	26:59	-4.073***	-3.049**
(-2,+2)	85	-4.41%	-3.31%	31:54	-4.415***	-1.962*
(-2,0)	85	-3.86%	-2.85%	23:62	-4.903***	-3.701***
(-1,0)	85	-3.07%	-2.27%	20:65	-4.780***	-4.353***
(-1,+1)	85	-3.44%	-2.47%	24:61	-4.245***	-3.484***
(0,+1)	85	-1.92%	-1.49%	28:57	-3.149***	-2.614**

Table III. Mean Cumulative Abnormal Returns Surrounding Convertible Bonds Announcement Using a Market Model, From January 1993 to December 2001.

The event windows in days are presented in the first column. The Mean Cumulative Abnormal Returns (Ares) are computed following the methodology described previously. Precision weighted Caars take the relative weight of each firm into account. The benchmark used is the value weighted index of CRSP. Proportions of positive and negative observations are also included. Under cross-sectional independence, the z-statistics follow the standard normal distribution under the null hypothesis (Patel, 1976). The generalized sign z-statistics are in the last column. The symbols $,*, **, and *** denote statistical significance at the 10%, 5%, 1% and 0.1% levels, respectively, using a 1-tail test.

Days	N	Mean Cumulative Abnormal Return	Precision Weighted CAAR	Positive: Negative	Z	Generalized Sign Z
(-5,0)	85	-5.12%	-3.63%	23:62	-4.499***	-3.643***
(-5,+1)	85	-5.46%	-3.82%	21:64	-4.390***	-4.078***
(-5,+2)	85	-5.73%	-4.15%	23:62	-4.453***	-3.643***
(-5,+5)	85	-6.01%	-4.31%	24:61	-3.944***	-3.426***
(-2,+2)	85	-4.48%	-3.26%	25:60	-4.431***	-3.208***
(-2,0)	85	-3.87%	-2.74%	27:58	-4.811***	-2.773**
(-1,0)	85	-2.97%	-2.13%	20:65	-4.571***	-4.295***
(-1,+1)	85	-3.30%	-2.32%	24:61	-4.076***	-3.426***
(0,+1)	85	-1.95%	-1.47%	27:58	-3.148***	-2.773**

Table IV. Mean Cumulative Abnormal Returns Surrounding Convertible Bonds Issue Using a Market Model, From January 1993 to December 2001.

The event windows in days are presented in the first column. The Mean Cumulative Abnormal Returns (Ares) are computed following the methodology described previously. Precision weighted Caars take the relative weight of each firm into account. The benchmark used is the equally weighted index of CRSP. Proportions of positive and negative observations are also included. Under cross-sectional independence, the z-statistics follow the standard normal distribution under the null hypothesis (Patel, 1976). The generalized sign z-statistics are in the last column. The symbols $,*, **, and *** denote statistical significance at the 10%, 5%, 1% and 0.1% levels, respectively, using a 1-tail test.

Days	N	Mean Cumulative Abnormal Return	Precision Weighted CAAR	Positive: Negative	Z	Generalized Sign Z
(-5,0)	214	-3.85%	-2.89%	84:130	-5.109***	-2.300*
(-5,+1)	214	-4.26%	-3.32%	85:129	-5.442***	-2.163*
(-5,+2)	214	-4.63%	-3.67%	83:131	-5.627***	-2.437**
(-5,+5)	214	-5.17%	-3.76%	81:133	-4.917***	-2.711**
(-2,+2)	214	-2.19%	-1.95%	85:129	-3.788***	-2.163*
(-2,0)	214	-1.42%	-1.17%	91:123	-2.926**	-1.341$
(-1,0)	214	-0.53%	-0.14%	94:120	-0.431	-0.931
(-1,+1)	214	-0.94%	-0.58%	99:115	-1.441$	-0.246
(0,+1)	214	-0.45%	-0.30%	102:112	-0.907	0.165

Table V. Mean Cumulative Abnormal Returns Surrounding Convertible Bonds Issue Using a Market Model, From January 1993 to December 2001.

The event windows in days are presented in the first column. The Mean Cumulative Abnormal Returns (Ares) are computed following the methodology described previously. Precision weighted Caars take the relative weight of each firm into account. The benchmark used is the valued weighted index of CRSP. Proportions of positive and negative observations are also included. Under cross-sectional independence, the z-statistics follow the standard normal distribution under the null hypothesis (Patel, 1976). The generalized sign z-statistics are in the last column. The symbols $,*,**, and *** denote statistical significance at the 10%, 5%, 1% and 0.1% levels, respectively, using a 1-tail test.

Days	N	Mean Cumulative Abnormal Return	Precision Weighted CAAR	Positive: Negative	Z	Generalized Sign Z
(-5,0)	214	-4.16%	-3.04%	78:136	-5.471***	-3.143***
(-5,+1)	214	-4.37%	-3.37%	75:139	-5.610***	-3.554***
(-5,+2)	214	-4.53%	-3.60%	77:137	-5.602***	-3.280***
(-5,+5)	214	-4.77%	-3.51%	78:136	-4.669***	-3.143***
(-2,+2)	214	-1.73%	-1.68%	90:124	-3.313***	-1.500$
(-2,0)	214	-1.36%	-1.13%	92:122	-2.866**	-1.226
(-1,0)	214	-0.57%	-0.18%	101:113	-0.565	0.006
(-1,+1)	214	-0.79%	-0.51%	97:117	-1.295$	-0.542
(0,+1)	214	-0.36%	-0.25%	99:115	-0.791	-0.268

Table VI. Panel A. Calendar-Time Test Adapted for Long-Horizon Event Study on Convertible Bonds Issue From January 1993 to December 2001.

The results are presented on a monthly basis in the first column, where 0 represent the month of the issue of the convertible bonds. The Mean Cumulative Abnormal Returns (Ares) are computed following the methodology described previously from calendar-time tests by Jaffe (1974) and Mandelker (1974) studies. The benchmark used is the equally weighted index of CRSP. The symbols $,*, **, and *** denote statistical significance at the 10%, 5%, 1% and 0.1% levels, respectively, using a 1-tail test.

Month	N	Mean Abnormal Return	Positive: Negative	Z	Calendar Time t	Generalized Sign Z
-1	216	-1.59%	100:116	-0.969	-0.918	-2.628**
0	216	-2.30%	91:125	-1.382$	-2.050*	-3.859***
+1	216	0.08%	114:102	0.771	0.767	-0.712
+2	204	-2.43%	92:112	-0.980	-1.723$	-2.898**
+3	193	-0.68%	89:104	-0.364	-0.268	-2.535**
+4	191	1.02%	94:97	0.215	0.455	-1.660*
+5	179	-3.73%	71:108	-1.638$	-1.838$	-4.176***
+6	177	-3.83%	75:102	-2.085*	-1.170	-3.428***
+7	167	-4.71%	66:101	-2.519**	-1.678	-4.071***
+8	163	-4.78%	72:91	-2.053*	-2.659*	-2.828**
+9	156	-4.53%	59:97	-1.970*	-2.106*	-4.362***
+10	152	-4.03%	60:92	-1.721*	-0.635	-3.896***
+11	144	-3.16%	59:85	-1.265	-1.536	-3.430***
+12	139	-4.62%	46:93	-2.622**	-1.181	-5.238***
+13	124	-2.54%	54:70	-0.780	-1.048	-2.606**
+14	119	-4.03%	50:69	-1.894*	-1.779$	-2.889**
+15	112	-3.78%	44:68	-1.893*	-1.654	-3.384***
+16	107	-3.49%	38:69	-1.551$	-0.904	-4.092***
+17	98	-2.89%	40:58	-1.049	-1.276	-2.861**
+18	92	-4.92%	27:65	-3.283***	-2.259*	-4.984***
+19	86	2.12%	44:42	1.218	0.973	-0.751
+20	81	-3.10%	34:47	-1.889*	-1.056	-2.391**
+21	75	-3.86%	33:42	-2.121*	-0.946	-1.948*
+22	70	-1.63%	30:40	-1.538$	0.332	-2.074*
+23	66	-0.32%	32:34	-0.496	-0.581	-1.095
+24	62	-0.77%	30:32	0.283	0.566	-1.077
+25	60	-1.82%	27:33	-1.223	-0.871	-1.587$
+26	56	-4.62%	21:35	-2.298*	-1.723$	-2.662**
+27	54	-3.80%	24:30	-2.670**	-0.720	-1.588$
+28	48	1.28%	25:23	0.088	-0.095	-0.432
+29	44	-5.11%	19:25	-3.542***	-1.293	-1.601$
+30	40	4.68%	22:18	2.432**	1.761$	-0.024
+31	39	5.51%	20:19	2.931**	1.542	-0.490
+32	38	-0.35%	18:20	0.144	-0.066	-0.969
+33	38	-3.70%	12:26	-2.564**	-0.274	-2.926**
+34	38	-0.52%	18:20	-0.602	-0.007	-0.969
+35	37	3.48%	17:20	1.874*	0.962	-1.130
+36	37	3.53%	21:16	1.054	0.631	0.192

Panel B. Cumulative Abnormal Returns

The event windows in months are presented in the first column. The Mean Cumulative Abnormal Returns (Ares) are computed following the methodology described previously. Precision weighted Cars take the relative weight of each firm into account. Both methods are from calendar-time tests from Jaffe and Mandelker studies as stated before. The benchmark used is the equally weighted index of CRSP. Proportions of positive and negative observations are also included. Under cross-sectional independence, the z-statistics follow the standard normal distribution under the null hypothesis (Patel, 1976). Calendar time t-test statistic is also included in the Table. The generalized sign z-statistics are in the last column. The symbols $,*, **, and *** denote statistical significance at the 10%, 5%, 1% and 0.1% levels, respectively, using a 1-tail test.

Months	N	Mean Cumulative Abnormal Return	Precision Weighted CAAR	Positive: Negative	Z	Calendar Time t	Generalized Sign Z
(-1,0)	216	-3.89%	-3.12%	89:127	-1.662*	-2.044*	-4.133***
(-1,+1)	216	-3.82%	-2.09%	92:124	-0.912	-1.282	-3.722***
(0,+1)	216	-2.23%	-0.80%	98:118	-0.433	-0.959	-2.901**
(0,+6)	216	-10.46%	-7.70%	79:137	-1.965*	-2.420*	-5.501***
(0,+12)	216	-28.89%	-25.43%	65:151	-4.509***	-4.826***	-7.416***
(0,+24)	216	-42.18%	-46.74%	44:172	-6.039***	-6.810***	-10.290***
(0,+36)	216	-43.33%	-52.54%	48:168	-6.297***	-7.404***	-9.742***
(-1,+6)	216	-12.04%	-8.99%	76:140	-2.186*	-2.336*	-5.911***
(-1,+12)	216	-30.48%	-26.72%	61:155	-4.583***	-4.625***	-7.964***
(-1,+24)	216	-43.76%	-48.04%	39:177	-6.064***	-7.045***	-10.974***
(-1,+36)	216	-44.92%	-53.83%	38:178	-6.317***	-7.547***	-11.111***

Table VII. Panel A. Calendar-Time Test Adapted for Long-Horizon Event Study on Convertible Bonds Issue From January 1993 to December 2001.

The results are presented on a monthly basis in the first column, where 0 represent the month of the issue of the convertible bonds. The Mean Cumulative Abnormal Returns (Ares) are computed following the methodology described previously from calendar-time tests by Lyon, Barber and Tsai (1999) study. The benchmark used is the equally weighted index of CRSP. The symbols $,*, **, and *** denote statistical significance at the 10%, 5%, 1% and 0.1% levels, respectively, using a 1-tail test.

Month	N	Mean Abnormal Return	Positive: Negative	Calendar Time t	Generalized Sign Z
-1	216	-1.59%	100:116	3.404**	-2.628**
0	216	-2.30%	91:125	2.902**	-3.859***
+1	216	0.08%	114:102	2.751**	-0.712
+2	204	-2.43%	92:112	1.504	-2.898**
+3	193	-0.68%	89:104	2.292*	-2.535**
+4	191	1.02%	94:97	2.886**	-1.660*
+5	179	-3.73%	71:108	2.828**	-4.176***
+6	177	-3.83%	75:102	0.668	-3.428***
+7	167	-4.71%	66:101	2.107*	-4.071***
+8	163	-4.78%	72:91	1.463	-2.828**
+9	156	-4.53%	59:97	1.275	-4.362***
+10	152	-4.03%	60:92	1.561	-3.896***
+11	144	-3.16%	59:85	-1.203	-3.430***
+12	139	-4.62%	46:93	-1.917$	-5.238***
+13	124	-2.54%	54:70	0.121	-2.606**
+14	119	-4.03%	50:69	-1.837$	-2.889**
+15	112	-3.78%	44:68	-0.131	-3.384***
+16	107	-3.49%	38:69	0.787	-4.092***
+17	98	-2.89%	40:58	-2.103*	-2.861**
+18	92	-4.92%	27:65	-0.989	-4.984***
+19	86	2.12%	44:42	-1.658	-0.751
+20	81	-3.10%	34:47	-2.740**	-2.391**
+21	75	-3.86%	33:42	-2.338*	-1.948*
+22	70	-1.63%	30:40	-0.447	-2.074*
+23	66	-0.32%	32:34	-1.619	-1.095
+24	62	-0.77%	30:32	-1.921$	-1.077
+25	60	-1.82%	27:33	-0.963	-1.587$
+26	56	-4.62%	21:35	-2.262*	-2.662**
+27	54	-3.80%	24:30	-0.893	-1.588$
+28	48	1.28%	25:23	-0.748	-0.432
+29	44	-5.11%	19:25	-0.833	-1.601$
+30	40	4.68%	22:18	-2.172*	-0.024
+31	39	5.51%	20:19	0.197	-0.490
+32	38	-0.35%	18:20	-1.273	-0.969
+33	38	-3.70%	12:26	-1.001	-2.926**
+34	38	-0.52%	18:20	0.715	-0.969
+35	37	3.48%	17:20	-0.436	-1.130
+36	37	3.53%	21:16	-0.061	0.192

Panel B. Compound Abnormal Returns

The event windows are presented in the first column. The Mean Compound Abnormal Returns (Ares) are computed following the methodology described previously. This method is from calendar-time tests from Lyon, Barber and Tsai study as stated before. The benchmark used is the equally weighted index of CRSP. Proportions of positive and negative observations are also included. Calendar time t-test statistic is also included in the Table. Under cross-sectional independence, the generalized z-statistics follow the standard normal distribution under the null hypothesis (Patel, 1976) and is presented in the last column. The symbols $,*, **, and *** denote statistical significance at the 10%, 5%, 1% and 0.1% levels, respectively, using a 1-tail test.

Months	N	Mean Compound Abnormal Return	Positive: Negative	Calendar Time t	Generalized Sign Z
(-1,0)	216	-4.10%	86:130	-0.956	-4.543***
(-1,+1)	216	-5.25%	86:130	-1.877$	-4.543***
(0,+1)	216	-2.63%	96:120	-0.879	-3.175***
(0,+6)	216	-13.58%	61:155	-0.342	-7.964***
(0,+12)	216	-40.09%	44:172	-1.087	-10.290***
(0,+24)	216	-90.54%	27:189	-1.878$	-12.616***
(0,+36)	216	-175.88%	22:194	1.878$	-13.300***
(-1,+6)	216	-15.00%	61:155	1.193	-7.964***
(-1,+12)	216	-43.16%	36:180	-0.278	-11.384***
(-1,+24)	216	-97.39%	27:189	-0.559	-12.616***
(-1,+36)	216	-186.26%	22:194	-0.197	-13.300***

Table VIII. Panel A. Cross-Sectional Tests of the Abnormal Returns on Announcement Dates and Issue Dates of Convertible Bonds

The cross-sectional tests were made on windows (-1, 0) and (–2, +2). The Table presents the coefficient of each variables and its level of significance. *, ** and *** indicates significance at the 10%, 5% and 1% levels, respectively. The dummy variable HOT takes the value of 1 during the period of 2000-2001.

Independent Variables	**Abnormal Returns**			
	Announcement Dates		Issue Dates	
	(-1, 0)	(-2, +2)	(-1, 0)	(-2, +2)
Intercept	0.2411 *	0.0846	-0.0021	0.0494
Log (Total Market Value)	0.0211 *	0.0391 **	0.0131 *	0.0110
Hot	-0.0132	-0.0333 *	-0.0241 ***	-0,0164
Price to Book Ratio	-0.0013 **	-0.0009	-0.0001	-0.0001
Log (Outstanding Amount of Issues)	-0.0397 **	-0.0306	-0.0046	-0.0115
R-Square	0.1064	0.0979	0.0381	0.0078

Panel B. Descriptive Table of the Abnormal Returns

The Table gives other descriptive statistics on the abnormal returns of the announcement and issue event studies. The mean abnormal returns, the standard deviation and the median are presented in the window (-1,0) for the announcement study and in the window (-2, +2) for the issue study.

Years	Announcement Dates (-1, 0)				Issue Dates (-2, +2)			
	Mean AR	Median	Standard Dev.	Sample Size	Mean AR	Median	Standard Dev.	Sample Size
1993-1996	-0,0178	-0,0193	0,0226	7	-0,0615	-0,0150	0,1949	10
1997	0,0088	0,0251	0,0370	5	0,0032	-0,0097	0,1078	15
1998	-0,0141	-0,0040	0,0215	6	-0,0044	0,0068	0,0767	17
1999	-0,0606	-0,0527	0,1003	8	0,0090	-0,0048	0,0832	27
2000	-0,0178	-0,0243	0,0688	23	-0,0232	-0,0374	0,1103	75
2001	-0,0410	-0,0322	0,0630	35	-0,0216	-0,0137	0,0717	65

Table IX. Returns of a Convertible Bond Arbitrage Strategy Using a Short-Sale of 1000 $ in Each Stock and a Long Position of 1000 $ in Each Convertible Bond on Issue Dates

Returns are gathered from 1month up to 36 months after the issue dates. The details of the computation are described above. I include the total gains in dollars at each month, the monthly standard deviation, the monthly t-test of the returns, the positive and negative firms' position and the number of observations available for each month. Transactions costs of 1.5% are included in the returns. The symbols *,**, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, using a two-tails test.

Months	Gain in Dollar	t - Test	Positive	Negative	N Total
1	-5 599	-0,975	124	105	229
2	-1 301	0,776	118	99	217
3	3 971 **	2,371	123	83	206
4	3 000	1,425	123	79	202
5	5 215 *	1,724	122	68	190
6	8 942	2,035	130	58	188
7	7 412	1,202	125	52	177
8	11 645 *	1,738	126	47	173
9	22 989 ***	4,104	119	47	166
10	25 742 ***	4,452	121	41	162
11	27 701 ***	4,286	110	43	153
12	29 131 ***	4,503	108	40	148
13	29 972 ***	5,344	96	36	132
14	26 595 ***	4,003	91	35	126
15	27 559 ***	3,396	86	33	119
16	31 316 ***	3,201	85	27	112
17	24 828 *	1,918	80	25	105
18	24 710 *	1,746	73	22	95
19	23 053	1,497	74	18	92
20	20 351	1,253	66	18	84
21	14 692	0,642	64	17	81
22	11 751	0,530	57	17	74
23	492	0,042	52	17	69
24	450	0,042	50	16	66
25	7 141	0,293	44	18	62
26	16 214	0,702	42	18	60
27	23 308	1,150	43	16	59
28	29 405 *	1,750	39	16	55
29	36 575 **	2,114	34	15	49
30	30 787	1,520	30	14	44
31	28 588	1,459	29	15	44
32	31 201	1,593	30	13	43
33	41 483 **	2,275	29	14	43
34	51 619 ***	3,293	28	14	42
35	54 411 ***	3,355	31	11	42
36	55 181 ***	3,097	33	9	42

Table X. Returns of Arbitrage Strategy Using a Short-Sale of 1000 $ in Each Stock and a Long Position of 1000 $ in Each Convertible Bond Presented on a Yearly Basis

Returns are for buy-and-hold positions for years 1998 through 2001. The returns from bonds issue prior to year under study are calculated from taking positions on the 1st January of the year and returns from issues during the same year are also computed in the year returns as well. All the details of the computation are described above. I include the total gains in dollars at each year, the yearly standard deviation, the yearly t-test of the returns and the number of observations available for each month. The symbols *,**, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, using a two-tails test.

	Profit in Dollars	t - test	N
1998	7 827	0,969	41
1999	3 834	0,292	65
2000	20 324 **	2,053	134
2001	36 249 ***	3,275	229

Table XI. Returns of a Passive Strategy of Investing only 1000 $ in the S&P 500, 3 Months and 30 Years T-Bills

Returns are for buy-and-hold positions from month 1 throw 36 from the issue dates. An investments of 1000 $ is taken in the specific assets at each issue dates of a convertible bond. All the details of the computation are described above. I include the total gains in dollars at each year for the strategy and also for passive strategies using S&P 500, 3 months T-Bills and 3- years T-Bills. The symbols *,**, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, using a two-tails test.

Months	Gain in $	Passvie SP500 in $	Passvie 3 M T-Bills in $	Passive 30 Y T-Bills in $
1	-5 599	-1 793	872	1 096
2	-1 301	-926	1 767	2 195
3	3 971 **	-2 869	2 696	3 303
4	3 000	-2 071	3 611	4 416
5	5 215 *	-2 575	4 612	5 543
6	8 942	-3 084	5 484	6 660
7	7 412	-3 075	6 476	7 797
8	11 645 *	-3 792	7 453	8 930
9	22 989 ***	-3 188	8 390	10 070
10	25 742 ***	-3 328	9 359	11 217
11	27 701 ***	-2 869	10 282	12 370
12	29 131 ***	-1 999	11 254	13 535
13	29 972 ***	47	12 483	14 758
14	26 595 ***	555	13 422	15 938
15	27 559 ***	4 497	14 406	17 140
16	31 316 ***	6 503	15 424	18 358
17	24 828 *	11 616	16 468	19 607
18	24 710 *	17 305	17 561	20 881
19	23 053	22 028	18 589	22 136
20	20 351	24 295	19 493	23 364
21	14 692	31 993	20 590	24 682
22	11 751	38 015	21 563	25 958
23	492	45 380	22 572	27 242
24	450	48 020	23 660	28 573
25	7 141	49 926	24 674	29 839
26	16 214	55 530	25 744	31 135
27	23 308	58 750	26 766	32 405
28	29 405 *	64 908	27 798	33 693
29	36 575	70 387	28 966	35 008
30	30 787	72 859	30 152	36 325
31	28 588	84 442	31 379	37 654
32	31 201	84 796	32 472	38 956
33	41 483 **	81 616	33 495	40 240
34	51 619 ***	78 725	34 496	41 526
35	54 411 ***	77 817	35 534	42 829
36	55 181 ***	75 557	36 480	44 118

Table XII. Returns of a Convertible Bond Arbitrage Strategy Using a Short-Sale of 1000 $ in Each Stock and a Long Position of 1000 $ in Each Convertible Bond on Issue Dates

Returns are for buy-and-hold positions of 1month up to 36 months after the issue dates. Positions are all closed when they it the 31 December 2001. The details of the computation are described above. I include the total gains in dollars at each month, the monthly variation in dollars, the monthly standard deviation, and the monthly t-test of the returns, the positive and negative firms' position and the number of open positions for each month. The symbols *,**, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively, using a two-tails test.

Months	Total Profit in $	Monthly Profit in $	*t*-test	Positive:Negative	Positions Alive
1	-5 599	-5 599	-0,975	124:105	229
2	-1 909	3 690	0,637	121:108	216
3	1 587 *	3 496	1,814	129:100	205
4	-414	-2 002	0,782	130:99	202
5	860	1 275	1,064	135:94	190
6	4 060	3 200	1,534	145:84	188
7	3 406	-654	1,035	148:81	177
8	7 194	3 788	1,673	153:76	172
9	14 717 ***	7 523	3,778	149:80	166
10	16 224 ***	1 507	4,008	153:76	162
11	17 734 ***	1 511	4,126	149:80	153
12	19 872 ***	2 138	4,609	152:77	152
13	23 852 ***	3 980	5,967	155:74	133
14	22 336 ***	-1 515	5,184	154:75	127
15	23 539 ***	1 203	4,926	155:74	119
16	24 952 ***	1 412	4,760	159:70	112
17	23 314 ***	-1 638	3,765	160:69	105
18	24 885 ***	1 572	4,012	162:67	95
19	25 258 ***	373	3,881	166:63	92
20	26 077 ***	819	4,077	166:63	84
21	24 336 ***	-1 741	2,940	166:63	81
22	25 017 ***	681	3,280	165:64	75
23	22 330 **	-2 687	2,238	164:65	70
24	23 329 ***	999	2,534	165:64	68
25	26 284 ***	2 955	3,549	162:67	63
26	29 384 ***	2 562	4,351	162:67	60
27	30 681 ***	1 835	5,171	164:65	59
28	32 172 ***	1 491	6,337	163:66	55
29	33 996 ***	1 824	6,949	162:67	49
30	34 148 ***	152	6,701	163:66	44
31	33 725 ***	-423	6,725	162:67	44
32	34 512 ***	787	6,948	164:65	43
33	36 443 ***	1 931	7,559	163:66	43
34	37 472 ***	1 029	8,172	162:67	42
35	37 984 ***	512	8,172	165:64	42
36	38 126 ***	141	7,919	167:62	42

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